A STRATEGIC AND FINANCIAL ANALYSIS OF A START-UP MANUFACTURING FIRM IN A MATURE INDUSTRY

by

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ABSTRACT

The deep foundation industry is a mature and highly competitive one exhibiting slow growth that is highly correlated with the Gross Domestic Product. The North American industry is very large, constituting approximately half of the global industry.

At present there are a variety of technologies employed in pile-driving hammers and the usage of each is determined by the foundation application and soil conditions. This presents a problem for contractors who must own or rent a variety of hammers in order to bid on a large number of contracts. In addition, due to the excessive forces employed in placing piles in the ground, the existing technology suffers from reliability issues, which can lead to a loss of productivity when a hammer is out of commission.

The Company examined is a Vancouver-based start-up venture with revolutionary technology that will completely reshape the pile-driving industry as we know it today. The technology uses the principle of high frequency resonance to lodge a pile into the ground with greater efficiency and better reliability than the existing equipment. This leads to significant cost savings for the contractor in the form of reduced driving times and therefore lower crew costs, and fewer breakdowns in the field. In an industry where contracts are tendered based on slim margins, any advantage will generate a significant amount of enthusiasm from deep foundation contractors.

The analysis presented in this project seeks to explore the strategic and financial aspects of bringing this revolutionary product to market in an industry dominated by two large and well-established hammer manufacturers.

DEDICATION

To my darling wife Brenda and daughter Léa who stood by me as I spread my wings and both patiently endured my extended absences from the family.

Thank you both from the bottom of my heart.

I would also like to dedicate this project to my father, who is unable to witness my completing the program. Thank you for always being there. You were right; "VERKADE" is the key to success.

May you rest in peace.

† M.P.H. van Engelen 1925 - 2003

ACKNOWLEDGMENTS

I am greatly indebted to Matthew Janes for involving me in his dream, allowing me to participate so fully, and for being a support throughout this program. It is a privilege to work with you.

I would like to acknowledge the members of my study group, Carol, Matthew, John and Anthony, for the many laughs shared. You truly made this experience memorable.

Gratitude must also be expressed to my NEMBA classmates. I must have learned as much from you as I did from the material taught. I wish you all continued success.

In addition, I would like to thank Dr. George Blazenko for his help and support throughout the project. The experience has been invaluable.

Finally, I must express my appreciation to *Printers Plus Inc.*, and in particular Mr. Ron Wood, who graciously offered to print this project.

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1 INTRODUCTION

Resonance Technology International Inc. is a Vancouver-based company, incorporated in 2003, that owns proprietary technology for application in the deep foundation industry. More specifically, the technology is based on the principle of resonance and permits the driving of foundation piles with greater efficiency and in a broader range of soil types, leading to significant cost savings for the contractor. Considering that the contractor operates in a highly competitive, low-margin industry, the introduction of this technology will likely be accepted with great enthusiasm.

This project seeks to explore a business structure incorporating two companies: a manufacturing entity that assembles the pile-driving hammers and a partnership that rents the hammers to contractors. The project will examine the strategic and financial aspects of entering a mature industry with the proposed business model.

In the second chapter I will present an overview of the company and the product, including a description of the business opportunity, the organisational structure, a description of pile-driving hammers in general and the reasons why the new technology is so compelling.

In Chapter three I conduct a detailed analysis of the industry in which the companies will operate. This includes a description of industry competitive dynamics.

In Chapter four the analysis becomes more specific with an internal investigation of the businesses including the value chain for the two companies and an examination of the product development strategy, the distribution strategy, and the marketing strategy.

Chapter five examines the financial side of the companies by presenting the projected financial statements, discussing the assumptions made and conducting a thorough ratio analysis.

Chapter six turns to the question of what the companies are worth, using a series of discounted cash flow calculations. Finally, chapter seven answers the questions of how much capital outside investors must inject into the individual companies and how much equity the companies must relinquish in return.

I hope that this project will be as interesting and informative to read, as it has been to write.

2 OVERVIEW OF THE COMPANY & THE PRODUCT

2.1 Description of the Business

Resonance Technology International Inc. (RTI) is a start-up company that was incorporated in Canada in 2003. The company possesses patented technology through a licensing agreement that will, initially be applied to the deep foundation industry in the form of a completely revolutionary pile-driving hammer. The technology uses high frequency, resonant vibratory technology and is considered revolutionary due to the efficiency gain and speed with which it drives foundation piles into the ground. This technology is unique to the market place. In an industry where contracts are tendered based on slim margins, any advantage will generate a significant amount of enthusiasm from deep foundation contractors.

As the company grows and resources permit, the research and development division of the business will create applications to address the needs of other industries. Of particular interest are the soil densification industry, the geo-technical drilling industry, the mining industry and ultimately, the oil & gas industry.

At present, there are a variety of technologies employed in pile-driving hammers and the usage of each is determined by the foundation application and soil conditions. Drop hammers work best in clay, marl, or compact sand, whereas other hammers are designed to penetrate gravel and require a combination of vibration and hammering to lodge the pile. The hammer designed by RTI uses sonic vibratory techniques to force the pile to sink deeper, faster and in a variety of different soil conditions. In effect, using the principle of resonance, this hammer achieves *three* times the efficiency of competing hammers and thereby helps the contractor to achieve 30% - 40% production cost savings per job! The technology provides a compelling value proposition for all pile-driving contractors. It is appropriately named: *The Revolution.*

The deep foundation industry is mature, exhibiting slow growth that is highly correlated with the Gross Domestic Product. The industry in North America is very large and approximately one third larger if Europe and Japan are also considered. The potential for RTI to capitalise on sizable returns is very real.

The technology was patented on April 5, 1994 and covers Canada, the United States, Europe, Australia and South East Asia. This technology is presently being applied to minesweeping as it allows an acoustic signature to be created that imitates a ship. The technology is therefore beyond the concept stage. The earliest patent expires in 2012 although RTI fully intends to consistently enhance the patent through continual research and development and thereby extend its useful life.

The company is in the process of constructing a 350Hp prototype hammer and is targeting August 2004 as the completion date. Once built, the unit will be subjected to rigorous testing to ensure that the engineering wrinkles are ironed out and that the computer algorithm that controls the operation of the unit is accurate. When the alpha testing is complete, the unit will be beta tested in the field under a variety of conditions in order to help perfect the unit prior to its release into the market place. When complete, the prototype will be unveiled for the deep foundation community through a series of comparative tests in order to demonstrate the effectiveness of the hammer.

The deep foundation industry experiences a continuous process of modernisation. Contractors expend significant sums on equipment in order to ensure that they remain competitive. The market is accustomed to adopting new technology to increase efficiency and production and thereby generate cost savings. The decision to acquire equipment is driven more by productivity gains and reliability than by price, although contractors are also sensitive to cost. The *Revolution* hammer will, through its simplicity of design, lead to greater dependability than existing technology, which requires numerous parts. The hammer will therefore result in lower field maintenance. Lower operating costs and higher production capabilities form a compelling value proposition for the client and will drive RTI to significant profitability.

In terms of the structure of RTI, there will be a manufacturing entity, wholly owned by RTI, and a joint venture between RTI and a well-known and well-established partner, *American Pile Driving Equipment Ltd.* (APE) of Seattle. The partnership is proposed to be structured on a 50/50 basis and will concentrate on renting and servicing the Revolution hammer through APE's established distribution network. The manufacturing enterprise will contract out the machining of parts to a small number of machine shops in Vancouver and then assemble the units in house. The hammers will be sold at a discounted price to the joint venture. This business model attempts to maintain as much control over the units as possible and thereby prevent competitors from reverse engineering and attempting to duplicate the hammer. The model is also designed to create an annuity for the joint venture in the form of an income stream from hammer rentals.

2.2 Origin of the Business Opportunity

The concept of a sonic hammer is not new. In the early 1960's, Bodine Industries[1], with the help of a physics graduate from the University of California at Berkeley named Dr. David Bies, were working on sonic drills and vibratory pile-driving hammers. These large vibrators had a capacity of up to 1,000 Hp but suffered from poor reliability. Dr. Bies recognised that these sonic hammers were fundamentally flawed in two ways. First the hammers could not control the force that they produced at any given frequency. Secondly, the technology did not permit the system to be tuned to the natural frequency of the unit being driven.

Dr. Bies left Bodine Industries and became an accomplished Professor of Acoustics at the University of Adelaide in Australia. He always maintained that there was a solution to the flaws in the Bodine technology that he had identified. In the early 1990's, he and a graduate student by the name of Stewart Page developed a new motor that could be controlled independent of the frequency and was frequency tuneable. The problem was that they were acoustics engineers and not geotechnical engineers.

At the same time, a manufacturer of foundation construction equipment, Berminghammer Foundation Equipment Corp., was looking for a better way to vibrate piles into the ground. Matthew Janes, the chief engineer at the company and the President of Resonance Technology International Inc., had been searching for a superior technology for some time, but to no avail. As luck would have it, while he was in Australia selling technology for Bermingham Foundation Equipment Corp., Dr. Bies and Stewart Page contacted him via e-mail. Mr. Janes visited the Australians in Adelaide and immediately saw the potential for the deep foundation industry. Mr. Janes brought the concept to his employer but, due to a problem with R&D capacity and reduced funding for new projects, the company abandoned the initiative. Mr. Janes, recognising the implications of the technology, left the company shortly after to pursue the development of resonant vibratory technology independently[2].

[1] Discussed later under the section entitled "The Sonic or Resonant Hammer".
[2] From a discussion with Matthew Janes, 2004.

2.3 Company Structure

2.3.1 Ownership Structure

The ownership structure of the manufacturing enterprise and the joint venture entity is illustrated in Figure 1.

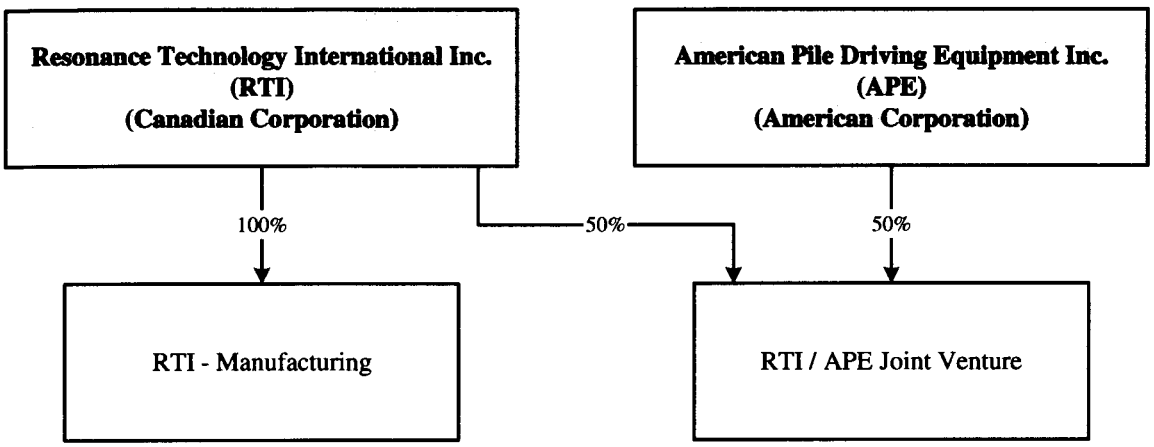

Figure 1: Joint Venture / RTI Ownership Structure

RTI will own the manufacturing company outright and will be equal partners with APE in the joint venture. The partnership agreement will specify that APE, which is a well-capitalised company, will fund the acquisition of the hammers. RTI will sell the hammers at a discounted price and provide the joint venture, and by extension APE, with exclusive use of the disruptive technology for the North American continent. Both RTI and APE will share in the profits on an equal basis. This structure will provide a win-win scenario for both parties.

2.3.2 Organisational Structure

The organisational structure of RTI is shown in Figure 2. Matthew Janes is the President and Stewart Page the Vice-President of Product Development. They are co-owners of RTI. Stewart is an Australian Engineer who co-invented the technology and is a co-owner of the patent. They have a bi-directional consulting relationship. In addition, a Board of Advisors, consisting of experts in their respective fields, supports RTI. The advisors are more akin to consultants and will add value to the enterprise by drawing on their numerous experiences in both

the engineering and business world. They will each be compensated with a small number of shares of RTI and be given the opportunity to participate further through share acquisition, should they choose to.

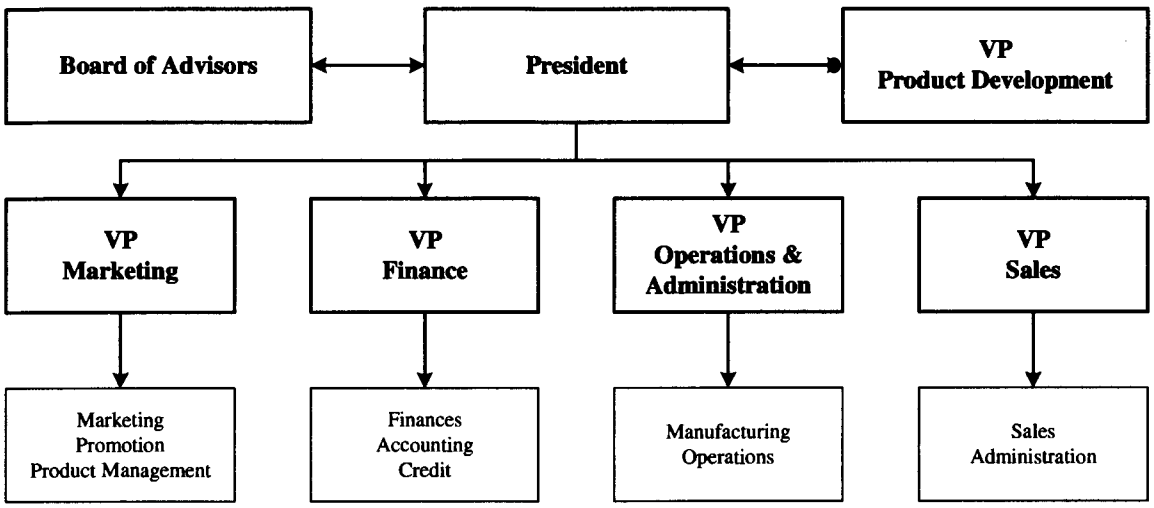

Figure 2: RTI's Organisational Structure

There will be four Vice-Presidents reporting directly to the President and each will be responsible for a team of professionals in their particular area of specialisation. The Marketing division will be in charge of all of the marketing, promotion and general product management. The Finance division will be entrusted with all of the accounting, the financial affairs and the credit related issues inherent in this organisation. The Sales department will concentrate on the sales process and the Operations & Administration division will oversee manufacturing and general operations related issues. This includes human resource management. Each officer of RTI will be selected for the specialities in their respective functional areas, for their diverse personalities and for their level of motivation. The objective is that the combined synchronicity ensures a dynamic and motivated leadership team. Each member will be encouraged to be creative in his or her search for new ideas and self-governing in the application of their duties. The expectation is that they are continuously accountable and loyal to RTI and its partner. The team will maintain a high level of focus and breathe the core values of the company in order to make it a company of excellence, despite changing markets and organisational demands. The following mission statement will guide the company to success:

"RTI will support and stimulate our personnel to continually deliver industry leading, innovative products that enhance client efficiency. We will distinguish ourselves in the global marketplace by providing exemplary service, educating our clients and collaborating to solve problems"[3].

2.3.2.1 The Chief Officers

As RTI is in its start-up phase, the full complement of officers has not yet been hired. The biographies of the existing officers follow, along with a description of the skill sets required for the other positions.

President

Matthew Janes is a Professional Engineer with a Masters of Engineering Science degree from the University of Western Ontario, specialising in foundation and structural dynamics. He has 18 years of experience in the manufacture and design of foundation construction equipment, foundation contracting and design engineering of deep foundations. He has developed numerous equipment and technology development projects resulting in patented foundation equipment products that are currently being sold on a global basis. He has an extensive network of contacts in the construction industry as well as in other relevant markets. Some of these contacts have consented to provide advice and are members of the Board of Advisors. Matthew's diverse experience led him to pursue resonant technology as a possible solution for the foundation construction market and this makes him the driving force behind the development of the RTI technology. He is presently completing his Masters of Business Administration degree at Simon Fraser University.

Vice-President of Product Development

Stewart Page is an Australian Professional Engineer and principal of Resonance Technology Pty., an Australian Corporation employing resonant technology for use in a marine environment (mine-sweeping). He is part owner of Resonant Technology International Inc. and co-inventor / owner of the intellectual property to be employed in this venture. He has over 28 years experience in product development and manufacturing including mechanical and electronics robotics design and various applications of high frequency vibration technology.

[3] Drawn from a discussion with Matthew Janes and Stewart Page.

Vice-President of Marketing

This senior position reports to the President and is an integral member of the executive management team. The incumbent will lead the company's marketing initiatives. He or she should have industrial goods marketing experience with expertise in consumer and trade advertising, product development, packaging, promotion and event management. He or she will be responsible for identifying marketing opportunities for the company's product(s), for developing and executing plans, for managing budgets and for leading a marketing team to achieve targeted revenues and profit margins.

Vice-President of Finance

Peter van Engelen holds a Bachelor's degree in Economics from the University of British Columbia and a Certified Financial Planner designation from the Financial Planners Standards Council. He has in excess of 14 years experience in the banking industry, specifically in financial management and commercial banking. His specialty lies in financing mid-market commercial enterprises with annual revenues in excess of USD 10 million. Growing up in Europe with dual nationalities, he has international business experience and is fluent in four languages. He is presently completing his Masters in Business Administration at Simon Fraser University.

Vice-President of Operations & Administration

The incumbent will have a strong background in operations and logistics engineering. He or she will be responsible for planning, budgeting, production, and information technology and will provide strong leadership to the production process and the administrative process.

Vice-President of Sales

This function will direct staffing, training, and performance evaluations to develop and control an effective sales program. In a supportive function to the joint venture, he or she will help to coordinate sales distribution by establishing sales territories, quotas, and goals and advise dealers, distributors, and clients concerning sales and advertising techniques. He or she will assign sales territories to sales personnel, analyse sales statistics to formulate policy and assist dealers in promoting sales. He or she will review market analysis to determine customer needs, volume potential, price schedules, and discount rates. In addition, he or she will develop sales campaigns to further the goals of the company and direct product simplification and standardization to eliminate unprofitable items from the sales line. Furthermore, he or she will

represent the company at trade meetings to promote the product and coordinate a liaison between the sales department and other sales-related units. He or she will analyse and control expenditures of the division to conform with budgetary requirements. He or she will also assist other departments within the firm to prepare manuals and technical publications.

2.3.2.2 The Board of Advisors

Dr. David Bies, Prof. Emeritus, University of Adelaide, Dept. of Acoustics Engineering, is an accomplished acoustics physicist who is widely published. A graduate of the University of California at Los Angeles, PhD 1953, he spent his early years working for Bodine Industries where he was introduced to the resonant hammer concept. Dr Bies was intrigued by the concept of resonant pile driving but recognized that the Bodine machine was fundamentally flawed. He left Bodine Industries to join the faculty of the University of Adelaide, Australia where he led a distinguished career publishing (1st author of "Engineering Noise Control: Theory and Practice") and teaching in the field of acoustics. He co-developed the patents describing the sonic vibration power generator with Mr. Stewart Page, Ing., The VP of Product Development, and has developed several additional patents since. Additional distinguishing awards and memberships include: Fellow of the Acoustical Society of America, Fellow of the Australian Acoustical Society, Fellow of the International Institute of Acoustics and Vibration. Dr. Bies is a founding shareholder of Resonance Technology International Inc.

Martin Fabi, retired, is the former CEO of Raymond Canada, which specialises in the distribution and installation of integrated warehousing and distribution systems. Martin is an experienced corporate leader with a variety of manufacturing, distribution and customer relations management experience.

Lee Matherne, President, Premiere Inc., New Iberia, Louisiana. Lee is an experienced oil patch executive who has led the way in providing specialist equipment and services for the conductor driving industry in the Gulf of Mexico. Lee and Matthew Janes, the President of RTI, co-developed direct drive diesel impact hammers for exclusive use by Premiere for the conductor driving market in the Gulf. Premiere has received awards for its exceptional rig safety record.

Alan MacNab, P.Eng. Vice President, Condon Johnson Constructors, Oakland, CA. Alan has led a distinguished career in foundation construction including a term as President of the *Association of Drilled Shaft Contractors* (ADSC). He is a recognized leader in deep foundation construction innovation, has authored a book on deep foundation construction techniques and was recently a member of an FHWA task force studying construction methodologies around the world. Alan's experience and contacts within the foundation construction industry will be invaluable when negotiating strategic partnerships with manufacturers, distributors and foundation construction companies.

Paul Gerrard, MBA, is a Certified Financial Planner and fellow of the Australian Institute of Company Directors. Paul is the financial advisor to Dr David Bies and Resonance Technology PTY. He holds directorships at APT Strategy Pty Ltd, a financial planning company based in Adelaide, Transparency Ltd 2002 (appointed 2002), an investment company, and Essential Asset Management Ltd (appointed 2002). Mr. Gerrard is a founding shareholder of Resonance Technology International Inc.

2.4 The Product

2.4.1 General Description of Pile-Driving Hammers

Over the years, pile-driving technology has continually advanced towards the development of larger and faster hammers, in an effort to achieve efficiency gains and thereby extract greater profits. Hammer selection is probably the most important aspect of pile installation. In some instances, only one type of hammer can be used for the pile and soil combination, whereas in other instances several different types may be applicable. The greatest consideration in selecting a hammer is the ability to drive the pile without damaging neighbouring structures or reducing the soil capacity. The different hammers and their applications are detailed below. The information is obtained from a publication entitled *piledrivinghelp.com* and written by *pilebuck.com*[4], an industry information source. Figure 3 depicts a typical crane and hammer assembly.

[4] Pile Buck, Inc.: Pile Driving Help.com [online], 2001-2004.

2.4.1.1 The Drop Hammer

This is the simplest and oldest form of pile-driving hammer and consists of a shaped block of cast iron or steel, with a mass of between 1,500 and 8,000 kg. The block is raised by a winch and released, enabling it to fall under gravity onto the pile head. In order to ensure that the hammer consistently hits its mark, it is guided by a "lead", which is akin to a rail system. The drop hammer is best suited for driving piles into clay, marl, or compact sand and is typically used on very small projects and for small piling. The drop hammer suffers from some energy loss because the cable must unwind as the anvil falls and there may be inertia in the drum and cable assembly. In addition, the operator might not achieve constant strokes and hence variable energy outputs will result from blow to blow.

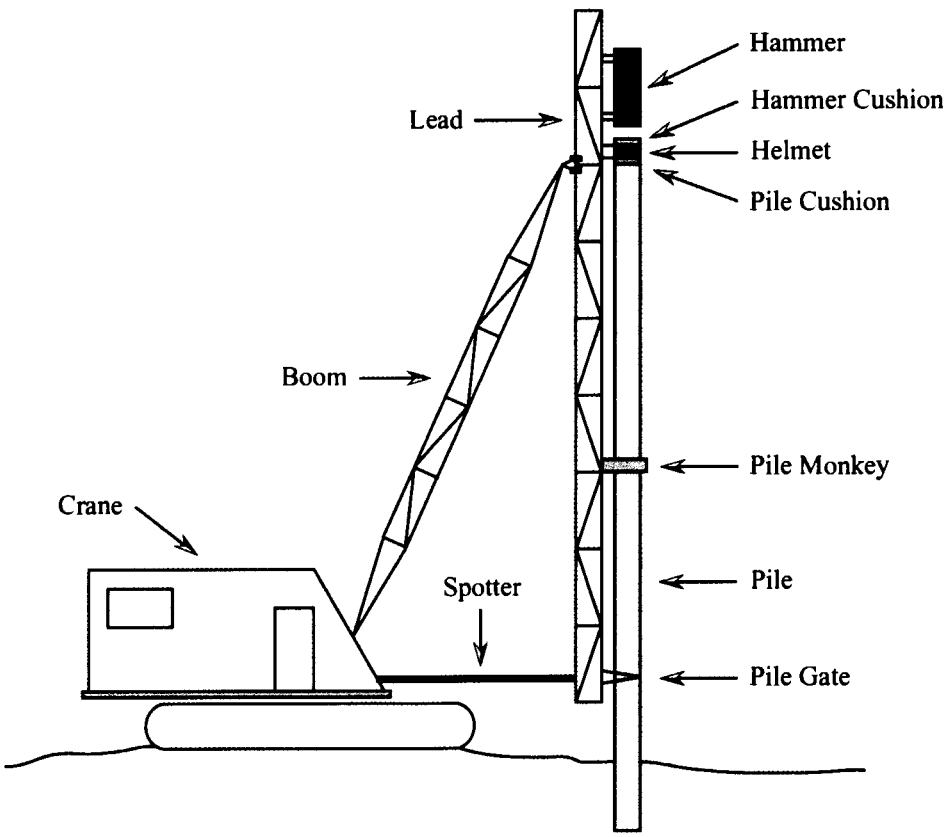

Figure 3: A Typical Crane and Hammer Assembly[5]

[5] Based on diagram in piledrivinghelp.com

The advantages of the drop hammer are its operating simplicity, the fact that the drop height can be altered, and the low cost of acquisition and maintenance. The disadvantages of the drop hammer are slow operation and its effectiveness is highly dependent on operator skill.

2.4.1.2 Single-Acting Steam or Compressed Air Hammer

This type of hammer is similar to a drop hammer in that the hammer falls freely under the force of gravity. A heavy cylinder, however, provides the blows. The cylinder slides up and down a fixed piston and is raised when compressed air or steam is forced into the piston through an inlet valve via a hollow piston rod. When the cylinder rises to the exhaust valve, the air or steam is exhausted, causing the cylinder to fall onto the pile. This type of hammer is capable of delivering blows at a rate of between 40 and 60 per minute. As the air / steam hammer is an external combustion hammer, its performance is dependent on the boiler (steam generator) or air compressor. This hammer is more efficient than the drop hammer and will work effectively in the same soil types.

The advantages of this hammer include a higher rate of blows compared to the drop hammer, its fairly consistent operation and its relatively simple design (compared to other hammers). The disadvantages of this hammer are that it requires additional equipment to operate (hoses and compressor) and that it is quite heavy, thereby requiring a larger crane.

2.4.1.3 The Double-Acting Hammer

This hammer is powered both upwards and downwards by compressed air, steam or hydraulic fluid and is therefore "double-acting". It consists of a cylinder, the base of which is the anvil block. The cylinder, which remains stationary and rests on top of the pile, carries a light piston. Initially, air, steam or fluid is forced under the piston through an inlet valve. This causes the piston to rise. At the top of the stroke, there is another inlet valve which forces the air, steam or fluid on top of the piston, which in turn forces the piston down and causes the ram to strike the pile. The cycle repeats itself, allowing the hammer to deliver a large number of rapid blows to the pile and keeps it moving into the ground. This type of hammer is extremely sensitive to proper valve timing and to the pressure of the air, steam or hydraulic fluid. The driving force is less than that of the drop hammer or the single-acting hammer but the speed is significantly increased, delivering between 90 and 225 blows per minute. These hammers are best suited to sites where the headroom is confined and where the use of other types of hammers is restricted.

It is also considered extremely effective in underwater piling where the device is activated by using compressed air.

2.4.1.4 The Single-Acting Diesel Hammer

To start the diesel hammer, the ram in the cylinder of the hammer is raised to the top of its stroke and then allowed to fall freely. While falling, a measured amount of diesel fuel is injected into a cup located at the base of the cylinder. As the ram falls, it compresses the air and the impact atomises the fuel, which then ignites. The resulting combustion of the fuel imparts an additional "kick" to the pile, which is already moving downwards under the impact of the ram. At the same time, the explosion raises the ram in preparation for the next down stroke. The burned gases from the combustion are exhausted on the up stroke of the ram. This cycle repeats itself continuously and will give 60 blows per minute. Obviously, this hammer is fairly noisy but it is very efficient and is actually one of the most popular hammers in use.

2.4.1.5 The Double-Acting Diesel Hammer

A double-acting diesel hammer consists of a long slender piston or ram, which moves inside a cylinder.

The ram is initially lifted a certain distance above the bottom exhaust port to start the hammer. As the ram rises, it closes the top exhaust ports and air is compressed in the bounce chamber. When the ram has reached its starting height, the trip is released and the ram begins to fall under gravity and the pressure of the air that is trapped in the bounce chamber. As the ram falls, it passes the lower exhaust ports and closes them. The air between the impact block and the ram is now compressed and heats up. The ram continues to fall and at a certain point trips a lever that injects fuel into the bottom chamber. The ram ultimately strikes the impact block, hammer cushion, helmet, and pile head. At this point, the fuel is ignited and this, along with the force from the recoiling pile, drives the ram back up to the top of its stroke to complete the cycle. The blow rate of these hammers is higher than that of the single-acting diesel hammers, however, their on-going maintenance is greater.

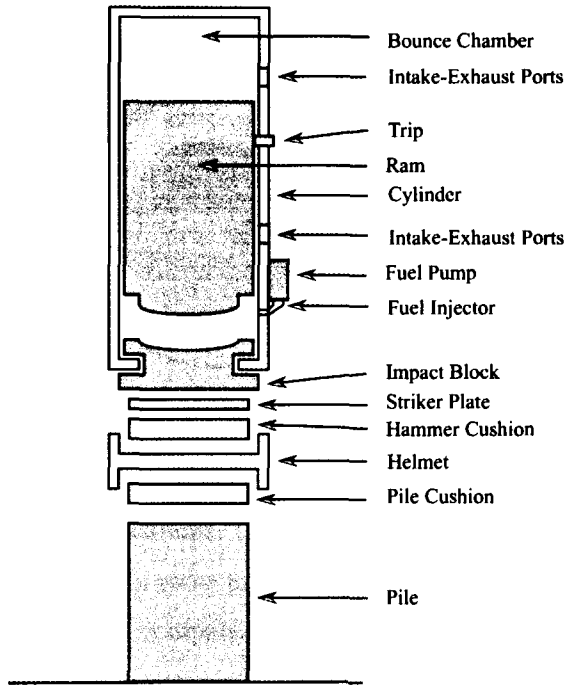

Figure 4: A Double-Acting Diesel Hammer[6]

2.4.1.6 The Vibratory Hammer

With this type of hammer, a vibrating device is mounted on the pile head. The unit vibrates and temporarily negates the friction that occurs between the pile and the soil. The pile consequently sinks into the soil under its own weight and the weight of the vibrator. The vibrating unit actually consists of rotating "eccentric" weights affixed to shafts. More specifically, a weight is attached to one side of a shaft and the shaft is then rotated. If one eccentric is used and the shaft is rotated, then in one revolution a force will be exerted in all directions (the principle of a centrifugal force), which will cause lateral whip. However, if eccentrics are paired and rotated in opposite directions, the lateral forces will cancel each other resulting in axial force for the pile.

[6] Based on diagram in piledrivinghelp.com

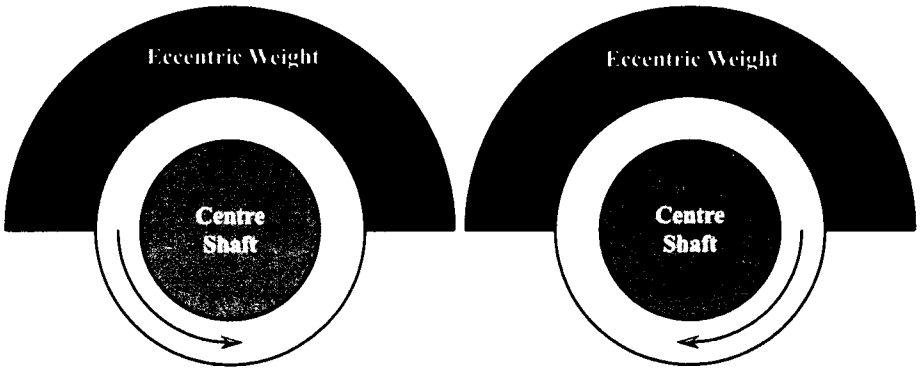

Figure 5: Eccentric Weights in a Vibratory Hammer[7]

The vibratory hammer is able to install piles into the ground because it loosens the soil surrounding the pile. In some ground types the vibrations actually liquefy the soil. The hammer is comparatively silent compared to diesel hammers. The main obstacle to successful pile installation is the toe-resistance of the pile and so it is best employed in gravel or loose sands.

There are a variety of different types of vibratory hammers that operate at different frequencies. The simplest is the low frequency hammer, which operates with a frequency of between 5 and 10 Hz. Medium frequency hammers run between 10 and 30 Hz and are primarily employed to drive sheet pile or small pipe piles into the ground. High frequency machines exhibit frequencies in the range of 30 – 40 Hz and are primarily designed to minimise vibration to neighbouring structures.

2.4.1.7 The Impact-Vibration Hammer

The Impact-Vibration hammer imparts both vibrations and impacts to the pile and is depicted below. Similar to the vibration hammers, it contains counter-rotating eccentrics that create vibrations in the head. A set of springs connects it to the frame and the vibration passes through them. At or near the bottom of the vibratory cycle, the head strikes an anvil, which delivers a blow to the pile at a rate far higher than conventional hammers. These hammers are manufactured in Europe and are consequently not often used in North American pile driving.

[7] Based on diagram in piledrivinghelp.com

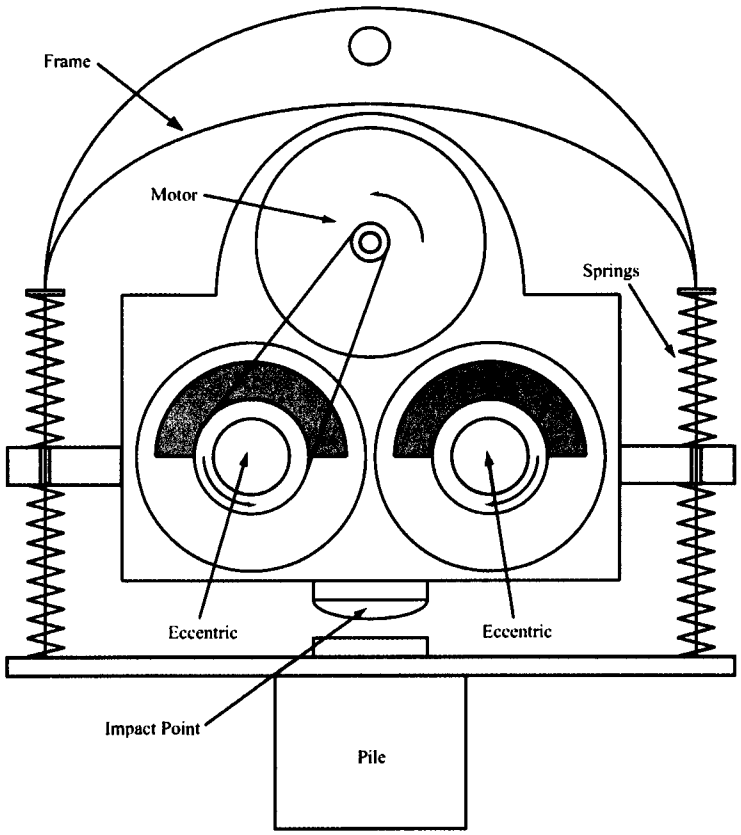

Figure 6: An Impact Vibration Hammer[8]

2.4.1.8 The Sonic or Resonant Hammer

The central principle with this form of hammer is to induce a resonant response in the pile, facilitating the driving and, if necessary, the extracting of a pile. The units operate in the range of 60 to 90 Hz and most of the driving takes place at the half wave frequency of the pile. The ability to achieve this response is dependent on properly matching the frequency range of the machine to the length of the pile, implying that as the pile is driven deeper into the ground so the frequency applied must be altered.

The concept of a resonant hammer has been around since the 1950's when Albert Bodine of Bodine Industries experimented with the technology. Initially, Bodine's efforts, which were funded by the Shell Oil Company in their quest to develop a better method of drilling for oil, were directed at drilling equipment, but he also worked on large vibratory pile drivers. In the late 1960's funding of the project ended and in the early 1970's, Bodine sold his drilling and pile-

[8] Based on diagram in piledrivinghelp.com

driving equipment to Hawker Siddeley, a British aircraft manufacturer with Canadian divisions. Throughout the 1970's renewed efforts to develop the vibratory pile drivers and drills continued in Canada, however, the recession of the 1980's discouraged Hawker Siddeley from continuing in this field. The units that were built during those years are still in use today. The principal problem with these machines, however, lies in the frequent breakdowns and the fact that they lack the appropriate tooling to withstand the vibratory forces generated. Even today, it is very difficult to economically design mechanical parts (like bearings) that will be able to withstand the intense forces.

2.4.1.9 The Principle of Resonance

The Webster dictionary definition of resonance is as follows:

> "A phenomenon in which a vibration or other cyclic process (such as tide cycles) of large amplitude is produced by smaller impulses, when the frequency of the external impulses is close to that of the natural cycling frequency of the process in that system."[9]

The concept of resonance is demonstrated in the process of pushing a child on a swing or shattering a wine glass with a tuning fork. The child on the swing is able to gain greater and greater elevation through the application of a small periodic force on each push. Similarly, a wine glass will shatter because the tuning fork applies a small cyclic force that is in tune with the natural vibration of the glass and raises the stress in the glass to the point where it shatters.[10] Thus, resonance requires the input of energy in a timed fashion such that it matches the vibration of the object to be excited. The trick to achieving resonance is to apply the energy at the exact frequency required. When resonance is deliberately achieved, it permits great efficiencies in creating useful energy available for work. Thus, with resonance, relatively little effort is required to obtain a large amplitude, however, each object has a different amount of elasticity, which determines how resonance reacts to it.

2.4.2 The Revolution Hammer

The *Revolution* hammer can be compared to the sonic or resonant hammer in that it employs the principles of resonance in order to drive the pile into the ground. However, the simplicity of design, the higher frequency range, the efficiency and the dependability are what

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[9] Webster's Online Dictionary: derived from the Webster's Revised Unabridged Dictionary Version originally published in 1913 [online], 2004.

make this product so revolutionary. The higher frequencies attainable with the *Revolution* will permit the user to create resonance in a longer pile and subsequently drive the pile with greater speed and efficiency. Before the *Revolution* hammer no machine was capable of efficiently producing high frequency vibrations. This leading edge technology should prove to be truly disruptive for the industry for the foreseeable future.

During conventional pile driving a hammer blow creates a compressive wave that travels down the pile, advancing it into the ground. When the compressive wave reaches the toe of the pile it reflects as a tension wave and travels back to the top of the pile. There is a large amount of energy still present in the tension wave as it reflects to the top of the pile. As a result the conventional pile driving process is only about 30% efficient. Resonant pile driving can take advantage of this reflected energy and make it available for work. During resonant pile driving, as the pile vibrates elastically from compression into tension, the resonant hammer provides a timed energy input. During a cycle of compression in the pile the resonant vibrator applies a downward or compressive force (during the pile's advance) followed by a timed tension force (pull) when the pile springs back into tension, thus enhancing the force in the pile during each cycle. Imagine a long steel pipe (a pile) suspended in the air that can be pulled upon at both ends (creating tension in the pipe) and then suddenly released. The pipe would elastically spring from tension into compression, becoming slightly shorter than its original length, and then springing back into tension. It would vibrate in this manner until all the energy had been dissipated into sound or heat. Now imagine applying a force at one end that would oscillate in perfect harmony with the vibration of the pipe. The force stored within the pipe can now be increased simply by adding force with every cycle. In this manner, the elastic rebound force of the previous blow is enhanced with every cycle and the pile is being driven at the highest possible efficiency, in phase with its natural period of vibration.[11]

In essence, the hammer consists of an outside tubular casing and an inside tubular casing. Valves form part of the casing and hydraulic fluid is forced under pressure into the various valves. These same valves are used to exhaust the fluid at a later time. In the process of passing the fluid through the valves, the inside casing is forced to move in an oscillatory fashion. There is only one moving part that is subject to the high acceleration forces which is, in part, what makes it so revolutionary. It is designed to provide power at frequencies from 20 Hz up to and including 250 Hz but will be employed in the 60 - 200 Hz range. One of the greatest advantages of the

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[10] Personal communication with Matthew Janes, 2004.
[11] Description provided by Matthew Janes, 2004.

hammer is the fact that the resonant frequencies can be changed. This is important as the pile is driven deeper into the ground and the elastic qualities of the pile and soil change, as described above. The constant monitoring of the pile characteristics is performed automatically, using a sophisticated computer algorithm, in the form of a proprietary electronic feedback system. The largest advantage to this is that the system does not rely on a specialist for it to be effective.

The *Revolution*'s differentiation lies in the fact that it will achieve three to four times the efficiency of competing hammers and will help customers extract a 30% - 40% production cost savings *per* job, or approximately $1,250 in daily crew savings! (Refer to Table 1) The robust and reliable design, incorporating only four moving parts, will permit the *Revolution* to achieve the high frequencies required, while minimising the potential for breakage. It is less expensive to manufacture, less expensive to maintain, will suffer fewer breakdowns and last longer than conventional equipment. Additionally, the electronic monitoring and control system, which allows the equipment to be kept at resonance automatically, despite changes in pile driving conditions, is completely unique. Furthermore, the design is scalable, which will allow it to be used in a variety of power ranges and industrial applications. Switching costs to the contractor are negligible as the contractor can use their existing base equipment and hydraulic power packs. These factors all contribute to placing the *Revolution* in a class by itself without any true competitors!

Activity	**Existing Impact Hammers**	**Existing Vibratory Hammers**	**The *Revolution* Hammer**	**Savings**	**Savings**
	Minutes	Minutes	Minutes	$	%
Pick up Pile	7	7	7		
Set up	8	8	8		
Drive first splice	25	10	6		
Set splice	10	10	10		
Weld splice*	45	45	45		
Drive to depth	45	120	12		
Move	10	10	10		
Total time	**110**	**170**	**58**		**47%**
Crew / Hour	$521.30	$586.30	$664.30		
Cost / Pile	$955.72	$1,661.18	$642.16	$313.56	33%
Cost / 400 lin. Ft.	$3,822.87	$6,644.73	$2,568.63	$1,254.24	33%
Monthly Cost	$84,103.07	$146,184.13	$56,509.79	**$27,593.28**	33%

* This is shown as 45 minutes but the hammer is able to commence driving another pile while the splice is being welded. Only 5 minutes are actually factored into the calculations.

Table 1: The Cost Savings of the Resonant Hammer over Existing Hammers[12]

[12] Source: Calculations performed by Matthew Janes, 2004.

3 INDUSTRY ANALYSIS

3.1 The Target Market

The *Revolution* hammer will appeal to contractors working in the deep foundation industry. In North America this is a multi billion-dollar market when equipment sales, construction services and equipment rentals are considered. This market grows by at least one third if the European and Japanese markets are included. Many of the players are long established and are either general contractors or specialists that offer a range of services. These services include shoring, pile driving, excavation, tunnel construction and offshore oil and gas drilling. RTI is focussed on the pile installation (driving and drilling) and shoring segment of the industry.

I approached the task of estimating the actual size of the market from two sides, a bottom-up method and a top-down method. In the bottom-up approach, a variety of statistics such as the value of commercial building permits, the value of shipments of construction machinery, the value of pile driving machinery manufacturing and the value of business conducted by pile driving contractors were compared to establish base numbers. Then, using the top-down approach, a few of the principals of some of the larger deep foundation equipment manufacturing firms[13] (as all firms are privately held[14]) were surveyed with questions concerning their estimates of the market size, their estimates of their competitor's annual revenues, the values of the annual spending on equipment and rentals by their own customers, and their predictions of the expected growth over the next five years, in an effort to verify the bottom-up numbers. In addition, the senior representatives of the two main construction industry associations: the *Deep Foundation Institute* (DFI) and the *Association of Drilled Shaft Contractors* (ADSC) were contacted regarding their estimates of the market breadth for both contracting as a whole and equipment sales in particular. Both of these organisations had recently conducted their own market analysis and were thus able to verify the numbers.

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[13] These included the sales and marketing manager for *American Pile-Driving Equipment* (APE) in Seattle, WA, the VP Sales of *Berminghammer Foundation Equipment* in Hamilton, ON, and the Senior Sales Manager of the NE Region for *International Construction Equipment* (ICE) in Raleigh, NC.

[14] Publicly held Dutch Company purchased ICE in early 2003.

The market for construction machinery is mature, highly cyclical and correlated with the Gross Domestic Product. The majority of construction activity utilising heavy equipment is privately financed and typically requires substantial amounts of capital. This capital is usually borrowed and investors will only commit their funds when the prospect of extracting a healthy return is good. Hence, when economic conditions are positive and borrowing costs are low, the demand for construction activity is heightened. On the other hand, public works projects are typically undertaken in periods of economic weakness, as a means for governments to fiscally stimulate activity. This tends to smooth-out cyclical fluctuations somewhat. In addition, during economically depressed times, there is greater demand for replacement parts as contractors seek to extend the life of their equipment, and this further serves to smooth cyclicality.

Trends in equipment prices are also an important determinant of demand. As construction equipment is usually expensive, contractors are driven to rent or purchase used equipment as prices for new equipment rise. This implies a fairly high price elasticity of demand. Furthermore, technology is a major driver of demand. Product innovations, which make machinery more efficient and reliable, are perceived as a way to gain a competitive advantage in what amounts to a highly competitive industry. Therefore the more innovative a product is, the greater the demand for it. A technologically sophisticated product probably exhibits a high price inelasticity of demand. This fact has led many construction machinery manufacturers to place a great emphasis on research and product development.

Appendix A shows the size of the market for construction machinery manufacturing in North America, the United Kingdom, France and Germany. These historical and forecast statistics serve to illustrate how large the construction machinery market is. I have included Japan but was unable to find a value for 1997, nor was I able to uncover any forecast statistics.

The historical and forecasted figures were obtained from a variety of sources including the U.S. Census Bureau, Euromonitor, Industry Canada, and The Japan Machinery Federation. In each case, the numbers show the value of shipments for the sector concerned with manufacturing construction machinery[15] and are expressed in millions of U.S. dollars. Of course, this sector comprises all construction machinery, of which pile driving is a component. Finding statistics on the pile driver manufacturing sector proved to be significantly more difficult. Delving deeper into the North American Industrial Classification System I found a classification entitled "Other

[15] 2002 NAICS Definitions: North American Industrial Classification System (NAICS) [online], 2004 – (333120 = Construction Machinery)

construction machinery and equipment (excluding parts)"[16]. This classification is narrower and the value of shipments only relate to the U.S. market, which for 2001 was $2,194 million, or approximately 10% of the construction machinery market. I ultimately found a value for shipments for the U.S. pile driving market of US$176.9 million[17] for 1997. I was unable to find statistics for any other year. This number represents approximately 0.8% of the value of all shipments for the construction machinery manufacturers in the U.S. In the absence of any other numbers, I am forced to estimate the size of the pile driving manufacturing market as lying somewhere between 0.75% and 1.00% of the construction machinery manufacturing market for the six countries specified in Appendix A. This range was found to be reasonable by the senior representatives of DFI and ADSC. The figures are shown in Appendix B. These numbers illustrate the potential size of the market for the *Revolution* hammer, however, the intent is to initially concentrate on the US market.

Overall, the forecasted numbers predict an average increase of 4.3% per year, with the largest growth occurring in North America and France. The general consensus is that after 2003, the worst of the global post 9/11 economic slump appears to be over. Markets such as China and Russia are growing at phenomenal rates and this will have a direct impact on the global pile driving market. Although Japan has been forecast to have zero growth up to 2006, this assumption was made due to the lack of statistical forecasts by the experts and in order to remain conservative. In reality, Japan's proximity to China should cause the demand for their output of pile-driving equipment to increase.

Uncovering numbers for the pile driving rental and leasing industry proved even more onerous. The NAICS classification is listed as 5324122585 and is entitled "Heavy equipment used for construction, mining and forestry (without operators) rental and or leasing". The US Census Bureau only provides a value for 1997 of $5,601 million[18]. Obviously, the sector that we are concerned with represents a small component of this overall figure. A conservative estimate, which was again verified, places the pile driver rental / leasing market at approximately 3% of the $5,601 million, or $168 million. It is anticipated that this figure has grown and will continue to grow into the future due to the carrying costs of purchasing new equipment and the fact that rentals are expensed.

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[16] US Census Bureau, "Value of Product Shipments 2001," *Annual Survey of Manufactures,* (2002): 85.
[17] US Census Bureau, "Product Summary" *1997 Economic Census – Manufacturing- US Department of Commerce* (2001): 289.
[18] US Census Bureau, "Summary" *1997 Economic Census – Real Estate and Rental and Leasing- US Department of Commerce* (1997): 21.

3.2 Industry Structure

The pile-driver manufacturing industry consists of large and small firms that provide a variety of hammers based on differing technologies and needs. Their customers are deep foundation contractors who attempt to execute low margin jobs in as efficient and timely a manner as possible. This is a highly cyclical and mature industry and success is based on a variety of factors.

Michael Porter, in his book *Competitive Strategy: Techniques for Analyzing Industries and Competitors*[19], describes how an industry's (or market's) attractiveness, as measured by the long-term return on investment of the average firm, depends largely on five factors that influence profitability. Each factor contributes to the explanation why some industries are historically more profitable than others. The factors are:

- The intensity of competition among the existing firms
- The presence of potential competitors who will be lured into the industry if there are potentially high profits
- The existence of substitute products that will draw customers away if the prices become too high
- The bargaining power of the customers
- The bargaining power of the suppliers

A discussion of the five forces as they apply to this industry follows. For a graphical summary of this description, please refer to Figure 7[20].

3.2.1 Competition among Existing Firms

Firms strive for a competitive advantage over their rivals and it is this intense rivalry that goes a long way to explaining the profitability of the industry. The industry is disciplined if the rivalry among firms is low. This discipline may result from the industry's history of competition, the role of the leading firm, or informal compliance with a generally understood code of conduct. However, a maverick firm seeking a competitive advantage can displace an otherwise disciplined market.[21]

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[19] Michael E. Porter, *Competitive Strategy: Techniques for Analyzing Industries and Competitors.* (New York: Free Press, 1980).
[20] Source of information Matthew Janes, 2004.
[21] Quick MBA, Porter's five forces [online], 2004.

Overall, with 16 identified manufacturers, the industry can be typified as exhibiting high rivalry. The concentration ratio for the industry as a whole is fairly high. This ratio measures the percent of market share held by the 2, 4 or 8 largest firms. For the two largest firms (CR_2) it is approximately 55%-60%[22]. For the four largest (CR_4) it is roughly 65%. These ratios imply that the rivalry for the remaining 40%-45% of the market is quite intense. In fact, the two largest companies are competing on a national level, whereas the smaller manufacturers tend to challenge each other on a regional basis. The rivalry is actually greater here. This has its advantages from a customer's point of view, as the supply of the product and the support of that product tend to be better in a smaller market area with many competitors.

The customary way to purchase a hammer is on a lease-to-own basis with a proportion of the lease payments being applied as a down payment on the eventual purchase. The contracts are usually of a short duration and on the expiry date, the contractor is able to commit to the purchase or walk away. The contractor will thus bid on a project knowing that he will be able to enter into a short-term lease contract. If there is an opportunity for additional business then the contractor may make the decision to actually purchase the unit. The manufacturer or supplier must therefore continually have stock available, as contractors rarely insist on custom-built pile-driving hammers. This implies that there is manufacturing overcapacity, which leads to increased rivalry amongst the competitors.

Rivalry is further increased by homogenous product offerings. There is little distinction between one impact hammer and another. Similarly, conventional vibratory hammers are essentially identical in their operation. The distinguishing features that set the different hammers apart from each other amount to innovations concerning weight, maintenance reduction or advantages in niche applications.

The barriers to exit for the manufacturers, the rental pool owners and even the foundation contractors are relatively high due to the sizeable investment required to compete. Should one of the stakeholders decide to concentrate on another area, they would be forced to liquidate the equipment at a loss. This presumably provides enough incentive to continue competing and thereby increases the rivalry.

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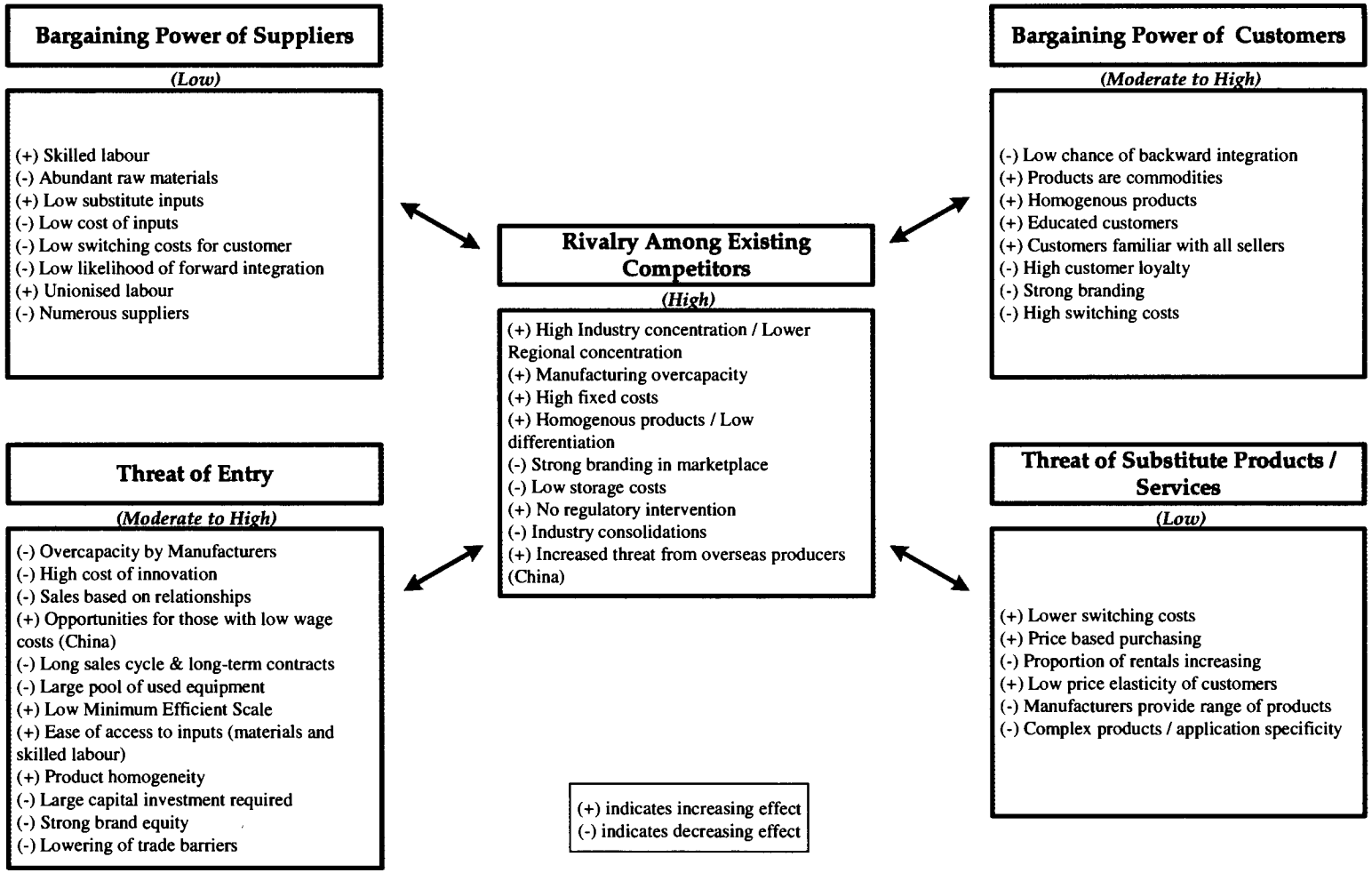
[22] Please refer to section 3.3 naming the competitors and showing an estimate of their respective market shares.



(Based on Porter's Five-Factors of Competition in an Industry)

Figure 7: Porter's 5 Forces Applied to the Pile-Driving Industry

The sizable investment also creates a barrier to entry. The equipment is highly market specific and in some cases has unique applicability. A manufacturer is forced to offer a variety of hammers and ancillary equipment in order to provide a complete range of products and services to clients. With labour rates increasing, the contractors are increasingly forced to specialise in order to gain a competitive advantage. This requires the manufacturer to comply and the rivalry to retain the client increases.

There is a threat of increasing competition from overseas, particularly China where the burgeoning infrastructure demands low-cost solutions to foundation issues and where the low-cost labour force enables manufacturers to become instantly competitive.

On the other hand, a reduction in rivalry occurs through high network effects and brand loyalty. There is a strong first mover advantage that exists. The loyalty and network effects are achieved by providing specialised training of field personnel in the repair and maintenance of the equipment and through the capital outlay required to purchase equipment and build up an inventory of spare parts. Once committed, the contractor remains brand loyal to minimise on-going costs. Suppliers and manufacturers recognising the need to make the initial sale, focus on a relationship-based selling model and attempt to provide exemplary service.

The hammers are built for durability so that they can withstand the harsh environment that they are subjected to and provide many years of service. In fact, many contractors have a fleet of wholly depreciated equipment that is fully functioning. The need to regularly purchase new equipment is diminished by hammer durability, which invariably leads to an expansive used equipment market. Fewer equipment purchases reduces the rivalry somewhat.

There is no government regulation in this industry. In fact, the only issue of concern is safety and this issue is of a sufficiently sensitive nature that the industry has developed a number of its own initiatives. The lack of government intervention serves to enhance the rivalry amongst the competitors. Having said that, collusion is considered illegal and would not be tolerated by the government if there were evidence of it occurring.

Finally, there has recently been some consolidation within the industry. A case in point is the acquisition of J&M Hydraulics by American Piledriving Equipment. J&M Hydraulics was actually a manufacturer for International Construction Equipment's U.S. operation from 1976 to 1999, when ICE decided to contract out some of the manufacturing to another company in an effort to lower prices from J&M. This move backfired as J&M broke their ties with ICE and went to market with their own brand. As it turns out, J&M did not fully comprehend the business

cycle and overextended themselves financially. They declared bankruptcy and APE purchased what was remaining. As the intense rivalry continues within the industry, the possibility for consolidations will increase. This will have the effect of reducing the rivalry over the long-term.

3.2.2 The Threat of Substitutes

Substitute products refer to products in other industries that serve the same function as the target product. A threat of substitute products exists when a product's demand is directly impacted by a change in the price of the substitute product. In other words, as the price of a substitute product drops, the customer may opt for the substitute rather than the original product. Consequently, substitute products affect a product's price elasticity. As more substitutes become available, the demand becomes more elastic as the client has an increasing number of alternatives to choose from. Similarly, a close substitute product constrains a firm's ability to raise prices for their product.

Pile-driving hammers are a reasonably complex product with very specific applications. There is no other type of equipment with a purpose other than pile-driving that could be used to hammer piles. The innovations that have occurred over time have been directed at marginally improving the hammer's efficiency in an effort to generate productivity gains. For example, the diesel hammer or the vibratory hammer allow the contractor certain productivity gains over the traditional drop hammer. These improvements can be considered substitutes with the impetus for these substitutes being relatively low switching costs. In addition, there is a trend among contractors to seek out equipment that will, as described above, generate productivity gains. However, there has not been a revolutionary leap forward in the technology or in the method of driving piles. Alternative products are generally created within the industry as a means to enhance the relationships with the clients and capture greater market share. Furthermore, the trend towards renting equipment rather than purchasing new equipment represents a form of substitution that also helps to discourage substitutes from other industries. There is consequently only a low threat of substitutes from outside affecting the profitability of the industry.

3.2.3 The Bargaining Power of Customers

The greater the impact that the customers have on a producing industry, the more bargaining power they collectively hold. At the extreme, a market may approach "monopsony"[23]

[23] Monopsony refers to a market in which there are many suppliers and only one buyer.

where one buyer is able to dictate the price to the suppliers. In reality, monopsony is relatively rare, but there is a situation where an asymmetry between producers and consumers exists that shifts the power to the consumers. For example, if there are a few buyers with significant market share or a buyer possesses a credible backwards integration threat, then the balance of power will lie with buyers. In the pile driving industry the overall bargaining power of customers is relatively high.

The pile-driving hammer is essentially a commodity. There may be subtle variations between the diesel hammers or vibratory hammers produced by different manufacturers but in essence the hammers are substitutable. This commoditisation leads to greater bargaining power for the contractor and forces the manufacturer to carefully consider the competition before adjusting their prices. The contractor is able to rent equipment, select from a huge pool of used equipment, or shop around for competitors products (particularly given the standardisation of the base equipment). This is due to the customer being well educated regarding the benefits and costs of the various equipment configurations and features. Manufacturers ensure that they are very visible at trade shows and provide well-stocked booths and impressive demonstrations. Moreover, in a fairly rivalrous market, the contractors know all of the suppliers as the industry values relationship selling. These facts all contribute to the bargaining power of customers.

On the other hand, customers typically exhibit loyalty to a particular brand. This is due to a preference for the way that a particular brand of machine operates and for after sales service. A contractor, who operates within very tight margins, is unable to tolerate any down time due to equipment malfunction. He will be faithful to a supplier that either ensures that a replacement hammer is immediately available or that a technician is on the worksite within hours. This loyalty serves to reduce the bargaining power of the customer somewhat and may permit the supplier to command a slight premium.

The likelihood of a contractor buying a manufacturer or deciding to build hammers for himself or herself is very slim. Economies of scale and scope would deter him or her from doing so. However, building or designing an ancillary piece of equipment to solve a special need is fairly common. The minuscule threat of backward integration serves to reduce the customer's bargaining power or enhance the producer's.

3.2.4 The Bargaining Power of Suppliers

A producing industry requires inputs in the form of raw materials, components and labour. This leads to buyer-supplier relationships between the producers and the suppliers of those inputs. If suppliers are powerful, they can exert an influence on the producers in the form of higher costs, in an attempt to capture some of the profits. The suppliers' power tends to increase if they are concentrated, there are costs associated with switching suppliers, or they possess a credible threat of forward integration.

In the deep foundation industry the bargaining power of suppliers (i.e. raw materials) is generally considered to be low. There is a minimal threat of forward integration. Moving from supplying to manufacturing will require a large capital investment and a clear understanding of the extended sales cycle. In addition, there is the need to overcome the pervasive strength of branding and the already intense rivalry. J&M Hydraulics, described above, provides a good example of forward integration that failed. Relatively inexpensive raw materials in plentiful supply and low switching costs add to the reduction in bargaining power of suppliers. The fact that they are numerous and all compete with one another, further adds to the situation.

Some inputs, such as labour, are in a position to leverage their strength. Skilled labour is in demand and experience cannot be taught overnight. This demand for experienced workers, along with the presence of unionisation, ensures that labour can command a high price for its services. This presents a problem for North American manufacturers if they import cheaper hammers from countries with lower wage rates, at which time it will become a significant business risk.

3.2.5 The Threat of New Entrants

Any industry runs the risk of new firms entering in order to compete. In a perfectly competitive market a firm is easily able to enter and is usually motivated to do so by an increase in industry profitability. When profits decline, on the other hand, firms usually exit. In reality, few markets are perfectly competitive and industries often possess characteristics that protect high profits and prevent firms from entering. These "characteristics" are called barriers to entry. They can be created or exploited to enhance a firm's competitive advantage and can arise through government regulation, intellectual property rights, or asset specificity, to name a few.

In the deep foundation industry the overall threat is rated as moderate. This is due to the threat from low cost producers on the one hand and the notion that there are unique factors that make it difficult to gain access.

It is relatively easy to source the raw materials and labour required to build pile drivers. If labour costs are low, given that it is fairly labour intensive to build a hammer, and the product can be produced at a fraction of the cost, then the new entrant will undoubtedly get noticed and gain a foothold in the market. This is made even easier by the fact that the products are fairly homogenous and that the designs are easily copied. In fact, there are few if any patents protecting the different hammer designs at this point. Added to this is the trend towards lower trade barriers, lower transportation costs and the small threat of retaliation from the existing manufacturers. The threat of retaliation is minor as the companies' profit margins are small and their distinguishing feature rests on their relationships and service support. Thus a competitor from a low wage region stands a good chance of posing a significant threat to the industry.

On the other hand, there are certain factors that impose barriers to entry, particularly to threats from within North America. Foremost among these are the low profit margins in pile driving. With the higher cost of acquiring equipment, the price differential would have to be significant for a contractor to consider replacing his existing fleet and breaking the established relationship with his supplier. The existence of rental equipment and a sizeable supply of used equipment compound the problem. So too does the manufacturers' overcapacity, which causes prices to be bid down and profit margins to be slim. A further disincentive is the long sales cycle typical of the industry in which a contractor leases the equipment with an option to purchase it later. Without a thorough understanding of the industry, its idiosyncrasies and significant capital to weather the time required to establish oneself, it is difficult to break in to this industry.

3.3 Competition within the North American Market

International Construction Equipment (ICE), based in the Netherlands, and American Pile Driving Equipment (APE), based in Seattle, WA, both dominate the North American pile-driving industry. ICE's market share varies between 36% and 40%, depending on whether the high or the low estimate of the market size is considered. APE's market share lies between 18% and 21%. The closest competitors are significantly smaller. The concentration ratio (CR_2) for the two largest firms thus fluctuates between 54% and 61%. The competitors in the North American market are listed below.

As is evident, APE is roughly 75% larger than its closest competitor. Although the two largest manufacturers hold a dominant position in the market place, the industry is considered mature and highly competitive. The division of market share is shown graphically in Figures 8 and 9.

For each type of hammer manufactured, there are a number of competitors with products that compete directly with one another, as is shown in Table 2 below. Some companies only produce one type of hammer whereas others have multiple product offerings. Due to the commoditisation of pile-driving hammers in general, the prices between competitors are very close and often the only differentiator is the after-sales service that is provided to the client.

Company	Country of Origin	Low Estimate	High Estimate
International Construction Equipment (ICE)	Netherlands	41.03%	36.36%
American Piledriving Equipment (APE)	USA	23.59%	21.82%
Conmaco	USA	6.15%	5.09%
Vulcan Iron Works[24]	USA	5.13%	5.09%
MKT Manufacturing Inc. (MKT)	USA	4.10%	5.09%
Hydraulic Power Systems Inc. (HPSI)	USA	4.10%	4.36%
Hercules Machinery Corp. (HMC)	USA	3.08%	3.64%
Berminghammer Foundation Equipment	Canada	3.08%	3.64%
Müller	Germany	2.05%	2.91%
BSP	UK	1.54%	2.55%
IHC Hydrohammer BV	Netherlands	1.54%	2.18%
Pennine	Italy	1.54%	2.18%
H&M	USA	1.54%	2.18%
Piling & Vibro Equipment (PVE)	Netherlands	0.51%	1.09%
PTC	France	0.51%	1.09%
Menck	Germany	0.51%	0.73%
		100.00%	**100.00%**

Table 2: Competitors in the North American Pile Driving Industry[25]

[24] This company is presently in receivership.

[25] Estimates based on discussions with company principals and M. Janes, 2003.

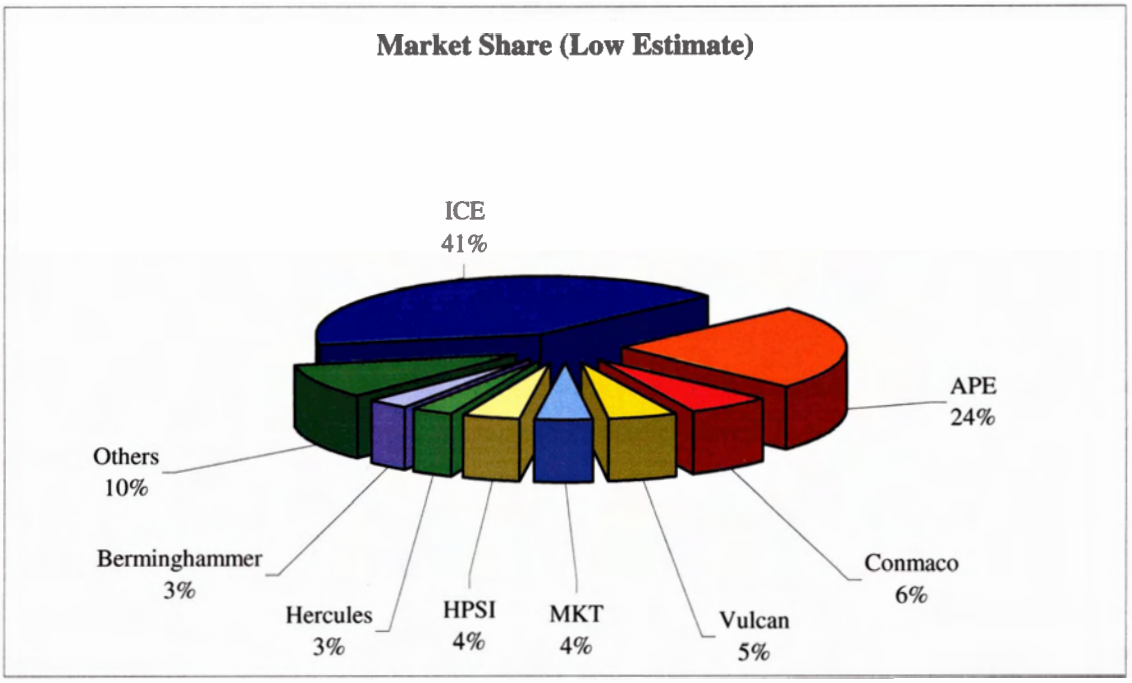


Figure 8: Composition of the Pile Driving Market in North America showing Market Share and based on the Low Estimate (0.75%)

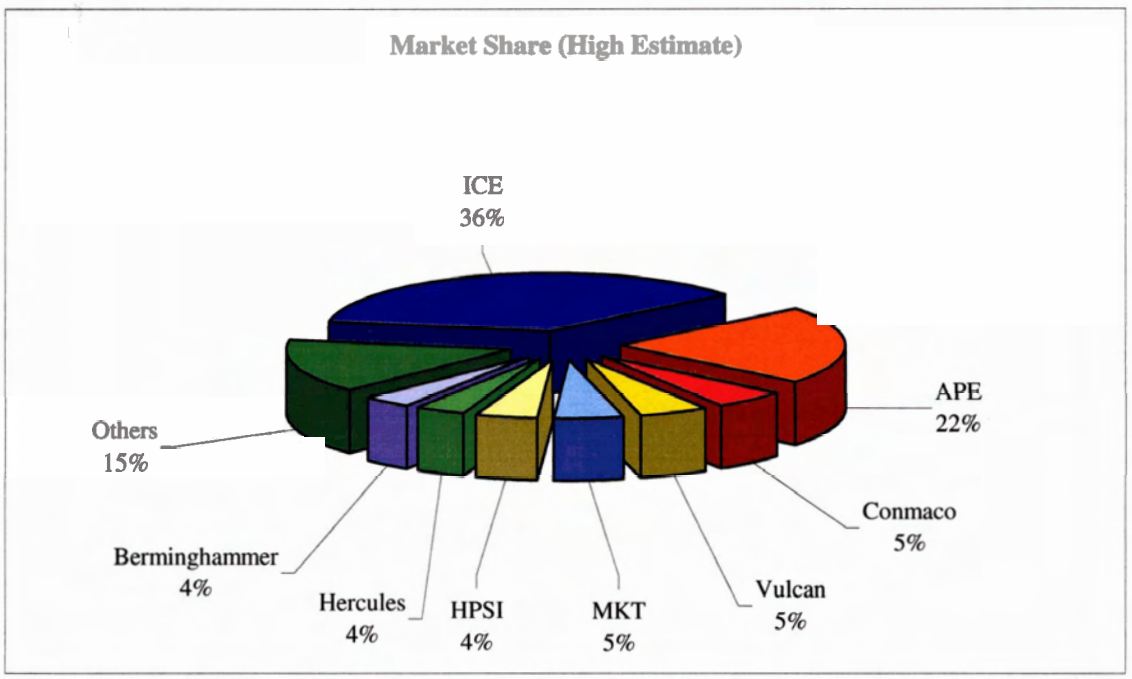


Figure 9: Composition of the Pile Driving Market in North America showing Market Share and based on the High Estimate (1.00%)

ICE is presently the largest manufacturer and is considered the most respected brand name in the marketplace. They are very sizable internationally, forming part of the Geveke Group, a large Dutch conglomerate with interests in a multitude of disciplines. They are experienced, mature and offer a full line up of products that are priced in the mid range. They derive their revenues from both rentals and sales and provide service packages, parts and consulting services.

With offices around the world and access to significant resources, ICE is able to handle any project anywhere. Their sheer size, however, is potentially their undoing. The reason is that they can be faulted for being out of tune with their market, particularly North America, and they consequently don't react to the needs of this market as well as they could. A summary of the strengths and weaknesses of seven of the North American competitors can be found in Appendix C.

APE, the other market leader, has, since its inception nine years ago, sought to capitalise on ICE's weakness. Their growth has been very strong and they are now a leadership contender. If they continue on their present path, they will overtake ICE in the not-too-distant future. Their strength lies in their innovation. They hold several patents and expend significant resources on Research and Development. They have also paid attention to the service that they provide their customers. This ranges from field visits to a pile-driving school designed to educate contractors on the use of their hammers. Due to their size they have achieved economies of scale and are thus very efficient in the production and delivery of their products. Furthermore, their marketing is excellent and in particular their web presence. In fact, they have become the leaders of both traditional and Internet marketing. Their business model concentrates on sales, rentals, parts and consulting. They are a company with a clearly defined objective – gaining market share and becoming the largest pile-driving manufacturer in the U.S.

Hercules Machinery Corporation (HMC) is a smaller company with 3% - 4% market share. They are showing steady growth and are primarily focussed on large contractors. They only provide diesel hammers and price their products in the medium range. One of their primary strengths is their experience, having been in business since 1964. Their stated objective is "To offer the world's finest pile-driving equipment while providing the highest level of service in the industry"[26]. HMC is not a full-service company, focussing on sales, rentals, service packages and parts.

[26] Hercules Machinery Corporation website [online], 2004.

Manufacturer	Vibratory Hammers	Air/Steam Hammers	Diesel Hammers	Hydraulic Impact Hammers
American Piledriving Equipment (APE)	MP		LP	MP
Berminghammer Foundation Equipment			MP	
Bruce				MP
BSP				MP
Conmaco		LP		
Delmag / Tunkers	HP		MP	
FEC			MP	
Hercules Machinery Corp. (HMC)			MP	
Hydraulic Power Systems Inc. (HPSI)	MP			MP
International Construction Equipment (ICE)	MP		MP	
IHC Hydrohammer BV				HP
IHI			MP	
J&M	MP			
Kobe			MP	
Menck		MP		HP
Mitsubishi			MP	
MKT Manufacturing Inc. (MKT)	LP	LP	LP	
Müller	HP			
Nissha				MP
Piling & Vibro Equipment (PVE)		LP		
Pilemer				MP
PTC	MP			
Raymond		LP		
Resonance Technology International (RTI)	HP			
Twinwood				LP
Vulcan Iron Works[24]	LP	LP		

(Low Price = LP Medium Price = MP High Price = HP)

Table 3: A Comparison of Global Competitors' Pile-driving Hammer offerings and their relative pricing

Berminghammer Foundation Equipment, better known as Berminghammer, is located in Hamilton, Ontario. They were founded in 1969 and have become known for their high quality equipment and their dedication to research and development. They hold a number of patents and consequently have leading-edge products in their line up. As a complement to the R&D, Berminghammer owns a construction company through which most of the testing of new

equipment takes place. As a whole, Berminghammer is relatively small and tends to focus on residential land development and, in particular, shoring.

Vulcan Iron Works Inc. is located in Tennessee and is heavily networked with the construction companies in the Southern United States. They are a well-established brand name and are mature in the market. Their sheer size and experience allow them to service the larger projects with their line up of Vibratory and Air / Steam hammers. However, Vulcan is slow to adopt new technologies and is sometimes overlooked by contractors, as the company is not perceived to be particularly innovative. In fact this may have been their undoing as there are now officially in receivership.

Hydraulic Power Systems Inc. (HPSI) was founded in 1980. After years of manufacturing hydraulic power units for HPSI's augers and for vibratory driver/extractors built by numerous other foundation construction equipment manufacturers, HPSI designed its own version of a vibratory driver/extractor in 1991. In 1992, HPSI began marketing a hydraulic impact hammer. Through the years, as a compliment to its product lines, HPSI has also designed a number of pile driving accessories including fixed and swinging lead systems[27]. Unfortunately, the company has been unexceptional, occupying a position in the middle of the pack of manufacturers. They have shown flat growth for a number of years. There is, however, good brand recognition in the industry and one of their key strengths is their experience.

MKT Manufacturing Inc. (MKT), like HPSI, is fairly non-descript. MKT is a small to mid-sized enterprise with flat growth. They focus their attention on the large contractors, primarily in the Southern U.S., and provide a range of hammers in the Vibratory, Diesel and Air/Steam categories. However, they are not a full-service shop, providing only sales, rentals and parts.

In summary, most of the firms in the industry are fairly well established in the market place. There have been few new competitors to emerge into this mature market to compete with the established firms. The exception, of course, is APE who has achieved success through a very aggressive marketing campaign and who is now the leader in both traditional and Internet marketing. Given that pile-driving equipment is a commodity and the prices are consequently very similar, the only real differentiator for a company tends to be the after-sales service. Again, APE has recognised this and does an exceptional job of ensuring that their customer base is satisfied.

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[27] Hydraulic Power Systems Inc. website [online], 2004.

3.4 The Industry Value Chain

Figure 10 shows the Industry value chain as it relates to RTI. As the legend indicates, yellow refers to the activities performed by RTI and orange to those executed by APE, the proposed partner in the revenue model. Where an activity blends colours, the implication is that the two firms are both involved in the process to one degree or another. The width of each competency indicates its relative importance within the value chain.

The deep foundation industry is a highly capital intensive one. Equipment is expensive and labour forms a large percentage of the total costs of production. These factors and the low profit margins for contractors are the principal drivers for the manufacturers to develop innovative production-oriented technology. This is nothing new as the R&D and Distribution (Sales and Service) activities have traditionally been the key core competencies allowing a company to achieve superiority amongst its peers. Recently, as demonstrated by APE, the marketing and supply of ancillary equipment have emerged as differentiating core competencies.

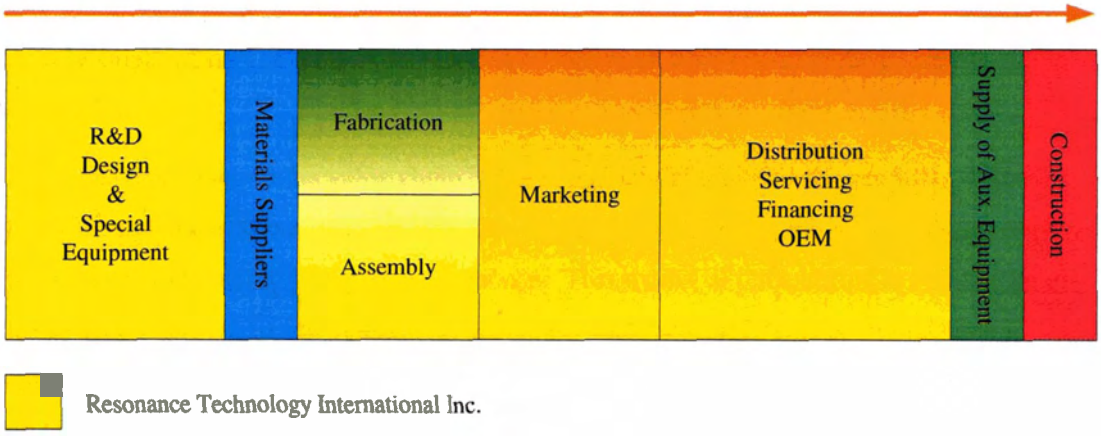


Figure 10: The Pile-Driving Industry Value chain as it applies to Resonance Technology International Inc.[28]

The Industry Value Chain described below illustrates the typical process required to bring a pile-driving product to market, from concept stage through production to marketing and distribution. It also serves to describe how the proposed interaction between the two companies

[28] Matthew Janes, "Industry and Strategic Analysis for a Start Up Manufacturing Company", 2004.

RTI and APE, will capture and exploit each company's strengths in order to extract maximum benefit and thereby challenge the competition.

Research and Development represents the first stage in the Industry Value chain and a key opportunity for differentiation. As stated previously, pile drivers are largely commodities. The product offerings between manufacturers in each category of hammer are very similar. The contractor is thus forced to choose their equipment based on network effects, branding, reputation and after-sales service. Periodically, a manufacturer designs a product that represents a technological leap forward with clear efficiency or production advantages, and the company generates enough interest to alter market share. Thus, R&D and the development of patents are very important, particularly for a new entrant into the market.

The second stage in the chain is entitled "Materials Suppliers". This competency refers to the sourcing and supply of raw materials in order for the production process to commence. As outlined in the description of the Industry structure, the raw materials are relatively abundant and very homogenous. This ensures that no one manufacturer is able to extract any advantage over other manufacturers. The only factor that might impact a manufacturer's profit margin is the ability to purchase in sufficient quantities to insist on a volume discount. The category is relatively small, as no company is required to spend much time sourcing these readily available raw materials.

The next stage in the value chain is the actual manufacture of the product. The trend within the industry is to outsource the machining of the components to local machine shops and to perform the assembly of the product in house. This model of outsourcing is typical of the industry and employs the specialisation concept for maximum efficiencies in production. Thus, a machine shop utilises their capital equipment for a variety of production applications allowing them to achieve higher volumes and a lower minimum efficient scale. Usually, a variety of machine shops are used to ensure that no one entity gains enough power to encourage a hostage situation.

The assembly of the final product is considered a secondary competency. The challenge lies in the coordination of the activities in order to ensure that the just-in-time form of inventory management takes place and that the assembly chain progresses smoothly.

Marketing is critical to the success of a company. If the contractors are not aware of the product's existence, revenue growth will stagnate. APE has been particularly successful in this arena. They incorporate high impact advertising with production claims and photographic

evidence illustrating the difficulty of the jobs. In addition, they adopt a controversial stance both in their marketing literature and their trade show presence. It is common for them to encourage "show downs" between their equipment and the competitor's to prove superiority.

Of importance, particularly to a start-up company, is the creation of a brand, one synonymous with quality and / or innovation. If executed well, the brand will permit revenues through subsequent product offerings, even if the patents on the initial product have expired and competitors are now copying it.

A key differentiator in this industry is the method of distribution. This incorporates both sales and service. It is insufficient to deliver the product to the distributor and not provide any support. Mechanical equipment, particularly equipment that is subject to extreme forces, will periodically experience technical difficulties. Given that a contractor is bidding on low-margin projects, their expectation is that the equipment is dependable. However, should the hammer falter, they insist on field support within hours, either in the form of a replacement hammer or a technician with parts on hand. So, the service aspect to the distribution channel is as important if not more important than the sales component.

This section is portrayed as the largest due to the additional functions performed here. Chief among these functions are the warehousing and distribution of parts and the provision of financing for the purchase of the hammers. The financing usually takes the form of "a lease with an option to buy", as described above.

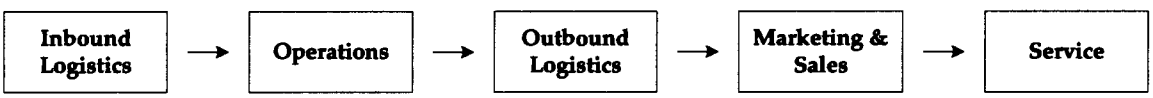
The next competency is the supply of auxiliary equipment. Due to the standardisation of power packs, leads and other auxiliary equipment, manufacturers typically produce their product with this "bolt on" capability in mind. They do not attempt to compete in this area, as it is simply not cost effective. Companies like Caterpillar are able to manufacture these auxiliary items at significantly lower costs, due to economies of scale.

The final section, entitled "Construction" refers to the application of the product's end use. This is where the contractors pursue their revenues.

4 AN INTERNAL ANALYSIS OF THE COMPANY

4.1 The Company Value Chain

Michael E. Porter first introduced the concept of a Value-Chain in his 1985 book *Competitive Advantage: Creating and Sustaining Superior Performance*[29]. The value-chain is based on the idea that each firm in an industry can be seen as comprising a chain of activities, with each link in this chain adding value to the ultimate product or service. This set of interrelated links should, if identified correctly and developed strategically, help a company to gain a competitive advantage over its competitors. The primary value-chain activities, as put forth by Porter, are shown below:



In order to determine the competitive advantage that is unique to a particular firm, one begins with the generic value-chain, depicted above, and then proceeds to identify the relevant firm-specific activities in the chain. Once they are identified, the linkages between them should be identified. A linkage exists if the performance or cost of one activity affects that of another. Competitive advantage is obtained when the linked activities are optimised and coordinated. The analysis is important because sources of competitive advantage may come from a company's ability to perform a function better than the competition and therefore not simply because a product is superior.

Porter distinguishes between primary and secondary (or support) activities in his model. The primary relates to the production and distribution processes and thus represents the core of the value creation in any company. The support activities are those activities that are deemed indispensable to the efficient development of the primary operations. The relative weight of each will differ from company to company.

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[29] Michael E. Porter, *Competitive Advantage: Creating and Sustaining Superior Performance,* (New York: Free Press, 1985).

Together with an analysis of the value-chain, it is important to determine the cost structures at each of the stages, particularly as they compare to competitors, for this allows for better decision-making. In some stages, the determining cost factor is the experience curve. In others it is economies of scale or potentially human resources. Ultimately, it is most important to uncover which factor is the most decisive in the creation of value, for it will allow a reconfiguration of the value-chain in order to reduce costs thereby potentially generating a competitive advantage.

In addition, there are also possibly differentiation drivers, which make it possible for a company to offer a product buyers consider to be somehow unique, thereby permitting the firm to charge higher prices. Examples include economies of scale, relations with suppliers or clients, learning processes or the degree of integration. These drivers should be controlled to the extent that it allows companies to offer additional value to its clients. In fact, every point of connection between a firm's value-chain and that of its clients creates opportunities for differentiating products and thus for gaining a competitive advantage.

The combination of these two drivers, cost and differentiation, contribute to the creation of value through attaining a certain scale of business, or through the difference between prices and unit costs.

The Value Chain for RTI is pictured in Figure 11[30]. The primary activities have been re-labelled as Inbound Logistics, Manufacturing, Sales, Marketing and Distribution. RTI's core competencies are coloured bright yellow and their secondary competencies are shown as pale yellow. This emphasises those areas that are considered vital for RTI to maintain its value proposition into the future and those competencies that are considered to be support activities or available for outsourcing. As described previously, the revenue model will incorporate APE as a strategic partner, particularly in the sales, marketing and distribution segments of the chain. The APE name provides instant recognition and trust within the contracting community and the joint venture is therefore strategically important for RTI. APE is shown as deep orange. Where there is a blending of colours, the implication is that there is a joint effort on that particular activity.

[30] Matthew Janes, "Industry and Strategic Analysis for a Start Up Manufacturing Company", 2004.

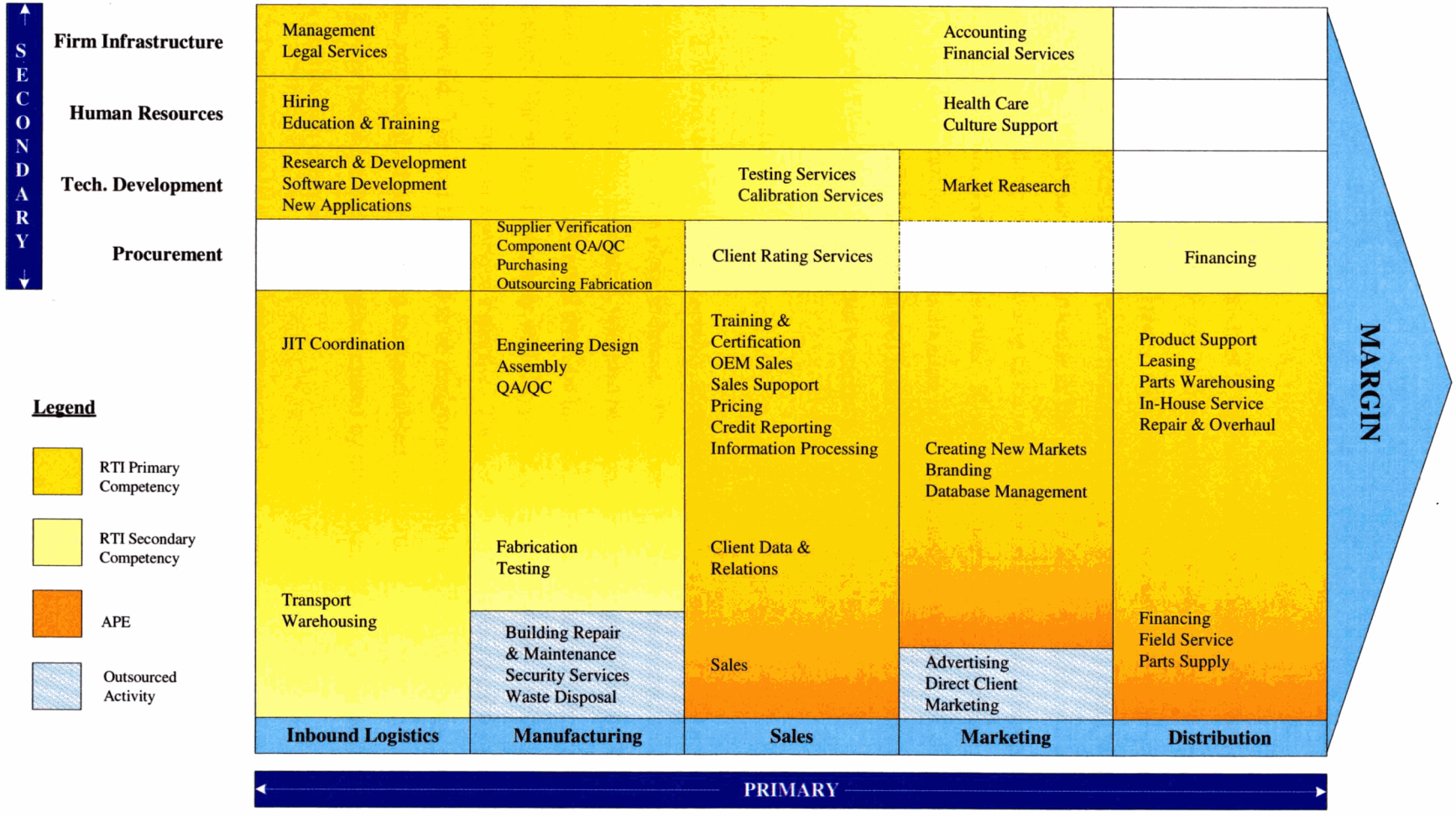

Figure 11: The Value Chain for Resonance Technology International Inc.

4.1.1 Primary Activities

4.1.1.1 Inbound Logistics

The first of the primary activities is entitled "Inbound Logistics". The Just-in-time form of raw materials inventory management is shown as a core competency and the transportation and warehousing as a secondary competency. Obviously, the successful management of the materials required for manufacturing is of critical importance to RTI. The supply chain will need to be managed exceptionally well, in particular as the machining of components will be outsourced. Success here depends upon maintaining close relationships with both suppliers of materials on the one hand and machine shops on the other. If optimum fabrication and machining procedures can be determined accurately, then coordination of the materials will be easier. A component of the interaction with materials suppliers will involve periodic quality control checks to ensure that products are of the highest grade and conform to ISO 9000 standards.

4.1.1.2 Manufacturing

The engineering design, assembly, testing and quality control of the *Revolution* hammer and ancillary parts will take place in-house. The computerised components, used to steer the hammer and control the resonance, will also be assembled and programmed by RTI. The primary reason is to maintain a tight control over the intellectual property and prevent any form of duplication. The in-house assembly will also permit the training of service personnel and the development of repair and service expertise. These skills will prove critical for product support going forward. The ancillary parts to be designed and built will include clamps and suppression systems, particularly those required for specialised applications. The "bolt on" accessories such as the power packs are presently manufactured by other companies and will be supplied through APE's distribution channel.

The functions labelled building repair and maintenance, security services and waste disposal will be outsourced to companies better able to provide those services efficiently. It is more cost effective to do so.

4.1.1.3 Sales

The Joint Venture between APE and RTI commences at this stage and the sharing of duties is shown graphically by the merging of the orange and yellow. As mentioned previously, the partnership will build up a rental pool of hammers for distribution through APE's extensive network. RTI personnel and APE personnel will be directly involved in this distribution, particularly as it pertains to the management of long-term relationships. RTI will conduct visits to contractors' sites to provide support in the form of training, updates and literature. They will also seek input regarding the operation of the hammer and its effectiveness. This information will then be fed back into the design stage to modify and enhance the product. This provides a feedback loop. Taking the information gathering one stage further, a user's group will be established on the website that will answer questions and encourage feedback. This website will also feature new applications, construction methods, safety issues, good practice tips and provide a section wherein contractors can post warnings about potential pitfalls with suppliers and clients. It is hoped that the RTI site will become an indispensable resource for the contractor and part of the daily routine for updating themselves.

RTI will create a training and certification program to augment APE's "pile-buck" training school. The contractor's field personnel will be educated in the concept of resonance and in the safe and effective operation of the *Revolution* hammer.

The supply of rental hammers to the four corners of North America will employ APE's well-established distribution channels and personnel. Rental centres will be established in strategic locations such that any contractor can gain access to them quickly and so that a malfunctioning piece of equipment can be replaced or repaired within hours. Service is key to solidifying relationships and ensuring loyalty.

4.1.1.4 Marketing

The marketing efforts will be led by APE but will be heavily supported by RTI for its product line. This product line will maintain its own brand name and model designation and be distinct from APE's line of products. RTI will produce its own product literature and advertising in support of the brand awareness. APE and RTI will rent out the *RTI Revolution* hammer through APE's channels, which will, by extension, lead to APE enhancing their brand and reputation. This will ensure that both companies gain brand equity. If RTI does not establish a brand they risk losing their market share and appeal when the patent protection expires.

Viral or word of mouth marketing will undoubtedly be the most effective form of marketing and will be the easiest to achieve when contractors see the effectiveness of the *Revolution* hammer. In addition, advertisements in industry publications and live demonstrations at trade shows will be effective at creating awareness.

The marketing campaigns will be crafted with the aid of advertising companies. This component of the value chain is shown as an outsourced activity, as the true competency will lie with the specialists. There will be a segmented market approach rather than a mass-market approach, as the hammer will only appeal to a select portion of the construction industry. Within this segment, however, RTI / APE will attempt to reach as many contractors as possible demonstrating the efficiency, effectiveness and cost saving potential of the *Revolution* hammer.

With the success of the *Revolution*, RTI will be in a position to explore other markets that would benefit from the application of resonant technology. Primary among these will be soil densification, environmental and geotechnical drilling, and oil and gas drilling.

4.1.1.5 Distribution

The joint venture will tap into APE's distribution network to reach as many potential clients in as short a time. As a start-up manufacturer, RTI must gain access to APE's distribution channels as APE has a competitive advantage here. APE has spent the last nine years establishing a national network of branch offices and distributors. Due to their coverage, their products and their support, their brand has become synonymous with quality and service. They are at the point where they can now trade on this reputation. With this infrastructure in place it would be foolish for RTI to expend resources trying to establish their own channels. With APE's endorsement of the RTI product, RTI will be able to trade on this reputation. However, as indicated previously, it is very important for RTI to create its own branding to ensure the company's success well into the future.

RTI will provide extensive product support to APE for the distribution and field support of the hammer. In addition, RTI will warehouse parts and perform all equipment servicing and overhauls in-house.

The recent trend in the industry is towards renting equipment rather than purchasing and so it is believed that the joint venture rental model is very timely. With the increasing importance of the internet for doing business, RTI / APE will complement existing delivery channels with a

web-based rental system that will guarantee on-site delivery of a hammer within 48 hours anywhere on the continent.

4.1.2 Secondary Activities

This tier of the value chain relates to support activities that are deemed indispensable for the efficient operation of the company. The four categories to be discussed are: Procurement, Technology & Development, Human Resources, and Firm Infrastructure.

4.1.2.1 Procurement

RTI will consistently need to ensure that they are buying the best quality raw materials at competitive prices and that the suppliers are able to meet the volume expectations specified. As stated, the inventory management will be critical to the manufacturing process. There will also be a need to verify the quality of the machined components outsourced to machine shops. If these components, which form an integral part of the final product, are not manufactured to the highest standards, the integrity of the *Revolution* hammer will be questionable. Given the nature of pile driving and the risks associated with that, there can be no margin of error.

Given that the joint venture will be renting hammers to contractors, there will be a need to perform financial checks on the credit worthiness of potential customers. Similarly, those contractors that abuse the equipment will be blacklisted and, wherever possible, face legal action. It is not in the interest of the joint venture to show any leniency in this regard.

Rental contracts will last anywhere from a week to a year. For clients with an established track record of dependability and a significant volume of business, an allowance for extended payment terms can be authorised. Under normal circumstances, the expectation will be for rental payments to be settled within thirty days of invoicing. On an exception basis, the preferred client may see their terms extended to sixty days after invoicing. To better manage cash flow, it is assumed that invoicing will occur monthly.

4.1.2.2 Technology & Development

RTI has identified Research & Development as its core competency and will expend significant resources on an ongoing basis to remain on the leading edge of innovation. It is felt that this is the competitive advantage that will distinguish RTI from other pile driver manufacturers and will ensure its success into the future. The excellence of the *Revolution*

hammer lies in its breakthrough technology and its ease of use. RTI will thus seek to develop additional products that are easy to use, provide flexibility, and guarantee efficiency for the end user. The desire is to venture beyond the pile driving industry and into other areas, such as soil densification and drilling, which will also benefit from the application of the resonance principle.

Periodically RTI's engineers will adapt the equipment or auxiliary components to meet very specific client needs. This, while adding value to the client relationship, will also serve as part of the on-going design process. With a process established to enable clients to provide feedback, RTI's products will be evolutionary.

Part of the process of bringing a product to market requires that certain standards of safety and performance are met. There is therefore a need for testing and calibration to take place. This has been identified in figure 11 as a light yellow activity, reflecting the possibility of some outsourcing to specialised firms.

Market research forms an integral component of any marketing plan. Although the joint venture will rely in large part on the expertise of APE, RTI will assist in this activity to some degree. Not only is it important to gauge the buying trends in the industry, but it will also help RTI determine the direction for future product development.

4.1.2.3 Human Resources

The founders of RTI are convinced that the success of the company will depend largely on people working together as a team. To achieve this, RTI will concentrate on providing a culture of excellence and personal growth amongst its employees. Determining "fit" will be critical and so a rigorous selection process must be implemented to not only uncover technical skills, but also personal, social, leadership and team skills. Once hired, an employee can expect a continuous investment in education, training and personal development. "Remuneration will be tied to productivity and the attainment of career and personal goals"[31]. RTI's success will ultimately depend on the quality of its managers and engineers and their ability to make quicker decisions than the competition.

4.1.2.4 Firm Infrastructure

Firm infrastructure incorporates the under-lying activities required for the efficient day-to-day operations of the concern. Of note is the activity labelled "Legal Services". There will

undoubtedly be attempts to infringe on the RTI patents when the competition sees how compelling the technology really is. This will require assertive responses from RTI in the form of cease and desist orders and legal challenges. It will be extremely important for RTI to send a strong message when necessary. This will require staff to monitor the industry for infringements and legal counsel to quell any infringements found.

4.2 Strategic Implementation

4.2.1 Product Development Strategy

The prototype *Revolution* hammer is presently being constructed in Australia by Resonance Technology PTY and will be ready for deployment in August 2004. The unit will operate at 350 Hp. It is essentially a scaled up version of the minesweeping devices being sold globally by Resonance Technology PTY. There are, however, some modifications that have been designed specifically for the pile-driving application. These include the electronic feedback management system, which will control resonance as the hammer drives a pile into the ground, and the clamp required to fasten the hammer to the pile. Both of these applications are new technologies and they will be patented in the near future.

The hammer uses a conventional diesel power pack. The power pack, available from numerous construction equipment manufacturers, will incorporate a bolt-on specialised hydraulic pump. This pump will be employed to drive the *Revolution* hammer, as described earlier.

The product development timeline is pictured in figure 12. The final testing of the prototype will take place shortly after its arrival in Vancouver, in September 2004. Although testing will have been completed in Australia prior to shipping the hammer, there will be a need to conduct further local testing. At this time, RTI will source machine shops in the Vancouver area that will be able to handle the manufacture of the machined parts and the volumes projected. There is a good supply of such businesses in the local area and it is anticipated that contracting a minimum of two shops will be strategic. The reasons are to avoid a potential "hostage" situation, to ensure that prices remain competitive, and to prevent bottlenecks from occurring when the demand for the hammer is high. The design of the hammer lends itself well to this approach to manufacturing as the majority of the parts will be machined from seamless tubing and can thus be turned on conventional lathes. There are no cast parts. The assembly will be performed by RTI

[31] Personal conversation with Matthew Janes, 2004.

in order to maintain ultimate control over the process. Each hammer will be serialised with information specific to that unit, such as part's batch numbers, personnel involved, machine shop used, and test results. Any subsequent service or maintenance to that particular unit will be tracked under the same job number. It is felt that this closed feedback loop will ensure that the highest standards of quality will be achieved.

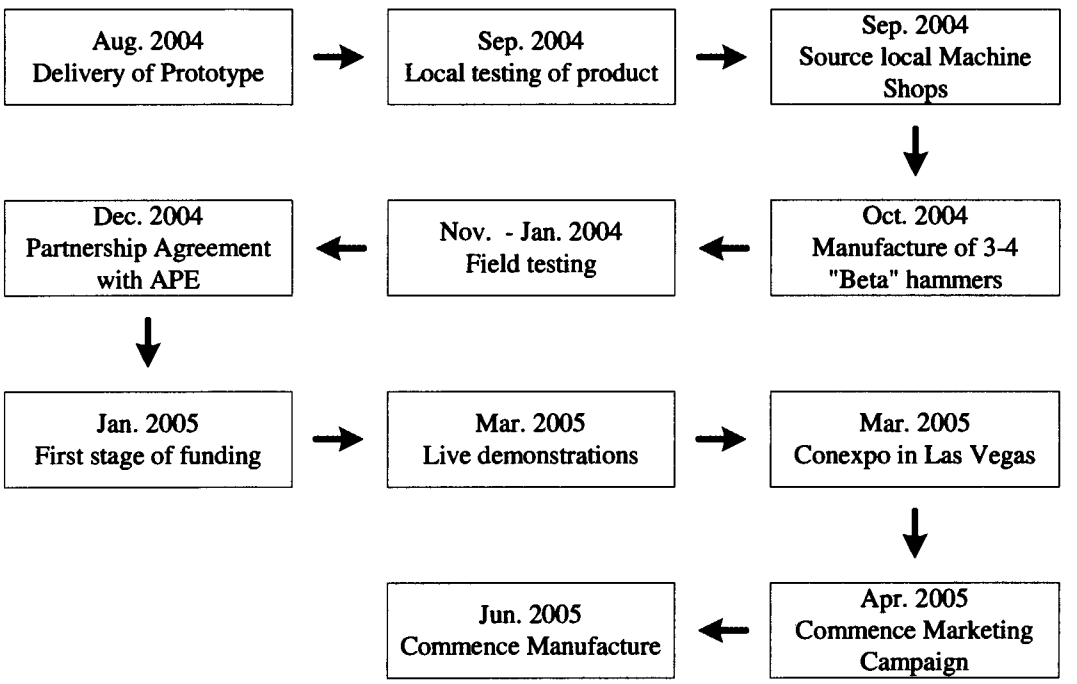

Figure 12: Product Development Timeline for the Revolution Hammer

Between October and December, three or four "Beta" hammers will be manufactured locally. These hammers will be placed with companies that have already expressed an interest in testing them. One of these companies is APE. This testing period, anticipated to commence in November 2004, will satisfy APE's stipulation to see the product's capabilities before creating the partnership with RTI. Field-testing will ideally take place in the Pacific North West. This is due to the diverse mix of soil layers and bedrock found here and it will permit proper testing of all facets of the beta units. It is anticipated that the joint venture will be formed in December 2004.

Prior to commencing production of the hammer, RTI will seek to finalise the early stage financing. The preferred source would be Resonance Technology PTY but RTI has already

established contact with local Angel investors to engender interest. It is anticipated that this financing will take place in January 2005.

In March 2005 RTI will participate with APE as exhibitors at the CONEXPO CON/AGG Trade show in Las Vegas. This is the world's largest international gathering for the construction and construction materials industries in 2005. Conexpo will showcase the latest equipment, services and technologies. According to the website[32], there will be over 2,300 exhibitors covering more than 1.85 million square feet of exhibit space. This represents a perfect opportunity to showcase the *Revolution* hammer. Following the tradeshow, RTI will commence site demonstrations at strategic locations throughout North America. This will be an on-going process and will lead into the start of the comprehensive marketing campaign in June. Production is expected to begin in July 2005.

4.2.2 Distribution Strategy

The concept of a joint venture was formulated as the most efficient means of tapping into a widely dispersed network of contractors. APE has been selected as the strategic partner for the joint venture due to the organisational fit between the two companies. APE is very highly regarded within the industry, has a well-established network and distribution channels, and is service oriented, motivated and well capitalised. RTI, on the other hand, possesses revolutionary technology and will sell the hammers at a significant discount to the joint venture. APE, through the venture, will participate exclusively.

The idea of an equity partner is loosely based on a blend of the Japanese *Keiretsu* and the Korean *Chaebol* forms of business structure, in which a grouping of affiliated companies form a tight-knit alliance to work towards each other's mutual success. The companies can be vertically or horizontally integrated and sometimes hold an equity stake in the other companies. The joint venture will be established to create synergy between RTI and APE.

RTI will manufacture the hammers and sell them at a discount to the RTI / APE Joint Venture. Existing hammers that are comparable in size to the 350Hp *Revolution* hammer command an average price of US$ 115M. If a power pack is added this price rises to US$ 225M. With the efficiency gains of the *Revolution* (see table 1) on the order of roughly 40%, the hammer will be priced at least 40% higher than comparable hammers, or US$ 160M. RTI will initially sell the hammer to the joint venture for US$ 130M. The joint venture in turn will build up a pool

[32] CONEXPO – CON/AGG Website [online], 2004.

of rental hammers and distribute these hammers throughout APE's network at close to the industry average rental cost of US$ 19,000 per month. Given that the *Revolution* hammer will save the contractor a minimum of approximately US$ 1,250 in crew costs per day (see table 1), they will save roughly US$ 27,600 *per month* (based on a 22 day month) after allowing for rental costs.

RTI will also sell a smaller version of the *Revolution*. It will generate 50Hp and will be sold in small quantities for approximately US$ 50M per unit.

The joint venture, as distribution partner to RTI, will be contractually obligated to provide a clearly defined level of support and service to the end user. In addition, performance metrics will be imposed on both the joint venture and RTI for two reasons. The first is to determine the success of the hammer and assess the effectiveness of the marketing campaign. Both parties will be measured against quarterly and annual deliverables such as sales revenues, inventory turnover and service revenues. The second reason is to measure the adoption rate in the market place and determine the direction of follow-on products. RTI will allocate approximately 15% of sales to R&D. This is considered a core competency for RTI and the emphasis will be on enhancing patents on the hammer for continued protection and developing new products for resonance inspired applications.

The proximity of RTI in Vancouver and APE in Seattle will prove beneficial from a logistics standpoint. In addition, both locations are port cities and are well served by the trucking industry. RTI will initially rent a small warehouse with a testing yard. Within two years RTI will move to larger premises that will be able to accommodate the production, warehousing and handle future expansion. At this stage there will be an electrical shop, a machine shop, a receiving and shipping area, a testing space, warehousing capabilities and administrative offices.

Inventory management will be critical to the success of the two ventures. An unmanaged supply chain can become very unstable and even lead to a phenomenon known as the "bullwhip effect"[33]. The principle here is that demand variability increases as one moves up the supply chain away from the consumer. Small changes in consumer demand can result in large variations in orders placed higher up in the supply chain, as each supplier seeks to solve the problem from their perspective. Such things as delay times for information and material flows, demand forecast efficiencies, and an overreaction to backlogs can cause this effect. The given model for RTI and the joint venture should hopefully reduce these sorts of supply problems. RTI will supply the

[33] Quick MBA: The Bullwhip Effect [online], 2004.

hammers for the rental pool directly to the joint venture, and the joint venture should have a very keen sense of the demand for the hammers. The feedback from the joint venture and constant monitoring of economic leading indicators should allow a fairly accurate forecast of the number of hammers that must be manufactured. With the input materials in reasonably plentiful supply, RTI can hopefully avoid the need to stockpile inventories. The emphasis will thus be on procuring input materials on a just-in-time basis, in order to prevent tying up too much cash flow in inventories.

When the hammers are complete and ready for delivery, they will be shipped FOB[34] to the partner. This is fairly standard in the industry.

4.2.3 Marketing Strategy

The major marketing management decisions are based on a combination of price, product, place (distribution), and promotion. The firm should try to garner a positive response in the target market by mixing these four variables in the best combination. These four categories are referred to as the "Four P's of Marketing"[35].

Pricing decisions must consider all aspects of the pricing equation for the product, such as the product's overall profitability and the likely response from competitors. This includes the consideration of whether to offer discounts and / or leasing options. Product refers to the product or service to be sold and includes decisions on appearance, function, packaging, service, and warranties. Place, or distribution decisions are concerned with which distribution channels to use to get the product to the target market. The decisions include market coverage, channel motivation, logistics and what level of service to provide. Finally, Promotion decisions relate to the process of getting the message out to the potential buyers, in an effort to convince them of the desirability of the product. Examples include advertising, personal selling, and public relations.

The product's life cycle is critical to the decisions of what the optimal blend for the "four P's" will be. Typically, a product will progress through the four stages as shown in figure 13.

In the Introduction stage, the company seeks to build product awareness and develop a market for the product to be sold. Here, the product branding and quality level is established and patents or other forms of protection have been obtained. The pricing could either be low in order

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[34] Freight On Board - A trade term requiring the seller to deliver goods on board a vessel designated by the buyer. The seller fulfils his obligations to deliver when the goods have passed over the ship's rail. - *Investopedia.com* [online]

[35] QuickMBA.com: The Marketing Mix (The 4 P's of Marketing) [online], 2004.

to penetrate the market and gain market share or high, to skim the market and try to recoup some of the R&D costs. The distribution is selective until customers accept the product and the promotion attempts to build product awareness and educate potential customers about the product.

In the growth stage, the company is looking to build market share and create a brand preference. New features might be added to the product in order to add value to the customers. Pricing is maintained, as the company is under little threat of competition. As the acceptance of the product grows, the variety of distribution channels increases, and the promotion is aimed at a much larger audience.

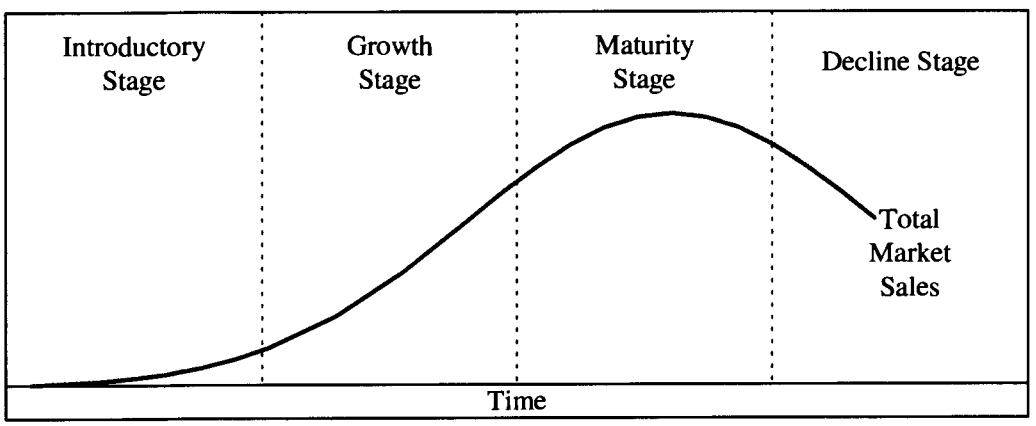

Figure 13: The Product Life Cycle[36]

At maturity, the strong sales growth peaks and then starts to wane. This may be attributable to an increase in competition from other companies with similar products, or new technologies. The company's primary objective here is to defend their market share while maximising profit. In order to do so, the firm might further enhance the features of the product, promote the differences, and / or reduce the price to discourage the competition. In addition, the distribution can become more intense and incentives may have to be offered to retain the customer base.

In the decline stage the company really has only three options; maintain the product, harvest the product or completely discontinue it.

[36] The Product Life Cycle, QuickMBA.com [online] 1999 - 2004

For a new company, such as RTI, seeking to enter an industry, there are four entry strategies to consider. These are shown graphically in figure 14 below.

Slow Skimming is the least pre-emptive strategy and is relatively inexpensive. It can be employed when there is patent protection to prevent competition from developing. Typically the price is set high and there is a fairly low level of promotion, as the market is already aware of the technology or product.

Rapid skimming is more pre-emptive and involves both a high price and a high level of promotion. The market is usually unaware of the product and so the promotion leans towards an aggressive approach. The market tends to be relatively price insensitive and the company is generally seeking to create first mover advantages in the branding of the product.

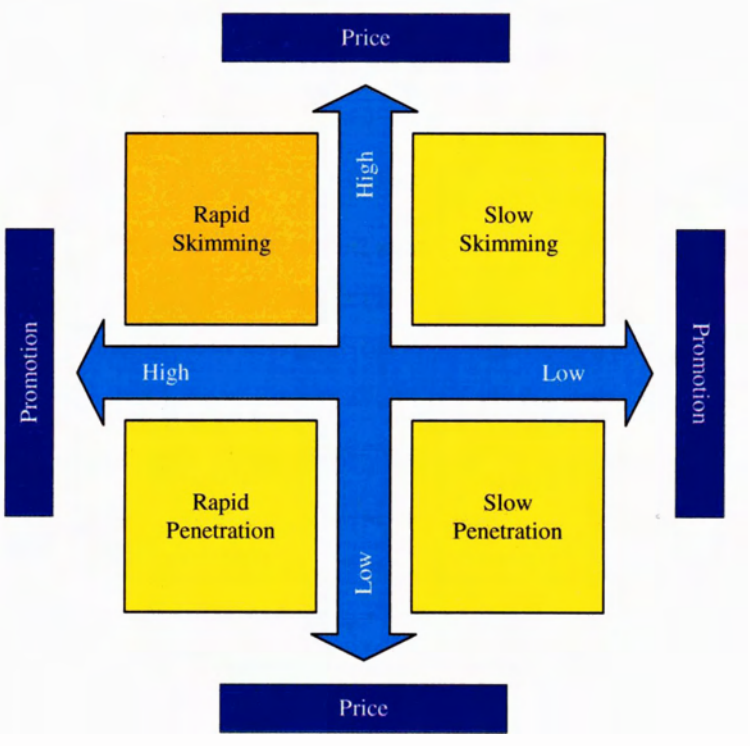

Figure 14: Entry Strategies for a New Firm[37]

Slow penetration occurs when the price is kept low and the level of promotion is low. The market is aware of the product and is price sensitive. The company adopting this strategy will seek to achieve a first mover advantage due to their pricing.

[37] Derived from: Marketing Strategy, QuickMBA.com [online] 1999 – 2004.

Finally, Rapid Penetration is employed when the market is unaware of the product and quite price sensitive. The product is highly promoted but sold at a low price. This is a fairly bold pre-emption strategy and is costly if it fails.

In general, products tend to be clustered in the Rapid Skimming or Slow Penetration categories. If a product starts off in a mixed category it will ultimately move to either Rapid Skimming or Slow Penetration, depending on the type of product.

The *Revolution* hammer will adopt a rapid skimming strategy in an effort to build brand recognition for RTI in a market that is relatively price insensitive. Although the market is "aware" of pile-driving hammer technology, they have not yet seen the *Revolution* hammer. The belief is that when the contractors discover the efficiency gains and daily crew cost savings possible with this hammer, they will be compelled to use it, even if the rental costs are relatively high. This is especially true if they are able to realise a minimum net savings, after the hammer rental, of approximately US$ 27,000. The best method for introducing the hammer to the industry appears to be through a high level of promotion.

RTI's hammer will be promoted using the avenues shown in figure 15.

The *Revolution* hammer has been named to identify the revolutionary capabilities of the technology and to emphasise how it will impact the industry. It is felt that the name will appeal to the American sense of identity and will therefore help with memory recall. It will be positioned as the new standard for equipment reliability and efficiency, and this message will be delivered consistently through all forms of marketing.

The field demonstrations will probably be the most effective form of promotion for an industry that has a "put your money where your mouth is" attitude. It will not be possible to argue with the facts when the *Revolution* hammer drives piles at a faster rate and in more types of soil than the competition. These demonstrations will take place at select sites around North America and at specific trade shows, where the audience will be larger. There are over fifty shows per year and so RTI / APE will have to be discriminating to ensure that they spend funds wisely. The first large show will be the CONEXPO - CON/AGG in March 2005 with over 2,300 exhibitors. The world's largest show is the BAUMA, which will be held in Munich, Germany in April 2007 and is projected to have over 2,800 exhibitors and in excess of 500,000 visitors. It is believed that viral (or word of mouth) marketing will be the best form of promotion for the hammer and for RTI.

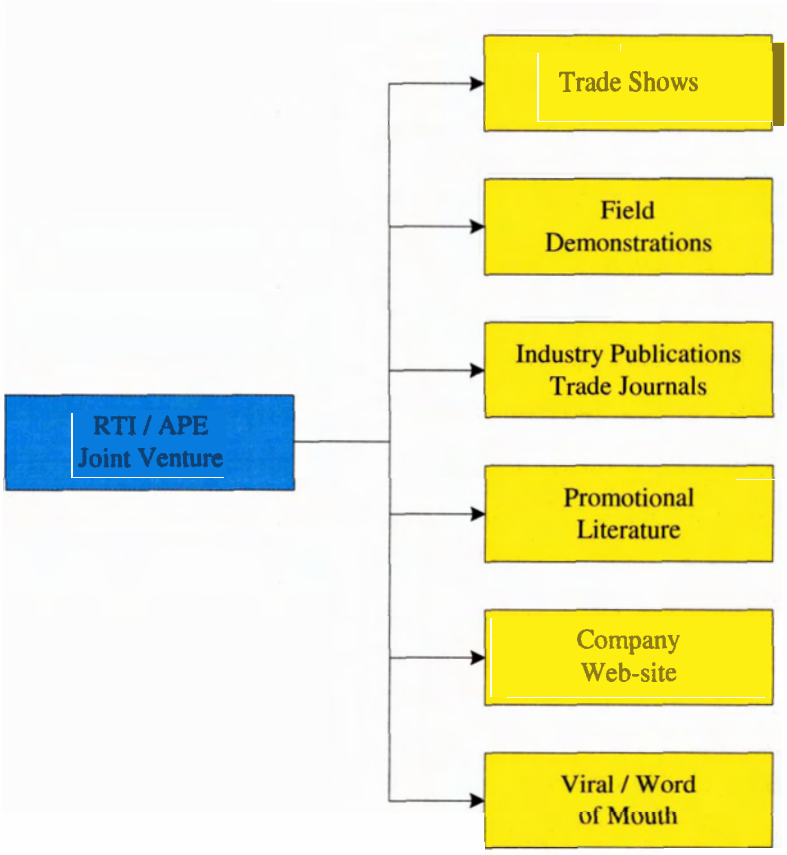

Figure 15: The Avenues for Promotion of the Revolution Hammer

RTI will advertise in a variety of industry publications including *Foundation Drilling* magazine, which is published eight times per year and is considered the best news source for the industry. RTI will also seek editorial coverage in this publication and others. In fact, RTI and its founder, Matthew Janes, have already been featured in the *Globe & Mail,* the *National Post,* and *Business in BC.*

RTI will control the promotional materials to ensure consistency and high quality. They will also build a web site, as discussed earlier, to convey the same messages to the industry at large. A comprehensive approach appears to be the best way to ensure that a rapid skimming strategy works.

5 THE FINANCIAL ANALYSIS

The revenue model presented describes two companies, RTI and a joint venture between RTI and APE, where RTI manufactures the *Revolution* pile-driving hammer and the Joint Venture rents them to contractors. This scenario has been developed based upon preliminary discussions with APE and is compelling from a net income standpoint, as I will demonstrate below. However, in an effort to plan for all contingencies, I will also describe a scenario in which the hammers are sold by RTI, rather than rented through a Joint Venture. This scenario would still require a distributor, operating under an exclusive license in North America. The preference would be for APE to remain involved. However, the relationship between the two companies would be at arm's length. The assumptions made to derive the projected financial statements in the two models follow.

For the sake of ease, I will actually refer to three models; the "Sales to Joint Venture" model, the "Joint Venture" model, and the "Direct Sales" model. It is important to realise that the first two are actually part of the same revenue proposal, as has been described thus far. Each model will be analysed based on their merits as standalone companies. However, the premise is that RTI as a supplier to the Joint Venture will participate in 50% of the revenues of the Joint Venture. Rather than complicating matters here by introducing a fourth model (which is really only an extension of the "Sales to Joint Venture" model), I will only explore this model in the next chapter when I attempt to determine the company valuations.

5.1 Assumptions for RTI as a Manufacturer (Sales to Joint Venture)

5.1.1 Income Statement Items

Please see Appendix G for the projected Income Statement and Appendix H for a graphical portrayal of revenues, profit and net income.

5.1.1.1 Cost of Goods Sold

RTI will manufacture two types of resonance hammers, a 50Hp unit and a 350Hp unit. The smaller unit will be manufactured and sold by RTI in comparatively small numbers. At this

stage, a small number of companies with specialised pile-driving requirements have been identified as the principal customers. The cost of manufacturing this hammer will be US$ 28M. The larger unit will be sold to the APE/RTI joint venture for placement in the rental pool. The largest component of the revenues will be generated with this unit and its cost of manufacture is projected to be US$ 80M. The manufacturing cost of either unit is assumed to remain constant over the 8 year forecast period. The reason is that although experience and economies of scale will contribute to the reduction in manufacturing costs, inflation will cause prices for inputs to rise. The assumption made is that these two counter-acting forces will cancel each other out. Incorporated in these costs are such items as the raw materials, the costs associated with machining components in independent machine shops, and the labour required to assemble the hammers in-house.

Although the *Revolution* line of hammers are designed with few moving parts and are expected to last longer and suffer from fewer breakdowns, any machinery that is subjected to high accelerations and/or forces will experience some mechanical problems within its lifetime. A component of RTI's business model therefore incorporates parts revenue. The costs, which are based on the level of sales, assume a 250% mark up. In other words, 40% of the revenue is attributable to the cost of the parts.

5.1.1.2 Selling, General and Administrative Expenses

A small component of total revenues will be derived from consulting. This will take the form of minor engineering projects commissioned by clients to customise equipment for application in extraordinary circumstances, and to develop new parts or configurations for them. The costs are included under the *Engineering* sub-category of SG&A. This category also comprises any re-engineering of parts that is required to enhance the design of the hammer. The engineering category is based on the value of COGS and applies a percentage ranging between 5% and 8%. COGS is used as it represents the cost of the hammers in any one period rather than the revenues. The greatest percentage is applied in the early stages when it is anticipated that the incidence of problems will be greatest, and then gradually declines over time. (Please refer to Appendix D for a detailed schedule of the percentages applied for each category of SG&A).

Sales costs incorporate expenses such as the training of personnel, the costs associated with distributing the hammer, and marketing costs. As the chart shows, the rate is initially set at 2% but quickly jumps to 5% of period sales. This expense rises from approximately US$ 12M in 2005, when the company is just getting under way, to approximately US$ 2,750M in 2012. The

bulk of these expenses will be spent on marketing costs, which RTI will share with the joint venture.

Disbursements incorporate courier costs, the costs related to maintaining a web presence, photographs and the costs associated with setting up and running a sales booth for the conferences / trade shows. These costs are projected to be 1% of the Cost of Goods Sold in each period.

Research & Development, as identified previously, is considered to be RTI's core competency. The expenditure in this area is projected to be relatively high, increasing from 6% to 15% of sales over the period. This amounts to roughly US$ 8MM in 2012 and is considered reasonable, particularly given that RTI is aiming to derive applications of resonant technology for other fields.

Legal expenses are projected to start at 7% of COGS and then gradually decrease to 0.60%. Registering patents, enforcing patents, writing contracts, dealing with liability issues, and structuring debt or equity instruments, will all be included under this heading. With projected expenses of approximately US$ 150M in 2012, this is considered reasonable.

Administration is projected to be a fairly sizeable expense, commencing at 10% of COGS and rising to as high as 13.50%. This is largely attributable to the costs associated with leasing the office and warehouse space that RTI will occupy. In addition, this category includes such items as general office administrative expenses, office equipment and utilities.

Travel has been planned at a steady 2% of COGS. With the support of the hammer being an integral part of the service proposition, it is anticipated that the travel expenses will be relatively significant. In addition, the association with Resonance Technology PTY in Adelaide will necessitate regular trips to Australia.

Bad Debts are projected, at 1% of Sales, to be on the conservative side. It is anticipated that if RTI sells the hammers to the Joint Venture, then there should be no bad debts. There is, however, the possibility that companies purchasing parts or consulting services do not pay.

The *Interest* expense is derived using a simple interest calculation at 9%. Although the prime interest rate at the major chartered banks in Canada at the time of writing is only 3.75%, and a company such as this might reasonably expect a term loan to be priced at approximately Prime plus 2.0%, the rate used is designed to be conservative. Interest rates will almost certainly rise over the projected time horizon. The principal payment is calculated by dividing the amount borrowed by an amortization period of 10 years, or 120 months. The calculation for a fixed term

loan is used for the sake of simplicity and for projection purposes. In reality, RTI would apply for an Operating loan (otherwise known as a line of credit) with no fixed terms of repayment. The only stipulations with an operating loan are that the balance be revolved to zero at least once a year and that the balance never exceeds the lower of the established limit and the calculated margin. The margin is typically based on 75% of Accounts Receivable and 50% of Inventory.

Office Expenses comprise all salaries for administrative personnel. Specifically, there will be clerical staff for Accounts Payable, Accounts Receivable and the front office. Over time, the number of staff will gradually be increased to accommodate the increased sales activity and to match the complexity of the business. The projected salaries are charted in Appendix E. Also shown here are the projected base salaries for the Management officers. Here too, the number of officers and variety of positions increase over time as the business grows. These are base salaries and bonuses will be paid based on individual performance and the profitability of the operation. Initially, the President and an Engineering manager will steer the company through the testing of the prototype, the building of the beta units, and the development of the business model to a point of full-scale production. Please note that where a fraction of a body is shown it implies part-time involvement. This is not to say that people will not be involved until shown but rather that they will not be placed on the payroll until shown. Thirty-three people will be employed in either a managerial or administrative capacity by 2012, at a total cost of approximately $3 million. The company will also employ people in the machine shop to assemble the hammers and machine parts. Their salaries are captured in the cost of each hammer.

5.1.1.3 Non-cash Expenses

Depreciation of the tools and dies required for assembly and depreciation of the prototype has been factored into the projections at 30%. This figure is equivalent to the Canada Customs & Revenue Agency's (CCRA) allowable capital cost allowance (CCA) for classes 43[38] and 38[39], respectively. The reason that the CCA rate is being utilised is to simplify the projections by

[38] Defined as "manufacturing and processing machinery and equipment acquired after February 25, 1992 that is used in Canada primarily to manufacture and process goods for sale or lease". Edmonton Chartered Accountants - Business, Tax, and IT Information and Advice - CABusiness advisor.com [online].
[39] Defined as "Most power-operated movable equipment acquired after 1987 used for moving, excavating, placing, or compacting earth, rock, concrete, or asphalt". Edmonton Chartered Accountants - Business, Tax, and IT Information and Advice - CABusiness advisor.com [online].

eliminating the need to calculate deferred taxes. Similarly, the patent is amortised using the CCA rate of 25% for class 44[40].

5.1.1.4 Revenues

In this model, both hammers will commence selling in 2005. The small pile driver will cost US$ 46.9M and the larger hammer will be priced at US$ 133.9M. The assumption is that inflation will remain constant at 3% and the price of both hammers is thus adjusted annually by the rate of inflation. The smaller hammer, as indicated previously, will be sold into the market by RTI and the large hammer will be sold to the joint venture at a discount. The annual projected sales of both hammers are shown in Appendix F.

Parts revenue is calculated by applying a multiplier to the previous period's sales of both hammers. The multiplier starts at 2.25% and then increases by 2.25% every quarter. Thus in period 2 the previous period's sales are multiplied by 2.25%. In period 3, period 2's sales are multiplied by 4.50% and so on. The assumption is that the demand for parts will rise as the number of hammers sold increases, and as those hammers age.

The income derived from consulting is calculated by multiplying hammer sales and parts revenues by a predetermined factor. This commences in the third quarter of 2005 at 3.50% and then gradually declines to 1.50% of revenues. In Q3 2005 this is US$ 5M and in Q4 2012 it amounts to US$ 209M.

5.1.1.5 Taxes

The Canadian Corporate tax rate for income earned in excess of CDN$ 300M is 35.62%. We have planned for this rate going forward. With the trend toward lowering corporate rates considered, this may overstate the amount of tax that RTI must pay over the projected period. However this would only lead to a more conservative estimate of earnings.

5.1.2 Balance Sheet Items

Please see Appendix I for the projected Balance Sheet.

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[40] Defined as "Patents and licenses to use patents for a limited or unlimited period that the corporation acquired after April 26, 1993". Edmonton Chartered Accountants - Business, Tax, and IT Information and Advice - CABusiness advisor.com [online]. Edmonton Chartered Accountants - Business, Tax, and IT Information and Advice - CABusiness advisor.com [online].

5.1.2.1 Current Assets

Of note here, other than the trading accounts, is the category entitled *Prepaid Expenses.* This reflects insurance costs of US$ 30M per year, which reduce by US$ 7.5M per quarter. A preliminary investigation leads to the conclusion that this amount may overstate the premiums initially, but will probably be accurate as the projections approach 2012.

5.1.2.2 Trading Accounts

Accounts Receivable are projected to be collected within sixty days. RTI will sell to the joint venture and so the collection of receivables should not be an issue. This permits the joint venture to utilise their cash for approximately two months prior to settling the invoice for a particular order of hammers. On the other hand, it requires RTI to delay the completion of their cash cycle by the same period. Considering the lengthy payment terms common to the industry, 60 days is actually a reasonable collection period.

Inventory is assumed to consist of parts for sale and Work-in-Progress (WIP). Specifically, parts are projected to comprise 5% of the next quarter's COGS and WIP 25%. The inventory conversion period thus approximates 30 days. Having too much inventory on hand has a tendency to cause cash flow problems as cash is needlessly tied up. If RTI manages their supply chain well, and is able to approximate "just-in-time", then inventory levels should drop even further than projected.

Accounts Payable represents an interest-free loan from a company's suppliers. Typically, a supplier will grant credit terms in an effort to entice their customer to pay sooner. If the customer is cash rich, they would be wise to take advantage of the discounts being offered as a reduced price increases profitability. However, the longer a company is able to delay payment to the supplier without becoming a credit risk, the more those funds are able to work for the company. RTI is projecting an Accounts Payable deferral period of approximately 26 days in the long run. Although the industry leans towards 90-day terms, paying these accounts sooner will only become possible as RTI becomes cash rich.

The Cash Conversion Cycle, defined as the time that it takes for cash to be converted to inventory, then to accounts receivable and finally back to cash, is also known as the Operating Cycle. For RTI, in this model, the cycle commences at 106 days and is gradually reduced to approximately 63 days in 2012. This confirms the projection that efficiency improvements will occur the longer that RTI is in business.

5.1.2.3 Long-term Assets

The item listed as *Machinery & Equipment* shows the original value of both the Prototype and the Tool & Die. These are broken out as US$250M for the prototype, and US$ 100M for the Tool & Die required for the assembly of the hammers. The net book value of this equipment is calculated by subtracting the accumulated depreciation from the original values. Thus, in 2012 the net book value is US$ 21.41M.

The *Rental Fleet* in this model incorporates the four beta hammers manufactured in the fall of 2004. They are originally built to permit longer-term field tests, as described above, but will ultimately be placed in a small pool for occasional rentals.

The Patent shows on the balance sheet under the heading *Goodwill & Other Intangible Assets.* It is brought into RTI under license from Resonance Technologies PTY at US$ 500M and is amortised at 25%.

5.1.2.4 Current Liabilities

Income taxes payable show the balance owing from the previous period's assessment and are paid within 90 days of the end of the fiscal year. As mentioned previously, there are no deferred income taxes as the depreciation and amortisation rates have been selected to match the CCA rates as outlined by the *Canada Customs and Revenue Agency.*

5.1.2.5 Equity

The Owners' investment into RTI is listed on the balance sheet under *Common Shares.* The initial investment of US$ 850M is required to license the patent, manufacture the prototype, purchase the tool & die for the assembly of the hammers, and set-up the office. *Preferred Shares* will be issued to the investors that fund the operation up to 2008. This amounts to US$ 1,200M and will come from one of the investor groups described in the next chapter.

In 2008 RTI should be able to approach a Schedule "A" bank for an operating line. RTI will have been in existence for three years at this point, and should have at least one year of positive net income to show the bank. In the long run, bank financing will be preferable to private financing, as the Bank will not demand an equity stake. It is projected that an operating line of US$ 500M will be sufficient to fund the operation from 2008 onwards.

5.1.2.6 Tangible Net Worth

Tangible Net Worth (TNW) is defined as equity less intangibles such as goodwill, copyrights, patents, and trademarks. It is a good measure of the value of a company in a liquidation scenario, when intangible assets might not have any value. As can be seen from the projected balance sheet, RTI's TNW quickly rises to approximately US$ 23MM in just 8 years. In fact, the average annual increase is 55%, which represents exceptional growth. However, if the technology is as revolutionary as believed and the adoption rate is as high as anticipated, then the growth is not unreasonable.

5.2 Assumptions for the RTI / APE Joint Venture

5.2.1 Income Statement Items

The projected Income Statement for the Joint Venture is shown in Appendix O and the revenues, profits and net income for the 8 projected years are shown graphically in Appendix P. In many cases the assumptions made are similar to those for RTI as a manufacturer. The principal distinction is that the revenue generated is derived from renting the hammers that were purchased from RTI, rather than selling them. Although there is a large requirement for capital in order to acquire the rental pool of hammers, the revenue model is lucrative as each hammer generates an annuity almost immediately. Within approximately 7 months a hammer is paid for (9 months if one factors in the cost of the power pack) and, save for some maintenance costs, for the rest of the hammer's useful life it generates pure profit!

The rental price of the hammers is assumed to be US$ 20M at the beginning of 2005. At the time of writing, average rental prices are in the range of US$ 14M for a regular impact or vibratory hammer. As the *Revolution* will only be available to be rented, and as the technology will save a contractor on the order of US$ 27M per month, the planned pricing appears appropriate. This is particularly true when one considers that the rental hammer is delivered with a power pack and a hose assembly. The expectation for long-term inflation rates to approximate 3% leads us to plan a 0.75% increase in the rental price per quarter. In the first quarter of 2012 the price will thus be US$ 24.68M. Another assumption regarding the rental revenues is that only 80% of the fleet is rented out at any one time. Some hammers will require repairs and all rental returns will require cleaning. In addition, the demand for hammers might drop off as a result of seasonality or in the case of an economic slump. On average, 80% utilisation appears reasonable.

Finally, commencing in 2010, the size of the existing rental pool is gradually reduced by approximately 2.5% per quarter. This is to allow for obsolescence. With an expected life of approximately 10 years, it may seem premature to commence this gradual reduction of the pool after only 5 years. In actual fact it probably is, but the worst that can happen to our projections as a result is that we *underestimated* the revenues. Please refer to Appendix N for an estimate of the annual rental revenues.

Consulting income also forms a part of total revenues, but at approximately 1.5% in 2012 it represents a very small component. There are no parts sales in this model. Rather, parts are purchased from RTI whenever a hammer requires repair.

Most of the expenses for the Joint Venture have been projected to be similar to those for RTI, described above (see Appendix M). This includes the office staff and management salaries. In fact, the total staffing complement is anticipated to be identical to RTI. Of note, however, is the fact that the Joint Venture will not spend any funds on Research & Development. As indicated, that is RTI's core competency. Instead the Joint Venture will utilise its strengths in marketing and distribution to place the rental hammer within reach of any contractor in North America.

Legal expenses are the only other category that differs from RTI. The expenses have been planned lower as there should not be a great need for excessive legal planning. The expenses have been projected to commence at US$ 25M and rise over time to approximately US$ 80M.

As can be seen from the projected Income Statement, the numbers are fairly compelling. With revenues in 2012 of US$ 163MM, gross profit of US$ 142MM and a net income of US$ 60MM, it confirms how lucrative this revenue model really is. With a good tax accountant it may be even more so!

5.2.2 Balance Sheet Items

The projected balance sheet is shown in Appendix Q. Noteworthy is the fact that all long-term assets are reflected in the value of the rental pool. There is no prototype, no tool & die and no patent to show. The rental fleet comprises the hammers, the power packs and the hoses which by 2012 has an acquisition cost of US$ 193MM and a net book value of US$ 79MM. This represents 45% of the company's total assets. The remaining 55% is primarily cash and accounts

receivable. This is an excellent position to be in, especially considering that total liabilities only amount to US$ 19MM.

5.2.2.1 Trading Accounts

In much the same way as for the RTI revenue model, Accounts Receivable will be collected in an average of 62 days. The Inventory conversion period is predicted to be around 11 days, and the Accounts Payable deferral period approximately 6 days. This implies that the cash conversion cycle at 67 days is actually very similar to the 63 days in the RTI scenario. Due to the low level of COGS and the relatively low level of Accounts Payable, the respective conversion and deferral periods are comparatively low (please see Appendix AC for an explanation of the formulas employed to calculate the ratios).

5.2.2.2 Equity

In order for this model to remain funded, there will need to be fairly significant injections of capital in the early stages as the company builds up its rental fleet and approaches the point where it is self-sustaining. The owners will need to inject US$ 500M in the 4th quarter of 2004 and outsiders, whose investment is listed as *preferred shares*, will need to invest US$ 1MM at the same time. Thereafter, US$ 2.5MM will be injected in 2006, US$ 3.0MM in 2007, US$ 4.5MM in 2008, and US$ 3.5MM in 2009, for a total of US$ 14.5MM. Considering the projected growth of the company, the investment is relatively small. The company, after two years of positive net income, will approach the Bank for financing in the amounts of US$ 6.5MM in 2008 and US$ 6.0MM in 2009.

5.2.2.3 Tangible Net Worth

The TNW is projected to rise from US$ 1.5MM to roughly US$ 160MM in the 8 years shown. This is based on a very significant value for total assets with relatively small total liabilities. The growth averages an astounding 87% per annum!

5.3 Assumptions for RTI as a Manufacturer and Distributor (Direct Sales)

As mentioned previously, this model is examined for comparison's sake. The premise is that RTI manufactures the hammers and then sell them to contractors around North America. The

model operates on the premise that APE will still be involved, but in the capacity of sales agent with exclusive rights for distribution in North America. In this manner, RTI will still be able to concentrate on their core competency of Research & Development and bringing products to market, and APE, with its extensive distribution channels, will be able to concentrate on their competencies, which lie in marketing and distribution. In this case RTI assumes most of the risk.

5.3.1 The Income Statement

The Income Statement is shown in Appendix W and the key statistics are shown in graph format in Appendix X.

The sale price of the hammers commences at US$ 144.2M in 2004 and increases by 3% per annum. Under this pricing there is still enough of a margin left for the distributors if they sell the 350Hp hammer to contractors at approximately US$ 190M to US$ 200M. Given that the crew savings amount to US$ 27M (refer table 1), the hammer should pay for itself in approximately 7 months. Thus a price of US$ 200M for revolutionary technology should be easily justifiable in a contractor's mind. The 50Hp hammer will be priced at a starting price of US$ 46.9M. The number of hammers sold is identical to the previous models in order to make a comparison easier. Those numbers are reproduced in Appendix V.

This model also incorporates parts and consulting income, according to the same assumptions detailed in the other models.

The percentages used to calculate the SG&A expense categories are illustrated in Appendix U. Please note that Research & Development is included once again and rises from 6% to 15% of sales.

As a result of the premium pricing over the model where RTI sells hammers to the Joint Venture, the level of sales revenues is almost 12% higher. Net Income in 2012, on the other hand, is approximately 34% higher at US$ 9.8MM.

5.3.2 The Balance Sheet

The Balance Sheet is depicted in Appendix Y. As is shown, almost 100% of Total Assets is made up of Current Assets, with roughly US$ 26MM in cash in 2012. TNW is also healthy at US$ 32MM in 2012.

The Accounts Receivable collection period is predicted at 61 days, the Inventory Conversion period at 28 days and the Accounts Payable deferral period is nearly 26 days. The operating cycle is consequently 63 days in 2012, down from 110 days in 2005.

5.4 Ratio Analysis

Ratios are the tool most often used to analyse financial statements as they permit comparability across periods and between companies. Caution should be used when interpreting ratios, however, as one ratio alone does not tell much. Ratios do not provide proof but rather offer clues to provide a basis upon which to form a conclusion[41]. Thus, an unsatisfactory ratio may lead one to explore the theory that an unfavourable condition exists. However, one can only conclude that a company is financially strong after examining a series of ratios.

Ratios are useful for comparing the financial results of companies in the same or similar industries. The differences highlighted by the trends are useful in showing how each company has fared in relation to the others.

A compilation of ratios for each revenue model discussed is shown in the appendices. Specifically, the ratios for the model in which RTI sells hammers to the Joint Venture is shown in Appendices J, K and L. The Joint Venture ratios are depicted in Appendices R, S and T. Finally, the ratios for the model in which RTI manufactures and then sells hammers to the distributors are illustrated in Appendices Z, AA and AB. The formulas used to calculate many of the ratios are found in Appendix AC.

Both the RTI (Sales to JV) and RTI (Direct Sales) models are compared to the industry median for *Manufacturers of Construction Equipment* (NAICS 333120) and are shown in Appendix AD. The Joint Venture model is compared to the industry median for the *Rental of Mining, Forestry and Construction Equipment* (NAICS 532412) and is shown in Appendix AE. This information was obtained from the *Mergent* database. It is impossible to find companies in the pile driving industry to compare financial performance with our models, as most are private companies. It would have been more meaningful. Instead, the broader classifications of "industry" have to suffice.

I am using industry medians, which appear to be a better benchmark than the industry average. The average seems to suffer from too many problems. For example, some companies are well capitalised and well managed, whereas others will have a tendency to distort the average

in the opposite direction. I feel that the averages are not representative and have therefore opted to use the median statistics.

A final note on the validity of the comparative statistics is that they reflect the 2003 fiscal year. As I am attempting to compare future results with historical numbers, it tends to skew the relevance of the comparison. In an attempt to present the numbers as more comparable, I have used the average ratio for the years 2005 to 2012. In the absence of anything better, the comparisons should, at a minimum, serve as a guide.

5.4.1 Profitability Ratios

These ratios illustrate how well management has made use of the company's resources in their pursuit of profits. The first ratio shows the level of sales growth from one period to the next. The trend is towards decreasing growth in all models, which is logical given that the divisor in the formula is ever increasing. Obviously the growth of RTI's sales in the two models is extremely close and although decreasing, is still healthy at approximately 9% in 2012. The Joint Venture, on the other hand, does not see such explosive growth initially, but is still growing substantially at 30% in 2012. The respective graphs illustrate the differences between the sales models and the joint venture quite well. In all cases the growth appears to take on a "hockey stick" shape, with gradual growth in the first two years and then explosive growth from 2007 onwards. The two models for RTI then gradually slow their growth, whereas the Joint Venture model continues to grow at a rapid rate.

Gross Profit to Sales, otherwise known as the *Gross Profit Margin* (GPM), measures the spread between the cost of producing goods and the sales prices of those goods. It is a good indicator of management's efficiency in turning over the company's goods at a profit. All three models are very profitable, certainly when compared to the industry averages. Of particular note is the GPM for the Joint Venture, which averages roughly 73% from 2005 to 2012! The other two models average roughly 50% over the same period, which is still extremely healthy. Noteworthy too is the fact that the GPM increases each and every year.

The *Net Profit Margin* (NPM) measures the true profit after cost of goods sold and operating expenses and expresses it as a percentage of sales. It can also be viewed as a measure of a business' ability to generate profit from each sales dollar. The three models shown are very

[41] *The Canadian Securities Course*. 27th ed. (The Canadian Securities Institute, 1998), Vol. 1, Ch. 3, P.3-1

healthy, certainly when compared to their respective industry averages. Again, the Joint Venture is the most profitable with an average annual NPM of 18.34%.

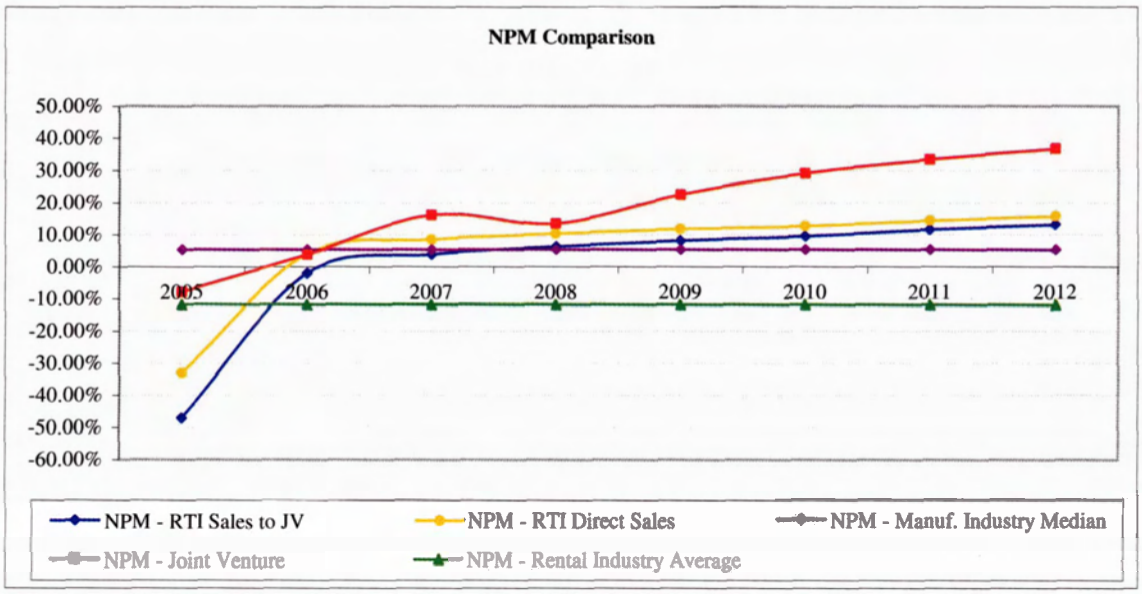

Figure 16: A Comparison of the Net Profit Margins for the Companies

The *Return on Assets* is a measure of the return on investment represented by a company's assets. It considers the net income *before* taxes. Stated another way, the ratio measures the *earning power* of the firm's investment in assets. Again, the three models fare extremely well, particularly in comparison to the industry averages. This is certainly not a surprise in the Joint Venture model, as the hammers in the rental pool very quickly generate profits for the company, as described above.

The *Return on Equity* (ROE) measures the rate of return on owner's equity, or the earnings per dollar of invested equity capital. It tends to be the most popular yardstick of financial performance, particularly among investors, and is therefore given a lot of attention. According to Robert C. Higgins[42] in *Analysis for Financial Management*, there are three determinants of ROE. They are: (1) the earnings squeezed out of each dollar of sales, or the profit margin; (2) the sales generated from each dollar of assets employed, or the asset turnover; and (3) the amount of equity used to finance the assets, or the financial leverage. This relationship can be represented as follows:

[42] Robert C. Higgins, *Analysis for Financial Management*, 6th ed. (New York: McGraw-Hill, 2001), 35.

$$ROE = \frac{\text{Profit}}{\text{Margin}} \times \frac{\text{Asset}}{\text{Turnover}} \times \frac{\text{Financial}}{\text{Leverage}}$$

The calculation of ROE using the "levers of performance" for the three scenarios is shown in Appendix AG. Interestingly enough, these three ratios are closely connected to a company's financial statements. Specifically, the profit margin summarises a company's income statement performance, while the asset turnover and the financial leverage ratios summarise the asset and liability sides of the balance sheet, respectively.

The industry median for the manufacturers of construction machinery is 1.80%. This appears a little low but may be explained by the range of companies that form part of this calculation. Even if the true statistic were in the range of 5% – 10%, all three models far exceed their industry median. The Joint Venture model again stands out with an *average* annual ROE of 46.30%!

The profit margin is particularly important as it reflects a company's pricing strategy and that company's ability to control their operating costs. You will note that each projected scenario shows a fairly healthy and increasing profit margin. As described above, the Joint Venture model appears to be the most profitable.

The Asset turnover ratio is a measure of the capital intensity within the business, with a low ratio signifying a capital-intensive company. All other things equal, the financial performance will improve as the asset turnover rises. Obviously, the models examined are not very capital intensive. The Joint Venture, with its build up of a rental fleet of hammers is the most capital intensive, but still returns a high ratio due to the almost immediate profitability of the hammers.

Financial leverage refers to the proportion of debt relative to equity that is used to finance the business. It is calculated by dividing the total assets for a period by the previous period's shareholder's equity. In all of the scenarios described, bank financing is first sought in 2008 but never represents a large component of the financing. The level of assets is always high compared with the shareholder's equity and this is largely due to the fact that so much cash is generated within the business.

By adding a fourth ratio, the *Retention Ratio*, it is possible to calculate the *Sustainable Growth Rate* of the company. The two primary determinants of growth in a company are the retention ratio and the return on equity. The retention ratio is defined as the fraction of earnings that is retained in the business and not paid out to financial asset-holders. The return on equity, as

discussed previously, measures the rate of return on owner's equity or rather the growth rate in equity. It is, of course, derived mathematically by multiplying the three levers of performance, as shown above.

Multiplying these levers of performance by the retention ratio will result in the *Sustainable Growth Rate (SGR)* (please see Appendix AC). This refers to the rate at which a company can grow without straining its resources. If the actual rate of growth of sales exceeds the SGR then the firm will experience financial pressures. There will be an increased need for investments into trade capital and depreciable assets that will not be available from operations, and hence free cash flow (defined later) will be negative. If this occurs, then by adjusting one of the four levers, the pressure can be released depending on whether the negative free cash flow needs to be "resolved" or "financed". If the operational side needs tweaking, then the *profit margin* or the *asset turnover* can be adjusted. If the financial side needs tweaking, then the alterations can be made to the *financial leverage ratio* or the *retention ratio*. In the models described, the retention ratio is assumed to be one. In other words, 100% of the profits are left in the business. The SGR is thus equivalent to the ROE.

The three models presented will be extremely profitable. Of course, projected numbers are only as good as the assumptions made. However, with what is deemed to be a conservative estimate of hammers sold and the fact that the technology to be employed will be truly revolutionary, the likelihood of achieving the projections are good.

5.4.2 Liquidity Ratios

Liquidity Ratios are used to judge the company's ability to meet their short-term commitments. Stated differently, they measure the ease with which assets can be converted to cash in order to settle the current liabilities. They are expressed as a multiple and are of particular interest to bankers who are naturally risk-averse.

The *Current Ratio* measures the number of current assets for each dollar of current liabilities. The median for manufacturers of construction machinery is 1.63:1. The average over the eight projected years for RTI (Sales to JV) is 3.96 and for RTI (Direct Sales) it is 4.49. In the case of the Joint Venture model the median for the industry is 1.55, whereas the average for the Joint Venture over the eight years is 4.15. Quite clearly there are no liquidity problems for the three models examined. This is largely attributable to the fact that each model generates a significant amount of cash.

The *Quick Ratio*, otherwise known as the *Acid Test*, is a more stringent test than the current ratio. It operates on the premise that inventories are generally not a very liquid asset, particularly if they comprise Work-in-Progress. By subtracting inventories from current assets, the quick ratio shows how well current liabilities are covered by cash and by items that are easily converted to cash. Again, due largely to the fact that inventories only represent a small portion of current assets in the three models, there is sufficient confirming evidence that there are no liquidity problems projected.

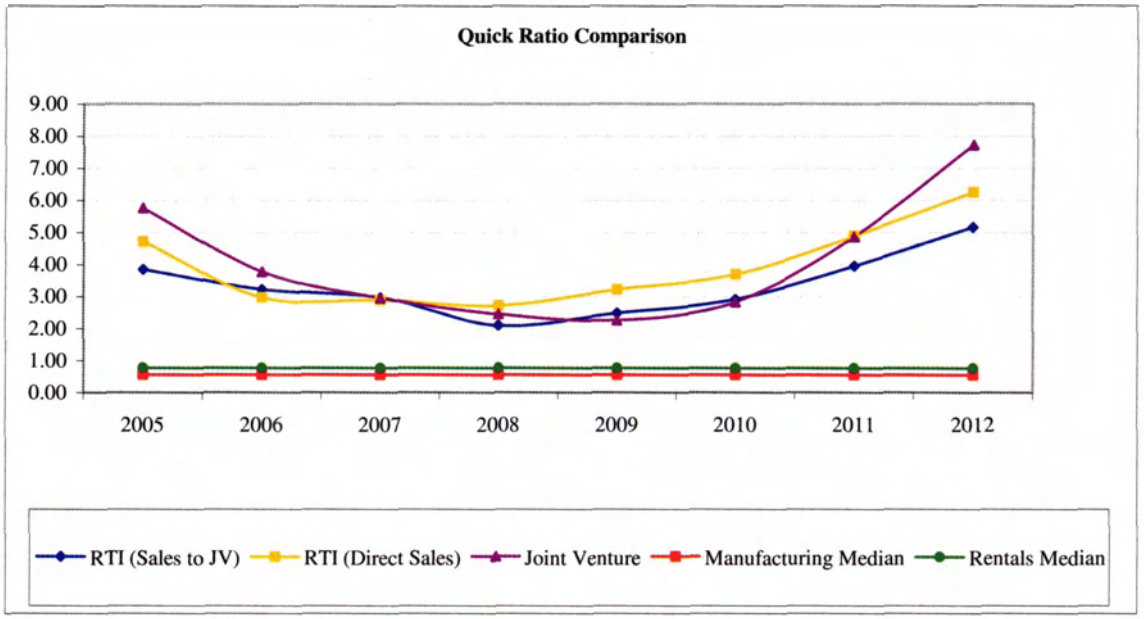

Figure 17: A Comparison of the Quick Ratios for the Companies

In summary, all three models are projected to be very liquid over time. This is understandable given that so much cash is generated from operations.

5.4.3 Capitalisation Ratio

The only ratio calculated here is known as the *Debt to Assets* ratio. It is calculated by dividing total liabilities by total assets. It compares what is owed to the value of the assets used by the business. Essentially it is used to predict long-term solvency. For RTI (Sales to JV) and for RTI (Direct Sales) the averages are both 0.25. In the Joint Venture model the average is 0.16. Of note in all three models is the fact that this ratio initially increases and then decreases over time, resembling a "bell" shape. Thus debt is employed to stimulate growth at a particular point but thereafter the earnings generate sufficient cash to build up total assets.

5.4.4 Debt Service Ratios

The analysis of a company's debt is particularly important for investors and bankers (another form of investor). The ratios examine how well a company can deal with its debt obligations. If a company is unable to generate sufficient cash to pay the interest on its outstanding debt, then its creditors could force it into bankruptcy. If the company is forced to sell off some of its assets to cover its debt obligations, then investors may be placed in the position of losing some or all of their investment.

Two ratios of particular importance are variations of each other. They are *Debt Service* and *Interest Coverage*. Interest coverage determines how well the earnings before interest, taxes, depreciation and amortisation (EBITDA) covers the interest on long-term debt. For all three models the interest coverage starts high and then rises to astronomical levels. Clearly, this is the case when very little debt is used to finance an operation. As expected, although the numbers are reduced somewhat, the *debt service ratio*, which determines how well EBITDA covers interest *and* the current portion of long-term debt, is also very high. When compared to the median for the respective industries, it is clear that most companies carry a lot more debt. Thus, from an investor's standpoint, all three models represent a low risk for additional investment. These findings are confirmed by both the *Total Debt to EBITDA* and *Total Debt to TNW* ratios. This final ratio measures the creditor's margin of safety.

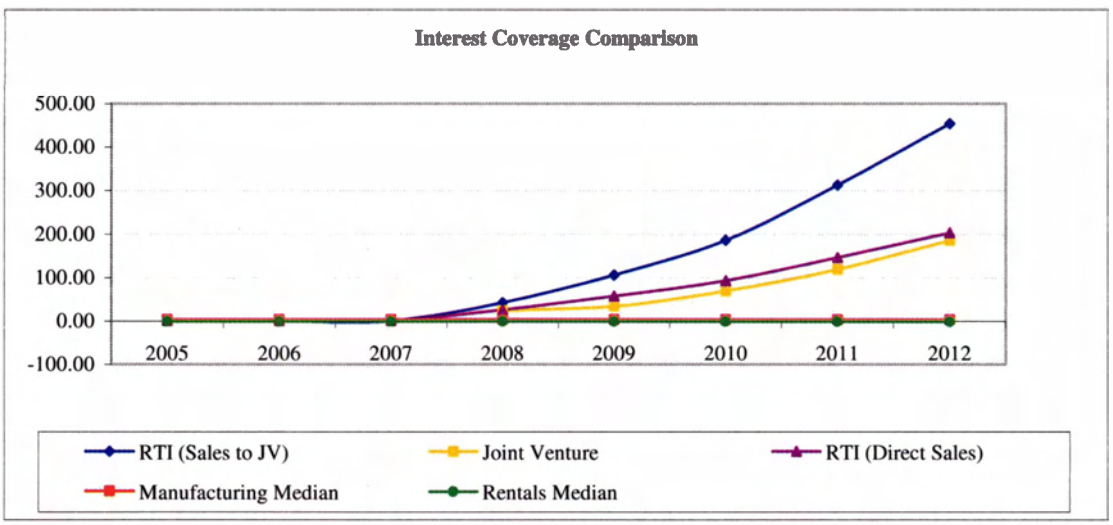

Figure 18: A Comparison of the Interest Coverage for the Companies

5.4.5 Invested Capital Ratios

The *Invested Capital* is a commonly used measure that helps to distinguish between the two sides of a corporation; the operating side and the financial side. On the financial side it is a measure of the expenditure by financial asset-holders rather than a measure of the current value of these financial assets. Specifically, the summation of debt and equity represent the financial definition of Invested Capital. On the operating side, Invested Capital measures the amount that the firm has invested into business activity *on behalf of* these financial asset-holders and constitutes the investment into trade capital and net fixed assets.

The Invested Capital ratios for RTI (Sales to Joint Venture) are shown in Appendix K. Those for RTI (Direct Sales) are found in Appendix AA and those for the Joint Venture are located in Appendix S.

There are a variety of useful ratios that can be calculated using Invested Capital. The first among these is the *Debt-to-Invested Capital*, which measures the level of debt used in the firm. This is of particular interest as debt places additional risk on shareholders and also because the interest owed on debt is tax-deductible and therefore will reduce the taxes payable. In all three models, the company seeks bank financing in 2008. The debt-to-Invested Capital ratio is consequently highest at this point. For each company the ratio drops off dramatically after this, reflecting that there is not an accumulation of bank financing.

On the operational side, the *Trade-to-Invested Capital* ratio is of particular importance as it measures the fraction of the firm's investment in business activity that is short-term and held to support the trading function of the firm[43]. (*Trade Capital* is calculated as current assets less current liabilities but excluding from current liabilities those accounts that are financial in nature, such as dividends payable, short-term debt and the current portion of long-term debt). In very general terms, a firm would prefer to generate the same level of sales with less and less trade capital as the rate of return earned for all financial asset-holders (ROIC) thereby increases.

In both models for RTI the ratio gradually rises until it approaches 100%. The reason is two-fold. First, as time goes on, the level of cash increases to the point where the majority of current assets are made up of cash. Secondly, the cash that is built up is not used to fund the acquisition of net fixed assets. If the projections instead anticipated investing in real estate or additional tooling, then the ratios would be lower.

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[43] George W. Blazenko and Kirk Vandezande, *Introduction to Financial Analysis for Corporations*. (Simon Fraser University Press, 1998), 2-23.

The Joint Venture model does invest in long-term assets in the form of the rental fleet. The *Trade-to-Invested capital* ratio thus takes on a different appearance, as shown below.

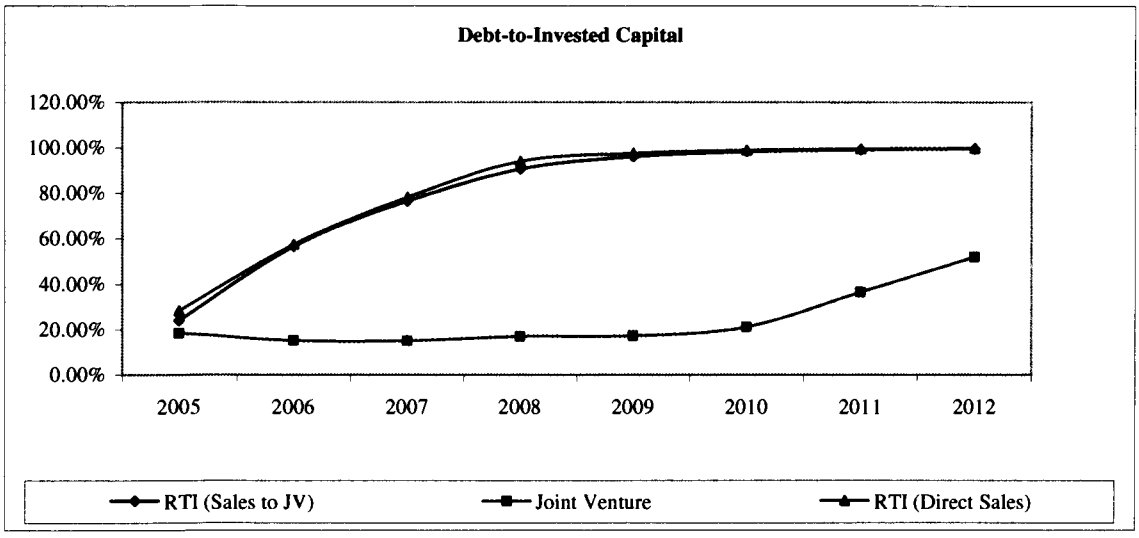

Figure 19: A Comparison of the Debt-to-Invested Capital Ratios of the Companies

The *Rate of Return on Invested Capital (ROIC)* referred to above is the rate of return that the firm earns for all financial asset-holders on their initial investment into the firm. It is calculated as EBITDA divided by the level of Invested Capital at the beginning of the period. The higher this number, the happier an investor would feel. The results for the three models are best shown graphically. The returns are exceptional.

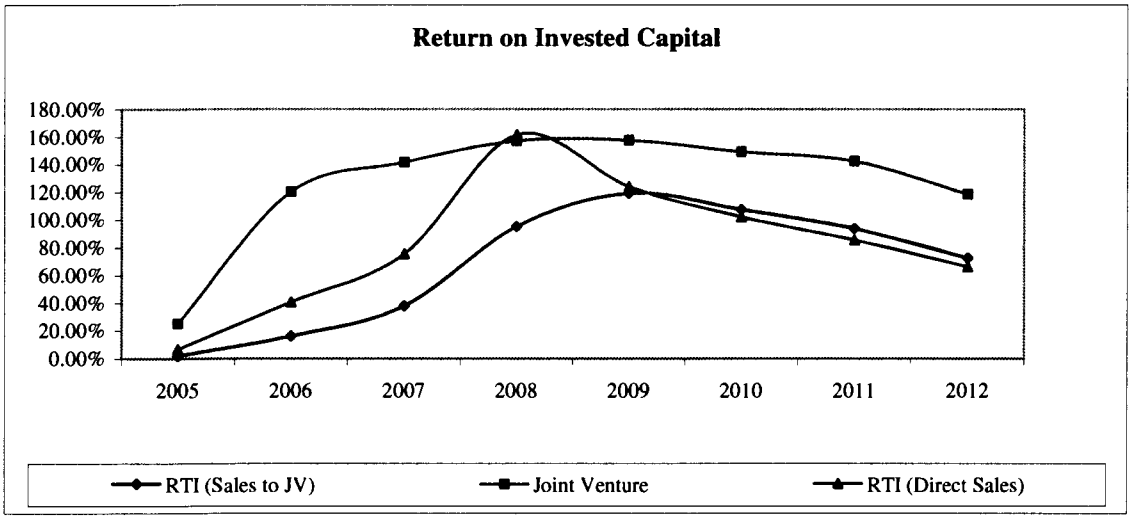

Figure 20: A Comparison of the Return on Invested Capital of the Companies

The final ratio is the *Invested Capital Turnover.* This ratio is calculated by expressing sales as a percentage of Invested capital at the beginning of the period. It measures the ability of the business to generate sales. A company that is able to increase sales but keep their invested capital at a constant level is more efficient. In the case of the three models examined here, both sales and invested capital rise over time. The invested capital, as mentioned before continues to rise due to the accumulation of cash. Looked at from the standpoint of the asset-holders, the invested capital rises due to the build up of retained earnings. The ratios for the three models are illustrated below.

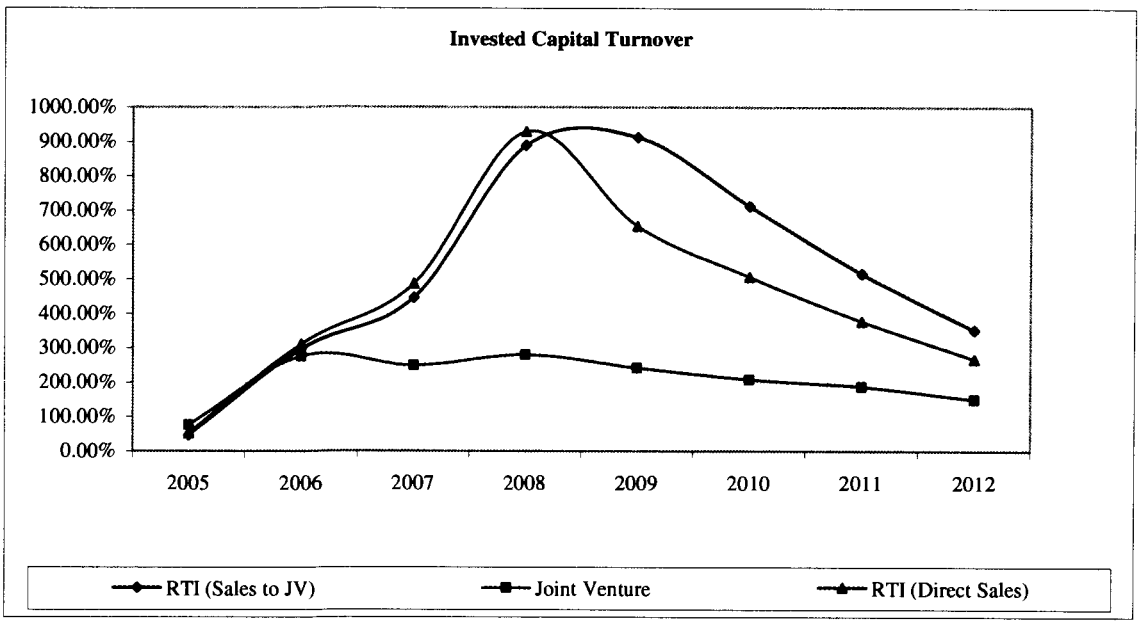

Figure 21: A Comparison of the Invested Capital Turnover for the Companies

The results for all three models are astonishing. The large numbers are explained by the low investment in fixed assets. A company that is forced to make a large investment in their fixed assets with a pay-off over many years tends to see a lower invested capital turnover ratio. Clearly that is not the case here. Only the Joint Venture invests in income-generating fixed assets, but they are paid for in a relatively short period of time.

5.5 Operating Risk Ratios

There are a number of interesting ratios that relate directly to the degree of operating risk in a company. A company that has a larger component of fixed expenses than variable expenses must generate a higher level of revenues to cover those costs than a firm that has more variable

expenses. Variable expenses of course vary with the level of the firm's sales whereas fixed expenses do not. Thus a manufacturing company that must invest a large amount of capital in machinery in order to commence production will have large fixed costs. Conversely, a firm in the service industry, where labour constitutes the largest cost, may have fewer fixed costs but potentially higher variable costs, as more labour is employed.

In order to calculate EBITDA, COGS (basically variable costs) and SG&A (fundamentally fixed expenses) are subtracted from total revenues. This can be represented algebraically as[44]:

$$EBITDA = \{\frac{CM}{\$}\} \times \{Sales\} - FC$$

Where:

$\{\frac{CM}{\$}\}$ = Contribution Margin per dollar of sales, and

FC = Fixed Costs.

Knowing three of the four variables allows us to calculate the contribution margin (CM), which represents the increment to EBITDA from one additional dollar of sales (before fixed costs). The higher the contribution margin is, the more the level of EBITDA is influenced by revenue-based variability than cost-based variability. Obviously too, the higher the contribution margin the more profitable the enterprise.

The contribution margin per dollar of sales has been calculated for the three models in Appendix AF. Please note that, due to the fact that the SG&A expenses in the projected financial statements are calculated using the percentage of sales or percentage of COGS basis (depending on the expense), the costs vary each year. The contribution margin consequently changes every year. Note too that the fixed costs in these calculations are calculated by summing all SG&A expenses with the exception of Bad Debt expense.

The contribution margin in the models is very healthy at 40.98% to 48.67% in 2005. However, this number increases annually thereafter. Of particular note is the CM for the Joint Venture model in 2012, which is 86.11! The contribution margins for the three models over the eight projected years are shown graphically below:

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[44] George W. Blazenko and Kirk Vandezande, *Introduction to Financial Analysis for Corporations.* (Simon Fraser University Press, 1998), 3-3.

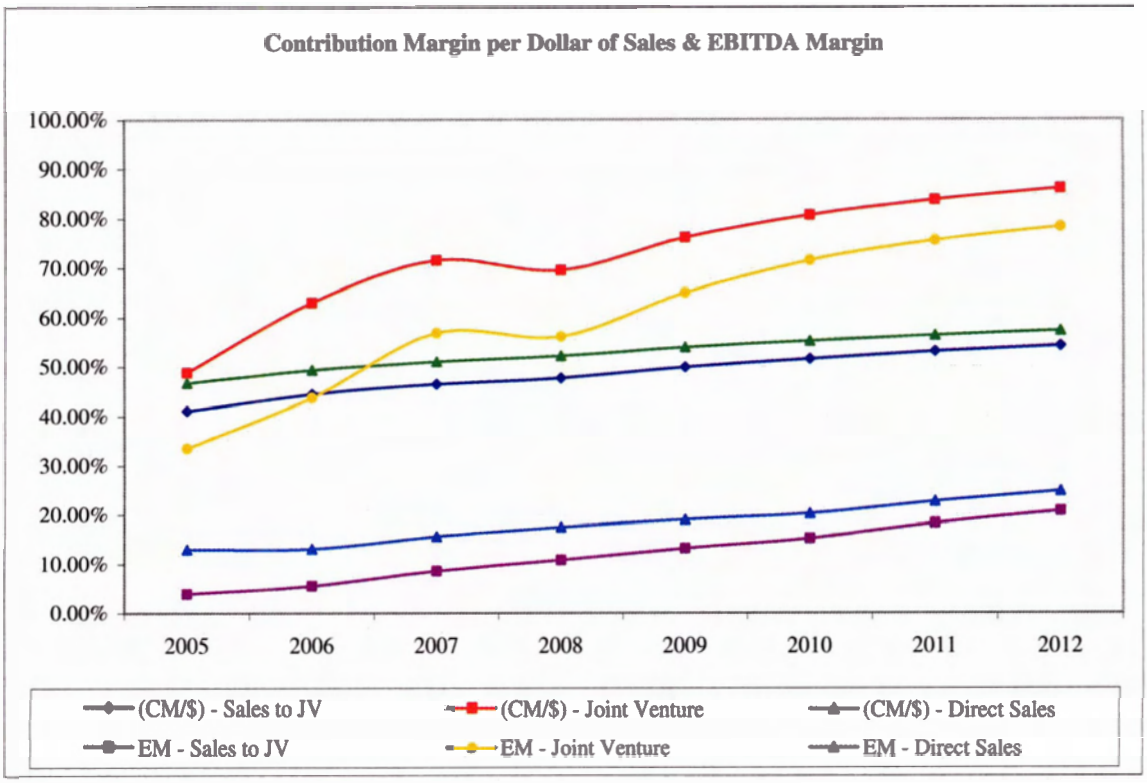

Figure 22: A Comparison the Contribution Margin per Dollar of Sales and the EBITDA Margin for the Companies

EBITDA margin, or *Net Operating Margin*, is calculated by dividing EBITDA by the level of sales. As opposed to the contribution margin, EBITDA margin represents the increment to EBITDA *after* fixed costs. It is also shown in Appendix AF. As expected, EBITDA margin increases over the period, just as the contribution margin does. Interesting is how the respective Contribution and EBITDA margins converge over time. I anticipate that this is largely attributable to the fact that fixed costs as a percentage of sales decrease over time.

The contribution margin can be utilized to determine the level of break-even sales. This is the minimum level of sales required to cover the fixed costs. This number starts high as a percentage of sales but gradually drops over time. Understandably, given the contribution margin statistics for the three models, the level of break-even sales in 2012 for the Joint Venture model is US$ 14.7MM, or only 9% of that period's sales!

Finally, using some of the numbers previously calculated, we are able to determine the *Degree of Operating Leverage (DOL)*. This is a measure of actual operating risk and can be calculated in one of two ways:

1. $$DOL = \frac{\left(\frac{CM}{\$}\right)(Sales)}{\left(\frac{CM}{\$}\right)(Sales)\text{-}(FC)}$$

2. $$DOL = \frac{\left(\frac{CM}{\$}\right)}{(\text{EBITDA Margin})}$$

Both of these calculations are shown in Appendix AF and are labelled "DOL – Method 1 or 2". You will see that the ratio is relatively small to commence and then decreases over time, regardless of the model. The implication of the DOL is that less efficient firms, as measured by the EBITDA margin, have a greater operating risk. Furthermore, as the EBITDA margin increases so the DOL decreases, suggesting an inverse relationship. This suggests that the first model, in which hammers are sold to the Joint Venture, is the least efficient, for the DOL is the highest in the initial years. Ultimately it straightens out and becomes similar to the Direct Sales model, but it is riskier in the first few years.

5.6 Summary

All three models are extremely attractive from an investor's point of view. They are all highly profitable, generate a significant amount of cash, and generally present a fairly low-risk investment with the potential for extraordinary returns. Of course, as stated previously, the three models are based on a set of assumptions and those assumptions have not yet been tested in the real world. However, every attempt has been made to predict the future as conservatively as possible and the belief is that most contingencies have been identified.

What remains to be uncovered is what the companies will be worth, who will invest and how much equity each company must surrender. This is the topic of the next section.

6 A VALUATION OF THE COMPANIES

The previous chapter identified that the three proposed business ventures each present a relatively low-risk investment with the potential for extraordinary returns. This conclusion resulted from an analysis of the ratios and a comparison of those ratios to the industry medians.

In this chapter I will endeavour to determine what the technology is worth to the interested parties and what the business venture, as described in the four different revenue models[45] should be valued at. I will commence by describing, in general terms, a concept for valuing investments known as the *time value of money.* I will then proceed to explain the concept of *free cash flow* and how it relates to the valuation of the investment opportunities described thus far. Using these general concepts, I apply them to the problem of evaluating the technology from both the contractor's standpoint, and from the position of the proposed equity partner, APE. The final sections seek to answer how much the company is worth during the period from 2005 to 2012 and beyond.

6.1 Time Value of Money Calculations

The most appropriate method of valuing an investment incorporates the use of *time value of money* calculations. The two formulas employed are the *Net Present Value* and the *Internal rate of Return.* The *Net Present Value* measures the viability of an investment project. It is the difference between the present value of the future revenue of the project, and the present value of its future costs. The present value is calculated by discounting the project's future revenues and costs by the cost of capital, or discount rate. In other words, the NPV discounts the expected future cash flows from the investment back to the present using a discount rate deemed appropriate, given the investor's expectations. The formula is shown below:

Net Present Value (NPV):

$$NPV = -CF_0 + \frac{(CF_1)}{(1+r)^1} + \frac{(CF_2)}{(1+r)^2} + \ldots\ldots + \frac{(CF_n)}{(1+r)^n}$$

Where *CF* is the net cash flow and *r* is the appropriate cost of capital for the particular project.

The calculation is employed to determine whether an investment is worth making. This will only be the case if the investment is worth more in the marketplace than it costs the investor to acquire it[46]. In other words, an investment should only be undertaken if it creates value. Thus, an investment is accepted if the NPV > 0 and rejected if the NPV < 0.

Closely related to the NPV, the *Internal Rate of Return (IRR)* is defined as "that hypothetical discount rate which makes the present value of future predicted cash flows (or payments) *net* of required expenditure (i.e. the *net present value*) equal to zero"[47]. Stated another way, the IRR is the interest rate at which the discounted future cash flow from a project exactly equals the investment in the project. In general, this must be higher than the marginal cost of capital for it to be worth going ahead with the project (or investment). It depends only on the cash flows of a particular investment, not on rates offered elsewhere. The general rule for using the IRR is to accept the project if IRR ≥ the cost of capital (financial market opportunity cost or discount rate), and reject the project otherwise. The equation is:

Internal Rate of Return (IRR):

$$\text{Return on Investment} = -CF_0 + \frac{(CF_1)}{(1+\text{IRR})^1} + \frac{(CF_2)}{(1+\text{IRR})^2} + \ldots\ldots + \frac{(CF_n)}{(1+\text{IRR})^n} = 0$$

Please note that in each case the initial cash flow is assumed to be the actual investment and is made in the present. It is shown as a negative value to signify the outlay of funds to acquire the asset or investment. All subsequent cash flows (net of expenses) are assumed to flow to the investor as revenue in some future period and are consequently shown as a positive value. Each payment in the future must be discounted back to the present based on how many periods into the future the cash flow occurs. Thus $\left\{CF_2/(1+r)^2\right\}$ occurs two periods into the future and therefore discounts the second payment back those two periods.

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[45] The fourth model assumes that RTI is a 50/50 owner of the Joint Venture and therefore incorporates 50% of the Joint Venture's net income in RTI's financial statements. This is described in greater detail later.
[46] Stephen A. Ross, Randolph W. Westerfield, Bradford D. Jordan, and Gordon S. Roberts, *Fundamentals of Corporate Finance.* 2nd Canadian ed. (Canada: Times Mirror Professional Publishing, 1996), 229.
[47] George W. Blazenko and Kirk Vandezande, *Introduction to Financial Analysis for Corporations.* (Simon Fraser University Press, 1998), 6-17.

6.2 Free Cash Flow as a basis for Valuation

In the foregoing I am referring to cash flows arising from a simple investment such as the interest paid on a term deposit that is held for a number of years. In the more complex case where the investment is a business, we must look at "free cash flow".

Free Cash Flow (FCF) is a fundamental determinant of the value of a business and is defined as "total cash available for distribution to owners and creditors after funding all worthwhile investment activities"[48]. It is the net amount of cash that flows into a firm as the result of operations. Specifically, a firm will generate returns based on their investment in business activity (trade capital and capital expenditures) in previous periods. This cash can then be used to make additional investments for future periods. The difference between the cash inflow and the cash outflow is Free Cash Flow. The implication is that a firm can distribute the free cash flows to financial asset-holders, use them for new business opportunities, or use them to pay down existing debt, all without reducing the value of existing assets. With a positive Free Cash Flow, a firm can flourish, however, insufficient cash flow will force a company into bankruptcy. It is the discounted sum of these FCF values that is used to determine the value of a business investment.

There are two definitions of Free Cash Flow: the operational and the financial. The operational Free Cash Flow can be calculated using the following formula:

Free Cash Flow = Funds from Operations – Incremental Investment

Funds from operations is calculated using one of the following three formulas[49]:

1. *FFO = [EBITDA – CCA] x (1 – tax rate) + CCA*
2. *FFO = EBITDA – Current Tax – (interest payment x corporate tax rate)*
3. *FFO = Net Income + Depreciation + Deferred Tax + After-tax interest*

Incremental Investment is derived as follows:

II = Change in Trade Capital – Change in Capital Expenditure

or:

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[48] Robert C. Higgins, *Analysis for Financial Management*, 6th ed. (New York: The McGraw-Hill Companies, Inc., 2001), 18.

[49] Please refer to Blazenko and VandeZande – Chapter 2

$$II = [Trade\ Capital_{present\ period} - Trade\ Capital_{previous\ period}] - [Net\ Fixed\ Assets_{present\ period} - Net\ Fixed\ Assets_{previous\ period} + Depreciation]$$

The financial definition views Free Cash Flow from the other side of the business, namely the net amounts flowing from the firm to the financial asset-holders. The formula is:

FCF = After Corporate Tax Net Distributions to Debt-Holders + Net Distributions to Shareholders + Net Distributions to Other Financial Asset-Holders

Or, more specifically:

FCF = [After-tax interest + Principal repayments – Sale of new debt] + [Sum of Dividends + Share Repurchases – New Issues of Shares] + [Net Distributions to other Financial Asset-Holders]

The calculations of free cash flow for the different scenarios to be discussed are shown in Appendices L, T, AB and AL.

6.3 Determining a Value for the Technology

Applying the theory of valuation from the previous two sections, we are able to commence assessing whether there is any validity, from a numerical standpoint, to the technology and the businesses that are built around this technology.

The approach is to evaluate the investment in the technology from a comparative standpoint. Specifically, it must be determined whether there would be any benefit to an end user (the contractor) from using the hammers. To accomplish this, the problem is analysed from the position of a contractor who wants to purchase the hammer (section 6.3.1.1) and then from the viewpoint of a contractor who intends to rent the hammer (section 6.3.1.2). In each case the question intends to determine whether the hammer represents a good investment.

Another approach to the problem is to determine whether the investment in the hammer makes sense for the proposed equity partner in the Joint Venture, APE. This will be described in section 6.3.2.

6.3.1 The Value of the Hammer to the Contractor

6.3.1.1 The Value of the Hammer if Purchased

The contractor is the end-user and, as explained in Chapter 2, he or she is most concerned with the savings generated by using the new technology. If the savings are significant it will warrant the acquisition of the *Revolution* hammer in the hopes of generating greater profits and allowing for more competitive bidding.

The following calculations are derived from table 1 in Chapter 2. The difference here is that in each case the cost of the hammer has been removed from the crew cost per hour.

	Impact Hammer	**Vibratory Hammer**	**RTI Hammer**
Crew Cost per Hour	US$351.00	US$351.00	US$351.00
x Efficiency of Hammer	(110min. / 60min.)	(170min. / 60min.)	(58min. / 60min.)
Equals: Crew Cost per 100' pile	US$643.50	US$994.50	US$339.30
x 4	x 4	x 4	x 4
Equals: Crew Cost per 400' pile	US$2,574.00	US$3,978.00	US$1,357.20
x 22 days	x 22	x 22	x 22
Equals: Crew Cost per Month	US$56,628.00	US$87,516.00	US$29,858.40
Savings by using RTI Hammer	**US$26,769.60**	**US$57,657.60**	**US$0.00**
Annual Savings	**US$321,235.20**	**US$691,891.20**	

Table 4: Annual Savings arising from using the RTI Revolution Hammer

In the calculation that follows, there are a number of assumptions made. The first is that the RTI hammer will sell to the distributor at approximately US$ 160M and to the contractor for around US$ 200M. The cost for the Impact hammer is presently approximately US$ 115M, implying that the contractor must pay a premium of US$ 85M to use the *Revolution* hammer. The second is that the *Revolution* will have a useful life of eight years. Thirdly, the discount rate applied is 15% (arrived at by taking a risk-free rate of 5%, a premium for a "Blue Chip" company of 6%, and an additional premium of 4% for a lower-risk start-up company). Finally, the annual savings are assumed to increase by the rate of inflation, or 3%. In order to account for this in the calculations, the discount rate has been reduced by the rate of inflation, so that the rate employed becomes 12%.

The decision to invest in the hammer, and consequently the incremental value of the hammer to the contractor is calculated as follows:

$$NPV = -(\$200{,}000 - \$115{,}000) + \frac{(\$321{,}235.20)}{(1+0.12)^1} + \frac{(\$321{,}235.20)}{(1+0.12)^2} + \frac{(\$321{,}235.20)}{(1+0.12)^3} +$$

$$\frac{(\$321{,}235.20)}{(1+0.12)^4} + \frac{(\$321{,}235.20)}{(1+0.12)^5} + \frac{(\$321{,}235.20)}{(1+0.12)^6} + \frac{(\$321{,}235.20)}{(1+0.12)^7} + \frac{(\$321{,}235.20)}{(1+0.12)^8}$$

$$= \text{US\$ } 1{,}510{,}780.75$$

The first expression is negative indicating that it there is a cash outflow from the contractor for the investment. The resultant value of US$85M represents the premium paid by the contractor for the *Revolution* over a regular Impact hammer. The expressions that follow show the annual savings from using the *Revolution* hammer for a total of eight years into the future. Due to the assumption that inflation will approximate 3% per annum for the period estimated, the discount rate used becomes 12%. In addition, it is important to note that the savings amount is net of taxes.

The calculation concludes that even after paying a premium for the hammer, the present value of the future streams of savings will amount to approximately US$ 1.5MM. Thus, the contractor would have to accept this as being a very worthwhile investment; particularly in view of the fact that this calculation does not consider that crew costs will probably rise by more than the rate of inflation during the eight years and that the savings are therefore probably understated.

The IRR at 377.92% is remarkable too and is calculated as follows:

$$0 = -(\$200{,}000 - \$115{,}000) + \frac{(\$321{,}235.20)}{(1+IRR)^1} + \frac{(\$321{,}235.20)}{(1+IRR)^2} + \frac{(\$321{,}235.20)}{(1+IRR)^3} +$$

$$\frac{(\$321{,}235.20)}{(1+IRR)^4} + \frac{(\$321{,}235.20)}{(1+IRR)^5} + \frac{(\$321{,}235.20)}{(1+IRR)^6} + \frac{(\$321{,}235.20)}{(1+IRR)^7} + \frac{(\$321{,}235.20)}{(1+IRR)^8}$$

$$= 377.92\%$$

As a result of these calculations, the immediate thought is that the hammer should really be sold for considerably more than the suggested US$200M. However, with a premium of US$85M already attached, the market might not accept pricing the hammer any higher. Although any contractor contemplating purchasing this hammer should perform these calculations, few

might, instead preferring to base their decision on very general assumptions about efficiency gains and a comparison of existing hammer prices.

6.3.1.2 The Value of the Hammer if Rented

Given that the Joint Venture will only rent the hammers to end users, the idea should also be valued from a rental perspective. Obviously, if a hammer is rented then there is no initial cash outlay. Instead, the contractor pays at the end of each month for the rental. In order to calculate the value of using the *Revolution*, the assumption made is that the contractor only ever rents and that they are comparing the use of the *Revolution* to the standard Impact hammer. The average rental cost over the eight years for both hammers is calculated in table 5 below. The extra annual cost of renting the *Revolution* is US$ 83,650 (i.e. US$ 270,390 – US$ 186,740). The savings from using the Revolution hammer were calculated above as US$ 321,235.20. Thus, the net savings are US$ 237,585.20 (i.e. US$ 321,235.20 – US$ 83,650) and the NPV is:

$$\text{NPV} = \frac{(\$237{,}585.20)}{(1+0.12)^1} + \frac{(\$237{,}585.20)}{(1+0.12)^2} + \frac{(\$237{,}585.20)}{(1+0.12)^3} + \frac{(\$237{,}585.20)}{(1+0.12)^4} +$$

$$\frac{(\$237{,}585.20)}{(1+0.12)^5} + \frac{(\$237{,}585.20)}{(1+0.12)^6} + \frac{(\$237{,}585.20)}{(1+0.12)^7} + \frac{(\$321{,}235.20)}{(1+0.12)^8}$$

= US$ 1,321,866.21

Once again, even though there is a premium charged for renting the *Revolution* hammer, the savings generated by using the hammer more than compensate the contractor. Given the NPV, there is a good argument for increasing the rental rate. This may meet with less resistance from the end users, as they are not required to spend a significant amount of money upfront to be able to benefit from the technology.

6.3.2 The Value of the Hammer to the Equity Partner in the Joint Venture

Having identified in the previous two sections that the technology will save the contractor money and that the NPV of their adopting this technology is positive, it is now fitting to examine this valuation question from the point of view of the equity partner to the Joint Venture. The reason that this is applicable is due to the fact that APE already has a rental fleet of other hammers that are a significant source of revenue for them. The question that would arise for APE is to determine whether partnering with RTI in a Joint Venture designed to rent the *Revolution*

makes economic sense, given that it will undoubtedly cannibalise their existing business somewhat. I do not believe that the rental market for the "inferior" hammers will evaporate but it will certainly be impacted by the new technology.

In order to determine the value of the revolutionary technology to APE, it is essential to assess the NPV of paying a premium for the hammer and the value of the revenue stream flowing from the "better" hammer. Given that the Impact hammer represents the closest type of hammer in terms of efficiency, it is considered the most comparable.

As stated, the *Revolution* hammer will command a premium over a conventional Impact hammer in terms of both its purchase price and the monthly rental cost. As the Joint Venture will acquire the hammers from RTI at a discount to the price that would be charged to the distributors, the Impact hammer has been discounted by a similar amount. This is done in order to make the two hammers more comparable and because it is assumed that APE would be able to purchase Impact hammers for its existing fleet at a volume discount. The Impact hammer is presently rented for US$ 14M per month and is assumed to increase by 3% per annum, in order to match the rate of increase of the *Revolution* rental price and the presumed rate of inflation. For the sake of simplicity, the average of both the cost of the hammers and the annual rental price has been calculated, as shown below. It is these averages that are used to determine the value of the technology employed in the *Revolution* hammer. Please note that the discount rate of 15% is used without factoring in the rate of inflation, assumed to be 3% in the calculations above. The reason is that the averages calculated in table 5 below already take inflation into consideration.

	RTI Hammer			**Impact Hammer**		
(000s)	**Rental P/mth (average)**	**Rental P/yr (average)**	**Cost / hammer**	**Rental P/mth (average)**	**Rental P/yr (average)**	**Cost / hammer**
2005	$20.25	$243.00	$132.60	$14.00	$168.00	$92.00
2006	$20.86	$250.32	$136.60	$14.42	$173.04	$94.76
2007	$21.49	$257.88	$140.70	$14.85	$178.23	$97.60
2008	$22.15	$265.80	$144.90	$15.30	$183.58	$100.53
2009	$22.82	$273.84	$149.30	$15.76	$189.09	$103.55
2010	$23.51	$282.12	$153.70	$16.23	$194.76	$106.65
2011	$24.22	$290.64	$158.30	$16.72	$200.60	$109.85
2012	$24.96	$299.52	$163.10	$17.22	$206.62	$113.15
Average		**$270.39**	**$147.40**		**$186.74**	**$102.26**

Table 5: Value of the Revolution hammer over a contemporary hammer (both as rental hammers)

The cost differential per hammer per year is US$ 45.14M (i.e. US$ 147.40M – US$ 102.26M) and this number is employed as the investment and therefore shown with a negative sign to indicate a cash outflow. The rental premium per hammer is US$ 83.65M (i.e. US$ 270.39M – US$ 186.74M). This number is shown as the annual benefit that accrues to the investor from renting out the *Revolution* hammers, and is shown as a return on investment or cash inflow. These figures are once again net of taxes.

Using a discount rate of 15%, the NPV per hammer is US$ 330,224.44:

$$\text{NPV} = -(\$147{,}400 - \$102{,}260) + \frac{(\$83{,}650)}{(1+0.15)^1} + \frac{(\$83{,}650)}{(1+0.15)^2} + \frac{(\$83{,}650)}{(1+0.15)^3} + \frac{(\$83{,}650)}{(1+0.15)^4} +$$

$$\frac{(\$83{,}650)}{(1+0.15)^5} + \frac{(\$83{,}650)}{(1+0.15)^6} + \frac{(\$83{,}650)}{(1+0.15)^7} + \frac{(\$83{,}650)}{(1+0.15)^8} = \text{US\$ } 330{,}224.44$$

and the IRR is 185.27%.

If we multiply the NPV by the number of hammers projected to be placed in the rental pool, discount that pool by 10% per annum after 2010 (for worn out hammers), and apply the estimate that only 80% of the hammers will be earning rental income at any one time, the cumulative NPV becomes US$ 189,680,665 (i.e. US$ 330,224 x 718 hammers x 80%). This represents the value of the technology to the Joint Venture based on the projected size of the rental fleet. If APE's share of the company is 50% then they can view their benefit from participating as half of this amount, or US$94,840,333. Thus, investing in the Joint Venture, which will invariably lead to a cannibalisation of APE's existing rental income, has a positive NPV and should therefore be pursued.

6.4 Valuation of a Company

Having established that investing in the technology makes economic sense from both a contractor's and APE's standpoint, it is important to turn our attention to the values of the companies selling and renting the Revolution hammer. The reason is that an investor will need to know whether the decision to invest in a company is a sound one. Once a value has been determined for the respective companies, it will be possible to establish the fractional ownership attributed to each investor. This will be the subject of the following chapter.

6.4.1 The Method Used to Establish a Company's Value

Using the NPV calculation described above, a value can be established for each company scenario. However, a distinction must be made. Where the formula employed in the determination of the technology valuation assumed a finite period, the valuation of the company must assess a value for the time frame after that finite period. This is named the *Terminal Value* and must be used here as we assume that the company will have an infinitely long life expectancy. The terminal value represents the present value of all free cash flows (described above) after the period projected in the statements. It is calculated by using a perpetual growth annuity, according to the following formula, where g is taken to be the perpetual growth rate and r the discount rate.

$$\textit{Terminal Value} = \frac{\left[CF_{n+1} / (r - g)\right]}{(1 + r)^n}$$

Thus, the NPV calculation becomes:

$$NPV = -CF_0 + \frac{(CF_1)}{(1 + r)^1} + \frac{(CF_2)}{(1 + r)^2} + \ldots\ldots + \frac{(CF_n)}{(1 + r)^n} + \frac{\left[CF_{n+1} / (r - g)\right]}{(1 + r)^n}$$

It is important to note that the method described here is not the only method used to value a company. The dividend discount model estimates the equity value as the present value of the firm's future dividends, discounted at the opportunity cost of capital. Yet another method seeks to evaluate the performance of a comparable company and then extrapolate a value for the first company. Neither method appears appropriate in this case. No dividends will be paid during the projected period and it is virtually impossible to find information on a comparable company that is in the same stage of development. Thus, the method used seems to be the best and certainly the most accurate.

6.4.2 Valuations of the Three Different Businesses

In the sections that follow I will calculate the values of the three proposed businesses separately using the NPV formula used in previous sections, and incorporating the terminal value, as described in the last section. The first company to be valued will be the Joint Venture followed by RTI. These two companies are connected in that RTI will manufacture the hammers

and sell them at a discount to the Joint Venture in which both RTI and APE participate. The final business valued will be RTI as a manufacturer that sells the hammer directly to the contractors and distributors. There is no Joint Venture associated with this business and RTI sells the hammers at a higher price than it does to the Joint Venture in the other scenario. The reason for incorporating this valuation is to verify that the proposed business structure (where RTI sells to the Joint Venture) actually makes sense from a business and investment standpoint. Thus RTI as a direct seller can be considered a comparable or benchmark.

6.4.2.1 Value of the Joint Venture Company

The method used to value the Joint Venture is to incorporate the free cash flows from the business and the terminal value of the business for the years after 2012 into the discounted cash flow formula, as described above.

The terminal value is projected to be:

CF_{n+1} (or FCF) = {[EBITDA – CCA](1-t) + CCA} – II - CCA

= {[$127,679,350- $34,093,990](1 – 0.3562) + $34,093,990} - $0 - $34,093,990

= US$60,250,254.77

This calculation states that the free cash flow for the terminal period is based on the EBITDA, the capital cost allowance (depreciation and amortisation) and the corporate tax rate for the final year projected (2012). Please note that CCA is deducted from the terminal value calculation of FCF as an approximation of the on-going maintenance costs for the up-keep of the rental fleet. This amounts to US$ 34MM, which is more than likely a gross overstatement but invariably, leads to a more conservative valuation.

Inserting the terminal value figure into the NPV formula and using a discount rate of 15% and a growth rate of 3% (to match long-term inflation), we find the value of the company to be:

$$NPV = -\$1,500,000 + \frac{(\$51,680)}{(1+0.15)^1} + \frac{(-\$2,417,970)}{(1+0.15)^2} + \frac{(-\$3,000,000)}{(1+0.15)^3} + \frac{(-\$9,987,500)}{(1+0.15)^4} +$$

$$\frac{(-\$7,590,550)}{(1+0.15)^5} + \frac{(\$1,837,030)}{(1+0.15)^6} + \frac{(\$1,764,600)}{(1+0.15)^7} + \frac{(\$1,692,170)}{(1+0.15)^8} +$$

$$\frac{\left[\$60,250,254.77 \Big/ (0.15 - 0.03)\right]}{(1+0.15)^8} = \text{US\$ } 151,403,204.29$$

The first term represents the FCF in period 1, the second term the FCF in period 2 etc. Wherever a term is negative it implies that the net effect for the business that year was to borrow funds and where the FCF is positive, it indicates that the business generated funds internally during the year. The free cash flow numbers are calculated in Appendix T. Comparing these numbers to the funds actually invested in the business (shown in Appendix AM), we see that in the first period a total of US$1.5MM is invested and, not surprisingly, no funds are generated by the business during that first period. The FCF thus shows the full amount of the investment. In the second period, no funds are invested and the business, still operating on the funds from the previous period's investment actually shows positive FCF. In the third period, a total of US$2.5MM is invested. During this year the firm generates a small return thereby reducing the FCF slightly to – US$ 2.417MM. The funds invested in the business continue to outweigh the cash generated by the business for the following three periods, thereby showing a negative FCF, after which there are no more investments and the business starts to generate sufficient capital to reflect positive FCF.

The value at of the business at US$ 151MM is staggering. The IRR is 46.698%, confirming what the ratio analysis has already demonstrated, that the Joint Venture model represents a very lucrative venture.

In an effort to be a little more conservative and apply a sensitivity analysis, it might be prudent to calculate the terminal value without a growth factor. The reason is that in eight years time, when the patent protection on the resonant hammer is nearing the end of its life, there is a possibility that competition might have entered the market with a product that competes directly with RTI's hammer. If this is the case then it would be foolish to assume that the Joint Venture will continue to grow into the indefinite future, particularly as the company will only focus on renting hammers.

Thus, if zero growth is factored into the terminal value calculation, the NPV becomes US$118, 576,679.02 and the IRR 45.564%.

$$\text{NPV} = -\$1{,}500{,}000 + \frac{(\$51{,}680)}{(1+0.15)^{1}} + \frac{(-\$2{,}417{,}970)}{(1+0.15)^{2}} + \frac{(-\$3{,}000{,}000)}{(1+0.15)^{3}} + \frac{(-\$9{,}987{,}500)}{(1+0.15)^{4}} +$$

$$\frac{(-\$7{,}590{,}550)}{(1+0.15)^{5}} + \frac{(\$1{,}837{,}030)}{(1+0.15)^{6}} + \frac{(\$1{,}764{,}600)}{(1+0.15)^{7}} + \frac{(\$1{,}692{,}170)}{(1+0.15)^{8}} +$$

$$\frac{\left[\$60{,}250{,}254.77 \Big/ (0.15 - 0.00)\right]}{(1+0.15)^{8}} = \text{US\$ } 118{,}576{,}679.02$$

Obviously, with the Joint Venture projected to generate an extraordinary return over eight years, it comes as no surprise that the valuation based on the company's free cash flows is also very large.

6.4.2.2 Value of RTI Selling to the Joint Venture

In the proposed model where RTI manufactures the *Revolution* hammer for sale to the Joint Venture, they are also equity partners in the Joint Venture. The proposal, based on preliminary discussions, is that both APE and RTI participate on a 50-50 basis. This implies that RTI is able to consider 50% of the Joint Venture's income as theirs and would do so using the "equity" method of accounting (explained below). I have therefore projected the financial statements for RTI without factoring in this partnership income (Appendices G to I) and have also projected the statements with this income included (Appendices AH and AI). The reason that I show both approaches is to be able to compare RTI with and without this additional income from their investment. This allows me to calculate a value for RTI on a standalone basis, determined solely by the efficiency of that operation. Both calculations are performed in the following two sections.

6.4.2.2.1 Value of RTI without additional Income

In the scenario where RTI sells the manufactured hammers directly to the Joint Venture and does not include 50% of the Joint Venture's income, the free cash flow for the final period is calculated as follows:

$$CF_{n+1} \text{ (or FCF)} = \{[EBITDA - CCA](1-t) + CCA\} - II$$
$$= \{[\$11,501,100 - \$33,780](1 - 0.3562) + \$33,780\} - \$0 = \text{US\$ } 7,416,440.62$$

Again the FCF for the terminal period incorporates EBITDA, the corporate tax rate and the capital cost allowance for the final year projected. The cash flow that summarises all future cash flows for this company amounts to US$ 7,416,440.62. Inserting this figure into the NPV formula and using a discount rate of 15% and a growth rate of 3% (to match long-term inflation), we find the value of the company to be US$18,238,710.23. The cash flows for periods 1 to 8 are found in Appendix L and are shown in the formula as the numerator for the first nine periods. As in the previous company valuation, the free cash flows reflect the net amounts of the investments into the company and the capital generated by the company during a particular period. Thus, in the first year the FCF is equivalent to the total amount invested, as the company does not generate

any funds internally at this point. In the second year, there are no investments and the company does not generate a return so the FCF is US$0. The same calculation of the net cash flow applies to the remaining seven periods.

$$NPV = -\$1{,}350{,}000 + \frac{(\$0)}{(1+0.15)^1} + \frac{(-\$430{,}390)}{(1+0.15)^2} + \frac{(-\$250{,}000)}{(1+0.15)^3} + \frac{(-\$422{,}110)}{(1+0.15)^4} +$$

$$\frac{(\$74{,}990)}{(1+0.15)^5} + \frac{(\$72{,}100)}{(1+0.15)^6} + \frac{(\$69{,}190)}{(1+0.15)^7} + \frac{(\$66{,}300)}{(1+0.15)^8} + \frac{\left[\$7{,}416{,}440 \,/\, (0.15 - 0.03)\right]}{(1+0.15)^8}$$

$$= \text{US\$ } 18{,}238{,}710.22$$

The same free cash flows generated within the company are used in the IRR calculation and the equation is set equal to zero. The formula is then solved for the internal rate of return, which turns out to be 37.005%, representing a very healthy rate of return.

$$0 = -\$1{,}350{,}000 + \frac{(\$0)}{(1+IRR)^1} + \frac{(-\$430{,}390)}{(1+IRR)^2} + \frac{(-\$250{,}000)}{(1+IRR)^3} + \frac{(-\$422{,}110)}{(1+IRR)^4} +$$

$$\frac{(\$74{,}990)}{(1+IRR)^5} + \frac{(\$72{,}100)}{(1+IRR)^6} + \frac{(\$69{,}190)}{(1+IRR)^7} + \frac{(\$66{,}300)}{(1+IRR)^8} + \frac{\left[\$7{,}416{,}440 \,/\, (IRR - 0.03)\right]}{(1+IRR)^8}$$

$$= 37.005\%$$

In the previous section in which the Joint Venture was valued, a second calculation was performed without a growth factor of 3% in the terminal years. The justification was that as the patent is due to expire in 2012, there will probably be an increase in competition either through other manufacturers copying the *Revolution's* design or improving upon it. Either way, it will be more conservative to project no growth in this business valuation. In this case the NPV of the company drops to US$ 14,197,964.23 and the IRR becomes 35.973%.

Given that RTI will be spending a significant amount on Research and Development in the hope of uncovering other applications of resonance with which to enter new industries, the assumption that there should be zero growth may be understating RTI's value, however, it is important to know what the company's base valuation is.

6.4.2.2.2 Valuation of RTI with Additional Income from the Joint Venture

As described before and based on preliminary consultations with APE, the Joint Venture will probably be structured on a 50%-50% basis. This implies that RTI is entitled to half of the net income derived from the Joint Venture's operations. This income has been factored into the income statement and balance sheet for RTI using the "equity" method[50] of accounting and is reproduced in Appendix AH and Appendix AI. With this income flowing in to RTI, it reduces the need for borrowing from outside sources and changes the cash flows over the projected period (please refer to Appendices AJ to AL). Please note that the initial investment from all sources in the first year is US$ 1.45MM and is shown as the FCF for the first year.

$$NPV = -\$1{,}450{,}000 + \frac{(\$0)}{(1+0.15)^1} + \frac{(-\$230{,}390)}{(1+0.15)^2} + \frac{(\$0)}{(1+0.15)^3} + \frac{(\$0)}{(1+0.15)^4} +$$

$$\frac{(\$0)}{(1+0.15)^5} + \frac{(\$0)}{(1+0.15)^6} + \frac{(\$0)}{(1+0.15)^7} + \frac{(\$0)}{(1+0.15)^8} + \frac{\left[\$26{,}668{,}668.01 \Big/ (0.15 - 0.03)\right]}{(1+0.15)^8}$$

$$= \text{US\$ } 71{,}026{,}082.70$$

The company quite obviously is significantly more valuable than the company without the additional income and the NPV becomes US$ 71,026,082.70. In order to ensure comparability, the same discount rate of 15% and growth rate of 3% are employed in the valuation. The Internal rate of return is 54.940%! This model is very compelling for an investor. Not only is it possible for them to extract a very healthy return on their investment, but the tangible net worth of the company rises to an astounding US$ 94MM in just eight years, minimising their risk of not being able to realise on their investment.

Again, if the assumption is made that there will be no growth in the terminal years, the NPV becomes US$ 56,496,024.58 and the IRR 54.129%. Still, significantly more valuable than RTI without the additional income.

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[50] The equity accounting method must be used when significant influence (but no control) exists between two companies. The underlying concept is that the investor has earned income from the investment equivalent to its ownership share. Thus income is recorded as a debit to the investment account and a credit to investment revenue. In this case, the investment in the Joint Venture is shown on the balance sheet as a long-term investment. The income has already been taxed in the hands of the Joint Venture and is consequently not taxed in RTI's hands.

6.4.3 Value of RTI Selling Directly to the Distributors

The model in which RTI sells directly to the various hammer distributors in North America also proves to be very profitable. The hammers are each sold for a starting price of US$ 160M, which is approximately US$ 30M more than when RTI sells to the Joint Venture. The company in this scenario thus earns more per hammer and therefore requires less investment from outside investors.

The reason for performing these calculations is to demonstrate how compelling the business model in which RTI manufactures the hammers and then sells them to the Joint Venture really is.

The value of the company is determined to be US$25,177,149.94 and the internal rate of return 41.057%, as shown below:

$$NPV = -\$1{,}350{,}000 + \frac{(\$1{,}680)}{(1+0.15)^1} + \frac{(-\$188{,}470)}{(1+0.15)^2} + \frac{(\$0)}{(1+0.15)^3} + \frac{(-\$1{,}266{,}340)}{(1+0.15)^4} +$$

$$\frac{(\$224{,}960)}{(1+0.15)^5} + \frac{(\$216{,}270)}{(1+0.15)^6} + \frac{(\$207{,}580)}{(1+0.15)^7} + \frac{(\$198{,}890)}{(1+0.15)^8} + \frac{\left[\$9{,}927{,}325.00 \,/\, (0.15 - 0.03)\right]}{(1+0.15)^8}$$

$$= \text{US\$ } 25{,}177{,}149.93$$

The free cash flows are shown in Appendix AB. The first term reflects the initial investment into the company by all investors. Please note that a growth rate of 3% is incorporated in these calculations. If that growth rate is set to zero for the reasons described before, then the NPV becomes US$ 19,768,383.01 and the IRR 40.082%. Once again, RTI's investment in R&D throughout the first eight years will more than likely ensure that the company has new products with which to approach new markets and will therefore grow in the future. However, if we only consider the resonant hammer, then competition will probably ensure that the company's growth subsides.

6.5 Summary

The calculations performed in this chapter are summarised in table 7. The valuation of RTI really only makes sense when the income from the Joint Venture is incorporated. I expected the value of the company to increase but was surprised by how much the internal rate of return

jumped. Based on these numbers, this proposed partnership between RTI and APE and the scenario where RTI manufactures hammers for sale to this partnership should both generate a significant amount of interest from Investors.

Summary of NPV and IRR Calculations	Joint Venture	Sales to JV	Sales to JV (+ 50% Income)	Direct Sales
3% Growth Assumed:				
NPV of Company	$151,403,204.29	$18,238,710.23	$71,026,082.70	$25,177,149.93
IRR of Company	46.70%	37.01%	54.94%	41.06%
0% Growth Assumed:				
NPV of Company	$118,576,679.02	$14,197,964.23	$56,496,024.58	$19,768,383.01
IRR of Company	45.56%	35.97%	54.13%	40.08%

Table 6: Summary of NPV and IRR calculations for the Four Revenue Models

The conclusion drawn earlier that the "Joint Venture" business is very attractive is further confirmed by these valuation numbers. The hammers are paid for in a very short period and thereafter create a very profitable annuity for the company. With a valuation of in excess of US$ 118MM, assuming a constant perpetuity past 2012, the company still generates a very healthy rate of return for investors. Given that the projections on which these numbers are based are relatively conservative, the future could be even rosier!

In the case of RTI, the scenario whereby the company incorporates the income from the Joint Venture understandably is the best in terms of the NPV and the IRR and provides an attractive investment opportunity for an investor.

Where RTI has allocated a significant sum (in excess of US$ 8MM in 2012) to Research and Development in support of its core competency, the feeling is that new applications for the resonant technology will be uncovered prior to the patent expiring on the hammer. If this is the case, then RTI will continue to grow as a company past 2012. In fact, 3% growth may even understate the situation. The calculations assuming a zero growth rate are therefore probably not a likely scenario.

7 FINANCING REQUIREMENTS FOR THE COMPANIES

The previous chapter calculated the value of the companies using discounted cash flow calculations and an appropriate discount rate. This was required to establish a basis for the calculations that are performed in this chapter where I will focus on assessing how much equity should be given to the investors to encourage them to infuse capital.

The reason that equity rather than debt is considered here is because equity is the first financial asset of any corporation[51] (created in the incorporation process) and we are only looking at early stage investing to aid in the establishment of the enterprise. It is far more difficult to structure debt financing at the start-up stage. There are of course some advantages to arranging debt financing, for example the tax deductibility of interest, and some disadvantages, like the fact that debt holders can sue a company for defaulting on a payment. Ultimately, a company should consider the merits of both forms of financing in structuring the borrowing needs of the enterprise, and may possibly settle on a combination of both.

Both RTI and the Joint Venture will require outside investors to inject capital in the early stages of the respective company's development. The reason is that each company needs funds to commence operations. In the case of RTI, they will need to purchase tooling for the assembly of the hammers, materials to build the hammers, and labour to run the operation. The Joint Venture, which will build up a fleet of hammers for rental to the contractors, will require capital to commence the acquisition of the hammers until such time as the cash inflow from operations is sufficient to self-fund further hammer purchases. The amount of capital required by RTI will depend on the scenario modelled. As described in the previous chapter, I am presenting three scenarios for comparative purposes. The first shows the base situation for RTI. The second shows RTI with the inclusion of 50% of the net income from the Joint Venture, based on RTI's fractional ownership of that company. The final scenario portrays RTI as a manufacturer that sells the hammers to the contractor community at large.

The financing required for each company is illustrated in Appendix AM. In each case, the amount required is relatively small compared to the ultimate value of the company and in all cases will come from both the owners of the company and from outside investors.

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[51] George W. Blazenko and Kirk Vandezande, *Introduction to Financial Analysis for Corporations.* (Simon Fraser University Press, 1998), 7-2.

In this chapter I will describe in very general terms the three sources of start-up capital available to RTI and the Joint Venture. I will then proceed to explain the fractional ownership calculation that will be used to determine how much equity each company must relinquish to satisfy the expectations of the outside investors. Finally, I will explore each company's situation in greater detail in an effort to determine whether investing in the particular company makes sense for the investors and whether the amount of equity that the company must give up is agreeable to the owners of the company.

7.1 Sources of Early-stage Investment for a Start-up Company

There are a variety of different sources of start-up capital available to a new venture. They range from personal savings through government lending programs to floating shares on a venture exchange or stock market and are illustrated in Figure 23. The type of financing is influenced both by the company's stage of development as well as level of sophistication of the management team. I will only describe three sources of capital in very general terms in order to give a bird's eye view of the options available to RTI. It is beyond the scope of this paper to delve any deeper into this subject. Please note that the assumption is that the Joint Venture get it's funding from the equity partner, APE.

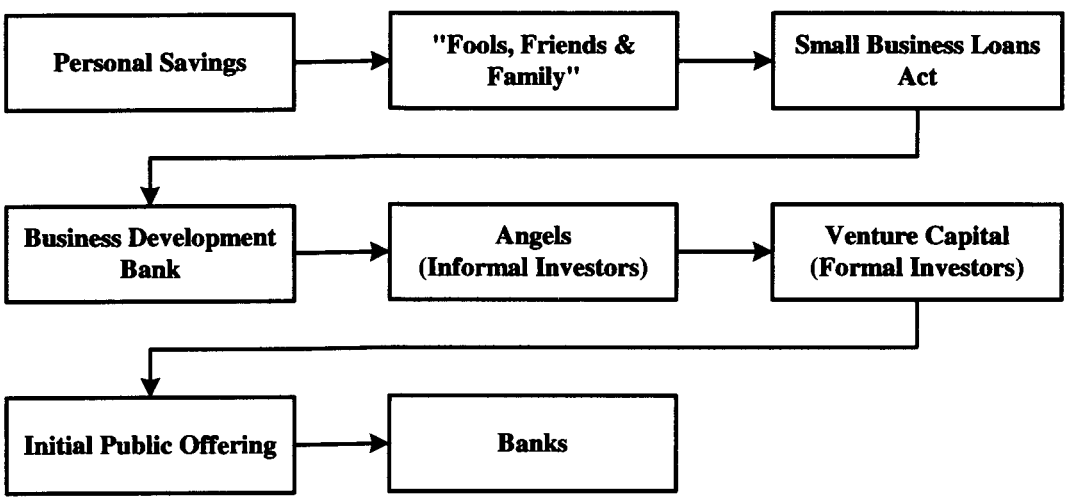


Figure 23: Sources of Financing by Stage

7.1.1 "Fools, Friends and Family"

These investors really represent the second stage investors in any new venture and the capital raised is also known as "love money". (The first stage would probably come from personal savings). As the name suggests, the potential business owner will usually convince friends and family of the validity of their idea and often persuade those personal contacts to provide the seed capital to fund the start-up.

7.1.2 Business Development Bank & Government Guaranteed Programs

There are a variety of programs available through the Government or one of its agencies that facilitate the start-up of businesses in an attempt to encourage entrepreneurial activity. These range from grants to government guaranteed loans held with banks. In all cases the amounts are relatively small.

7.1.3 Angel Investors

Angel investors are probably the most appropriate type of financier for RTI. The reason is that they tend to get involved in higher risk ventures at an earlier stage of a company's development than do other investors. This might be the prototype stage or perhaps the early commercialisation phase. They are officially known as "informal" investors as they usually commit their own funds and are involved on a personal level. This personal involvement can be advantageous to the firm requiring financing, as the Angels will bring experience, personal energy, and a Rolodex of contacts. They are more "patient" and will often commit to between five and eight years before looking to exit. In return for the higher risk undertaken, they will seek to extract an annual return of approximately 30% – 35%. This may appear high, but given that on average only two out of every ten investments are actually profitable, it is not that unreasonable.

7.1.4 Venture Capitalists

If the Angels are informal investors, the Venture Capitalists are certainly more formal in their structure and their approach. In most cases, they are institutional and the individuals transacting are employees of the financial institutions. There are a variety of different types ranging from private independent funds that raise their capital from pension funds and insurance companies, to labour sponsored funds that draw their funds by soliciting the public and providing an incentive to their investors through large tax benefits.

Venture Capital funds tend to get involved at higher levels of the firm's development and usually at the time of second round of financing. The product or service is probably past the concept stage and the risk is therefore reduced. Still, the returns sought are still on the order of 25% – 35% and the time frame for exit can be shorter at between 3 and 5 years.

7.1.5 Initial Public Offering (IPO)

An Initial Public Offering, or IPO, occurs when a company offers its shares for sale to the public through one of the stock exchanges. Which exchange is usually a function of the growth stage that the business finds itself in. For example, a smaller company in the earlier stages of development may be listed on the Venture exchange, whereas a more mature company might seek a listing on one of the more established markets, such as the TSX.

There are a number of advantages to "going public". Chief among these is that it allows a company access to large amounts of expansion capital that will permit the financing of greater growth. In addition, and this may also be one of the primary reasons for choosing to go public, it can provide an exit strategy for the informal and formal investors who are looking to realise a return on their investment after years of patience. Similarly, owners are presented with an opportunity to convert some of their equity to cash and it also allows employees to take part in the growth of the business through stock options or employee share ownership plans.

Disadvantages abound too. Largest among these are probably the very significant legal obligations that become compulsory. These include full disclosure and fiduciary duties of not only the company but also its officers and directors. In addition, the whole process of actually going public is extremely expensive, not to mention the on-going costs after listing. Finally, the process requires an enormous amount of management time, time that is taken from running the business.

7.2 The Method of Determining the Fractional Ownership of a Company for the Investors

Having established that both RTI and the Joint Venture will require outside investors to help fund the early stage of development, it is necessary to compute how the companies will be affected by the infusion of capital. The description of Angel Investors in section 7.1.1 described that these "informal" investors are more patient than other investors, but that they typically seek 30% to 35% return on their money to compensate them for the risk that they must bear. The

sections that follow will describe the fractional ownership calculation in general terms and then proceed to examine each company individually. The reason that these calculations are appropriate is to satisfy the outside investors that they will be able to extract the return that they are seeking, and to determine exactly how much equity or control the owners might have to give up to get the investment. Obviously, the owners will be concerned if they are required to relinquish more than 49% of the company as this will place them in a minority equity position and they will therefore lose control of the company.

7.2.1 The Fractional Ownership Calculation

The present value formula presented in Chapter 6 is used to discount the staged investments by the outside investors, in order to determine the equity granted in each case. The first step is to calculate the present value of the investments that are made over time, using the following equation:

$$PV = \text{Initial Investment}_0 + \frac{(\text{Investment}_{\text{Period 1}})}{(1+r)^1} + \frac{(\text{Investment}_{\text{Period 2}})}{(1+r)^2} + \ldots\ldots + \frac{(\text{Investment}_{\text{Period n}})}{(1+r)^n}$$

The variable *r* used in the denominator is the discount rate deemed appropriate for the investors. In the sections that follow, in which I perform the specific fractional ownership calculations, I will use both a discount rate of 15% and 35%, reflecting the cost of capital for the company and for the investors respectively.

The next step in determining the fractional ownership is to divide the present value of the outsider's investment by the NPV of the company *plus* the investments by the owners *and* the investment by the outside investors. The formula is shown below:

$$\%\ \text{Ownership for the outside investor}(f) = \frac{\text{PV of Outsider's Investment}}{\text{NPV of Company} + \text{PV of Outsider's Investment} + \text{PV of Investment by Owners}}$$

This determines the equity that the investor will receive for their financing, however, does not calculate the return on their capital over the holding period. For that we need to resort to the IRR formula and incorporate the fractional ownership percentage, denoted "f", in calculating

the terminal value. The essence of this calculation is that an investor will make a series of investments over time and then participate in the returns in the terminal period. Please note that an investment is shown with a negative sign, denoting a cash outlay, and that the final term in the expression is the fractional component of the company's terminal value. In addition, please note that in each case there are a maximum of nine investment periods assumed, covering the years from 2004 to 2012. Thus in the expression below where the denominator is raised to the eighth power, that investment would occur in the year 2012.

$$0 = -\text{Investment}_0 + \frac{(-\text{Investment}_1)}{(1+\text{IRR})^1} + \frac{(-\text{Investment}_2)}{(1+\text{IRR})^2} + \frac{(-\text{Investment}_3)}{(1+\text{IRR})^3} + \ldots + \frac{(-\text{Investment}_8)}{(1+\text{IRR})^8} + f\frac{\left[\text{FCF}/(\text{IRR}-g)\right]}{(1+\text{IRR})^8}$$

The calculations of fractional ownership and return on investment for each model are performed in the sections that follow.

7.2.2 Fractional Ownership Valuation for the Investors in RTI

In Chapter 6 RTI as a company was valued in three different scenarios. The first was the situation where RTI sells to the Joint Venture without consideration of its fractional ownership in the partnership. In the second scenario 50% of the net income from the Joint Venture was factored into RTI's financial picture, and the third business valuation considered RTI as a manufacturer selling directly to the contractors. The same three scenarios are maintained here, again for comparative purposes, and the fractional ownership for each is evaluated in the following three sections.

7.2.2.1 Fractional Ownership Calculation for the Investors in RTI (RTI without additional Income)

A total of US$ 1,200,000 is required from Angel investors in this scenario (see appendix AM – labelled "Sales to Joint Venture). This amount equates to US$1,004,643.71 in present value dollars. The fractional ownership is determined in five stages:

❶ PV of Angel's Investment = $\$500{,}000 + \frac{(\$0)}{(1+0.15)^1} + \frac{(\$450{,}000)}{(1+0.15)^2} + \frac{(\$250{,}000)}{(1+0.15)^3}$

= US$ 1,004,643.71

The numbers in the numerator represent the nominal investment by the outside investor in each year. Thus, US$500,000 is invested in the first year, nothing in the second year, US$450,000 in the third year etc. Each period that an investment is made into the future requires that that amount be discounted one additional period back to the present.

❷ PV of Investment by Owners of RTI = US$ 850,000

This amount is invested by the owners in the first year and therefore does not need to be discounted.

❸ NPV of RTI with 3% growth (derived above) = US$ 18,238,710.23

The NPV of RTI in the scenario without the additional income was calculated in section 6.4.2.2.1 above.

❹ % Ownership of Angels = $\frac{\$1{,}004{,}643.71}{\$18{,}238{,}710.23 + \$1{,}004{,}643.71 + \$850{,}000} = 4.99\%$

The percentage ownership that the outside investors would receive based on their investment versus the total value of the company is 4.99% and is based on the equation explained in section 7.2.1.

Finally, the return on investment can be calculated for the outside investors as shown below. The NPV formula is set equal to zero and the equation is solved for the IRR.

❺ $0 = -\$500{,}000 + \frac{(\$0)}{(1+IRR)^1} + \frac{(-\$450{,}000)}{(1+IRR)^2} + \frac{(-\$250{,}000)}{(1+IRR)^3} + \ldots +$

$$0.05x\frac{\left[\$7{,}416{,}440.62 \Big/ (IRR - 0.03)\right]}{(1+IRR)^8} = 15.039\%.$$

A return of 15.039% is not surprising given that we have continually discounted our NPV calculations by 15%. However, knowing that the "outside" investors required at this early stage

are Angels, the fractional ownership is clearly too low to adequately compensate them and achieve their hurdle rate of 35%. Substituting 35% into the formula and solving for the fractional component *f*, the Angels will need 40.39% equity in the company in order to be satisfied. This is calculated as follows:

❶ Terminal Value = CF_{n+1} (or FCF) = {[EBITDA – CCA](1-t) + CCA} – II

= {[$11,501,100 - $33,780](1 – 0.3562) + $33,780} - $0 = US$7,416,440.62

❷ PV of Angel's Investment (using a 35% discount rate):

$$PV = \$500{,}000 + \frac{(\$0)}{(1+0.35)^1} + \frac{(\$450{,}000)}{(1+0.35)^2} + \frac{(\$250{,}000)}{(1+0.35)^3} = \text{US\$ } 848{,}524.11$$

❸ NPV of the Company (using a 35% discount rate):

$$NPV = -\$1{,}350{,}000 + \frac{(\$0)}{(1+0.35)^1} + \frac{(-\$430{,}390)}{(1+0.35)^2} + \frac{(-\$250{,}000)}{(1+0.35)^3} + \frac{(-\$422{,}110)}{(1+0.35)^4} +$$

$$\frac{(\$74{,}990)}{(1+0.35)^5} + \frac{(\$72{,}100)}{(1+0.35)^6} + \frac{(\$69{,}190)}{(1+0.35)^7} + \frac{(\$66{,}300)}{(1+0.35)^8} + \frac{\left[\$7{,}416{,}440.62 \,/\, (0.35 - 0.03)\right]}{(1+0.35)^8}$$

= US$ 329,017.37

❹ IRR for the company:

$$0 = -\$1{,}350{,}000 + \frac{(\$0)}{(1+IRR)^1} + \frac{(-\$430{,}390)}{(1+IRR)^2} + \frac{(-\$250{,}000)}{(1+IRR)^3} + \frac{(-\$422{,}110)}{(1+IRR)^4} + \frac{(\$74{,}990)}{(1+IRR)^5}$$

$$+ \frac{(\$72{,}100)}{(1+IRR)^6} + \frac{(\$69{,}190)}{(1+IRR)^7} + \frac{(\$66{,}300)}{(1+IRR)^8} + \frac{\left[\$7{,}416{,}440 \,/\, (IRR - 0.03)\right]}{(1+IRR)^8}$$

= 37.005%

❺ % Ownership of Angels= $\dfrac{\$848{,}524.11}{\$329{,}017.37 + \$848{,}524.11 + \$850{,}000} = 41.85\%$

❻ The return on investment for the Angels becomes:

$$0 = -\$500{,}000 + \frac{(\$0)}{(1+\text{IRR})^1} + \frac{(-\$450{,}000)}{(1+\text{IRR})^2} + \frac{(-\$250{,}000)}{(1+\text{IRR})^3} + \ldots +$$

$$0.4185x\frac{\left[\$7{,}416{,}440.62 \Big/ (\text{IRR} - 0.03)\right]}{(1+\text{IRR})^8} = 35.426\%.$$

Thus, incorporating an expected 35% discount rate for the outside investors, the company in this model would have to give up 41.85% of their equity. That still leaves majority ownership with RTI but does give the outside investors a significant stake of the company.

7.2.2.2 Fractional Ownership Calculation for the Investors in RTI (RTI with 50% Income from the Joint Venture)

As explained in section 6.4.2.2.2, when RTI includes 50% of the net income generated in the Joint Venture into their income, the requirement for financing drops. Please note from Appendix AM that there is no bank financing required and that the investment from Angel investors is only US$850M and is staged over three periods.

❶ PV of Angel's Investment (using a discount rate of 15%)

$$\text{NPV} = \$600{,}000 + \frac{(\$0)}{(1+0.15)^1} + \frac{(\$250{,}000)}{(1+0.15)^2} = \text{US\$ } 789{,}035.92$$

❷ PV of Investment by Owners of RTI = US$ 850,000

❸ NPV of revenue model (derived in section 6.4.2.2.2 and using 15%) = US$ 71,026,082.70

❹ % Ownership for Angels

$$= \frac{\text{PV of Angel's Investment}}{\text{NPV of Company} + \text{PV of Angel's Investment} + \text{PV of Investment by RTI}}$$

$$= \frac{\$789{,}035.92}{\$71{,}026{,}082.70 + \$789{,}035.92 + \$850{,}000.00} = 1.09\%$$

❺ Finally, the return on investment can be calculated for the Angels.

$$0 = -\$600{,}000 + \frac{(-\$0)}{(1+\text{IRR})^1} + \frac{(-\$250{,}000)}{(1+\text{IRR})^2} + \ldots + 0.0109x\frac{\left[\$26{,}668{,}668.01 \big/ (\text{IRR} - 0.03)\right]}{(1+\text{IRR})^8}$$

= 14.999%.

Thus, in this version of the business, the company must only give up 1.09% of the equity and the outside investors would get a 14.99% return on their investment.

Again, given that the early stage investors required to help capitalize the company will have to be Angel Investors, the same calculation should be performed with a discount rate of 35%. The calculations become:

❶ Terminal Value = CF_{n+1} (or FCF) = {[EBITDA – CCA](1-t) + CCA} – II

= {[$41,405,150 - $33,780](1 – 0.3562) + $33,780} - $0 = US$26,668,668.01

❷ PV of Outsider's Investment (using a 35% cost of capital rate:)

$$\text{NPV} = \$600{,}000 + \frac{(\$0)}{(1+0.35)^1} + \frac{(\$250{,}000)}{(1+0.35)^2} = \text{US\$ } 737{,}174.21$$

❸ NPV of the Company (using a 35% discount rate):

$$\text{NPV} = -\$1{,}450{,}000 + \frac{(\$0)}{(1+0.35)^1} + \frac{(-\$230{,}390)}{(1+0.35)^2} + \frac{(\$0)}{(1+0.35)^3} + \frac{(\$0)}{(1+0.35)^4} +$$

$$\frac{(\$0)}{(1+0.35)^5} + \frac{(\$0)}{(1+0.35)^6} + \frac{(\$0)}{(1+0.35)^7} + \frac{(\$0)}{(1+0.35)^8} + \frac{\left[\$26{,}668{,}668.01 \big/ (0.35 - 0.03)\right]}{(1+0.35)^8}$$

= US$ 5,977,659.10

❹ IRR for the company:

$$0 = -\$1{,}450{,}000 + \frac{(\$0)}{(1+\text{IRR})^1} + \frac{(-\$230{,}390)}{(1+\text{IRR})^2} + \frac{(\$0)}{(1+\text{IRR})^3} + \frac{(\$0)}{(1+\text{IRR})^4} + \frac{(\$0)}{(1+\text{IRR})^5} +$$

$$\frac{(\$0)}{(1+\text{IRR})^6} + \frac{(\$0)}{(1+\text{IRR})^7} + \frac{(\$0)}{(1+\text{IRR})^8} + \frac{\left[\$26{,}668{,}668.01 \big/ (\text{IRR} - 0.03)\right]}{(1+\text{IRR})^8}$$

= 54.94%

❺ % Ownership of the Angels = $$\frac{\$737,174.21}{\$5,977,659.10 + \$737,174.21 + \$850,000} = 9.75\%$$

❻ The return on investment for the Angel investors becomes:

$$0 = -\$600,000 + \frac{(\$0)}{(1+IRR)^1} + \frac{(-\$250,000)}{(1+IRR)^2} + \frac{(\$0)}{(1+IRR)^3} + \ldots +$$

$$0.0975x\frac{\left[\$26,668,668.01/(IRR - 0.03)\right]}{(1+IRR)^8} = 35.000\%.$$

Clearly, this model is very compelling. By incorporating 50% of the net income from the Joint Venture, the value of the company jumps significantly and the corresponding equity give up to the early stage investors is pleasantly low at 9.75%. In return, the Angels will receive their 35% return.

7.2.2.3 Fractional Ownership Calculation for the Investors in RTI (RTI Selling Directly to the Contractors)

The investment by outsiders in this scenario is relatively small. This is due to the sales price on the hammers being slightly higher which allows for greater profitability sooner than the model in which hammers are sold to the Joint Venture. The total to be invested by Angels is US$700,000 with US$ 850,000 to be invested by RTI. The calculation of the equity given up to outside investors in this scenario is as follows:

❶ PV of Angel's Investment (using a 15% discount rate):

$$PV = \$500,000 + \frac{(\$200,000)}{(1+0.15)^1} = US\$\ 651,228.73$$

❷ PV of Investment by Owners of RTI = US$ 850,000

❸ NPV of company (derived in section 6.4.3 and incorporating a 15% discount rate):

NPV = US$ 25,177,149.93

❹ % Ownership of Angel Investors

$$= \frac{\text{PV of Angel's Investment}}{\text{NPV of Company + PV of Angel's Investment + PV of Investment by RTI}}$$

$$= \frac{\$651,228.73}{\$25,177,149.94 + \$651,228.73 + \$850,000} = 2.441\%$$

❺ Finally, the return on investment can be calculated for the Angels.

$$0 = -\$500,000 + \frac{(-\$200,000)}{(1+\text{IRR})^1} + \ldots + 0.0244x\frac{\left[\$9,927,325.00 \big/ (\text{IRR} - 0.03)\right]}{(1+\text{IRR})^8} = 15.091\%.$$

The equity surrendered for a total investment of US$ 700M by outside investors amounts to 2.441%. Not bad if the investor is satisfied with a return of 15%. However, in order to achieve the 35% hurdle rate, the Angels would require a 21.685% equity stake. This is a considerable increase over the 2.441% calculated. Given that a 22% stake will not give up control of the company and that the Angel's investment is required to commence operations, it does not, however, appear to be too great a sacrifice.

7.2.3 Fractional Ownership Calculation for the Investors in the Joint Venture

In this scenario, as explained in detail above, the investment will come from APE. In fact, a total of US$ 14,500,000 is required in stages from 2004 to 2009, as depicted in Appendix AM. In addition, APE will supply its network, which should also be assigned a value when calculating the fractional ownership. In return, RTI will invest US$ 500,000 and provide the opportunity to participate exclusively in bringing the revolutionary technology to market. The calculations using a discount rate of 15% are:

❶ PV of APE's Investment = $\$1,000,000 + \frac{(\$0)}{(1+0.15)^1} + \frac{(\$2,500,000)}{(1+0.15)^2} + \frac{(\$3,000,000)}{(1+0.15)^3}$

$$+\frac{(\$4,500,000)}{(1+0.15)^4} + \frac{(\$3,500,000)}{(1+0.15)^5}$$

= US$ 9,175,916.04

The investment required from APE is staged and occurs in years one through six, or 2004 to 2009. As before, each year into the future must be discounted back one additional year in order to calculate the present value.

❷ Arbitrary Value of APE's Network = US$ 50,000,000

This number was arbitrarily chosen to represent the value of APE's distribution channel (network). It is not based on a detailed evaluation of the scope of the network. It is merely a large figure that appears to be a more than generous estimate of what it would cost to establish a well-diversified distribution channel in North America.

❸ PV of Investment by RTI = US$ 500,000

❹ NPV of Joint Venture with zero growth (derived in section 6.4.2.1 above)

NPV = US$ 118,576,679.02

❺ % Ownership for APE

$$= \frac{\text{PV of APEs Investment} + \text{Arbitrary Value of APEs Network}}{\text{NPV of Company} + \text{PV of APEs Investment} + \text{Arbitrary Value of APEs Network} + \text{PV of Investment by RTI}}$$

$$= \frac{\$9,175,916.04 + \$50,000,000}{\$118,576,679.02 + \$9,175,916.04 + \$50,000,000 + \$500,000} = 33.20\%$$

❻ Finally, the return on investment can be calculated for APE.

$$0 = -\$1,000,000 + \frac{(\$0)}{(1+\text{IRR})^1} + \frac{(-\$2,500,000)}{(1+\text{IRR})^2} + \frac{(-\$3,000,000)}{(1+\text{IRR})^3} + \frac{(-\$4,500,000)}{(1+\text{IRR})^4} +$$

$$\frac{(-\$3,500,000)}{(1+\text{IRR})^5} + \ldots + 0.3320x\frac{\left[\$60,250,254.77 \Big/ (\text{IRR} - 0.03)\right]}{(1+\text{IRR})^8} = 33.53\%.$$

Assuming that APE is looking for at least 35% return on their investment, their ownership stake would have to be 36.70%. (Given that RTI is looking for a long-term partner with whom to structure the Joint Venture, it is felt that the minimum rate of return expected will not be 35% over the shorter term but rather closer to the 15% modelled above). Note that the value of their network has been arbitrarily set at $50,000,000, however, this could understate the situation or potentially overstate it. If understated, then APE's equity would have to increase. Conversely, if overstated then the equity would decrease. It would be possible to more accurately estimate the value of the network by calculating how long and at what cost RTI would be able to

establish a similar network of distributors and district offices, however, that is beyond the scope of this paper. For our purposes at this stage, US$ 50MM appears to be a reasonable guess.

Thus far I have suggested that the Joint Venture be structured on a 50/50 basis with APE. This is clearly not the case, based on the calculations using a 15% discount rate and assuming 0% growth. In fact, the only way that this would be possible is if the network were valued at US$110,000,000. Should the partnership be structured equally, then APE's return on investment would be 39.73%.

If the less conservative approach of 3% growth into the distant future is adopted, then APE's ownership would have to drop slightly to 28.03%. At this equity stake, the IRR would become 31.125%. Again, assuming that APE would be looking for a 35% annual return on their money, their equity would have to rise to a minority share of 33.554%. Obviously, APE's bargaining position will be based on the value of their network. Before structuring a deal, more work will have to be done to accurately determine the value of the distribution channel.

7.3 Summary

Table 6 summarises the calculations performed in this chapter. The four scenarios presented are all very attractive investments with excellent returns for the investors.

The scenario where RTI sells the hammers directly to the Joint Venture really only makes sense when valued with the income from the Joint Venture. I expected the worth of the company to increase but was surprised by how much the IRR jumped. I was also pleasantly surprised by how little equity needs to be given up in this model. Obviously, this is the model to present to the informal investors during the negotiations for early stage financing.

The "Joint Venture" is also a very compelling revenue model. The hammers are paid for in a very short period of time and thereafter create a very profitable annuity for the company. With a valuation of in excess of US$ 118MM, assuming a constant perpetuity past 2012, the company still generates a very healthy rate of return for its investors. Given that the projections on which these numbers are based are relatively conservative, the future could be even rosier!

The decision for the investor is therefore not whether to invest but rather how much equity it is possible to extract. The favourable outcome will ultimately lie with the strongest negotiator.

Summary of Financing	Sales to JV	Sales to JV (+ 50% Income)	Direct Sales	Joint Venture
Investment - RTI	$850,000.00	$850,000.00	$850,000.00	$500,000.00
Investment - Outsiders	$1,200,000.00	$850,000.00	$700,000.00	$14,500,000.00
@ 15% discount rate and 3% growth				
NPV of Outsider's Investment	$1,004,643.71	$789,035.92	$651,228.03	$9,175,916.04
NPV of Company	$18,238,710.22	$71,026,082.70	$25,177,149.93	$151,403,204.28
IRR of Company	37.005%	54.940%	41.057%	46.697%
% Ownership of Outsiders	4.999%	1.086%	2.441%	28.035%
ROR of Outsiders	15.039%	14.999%	15.091%	32.492%
@ 35% discount rate and 3% growth				
NPV of Outsider's Investment	$848,524.11	$737,174.21	$609,739.37	$5,726,422.72
NPV of Company	$329,017.37	$5,977,659.10	$1,107,880.66	$9,031,563.23
IRR of Company	37.005%	54.940%	41.057%	46.697%
% Ownership of Outsiders	41.850%	9.745%	23.747%	85.394%
ROR of Outsiders	35.426%	34.984%	36.043%	49.687%
Ownership % needed if 35% return	40.390%	9.758%	21.685%	33.554%
@ 15% discount rate and 0% growth				
NPV of Company	$14,197,964.23	$56,496,024.58	$19,768,383.01	$118,576,679.02
IRR of Company	35.973%	54.129%	40.082%	45.564%
% Ownership of Outsiders	6.258%	1.357%	3.062%	33.198%
ROR of Outsiders	15.054%	14.998%	15.129%	33.530%
@ 35% discount rate and 0% growth				
NPV of Company	$148,952.66	$5,330,167.10	$866,853.86	$7,568,739.59
IRR of Company	35.973%	54.129%	40.082%	45.564%
% Ownership of Outsiders	45.930%	10.657%	26.207%	87.352%
ROR of Outsiders	35.482%	34.982%	36.183%	48.995%
Ownership % needed if 35% return	44.178%	10.674%	23.716%	36.700%

Table 7: Summary of Financing for the Four Company Scenarios

The calculations have also borne out that the proposed model whereby RTI manufactures the *Revolution* hammer and sells it to the Joint Venture is the most lucrative for all stakeholders. The "Direct Sales" scenario is certainly profitable; however, at this stage probably only represents

a fall back position. If a Joint Venture that rents hammers cannot be structured, then RTI can always sell the hammer directly into the market.

8 CONCLUSION

This paper has attempted to present a strategic and financial analysis of a start-up manufacturing company in a mature industry. This industry is the deep foundation or pile-driving industry. The technology is beyond proof of concept and uses high frequency, resonant vibratory technology to lodge foundation piles into more types of soil and at three times the efficiency of conventional pile driving hammers. It is truly disruptive and very real, with the first prototype being delivered in August 2004. This hammer will be completely unique to the market.

The market in Japan, Germany, France, the United Kingdom, Canada and the USA is estimated to lie somewhere between US$278MM and US$371MM. In 2004, The North American market is estimated to range between US$168MM and US$225MM. With revolutionary technology poised to capture a large share of the market, these estimates make the revenue models compelling.

The industry is mature, concentrated, highly rivalrous and the products are fairly homogenous. The bulk of the power lies with the two largest manufacturers, ICE and APE, and also with the customers. This implies that the margins are low and the need for a way to distinguish oneself becomes of paramount importance to the survival of a hammer manufacturer. Thus a reputation for dependability, innovation and service are qualities that companies strive for.

A conservative calculation of the production cost savings, when compared to conventional hammers, estimates that the *Revolution* hammer will save contractors US$ 331M per year. In a low margin and highly competitive industry any chance to enhance the profits and create an advantage will form a compelling value proposition for the deep foundation contractor. In addition, this hammer, which has fewer moving parts, will be more dependable in the field and require less on-going maintenance, which further serves to enhance a contractor's ability to perform and save money.

The proposed revenue model consists of RTI as an R&D and manufacturing entity that will supply the hammer to a Joint Venture between RTI and APE. The Joint Venture will in turn build up a fleet of rental hammers, which will be distributed through APE's expansive distribution network throughout North America. This model generates revenues in the sale to the Joint Venture and creates an annuity in the form of rental income. The percentage ownership structure of the two companies partnered in the Joint Venture has yet to be finalised. If the

financial projections are as conservative as we think, then APE's equity stake will depend in large part on the valuation of their distribution channel. If it is determined to be worth US$110MM then APE would end up with a 50% share of the Joint Venture. If it is less, and the preliminary estimate is that it should be worth US$50MM, then APE would end up with a 33.2% equity stake, assuming a 15% discount rate and 0% growth.

The scenarios for each business, separated for simplicity, have been analysed on a financial level to determine how they compare to their respective industry medians, and how they measure up to a third proposed model in which RTI sells the hammers directly to the contractors. The results are impressive. All three models are extremely attractive from an investor's standpoint. They are all highly profitable, generate a significant amount of cash, and generally present a low-risk investment with the potential for extraordinary returns. Of particular note, although probably not a surprise given that it is based on annuity revenues, are the projections for the Joint Venture. Within the eight projected years, EBITDA rises to approximately US$128MM, net income to US$60MM, and Tangible Net Worth to US$159MM, all on sales of US$ 160MM. Of note too is the average annual Return on Equity of 46.30% and a contribution margin of 86% in 2012!

The final stage of the analysis has used discounted cash flow analysis to formerly establish the value of the companies as going concerns. In addition, with early stage investment required from Angel investors and from APE (depending on the company), it is important to answer the question of how much equity each respective company needs to give up to compensate for the outsider's investment. The results again emphasise that both companies in the proposed structure are extremely attractive investments. In the case of the manufacturing company, when 50% of the net income of the Joint Venture is factored in, the equity given to the Angel investors does not need to exceed 10%. This will allow the Angels to realise a return on their investment of 35% (3% growth presumed). In the case of the Joint Venture, 33% is given up for APE to earn 33.5% and 36.7% if they earn a 35% return (growth rate of 0% assumed). The belief is that APE, being a long-term investor and partner, should be satisfied with a 33.5%return but the ultimate ownership structure will be determined by the negotiating strength of both parties. It is important to note that the synergies created by working with APE in the North American market are appealing to RTI, however, they are not the only potential partner. If RTI encounters resistance to the proposed equity structure then ICE would be the next logical candidate. Their affiliation would in fact be very strategic when the decision to expand into overseas markets is made.

RTI anticipates exiting this industry in approximately eight years. They would do so by offering both the manufacturing company and their equity in the Joint Venture to APE. The belief is that at this stage, the company will have developed spin-off technology to enter new and larger industries such as soil densification and oil & gas. The projection is also that RTI will be so cash rich that they will be able to self-fund this move. This would of course require the R&D to be executed outside RTI to prevent APE from laying claim to it in the eventual sale, but that is a detail that is easily structured legally through a holding company.

What remains now is for RTI to put this plan into action. With the prototype due for delivery in August 2004, the future is just around the corner and it promises to be very exciting.

APPENDICES

APPENDIX A – MARKET SIZE FOR CONSTRUCTION MACHINERY

(Value of Shipments)

($ millions)

Historical

	1997	% chg.	1998	% chg.	1999	% chg.	2000	% chg.	2001	% chg.	Aver. % Chg.	
Canada	$1,076.9	n/a	$1,230.8	14.3%	$1,153.8	-6.3%	$1,307.7	13.3%	$1,230.8	-5.9%	3.6%	①
USA	$22,117.4	n/a	$24,022.7	8.6%	$21,920.7	-8.8%	$22,978.7	4.8%	$20,587.8	-10.4%	-1.7%	②
UK	$1,053.0	n/a	$1,138.5	8.1%	$1,171.5	2.9%	$1,215.2	3.7%	$1,247.0	2.6%	4.6%	③
France	$2,143.3	n/a	$2,340.3	9.2%	$2,637.6	12.7%	$3,405.0	29.1%	$3,575.3	5.0%	16.7%	④
Germany	$6,357.9	n/a	$6,687.9	5.2%	$6,555.9	-2.0%	$6,445.9	-1.7%	$5,334.9	-17.2%	-4.0%	⑤
Japan	n/a	n/a	$4,925.3	n/a	$5,175.6	5.1%	$4,955.3	-4.3%	$4,188.6	-15.5%	-5.0%	⑥
Total	**$32,748.5**	n/a	**$40,345.5**	23.2%	**$38,615.1**	-4.3%	**$40,307.8**	4.4%	**$36,164.4**	-10.3%	2.6%	

Forecast

	2002	% chg.	2003	% chg.	2004	% chg.	2005	% chg.	2006	% chg.	Aver. % Chg.	
Canada	$1,213.5	-1.4%	$1,189.6	-2.0%	$1,267.3	6.5%	$1,362.9	7.5%	$1,465.2	7.5%	5.2%	①
USA	$20,300.0	-1.4%	$19,900.0	-2.0%	$21,200.0	6.5%	$22,800.0	7.5%	$24,510.0	7.5%	5.2%	②
UK	$1,249.2	0.2%	$1,262.3	1.0%	$1,263.6	0.1%	$1,262.1	-0.1%	$1,272.7	0.8%	0.5%	③
France	$3,754.0	5.0%	$4,016.8	7.0%	$4,358.3	8.5%	$4,663.3	7.0%	$4,999.1	7.2%	8.3%	④
Germany	$4,829.0	-9.5%	$4,785.0	-0.9%	$4,840.0	1.1%	$5,004.9	3.4%	$5,279.9	5.5%	2.3%	⑤
Japan	$4,188.6	0.0%	$4,188.6	0.0%	$4,188.6	0.0%	$4,188.6	0.0%	$4,188.6	0.0%	0.0%	⑦
Total	**$35,534.3**	-1.7%	**$35,342.3**	-0.5%	**$37,117.8**	5.0%	**$39,281.8**	5.8%	**$41,715.5**	6.2%	4.3%	

① Industry Canada "Canadian Industry Statistics – Data Tables Construction Machinery Manufacturing", *Annual Survey of Manufactures* (2001)

② US Census Bureau, "Statistics for Industry Groups and Industries 2001", *Annual Survey of Manufactures* (2001)

③ Euromonitor, "Construction Machinery in the UK" (Sep 2002)

④ Euromonitor, "Construction Machinery in the France" (Sep 2002)

⑤ Euromonitor, "Construction Machinery in Germany" (Sep 2002)

⑥ The Japan Machinery Federation, "Detailed Trends in the Machinery Industry" (2002)

⑦ No statistics available - assumed to remain the same as 2001 value

APPENDIX B – ESTIMATED MARKET SIZE FOR PILE DRIVING MACHINERY

Pile Driving Manufacturing

Total Value of Shipments

($ millions)

High estimate based on 1.0% of Construction Machinery Manufacturing

	Historical					Forecast				
	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Canada	$10.77	$12.31	$11.54	$13.08	$12.31	$12.14	$11.90	$12.67	$13.63	$14.65
USA	$221.17	$240.23	$219.21	$229.79	$205.88	$203.00	$199.00	$212.00	$228.00	$245.10
UK	$10.53	$11.39	$11.72	$12.15	$12.47	$12.49	$12.62	$12.64	$12.62	$12.73
France	$21.43	$23.40	$26.38	$34.05	$35.75	$37.54	$40.17	$43.58	$46.63	$49.99
Germany	$63.58	$66.88	$65.56	$64.46	$53.35	$48.29	$47.85	$48.40	$50.05	$52.80
Japan	$0.00	$49.25	$51.79	$49.55	$41.89	$41.89	$41.89	$41.89	$41.89	$41.89
Total	$327.49	$403.46	$386.19	$403.08	$361.64	$355.34	$353.42	$371.18	$392.82	$417.16

Pile Driving Manufacturing

Total Value of Shipments

($ millions)

Low estimate based on 0.75% of Construction Machinery Manufacturing

	Historical					Forecast				
	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Canada	$8.08	$9.23	$8.65	$9.81	$9.23	$9.10	$8.92	$9.50	$10.22	$10.99
USA	$165.88	$180.17	$164.41	$172.34	$154.41	$152.25	$149.25	$159.00	$171.00	$183.83
UK	$7.90	$8.54	$8.79	$9.11	$9.35	$9.37	$9.47	$9.48	$9.47	$9.55
France	$16.07	$17.55	$19.78	$25.54	$26.81	$28.16	$30.13	$32.69	$34.97	$37.49
Germany	$47.68	$50.16	$49.17	$48.34	$40.01	$36.22	$35.89	$36.30	$37.54	$39.60
Japan	$0.00	$36.94	$38.84	$37.16	$31.41	$31.41	$31.41	$31.41	$31.41	$31.41
Total	$245.61	$302.59	$289.64	$302.31	$271.23	$266.51	$265.07	$278.38	$294.61	$312.87

APPENDIX C – COMPETITOR ANALYSIS (PART 1)

	Competitor #1 International Construction Equipment	Competitor #2 American Piledriving Equipment Inc. (APE)	Competitor #3 Hercules Machinery Corp. (HMC)	Competitor #4 Berminghammer Foundation Equipment
Performance / Trends / Products	▪ Strong performer – Leader in the marketplace. Well –established brand name ▪ Mature in market ▪ Vibratory and Diesel hammers	▪ Aggressive growth since inception 8 years ago ▪ Market leadership contender ▪ Gaining market share steadily ▪ Vibratory, Diesel & Hydraulic Impact hammers	▪ Steady growth ▪ Diesel hammers	▪ Flat growth ▪ Diesel hammers
Key Strengths (Core Competencies)	▪ Large Co. (Can handle large Projects) ▪ Experience ▪ Complete range of product and service offerings ▪ Financial resources ▪ Global network of offices	▪ Innovative – hold several patents ▪ Range of product and service offerings (even conduct a pile-driving school) ▪ Large size (economies of scale in operations) ▪ Focussed on major projects ▪ Great web presence – very well marketed ▪ Responsive to customer needs	▪ Small to medium sized ▪ Focussed on large contractors ▪ Equipment hung from a crane ▪ Experienced	▪ Small size ▪ Focussed on residential land development (mainly shoring) ▪ Top quality products with matching price point
Key Weaknesses	▪ Overlook smaller business opportunities Very large and not tuned in to market and nor reacting appropriately	▪ Too focussed on market leadership position	▪ Not full service shop	▪ Near full-service shop ▪ Niche innovations and technology or techniques ▪ Numerous patents
Revenue Stream	▪ Sales & Rentals ▪ Service packages ▪ Replacement parts ▪ Transportation of machinery ▪ Consulting services	▪ Sales & Rentals ▪ Service packages ▪ Replacement parts ▪ Transportation of machinery ▪ Consulting services ▪ Licensing of patents	▪ Sales & Rentals ▪ Service packages ▪ Replacement parts	▪ Sales & Rentals ▪ Service packages ▪ Replacement parts ▪ Licensing of patents
Strategic Alliances	▪ Several international alliances ▪ Assoc. of Drill Shaft Contractors (ADSC) ▪ Deep Foundation Institute (DFI)	▪ CAT – power plants ▪ ADSC ▪ DFI ▪ Pile Drivers of America (PDA)	▪ None	▪ Also own a construction company (test new products)

APPENDIX C – COMPETITOR ANALYSIS (PART 2)

	Competitor #5 Vulcan Iron Works	Competitor #6 Hydraulic Power Systems Inc. (HPSI)	Competitor #7 MKT Manufacturing Inc. (MKT)
Performance / Trends / Products	▪ Well-established brand name – one of the originals ▪ Mature in market place ▪ Vibratory and Air/Steam hammers	▪ Flat growth ▪ Unexceptional ▪ Vibratory and Hydraulic Impact hammers	▪ Flat growth ▪ Unexceptional ▪ Air / Steam hammers
Key Strengths (Core Competencies)	▪ Large size (can handle large scale projects) ▪ Experience ▪ Complete range of product and service offerings (truck drills to crane mounted) ▪ Well known, charismatic leader ▪ Heavily networked with construction firms in the Southern US	▪ Good brand recognition in the industry ▪ Established ▪ Experience ▪ Mix of conventional hammers and vibros	▪ Small to medium sized ▪ Focussed on large contractors (equipment is hung from a crane) ▪ Experience ▪ Mix of conventional hammers and vibros
Key Weaknesses	▪ Slow to adopt new technologies ▪ Miss opportunities as they are nor perceived as innovative	▪ Middle of the pack	▪ Not full service shop
Revenue Stream	▪ Sales & Rentals ▪ Service packages ▪ Replacement parts ▪ Consulting services	▪ Sales & Rentals ▪ Service packages ▪ Replacement parts	▪ Sales & Rentals ▪ Service packages ▪ Replacement parts
Strategic Alliances	▪ Unknown	▪ Unknown	▪ Unknown

APPENDIX D – CALCULATION OF SG&A CATEGORIES USING PERCENTAGES (SALES TO JOINT VENTURE)

		2005	2006	2007	2008	2009	2010	2011	2012
Sales	Sales	2.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Engineering	COGS	8.00%	7.00%	6.00%	6.00%	6.00%	5.00%	5.00%	5.00%
Disbursements	COGS	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
R&D	Sales	0.00%	6.00%	8.00%	10.00%	12.00%	15.00%	15.00%	15.00%
Legal	COGS	7.00%	2.00%	1.00%	1.00%	1.00%	0.75%	0.65%	0.60%
Administration	COGS	10.00%	12.00%	13.50%	13.50%	13.25%	12.48%	11.80%	10.00%
Travel	COGS	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Bad Debt Expense	Sales	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
Interest Expense	Calculated separately								
Office Salaries	Calculated separately								
Management Compensation	Calculated separately								

APPENDIX E – PROJECTED MANAGEMENT & OFFICE STAFF COMPENSATION

('000s)	2005		2006		2007		2008		2009		2010		2011		2012	
	No.	Total	No.	Total	No.	Total	No.	Total	No.	Total	No.	Total	No.	Total	No.	Total
Management																
President	0.4	$50	1.0	$90	1.0	$135	1.0	$180	1.0	$180	1.0	$180	1.0	$180	1.0	$180
VP/Sales	0.0	$0	0.0	$0	1.0	$115	2.0	$270	3.5	$490	3.5	$490	3.5	$490	3.5	$490
VP/Marketing	0.0	$0	0.0	$0	0.0	$0	1.5	$203	2.5	$350	2.5	$350	2.5	$350	2.5	$350
VP/Finance (CFO)	0.0	$0	0.5	$50	1.0	$120	1.0	$135	2.0	$280	2.0	$280	2.0	$280	2.0	$280
Engineering Mgr.	0.5	$40	1.0	$80	1.0	$100	2.0	$220	2.0	$250	2.0	$250	2.0	$250	2.0	$250
Manufacturing Mgr.	0.0	$0	0.0	$0	0.0	$0	1.0	$110	2.0	$250	2.0	$250	2.0	$250	2.0	$250
Engineering / CAD	0.0	$0	2.0	$120	2.0	$120	3.0	$195	6.0	$390	6.0	$450	7.5	$563	10.0	$750
Total	**0.9**	**$90**	**4.5**	**$340**	**6.0**	**$590**	**11.5**	**$1,313**	**19.0**	**$2,190**	**19.0**	**$2,250**	**20.5**	**$2,363**	**23.0**	**$2,550**
Office Staff																
Accts. Payable	0.0	$0	1.0	$50	1.0	$50	2.0	$100	3.0	$165	3.0	$180	3.0	$180	3.0	$180
Accts. Receivable	0.3	$15	1.0	$50	2.0	$100	3.0	$150	3.0	$165	3.0	$180	3.0	$180	3.0	$180
Front Office	0.3	$11	1.0	$35	2.0	$70	4.0	$140	4.0	$160	4.0	$180	4.0	$200	4.0	$200
Total	**0.6**	**$26**	**3.0**	**$135**	**5.0**	**$220**	**9.0**	**$390**	**10.0**	**$490**	**10.0**	**$540**	**10.0**	**$560**	**10.0**	**$560**
Total Compensation		**$116**		**$475**		**$810**		**$1,703**		**$2,680**		**$2,790**		**$2,923**		**$3,110**

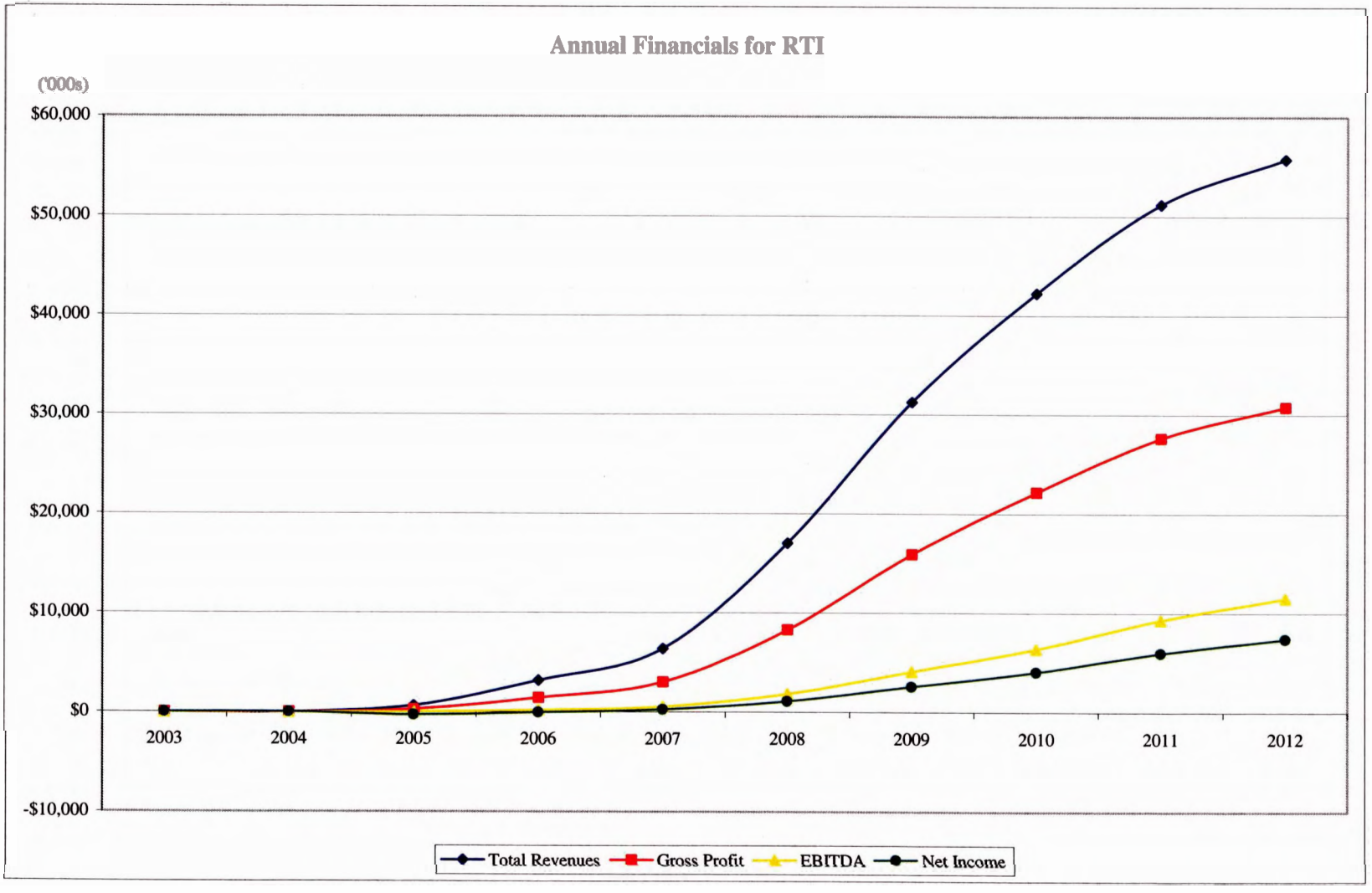
APPENDIX F – PROJECTED SALES OF THE REVOLUTION HAMMER (SALES TO JOINT VENTURE)

(000's)	2005	2006	2007	2008	2009	2010	2011	2012
Revolution hammer - **50Hp** (# sold)	1	6	8	8	8	8	8	8
Price per hammer	$48.30	$49.70	$51.20	$52.70	$54.30	$56.00	$57.60	$59.40
Revenue	**$48.30**	**$298.20**	**$409.60**	**$421.60**	**$434.40**	**$448.00**	**$460.80**	**$475.20**
Revolution hammer - **350Hp** (# sold)	4	18	34	90	148	183	200	200
Price per hammer	$132.60	$136.60	$140.70	$144.90	$149.30	$153.70	$158.30	$163.10
Revenue	**$530.40**	**$2,458.80**	**$4,783.80**	**$13,041.00**	**$22,096.40**	**$28,127.10**	**$31,360.00**	**$32,620.00**
Total Revenue	**$578.70**	**$2,757.00**	**$5,193.40**	**$13,462.60**	**$22,530.80**	**$28,575.10**	**$31,820.80**	**$33,095.20**

APPENDIX G – PROJECTED INCOME STATEMENT (SALES TO JOINT VENTURE)

Income Statement	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All data in ($000s)										
Revenues										
Sales, Parts, Rentals	$0.00	$0.00	$593.64	$3,040.56	$6,193.70	$16,742.40	$30,801.53	$41,621.14	$50,438.81	$54,908.77
CAT OEM Sales	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Consulting	$0.00	$0.00	$16.14	$106.42	$154.84	$251.14	$462.02	$624.32	$756.58	$823.63
Total Revenues	**$0.00**	**$0.00**	**$609.78**	**$3,146.98**	**$6,348.54**	**$16,993.54**	**$31,263.56**	**$42,245.46**	**$51,195.39**	**$55,732.40**
Cost of Goods Sold										
Sales, Parts, Rentals	$0.00	$0.00	$353.97	$1,721.44	$3,344.24	$8,735.44	$15,374.77	$20,080.04	$23,547.38	$24,949.80
CAT OEM Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Gross Profit	**$0.00**	**$0.00**	**$255.81**	**$1,425.53**	**$3,004.30**	**$8,258.10**	**$15,888.78**	**$22,165.42**	**$27,648.01**	**$30,782.60**
SGA										
Sales	$0.00	$0.00	$11.87	$152.03	$309.68	$837.12	$1,540.08	$2,081.06	$2,521.94	$2,745.44
Engineering	$0.00	$0.00	$28.32	$120.50	$200.65	$524.13	$922.49	$1,004.00	$1,177.37	$1,247.49
Disbursements	$0.00	$0.00	$3.54	$17.21	$33.44	$87.35	$153.75	$200.80	$235.47	$249.50
R & D	$0.00	$0.00	$0.00	$182.43	$495.50	$1,674.24	$3,696.18	$6,243.17	$7,565.82	$8,236.32
Legal	$0.00	$0.00	$24.78	$34.43	$33.44	$87.35	$153.75	$150.60	$153.06	$149.70
Administration	$0.00	$0.00	$35.40	$206.57	$451.47	$1,179.28	$2,037.16	$2,505.99	$2,778.59	$2,494.98
Travel	$0.00	$0.00	$7.08	$34.43	$66.88	$174.71	$307.50	$401.60	$470.95	$499.00
Bad Debt Expense	$0.00	$0.00	$5.94	$30.41	$61.94	$167.42	$308.02	$416.21	$504.39	$549.09
Office Salaries	$0.00	$0.00	$25.50	$135.00	$220.00	$390.00	$490.00	$540.00	$560.00	$560.00
Management Salaries	$0.00	$0.00	$90.00	$340.00	$590.00	$1,312.50	$2,190.00	$2,250.00	$2,362.50	$2,550.00
Total SGA	**$0.00**	**$0.00**	**$232.42**	**$1,253.01**	**$2,463.01**	**$6,434.11**	**$11,798.91**	**$15,793.43**	**$18,330.09**	**$19,281.50**
EBITDA	**$0.00**	**$0.00**	**$23.39**	**$172.52**	**$541.29**	**$1,823.99**	**$4,089.87**	**$6,371.98**	**$9,317.92**	**$11,501.10**
Depreciation	$0.00	$0.00	$186.00	$145.20	$101.64	$71.15	$49.81	$34.86	$24.40	$17.09
Amortization	$0.00	$0.00	$125.00	$93.75	$70.31	$52.74	$39.55	$29.66	$22.25	$16.69
Interest	$0.00	$0.00	$0.00	$0.00	$0.00	$43.32	$38.81	$34.32	$29.81	$25.32
Taxes	$0.00	$0.00	$0.00	$0.00	$131.56	$590.14	$1,411.16	$2,234.50	$3,291.81	$4,075.64
Net Income	**$0.00**	**$0.00**	**-$287.61**	**-$66.43**	**$237.78**	**$1,066.63**	**$2,550.55**	**$4,038.65**	**$5,949.65**	**$7,366.36**

APPENDIX H – GRAPHICAL REPRESENTATION OF PROFITABILITY



APPENDIX I – PROJECTED BALANCE SHEET (SALES TO JOINT VENTURE)

Balance Sheet	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All data in ($000s)										
Assets										
Cash	$0.00	$230.00	$129.35	$288.73	$462.95	$765.29	$1,845.56	$4,986.63	$10,003.20	$16,893.31
Accounts Receivable	$0.00	$0.00	$92.85	$578.12	$1,102.09	$3,131.84	$5,360.38	$7,196.58	$8,530.21	$9,285.01
Inventory	$0.00	$0.00	$83.79	$204.65	$425.70	$1,025.16	$1,353.06	$1,722.15	$1,824.06	$1,909.30
Prepaid Expenses	$0.00	$0.00	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50
Total Current Assets	**$0.00**	**$230.00**	**$313.48**	**$1,079.00**	**$1,998.23**	**$4,929.79**	**$8,566.51**	**$13,912.86**	**$20,364.98**	**$28,095.11**
Long-term Assets										
Machinery & Equipment (gross)	$0.00	$300.00	$300.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00
Accumulated Depreciation	$0.00	$0.00	-$90.00	-$168.00	-$222.60	-$260.83	-$287.58	-$306.30	-$319.41	-$328.59
Rental Fleet	$0.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00
Accumulated Depreciation	$0.00	$0.00	-$96.00	-$163.20	-$210.24	-$243.17	-$266.22	-$282.35	-$293.65	-$301.55
Goodwill & Other Intangible Assets	$0.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00
Accumulated Amortization	$0.00	$0.00	-$125.00	-$218.75	-$289.06	-$341.80	-$381.35	-$411.01	-$433.26	-$449.95
Total Long-term Assets	**$0.00**	**$1,120.00**	**$809.00**	**$620.05**	**$448.10**	**$324.21**	**$234.85**	**$170.33**	**$123.68**	**$89.91**
Total Assets	**$0.00**	**$1,350.00**	**$1,122.48**	**$1,699.05**	**$2,446.33**	**$5,253.99**	**$8,801.36**	**$14,083.19**	**$20,488.66**	**$28,185.02**
Liabilities & Equity										
Short-term Bank Loans	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Accounts Payable	$0.00	$0.00	$60.09	$255.11	$473.25	$1,552.10	$2,440.34	$3,502.69	$3,811.10	$3,992.64
Income Taxes Payable	$0.00	$0.00	$0.00	$17.59	$58.96	$271.14	$429.71	$660.54	$857.95	$1,056.41
Due to Officers & Affiliates	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Dividends Payable	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Current Portion of Long-term Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$46.25	$41.25	$36.25	$31.25	$26.25
Total Current Liabilities	**$0.00**	**$0.00**	**$60.09**	**$272.70**	**$532.21**	**$1,869.49**	**$2,911.30**	**$4,199.48**	**$4,700.30**	**$5,075.30**
Long-term Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$403.75	$358.75	$313.75	$268.75	$223.75
Deferred Income Taxes	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Long-term Liabilities	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$403.75**	**$358.75**	**$313.75**	**$268.75**	**$223.75**
Total Liabilities	**$0.00**	**$0.00**	**$60.09**	**$272.70**	**$532.21**	**$2,273.24**	**$3,270.05**	**$4,513.23**	**$4,969.05**	**$5,299.05**
Common Shares	$0.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00
Preferred Shares	$0.00	$500.00	$500.00	$950.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00
Retained Earnings	$0.00	$0.00	-$287.61	-$373.65	-$135.87	$930.76	$3,481.31	$7,519.96	$13,469.61	$20,835.97
Total Equity	**$0.00**	**$1,350.00**	**$1,062.39**	**$1,426.35**	**$1,914.13**	**$2,980.76**	**$5,531.31**	**$9,569.96**	**$15,519.61**	**$22,885.97**
Total Liabilities & Equity	**$0.00**	**$1,350.00**	**$1,122.48**	**$1,699.05**	**$2,446.33**	**$5,253.99**	**$8,801.36**	**$14,083.19**	**$20,488.66**	**$28,185.02**
Tangible Net Worth	**$0.00**	**$850.00**	**$687.39**	**$1,145.10**	**$1,703.19**	**$2,822.56**	**$5,412.66**	**$9,480.97**	**$15,452.87**	**$22,835.92**

APPENDIX J – KEY RATIOS (SALES TO JOINT VENTURE)

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Profitability										
Sales Growth	N/A	N/A	N/A	416.09%	101.73%	167.68%	83.97%	35.13%	21.19%	8.86%
Gross Profit / Sales	N/A	N/A	41.95%	45.30%	47.32%	48.60%	50.82%	52.47%	54.00%	55.23%
SG&A / Sales	N/A	N/A	38.12%	39.82%	38.80%	37.86%	37.74%	37.38%	35.80%	34.60%
EBITDA/Sales	N/A	N/A	3.84%	5.48%	8.53%	10.73%	13.08%	15.08%	18.20%	20.64%
Net Income / Sales	N/A	N/A	-47.17%	-2.11%	3.75%	6.28%	8.16%	9.56%	11.62%	13.22%
Return on Assets	N/A	N/A	-21.30%	-5.92%	13.99%	43.60%	48.54%	45.89%	42.25%	35.95%
Return on Equity	N/A	N/A	-21.30%	-6.25%	16.67%	55.72%	85.57%	73.01%	62.17%	47.46%
Liquidity										
Current Ratio	N/A	N/A	5.22	3.96	3.75	2.64	2.94	3.31	4.33	5.54
Quick Ratio	N/A	N/A	3.82	3.21	2.95	2.09	2.48	2.90	3.94	5.16
Working Capital	$0.00	$230.00	$253.39	$806.30	$1,466.03	$3,060.30	$5,655.21	$9,713.38	$15,664.68	$23,019.81
Capitalisation										
Total Liabilities / Total Assets	N/A	0.00	0.05	0.16	0.22	0.43	0.37	0.32	0.24	0.19
Debt Service										
EBITDA / Interest Expense	N/A	N/A	N/A	N/A	N/A	42.11	105.38	185.66	312.58	454.23
EBITDA / (Intr. Exp. + CPLTD)	N/A	N/A	N/A	N/A	N/A	20.36	51.09	90.29	152.60	223.02
Total Debt / EBITDA	N/A	N/A	0.00	0.00	0.00	0.25	0.10	0.05	0.03	0.02
Total Debt / TNW	N/A	0.00	0.00	0.00	0.00	0.16	0.07	0.04	0.02	0.01
Turnover Ratios										
Accounts Receivable Turnover	N/A	N/A	6.6	5.4	5.8	5.4	5.8	5.9	6.0	6.0
A/R Collection Period	N/A	N/A	55.6	67.1	63.4	67.3	62.6	62.2	60.8	60.8
Inventory Turnover	N/A	N/A	4.2	8.4	7.9	8.5	11.4	11.7	12.9	13.1
Inventory Conversion Period	N/A	N/A	86.4	43.4	46.5	42.8	32.1	31.3	28.3	27.9
Accounts Payable Turnover	N/A	N/A	10.1	12.3	13.4	10.9	12.8	12.1	13.4	14.0
A/P Deferral Period	N/A	N/A	36.0	29.6	27.2	33.3	28.5	30.3	27.2	26.1
Cash Conversion Cycle	N/A	N/A	106.0	80.9	82.6	76.8	66.2	63.2	61.9	62.6

APPENDIX K –INVESTED CAPITAL (SALES TO JOINT VENTURE)

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
('000s)										
Invested Capital (Asset Holders)										
S-T Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Dividends Payable	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CPLTD	$0.00	$0.00	$0.00	$0.00	$0.00	$46.25	$41.25	$36.25	$31.25	$26.25
L-T Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$403.75	$358.75	$313.75	$268.75	$223.75
Deferred Taxes	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Preferred Shares	$0.00	$500.00	$500.00	$950.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00	$1,200.00
Common Shares	$0.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00
Other Contribution	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Retained Earnings	$0.00	$0.00	-$287.61	-$373.65	-$135.87	$930.76	$3,481.31	$7,519.96	$13,469.61	$20,835.97
Other Financial Assets (bonds etc)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Equals: Invested Capital (Asset Hldrs.)	**$0.00**	**$1,350.00**	**$1,062.39**	**$1,426.35**	**$1,914.13**	**$3,430.76**	**$5,931.31**	**$9,919.96**	**$15,819.61**	**$23,135.97**
Invested Capital (Investing)										
Current Assets	$0.00	$230.00	$313.48	$1,079.00	$1,998.23	$4,929.79	$8,566.51	$13,912.86	$20,364.98	$28,095.11
Less: A/P etc	$0.00	$0.00	-$60.09	-$272.70	-$532.21	-$1,823.24	-$2,870.05	-$4,163.23	-$4,669.05	-$5,049.05
Net Fixed Assets	$0.00	$1,120.00	$809.00	$620.05	$448.10	$324.21	$234.85	$170.33	$123.68	$89.91
Other Assets										
Equals: Invested Capital (Investing)	**$0.00**	**$1,350.00**	**$1,062.39**	**$1,426.35**	**$1,914.13**	**$3,430.76**	**$5,931.31**	**$9,919.96**	**$15,819.61**	**$23,135.97**
Invested Capital Ratios										
Debt-to-Invested Capital	N/A	0.00%	0.00%	0.00%	0.00%	13.12%	6.74%	3.53%	1.90%	1.08%
Trade Capital to Invested Capital	N/A	17.04%	23.85%	56.53%	76.59%	90.55%	96.04%	98.28%	99.22%	99.61%
Rate of Return on Invested Capital	N/A	N/A	1.73%	16.24%	37.95%	95.29%	119.21%	107.43%	93.93%	72.70%
ROIC after depreciation & amortisation	N/A	N/A	-21.30%	-6.25%	25.89%	88.82%	116.61%	106.34%	93.46%	72.49%
Invested Capital Turnover	N/A	N/A	45.17%	296.22%	445.09%	887.80%	911.27%	712.25%	516.08%	352.30%
Invested Capital to Equity	N/A	N/A	N/A	-369.38%	-381.73%	-1408.76%	368.60%	170.38%	131.92%	117.45%

APPENDIX L – FREE CASH FLOW (SALES TO JOINT VENTURE)

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
('000s)										
Free Cash Flow (Operational)										
FFO - Method 1	$0.00	$0.00	$125.84	$196.18	$409.73	$1,218.42	$2,664.89	$4,125.26	$6,015.49	$7,416.44
FFO - Method 2	$0.00	$0.00	$23.39	$172.52	$409.73	$1,218.42	$2,664.89	$4,125.26	$6,015.49	$7,416.44
FFO - Method 3	$0.00	$0.00	$23.39	$172.52	$409.73	$1,218.42	$2,664.89	$4,125.26	$6,015.49	$7,416.44
Incremental Investment	N/A	$1,350.00	$23.39	$602.91	$659.73	$1,640.53	$2,589.90	$4,053.17	$5,946.30	$7,350.14
Equals: FCF = FFO - II	**N/A**	**-$1,350.00**	**$0.00**	**-$430.39**	**-$250.00**	**-$422.11**	**$74.99**	**$72.10**	**$69.19**	**$66.30**
Free Cash Flow (Financial)										
After-tax dist. To Debt-holders	N/A	$0.00	$0.00	$0.00	$0.00	-$422.11	$74.99	$72.10	$69.19	$66.30
Net dist. To Shareholders	N/A	$0.00	$0.00	$19.61	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Private Investment	N/A	-$1,350.00	$0.00	-$450.00	-$250.00	$0.00	$0.00	$0.00	$0.00	$0.00
Equals: FCF	**N/A**	**-$1,350.00**	**$0.00**	**-$430.39**	**-$250.00**	**-$422.11**	**$74.99**	**$72.10**	**$69.19**	**$66.30**

APPENDIX M - CALCULATION OF SG&A CATEGORIES USING PERCENTAGES (JOINT VENTURE)

		2005	2006	2007	2008	2009	2010	2011	2012
Sales	Sales	2.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Engineering	COGS	8.00%	7.00%	6.00%	6.00%	6.00%	5.00%	5.00%	5.00%
Disbursements	COGS	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
R&D	Sales	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Legal	COGS	44.00%	14.00%	7.00%	4.00%	2.00%	1.00%	1.00%	1.00%
Administration	COGS	10.00%	12.00%	13.50%	13.50%	13.25%	12.48%	11.80%	10.00%
Travel	COGS	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Bad Debt Expense	Sales	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
Interest Expense	Calculated separately								
Office Salaries	Calculated separately								
Management Compensation	Calculated separately								

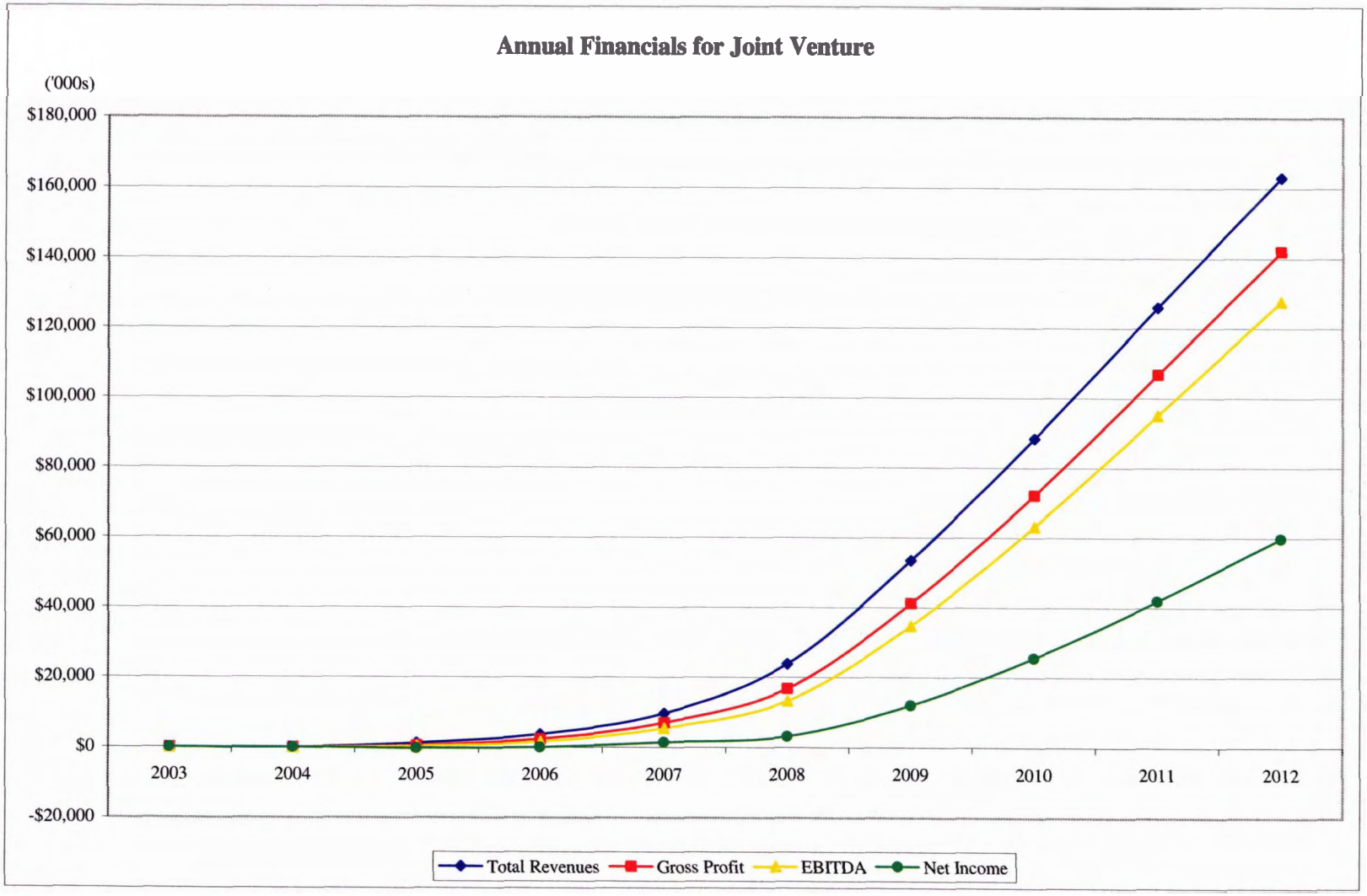
APPENDIX N – SIZE OF RENTAL POOL (JOINT VENTURE)

(000's)	2005	2006	2007	2008	2009	2010	2011	2012
# of Hammers purchased	8	18	34	90	148	183	200	200
# of Hammers @ year end (**350Hp**)	8	26	60	150	298	481	681	881
Actual # of Hammers (after obsoles.)	8	26	60	150	298	441	587	718
Average Rental Price / hammer / mth	$20.25	$20.86	$21.49	$22.15	$22.82	$23.51	$24.22	$24.96
Total Revenue from Rentals	**$1,120.00**	**$3,614.10**	**$9,509.00**	**$23,435.70**	**$52,649.80**	**$87,075.40**	**$124,121.40**	**$160,568.80**

APPENDIX O – PROJECTED INCOME STATEMENT (JOINT VENTURE)

Income Statement	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All data in ($000s)										
Revenues										
Sales, Parts, Rentals	$0.00	$0.00	$1,119.97	$3,614.11	$9,508.99	$23,435.68	$52,649.82	$87,075.35	$124,121.42	$160,568.79
CAT OEM Sales	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Consulting	$0.00	$0.00	$24.00	$126.49	$237.72	$351.54	$789.75	$1,306.13	$1,861.82	$2,408.53
Total Revenues	**$0.00**	**$0.00**	**$1,143.97**	**$3,740.60**	**$9,746.71**	**$23,787.21**	**$53,439.57**	**$88,381.48**	**$125,983.24**	**$162,977.32**
Cost of Goods Sold										
Sales, Parts, Rentals	$0.00	$0.00	$56.00	$180.71	$475.45	$1,171.78	$2,632.49	$4,353.77	$6,206.07	$8,028.44
CAT OEM Costs	$0.00	$0.00	$520.00	$1,170.00	$2,210.00	$5,850.00	$9,620.00	$11,895.00	$13,000.00	$13,000.00
Gross Profit	**$0.00**	**$0.00**	**$567.97**	**$2,389.90**	**$7,061.26**	**$16,765.43**	**$41,187.08**	**$72,132.71**	**$106,777.17**	**$141,948.88**
SGA										
Sales	$0.00	$0.00	$22.40	$180.71	$475.45	$1,171.78	$2,632.49	$4,353.77	$6,206.07	$8,028.44
Engineering	$0.00	$0.00	$4.48	$12.65	$28.53	$70.31	$157.95	$217.69	$310.30	$401.42
Disbursements	$0.00	$0.00	$0.56	$1.81	$4.75	$11.72	$26.32	$43.54	$62.06	$80.28
R & D	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Legal	$0.00	$0.00	$24.64	$25.30	$33.28	$46.87	$52.65	$43.54	$62.06	$80.28
Administration	$0.00	$0.00	$5.60	$21.68	$64.19	$158.19	$348.81	$543.35	$732.32	$802.84
Travel	$0.00	$0.00	$1.12	$3.61	$9.51	$23.44	$52.65	$87.08	$124.12	$160.57
Bad Debt Expense	$0.00	$0.00	$11.20	$36.14	$95.09	$234.36	$526.50	$870.75	$1,241.21	$1,605.69
Office Salaries	$0.00	$0.00	$25.50	$135.00	$220.00	$390.00	$490.00	$540.00	$560.00	$560.00
Management Salaries	$0.00	$0.00	$90.00	$340.00	$590.00	$1,312.50	$2,190.00	$2,250.00	$2,362.50	$2,550.00
Total SGA	**$0.00**	**$0.00**	**$185.50**	**$756.90**	**$1,520.80**	**$3,419.16**	**$6,477.37**	**$8,949.71**	**$11,660.65**	**$14,269.53**
EBITDA	**$0.00**	**$0.00**	**$382.48**	**$1,633.00**	**$5,540.47**	**$13,346.26**	**$34,709.71**	**$63,183.00**	**$95,116.52**	**$127,679.35**
Depreciation	$0.00	$0.00	$474.27	$1,420.58	$3,092.43	$7,832.25	$14,995.57	$22,505.41	$29,154.56	$34,093.99
Amortization	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Interest	$0.00	$0.00	$0.00	$0.00	$0.00	$563.06	$1,024.31	$911.82	$799.31	$686.82
Taxes	$0.00	$0.00	$0.00	$75.66	$871.99	$1,763.53	$6,657.32	$14,164.57	$23,210.94	$33,090.46
Net Income	**$0.00**	**$0.00**	**-$91.79**	**$136.75**	**$1,576.05**	**$3,187.42**	**$12,032.51**	**$25,601.21**	**$41,951.72**	**$59,808.08**

APPENDIX P – GRAPHICAL REPRESENTATION OF PROFITABILITY



APPENDIX Q – PROJECTED BALANCE SHEET (JOINT VENTURE)

Balance Sheet	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All data in ($000s)										
Assets										
Cash	$0.00	$1,497.12	$89.16	$97.52	$97.77	$782.34	$1,217.46	$4,507.74	$26,194.83	$69,987.37
Accounts Receivable	$0.00	$0.00	$196.06	$673.37	$1,734.51	$4,289.11	$9,501.36	$15,283.37	$21,572.89	$27,651.86
Inventory	$0.00	$2.88	$8.17	$25.25	$59.13	$149.45	$277.43	$413.19	$551.58	$652.42
Prepaid Expenses	$0.00	$0.00	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50
Total Current Assets	**$0.00**	**$1,500.00**	**$300.89**	**$803.64**	**$1,898.90**	**$5,228.40**	**$11,003.75**	**$20,211.80**	**$48,326.81**	**$98,299.14**
Long-term Assets										
Machinery & Equipment (gross)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Accumulated Depreciation	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Rental Fleet	$0.00	$0.00	$1,580.90	$5,209.54	$12,202.95	$31,094.78	$62,804.75	$102,833.11	$147,502.37	$193,121.70
Accumulated Depreciation	$0.00	$0.00	-$474.27	-$1,894.85	-$4,987.28	-$12,819.53	-$27,815.10	-$50,320.50	-$79,475.06	-$113,569.05
Goodwill & Other Intangible Assets	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Accumulated Amortization	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Long-term Assets	**$0.00**	**$0.00**	**$1,106.63**	**$3,314.69**	**$7,215.67**	**$18,275.25**	**$34,989.65**	**$52,512.61**	**$68,027.31**	**$79,552.64**
Total Assets	**$0.00**	**$1,500.00**	**$1,407.52**	**$4,118.33**	**$9,114.57**	**$23,503.65**	**$45,993.41**	**$72,724.42**	**$116,354.11**	**$177,851.79**
Liabilities & Equity										
Short-term Bank Loans	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Accounts Payable	$0.00	$0.00	$20.64	$89.51	$202.66	$509.93	$1,025.22	$1,529.99	$2,083.49	$2,587.91
Income Taxes Payable	$0.00	$0.00	$30.35	$117.56	$424.61	$969.00	$2,660.94	$4,535.98	$6,910.46	$9,345.63
Due to Officers & Affiliates	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Dividends Payable	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Current Portion of Long-term Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$601.25	$1,091.25	$966.25	$841.25	$716.25
Total Current Liabilities	**$0.00**	**$0.00**	**$50.99**	**$207.07**	**$627.27**	**$2,080.18**	**$4,777.41**	**$7,032.22**	**$9,835.20**	**$12,649.79**
Long-term Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$5,248.75	$9,508.75	$8,383.75	$7,258.75	$6,133.75
Deferred Income Taxes	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Long-term Liabilities	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$5,248.75**	**$9,508.75**	**$8,383.75**	**$7,258.75**	**$6,133.75**
Total Liabilities	**$0.00**	**$0.00**	**$50.99**	**$207.07**	**$627.27**	**$7,328.93**	**$14,286.16**	**$15,415.97**	**$17,093.95**	**$18,783.54**
Common Shares	$0.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00
Preferred Shares	$0.00	$1,000.00	$1,000.00	$3,500.00	$6,500.00	$11,000.00	$14,500.00	$14,500.00	$14,500.00	$14,500.00
Retained Earnings	$0.00	$0.00	-$143.47	-$88.74	$1,487.30	$4,674.73	$16,707.24	$42,308.45	$84,260.17	$144,068.24
Total Equity	**$0.00**	**$1,500.00**	**$1,356.53**	**$3,911.26**	**$8,487.30**	**$16,174.73**	**$31,707.24**	**$57,308.45**	**$99,260.17**	**$159,068.24**
Total Liabilities & Equity	**$0.00**	**$1,500.00**	**$1,407.52**	**$4,118.33**	**$9,114.57**	**$23,503.65**	**$45,993.41**	**$72,724.42**	**$116,354.11**	**$177,851.79**

Tangible Net Worth	**$0.00**	**$1,500.00**	**$1,356.53**	**$3,911.26**	**$8,487.30**	**$16,174.73**	**$31,707.24**	**$57,308.45**	**$99,260.17**	**$159,068.24**

APPENDIX R – KEY RATIOS (JOINT VENTURE)

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Profitability										
Sales Growth	0.00%	N/A	N/A	226.98%	160.57%	144.05%	124.66%	65.39%	42.54%	29.36%
Gross Profit / Sales	N/A	N/A	49.65%	63.89%	72.45%	70.48%	77.07%	81.62%	84.76%	87.10%
SG&A / Sales	N/A	N/A	16.22%	20.23%	15.60%	14.37%	12.12%	10.13%	9.26%	8.76%
EBITDA/Sales	N/A	N/A	33.43%	43.66%	56.84%	56.11%	64.95%	71.49%	75.50%	78.34%
Net Income / Sales	N/A	N/A	-8.02%	3.66%	16.17%	13.40%	22.52%	28.97%	33.30%	36.70%
Return on Assets	N/A	N/A	-6.12%	9.72%	38.27%	34.97%	51.19%	55.66%	57.69%	51.40%
Return on Equity	N/A	N/A	-6.12%	10.08%	40.30%	37.56%	74.39%	80.74%	73.20%	60.25%
Liquidity										
Current Ratio	N/A	N/A	5.90	3.88	3.03	2.51	2.30	2.87	4.91	7.77
Quick Ratio	N/A	N/A	5.74	3.76	2.93	2.44	2.25	2.82	4.86	7.72
Working Capital	$0.00	$1,500.00	$249.90	$596.57	$1,271.64	$3,148.23	$6,226.34	$13,179.59	$38,491.61	$85,649.35
Capitalisation										
Total Liabilities / Total Assets	N/A	0.00	0.04	0.05	0.07	0.31	0.31	0.21	0.15	0.11
Debt Service										
EBITDA / Interest Expense	N/A	N/A	N/A	N/A	N/A	23.70	33.89	69.29	119.00	185.90
EBITDA / (Intr. Exp. + CPLTD)	N/A	N/A	N/A	N/A	N/A	11.46	16.41	33.64	57.98	91.00
Total Debt / EBITDA	N/A	N/A	0.00	0.00	0.00	0.44	0.31	0.15	0.09	0.05
Total Debt / TNW	N/A	0.00	0.00	0.00	0.00	0.36	0.33	0.16	0.08	0.04
Turnover Ratios										
Accounts Receivable Turnover	N/A	N/A	5.8	5.6	5.6	5.5	5.6	5.8	5.8	5.9
A/R Collection Period	N/A	N/A	62.6	65.7	65.0	65.8	64.9	63.1	62.5	61.9
Inventory Turnover	N/A	0.0	70.5	53.5	45.4	47.0	44.2	39.3	34.8	32.2
Inventory Conversion Period	N/A	N/A	5.2	6.8	8.0	7.8	8.3	9.3	10.5	11.3
Accounts Payable Turnover	N/A	N/A	55.4	41.8	48.1	46.6	52.1	57.8	60.5	63.0
A/P Deferral Period	N/A	N/A	6.6	8.7	7.6	7.8	7.0	6.3	6.0	5.8
Cash Conversion Cycle	N/A	N/A	61.1	63.8	65.4	65.8	66.2	66.1	66.9	67.5

APPENDIX S – INVESTED CAPITAL (JOINT VENTURE)

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Invested Capital (Asset Holders)										
S-T Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Dividends Payable	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CPLTD	$0.00	$0.00	$0.00	$0.00	$0.00	$601.25	$1,091.25	$966.25	$841.25	$716.25
L-T Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$5,248.75	$9,508.75	$8,383.75	$7,258.75	$6,133.75
Deferred Taxes	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Preferred Shares	$0.00	$1,000.00	$1,000.00	$3,500.00	$6,500.00	$11,000.00	$14,500.00	$14,500.00	$14,500.00	$14,500.00
Common Shares	$0.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00
Other Contribution	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Retained Earnings	$0.00	$0.00	-$143.47	-$88.74	$1,487.30	$4,674.73	$16,707.24	$42,308.45	$84,260.17	$144,068.24
Other Financial Assets (bonds etc)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Equals: Invested Capital (Asset Hldrs.)	**$0.00**	**$1,500.00**	**$1,356.53**	**$3,911.26**	**$8,487.30**	**$22,024.73**	**$42,307.24**	**$66,658.45**	**$107,360.17**	**$165,918.24**
Invested Capital (Investing)										
Current Assets	$0.00	$1,500.00	$300.89	$803.64	$1,898.90	$5,228.40	$11,003.75	$20,211.80	$48,326.81	$98,299.14
Less: A/P etc	$0.00	$0.00	-$50.99	-$207.07	-$627.27	-$1,478.93	-$3,686.16	-$6,065.97	-$8,993.95	-$11,933.54
Net Fixed Assets	$0.00	$0.00	$1,106.63	$3,314.69	$7,215.67	$18,275.25	$34,989.65	$52,512.61	$68,027.31	$79,552.64
Other Assets										
Equals: Invested Capital (Investing)	**$0.00**	**$1,500.00**	**$1,356.53**	**$3,911.26**	**$8,487.30**	**$22,024.73**	**$42,307.24**	**$66,658.45**	**$107,360.17**	**$165,918.24**
Invested Capital Ratios										
Debt-to-Invested Capital	N/A	0.00%	0.00%	0.00%	0.00%	26.56%	25.05%	14.03%	7.54%	4.13%
Trade Capital to Invested Capital	N/A	100.00%	18.42%	15.25%	14.98%	17.02%	17.30%	21.22%	36.64%	52.05%
Rate of Return on Invested Capital	N/A	N/A	25.50%	120.38%	141.65%	157.25%	157.59%	149.34%	142.69%	118.93%
ROIC after depreciation & amortisation	N/A	N/A	-6.12%	15.66%	62.59%	64.97%	89.51%	96.15%	98.96%	87.17%
Invested Capital Turnover	N/A	N/A	76.26%	275.75%	249.20%	280.27%	242.63%	208.90%	189.00%	151.80%
Invested Capital to Equity	N/A	N/A	N/A	-945.52%	-4407.47%	570.65%	471.14%	253.23%	157.55%	127.42%

APPENDIX T – FREE CASH FLOW (JOINT VENTURE)

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Free Cash Flow (Operational)										
FFO - Method 1	$0.00	$0.00	$415.17	$1,557.33	$4,668.48	$11,382.17	$27,687.53	$48,693.64	$71,620.87	$94,344.24
FFO - Method 2	$0.00	$0.00	$382.48	$1,557.33	$4,668.48	$11,382.17	$27,687.53	$48,693.64	$71,620.87	$94,344.24
FFO - Method 3	$0.00	$0.00	$382.48	$1,557.33	$4,668.48	$11,382.17	$27,687.53	$48,693.64	$71,620.87	$94,344.24
Incremental Investment	N/A	$1,500.00	$330.80	$3,975.31	$7,668.48	$21,369.67	$35,278.08	$46,856.61	$69,856.28	$92,652.07
Equals: FCF = FFO - II	**N/A**	**-$1,500.00**	**$51.68**	**-$2,417.97**	**-$3,000.00**	**-$9,987.50**	**-$7,590.55**	**$1,837.03**	**$1,764.60**	**$1,692.17**
Free Cash Flow (Financial)										
After-tax dist. To Debt-holders	N/A	$0.00	$0.00	$0.00	$0.00	-$5,487.50	-$4,090.55	$1,837.03	$1,764.60	$1,692.17
Net dist. To Shareholders	N/A	$0.00	$51.68	$82.03	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Private Investment	N/A	-$1,500.00	$0.00	-$2,500.00	-$3,000.00	-$4,500.00	-$3,500.00	$0.00	$0.00	$0.00
Equals: FCF	**N/A**	**-$1,500.00**	**$51.68**	**-$2,417.97**	**-$3,000.00**	**-$9,987.50**	**-$7,590.55**	**$1,837.03**	**$1,764.60**	**$1,692.17**

APPENDIX U - CALCULATION OF SG&A CATEGORIES USING PERCENTAGES (RTI DIRECT SALES)

		2005	2006	2007	2008	2009	2010	2011	2012
Sales	Sales	2.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%
Engineering	COGS	8.00%	7.00%	6.00%	6.00%	6.00%	5.00%	5.00%	5.00%
Disbursements	COGS	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
R&D	Sales	0.00%	6.00%	8.00%	10.00%	12.00%	15.00%	15.00%	15.00%
Legal	COGS	7.00%	2.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
Administration	COGS	10.00%	12.00%	13.50%	13.50%	13.25%	12.48%	11.80%	10.00%
Travel	COGS	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%	2.00%
Bad Debt Expense	Sales	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
Interest Expense	Calculated separately								
Office Salaries	Calculated separately								
Management Compensation	Calculated separately								

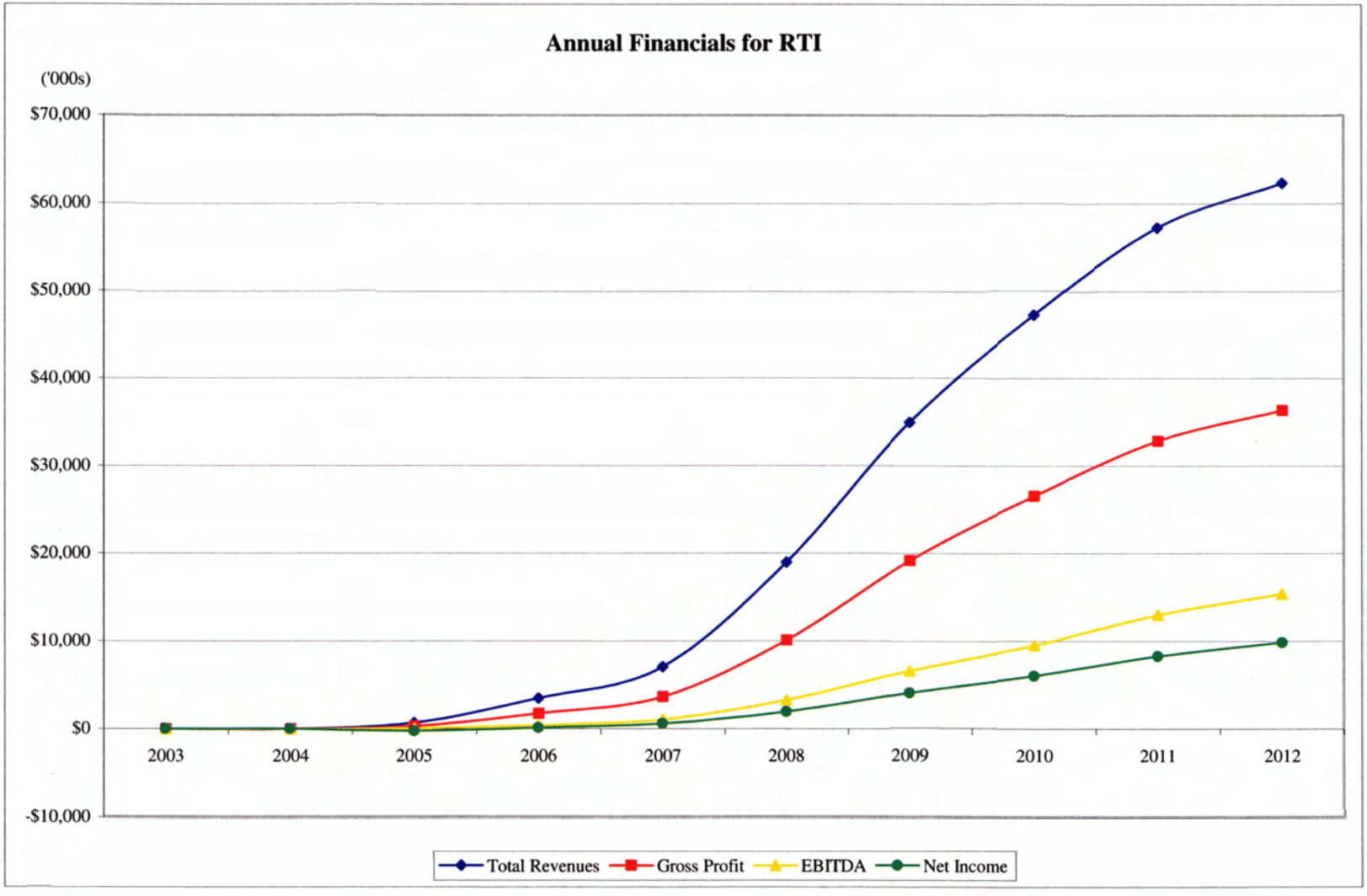
APPENDIX V - PROJECTED SALES OF THE REVOLUTION HAMMER (RTI DIRECT SALES)

(000's)	2005	2006	2007	2008	2009	2010	2011	2012
Revolution hammer - **50Hp** (# sold)	1	6	8	8	8	8	8	8
Price per hammer	$48.30	$49.70	$51.20	$52.70	$54.30	$56.00	$57.60	$59.40
Revenue	**$48.30**	**$298.20**	**$409.60**	**$421.60**	**$434.40**	**$448.00**	**$460.80**	**$475.20**
Revolution hammer - **350Hp** (# sold)	4	18	34	90	148	183	200	200
Price per hammer	$148.50	$153.00	$157.60	$162.30	$167.20	$172.20	$177.30	$182.70
Revenue	**$594.00**	**$2,754.00**	**$5,358.40**	**$14,607.00**	**$24,745.60**	**$31,512.60**	**$35,460.00**	**$36,540.00**
Total Revenue	**$642.30**	**$3,052.20**	**$5,768.00**	**$15,028.60**	**$25,180.00**	**$31,960.60**	**$35,920.80**	**$37,015.20**

APPENDIX W – PROJECTED INCOME STATEMENT (RTI DIRECT SALES)

Financial Forecast	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All data in ($000s)										
Revenues										
Sales, Parts, Rentals	$0.00	$0.00	$659.08	$3,365.75	$6,877.34	$18,685.57	$34,425.16	$46,536.14	$56,404.61	$61,403.26
CAT OEM Sales	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Consulting	$0.00	$0.00	$17.87	$117.80	$171.93	$280.28	$516.38	$698.04	$846.07	$921.05
Total Revenues	**$0.00**	**$0.00**	**$676.95**	**$3,483.55**	**$7,049.27**	**$18,965.86**	**$34,941.54**	**$47,234.19**	**$57,250.67**	**$62,324.31**
Cost of Goods Sold										
Sales, Parts, Rentals	$0.00	$0.00	$354.68	$1,733.50	$3,388.09	$8,886.70	$15,763.91	$20,695.64	$24,413.58	$25,981.87
CAT OEM Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Gross Profit	**$0.00**	**$0.00**	**$322.27**	**$1,750.04**	**$3,661.18**	**$10,079.16**	**$19,177.63**	**$26,538.55**	**$32,837.10**	**$36,342.44**
SGA										
Sales	$0.00	$0.00	$13.18	$168.29	$343.87	$934.28	$1,721.26	$2,326.81	$2,820.23	$3,070.16
Engineering	$0.00	$0.00	$28.37	$121.35	$203.29	$533.20	$945.83	$1,034.78	$1,220.68	$1,299.09
Disbursements	$0.00	$0.00	$3.55	$17.34	$33.88	$88.87	$157.64	$206.96	$244.14	$259.82
R & D	$0.00	$0.00	$0.00	$201.94	$550.19	$1,868.56	$4,131.02	$6,980.42	$8,460.69	$9,210.49
Legal	$0.00	$0.00	$24.83	$34.67	$33.88	$88.87	$157.64	$206.96	$244.14	$259.82
Administration	$0.00	$0.00	$35.47	$208.02	$457.39	$1,199.70	$2,088.72	$2,582.82	$2,880.80	$2,598.19
Travel	$0.00	$0.00	$7.09	$34.67	$67.76	$177.73	$315.28	$413.91	$488.27	$519.64
Bad Debt Expense	$0.00	$0.00	$6.59	$33.66	$68.77	$186.86	$344.25	$465.36	$564.05	$614.03
Office Salaries	$0.00	$0.00	$25.50	$135.00	$220.00	$390.00	$490.00	$540.00	$560.00	$560.00
Management Salaries	$0.00	$0.00	$90.00	$340.00	$590.00	$1,312.50	$2,190.00	$2,250.00	$2,362.50	$2,550.00
Total SGA	**$0.00**	**$0.00**	**$234.58**	**$1,294.93**	**$2,569.03**	**$6,780.57**	**$12,541.64**	**$17,008.01**	**$19,845.49**	**$20,941.24**
EBITDA	**$0.00**	**$0.00**	**$87.69**	**$455.11**	**$1,092.15**	**$3,298.59**	**$6,636.00**	**$9,530.53**	**$12,991.61**	**$15,401.20**
Depreciation	$0.00	$0.00	$186.00	$145.20	$101.64	$71.15	$49.81	$34.86	$24.40	$17.09
Amortization	$0.00	$0.00	$125.00	$93.75	$70.31	$52.74	$39.55	$29.66	$22.25	$16.69
Interest	$0.00	$0.00	$0.00	$0.00	$0.00	$129.94	$116.44	$102.94	$89.44	$75.94
Taxes	$0.00	$0.00	$0.00	$77.00	$327.78	$1,084.54	$2,290.44	$3,335.13	$4,579.14	$5,446.83
Net Income	**$0.00**	**$0.00**	**-$223.31**	**$139.17**	**$592.42**	**$1,960.22**	**$4,139.76**	**$6,027.95**	**$8,276.38**	**$9,844.66**

APPENDIX X – GRAPHICAL REPRESENTATION OF PROFITABILITY



APPENDIX Y – PROJECTED BALANCE SHEET (RTI DIRECT SALES)

Balance Sheet	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All data in ($000s)										
Assets										
Cash	$0.00	$230.00	$182.93	$299.52	$555.08	$2,586.99	$5,029.88	$10,011.18	$17,152.80	$26,378.12
Accounts Receivable	$0.00	$0.00	$103.99	$638.96	$1,224.25	$3,496.50	$5,991.36	$8,046.71	$9,539.14	$10,383.22
Inventory	$0.00	$0.00	$84.13	$206.77	$431.17	$1,047.70	$1,391.75	$1,781.92	$1,895.89	$1,991.20
Prepaid Expenses	$0.00	$0.00	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50
Total Current Assets	**$0.00**	**$230.00**	**$378.55**	**$1,152.75**	**$2,218.00**	**$7,138.69**	**$12,420.48**	**$19,847.31**	**$28,595.33**	**$38,760.05**
Long-term Assets										
Machinery & Equipment (gross)	$0.00	$300.00	$300.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00
Accumulated Depreciation	$0.00	$0.00	-$90.00	-$168.00	-$222.60	-$260.83	-$287.58	-$306.30	-$319.41	-$328.59
Rental Fleet	$0.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00
Accumulated Depreciation	$0.00	$0.00	-$96.00	-$163.20	-$210.24	-$243.17	-$266.22	-$282.35	-$293.65	-$301.55
Goodwill & Other Intangible Assets	$0.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00
Accumulated Amortization	$0.00	$0.00	-$125.00	-$218.75	-$289.06	-$341.80	-$381.35	-$411.01	-$433.26	-$449.95
Total Long-term Assets	**$0.00**	**$1,120.00**	**$809.00**	**$620.05**	**$448.10**	**$324.21**	**$234.85**	**$170.33**	**$123.68**	**$89.91**
Total Assets	**$0.00**	**$1,350.00**	**$1,187.55**	**$1,772.80**	**$2,666.10**	**$7,462.90**	**$12,655.34**	**$20,017.65**	**$28,719.01**	**$38,849.96**
Liabilities & Equity										
Short-term Bank Loans	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Accounts Payable	$0.00	$0.00	$60.87	$268.59	$503.62	$1,666.15	$2,638.66	$3,829.40	$4,185.60	$4,402.20
Income Taxes Payable	$0.00	$0.00	$1.68	$51.57	$117.42	$441.47	$671.63	$965.25	$1,184.04	$1,403.72
Due to Officers & Affiliates	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Dividends Payable	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Current Portion of Long-term Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$138.75	$123.75	$108.75	$93.75	$78.75
Total Current Liabilities	**$0.00**	**$0.00**	**$62.55**	**$320.16**	**$621.04**	**$2,246.37**	**$3,434.04**	**$4,903.40**	**$5,463.39**	**$5,884.67**
Long-term Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$1,211.25	$1,076.25	$941.25	$806.25	$671.25
Deferred Income Taxes	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Long-term Liabilities	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$1,211.25**	**$1,076.25**	**$941.25**	**$806.25**	**$671.25**
Total Liabilities	**$0.00**	**$0.00**	**$62.55**	**$320.16**	**$621.04**	**$3,457.62**	**$4,510.29**	**$5,844.65**	**$6,269.64**	**$6,555.92**
Common Shares	$0.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00
Preferred Shares	$0.00	$500.00	$500.00	$700.00	$700.00	$700.00	$700.00	$700.00	$700.00	$700.00
Retained Earnings	$0.00	$0.00	-$225.00	-$97.36	$495.07	$2,455.28	$6,595.05	$12,622.99	$20,899.38	$30,744.04
Total Equity	**$0.00**	**$1,350.00**	**$1,125.00**	**$1,452.64**	**$2,045.07**	**$4,005.28**	**$8,145.05**	**$14,172.99**	**$22,449.38**	**$32,294.04**
Total Liabilities & Equity	**$0.00**	**$1,350.00**	**$1,187.55**	**$1,772.80**	**$2,666.10**	**$7,462.90**	**$12,655.34**	**$20,017.65**	**$28,719.01**	**$38,849.96**

Tangible Net Worth	**$0.00**	**$850.00**	**$750.00**	**$1,171.39**	**$1,834.13**	**$3,847.08**	**$8,026.40**	**$14,084.00**	**$22,382.64**	**$32,243.99**

APPENDIX Z – KEY RATIOS (RTI DIRECT SALES)

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Profitability										
Sales Growth	0.00%	N/A	N/A	414.59%	102.36%	169.05%	84.23%	35.18%	21.21%	8.86%
Gross Profit / Sales	N/A	N/A	47.61%	50.24%	51.94%	53.14%	54.88%	56.19%	57.36%	58.31%
SG&A / Sales	N/A	N/A	34.65%	37.17%	36.44%	35.75%	35.89%	36.01%	34.66%	33.60%
EBITDA/Sales	N/A	N/A	12.95%	13.06%	15.49%	17.39%	18.99%	20.18%	22.69%	24.71%
Net Income / Sales	N/A	N/A	-32.99%	3.99%	8.40%	10.34%	11.85%	12.76%	14.46%	15.80%
Return on Assets	N/A	N/A	-16.54%	11.72%	33.42%	73.52%	55.47%	47.63%	41.35%	34.28%
Return on Equity	N/A	N/A	-16.54%	12.37%	40.78%	95.85%	103.36%	74.01%	58.40%	43.85%
Liquidity										
Current Ratio	N/A	N/A	6.05	3.60	3.57	3.18	3.62	4.05	5.23	6.59
Quick Ratio	N/A	N/A	4.71	2.95	2.88	2.71	3.21	3.68	4.89	6.25
Working Capital	$0.00	$230.00	$316.00	$832.59	$1,596.97	$4,892.33	$8,986.45	$14,943.91	$23,131.94	$32,875.38
Capitalisation										
Total Liabilities / Total Assets	N/A	0.00	0.05	0.18	0.23	0.46	0.36	0.29	0.22	0.17
Debt Service										
EBITDA / Interest Expense	N/A	N/A	N/A	N/A	N/A	25.39	56.99	92.58	145.26	202.81
EBITDA / (Intr. Exp. + CPLTD)	N/A	N/A	N/A	N/A	N/A	12.28	27.63	45.02	70.92	99.56
Total Debt / EBITDA	N/A	N/A	0.00	0.00	0.00	0.41	0.18	0.11	0.07	0.05
Total Debt / TNW	N/A	0.00	0.00	0.00	0.00	0.35	0.15	0.07	0.04	0.02
Turnover Ratios										
Accounts Receivable Turnover	N/A	N/A	6.5	5.5	5.8	5.4	5.8	5.9	6.0	6.0
A/R Collection Period	N/A	N/A	56.1	66.9	63.4	67.3	62.6	62.2	60.8	60.8
Inventory Turnover	N/A	N/A	4.2	8.4	7.9	8.5	11.3	11.6	12.9	13.0
Inventory Conversion Period	N/A	N/A	86.6	43.5	46.5	43.0	32.2	31.4	28.3	28.0
Accounts Payable Turnover	N/A	N/A	11.1	13.0	14.0	11.4	13.2	12.3	13.7	14.2
A/P Deferral Period	N/A	N/A	32.8	28.1	26.1	32.1	27.6	29.6	26.7	25.8
Cash Conversion Cycle	N/A	N/A	109.8	82.3	83.8	78.3	67.2	64.0	62.5	63.0

APPENDIX AA – INVESTED CAPITAL (RTI DIRECT SALES)

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Invested Capital (Asset Holders)										
S-T Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Dividends Payable	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CPLTD	$0.00	$0.00	$0.00	$0.00	$0.00	$138.75	$123.75	$108.75	$93.75	$78.75
L-T Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$1,211.25	$1,076.25	$941.25	$806.25	$671.25
Deferred Taxes	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Preferred Shares	$0.00	$500.00	$500.00	$700.00	$700.00	$700.00	$700.00	$700.00	$700.00	$700.00
Common Shares	$0.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00
Other Contribution	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Retained Earnings	$0.00	$0.00	-$225.00	-$97.36	$495.07	$2,455.28	$6,595.05	$12,622.99	$20,899.38	$30,744.04
Other Financial Assets (bonds etc)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Equals: Invested Capital (Asset Hldrs.)	**$0.00**	**$1,350.00**	**$1,125.00**	**$1,452.64**	**$2,045.07**	**$5,355.28**	**$9,345.05**	**$15,222.99**	**$23,349.38**	**$33,044.04**
Invested Capital (Investing)										
Current Assets	$0.00	$230.00	$378.55	$1,152.75	$2,218.00	$7,138.69	$12,420.48	$19,847.31	$28,595.33	$38,760.05
Less: A/P etc	$0.00	$0.00	-$62.55	-$320.16	-$621.04	-$2,107.62	-$3,310.29	-$4,794.65	-$5,369.64	-$5,805.92
Net Fixed Assets	$0.00	$1,120.00	$809.00	$620.05	$448.10	$324.21	$234.85	$170.33	$123.68	$89.91
Other Assets										
Equals: Invested Capital (Investing)	**$0.00**	**$1,350.00**	**$1,125.00**	**$1,452.64**	**$2,045.07**	**$5,355.28**	**$9,345.05**	**$15,222.99**	**$23,349.38**	**$33,044.04**
Invested Capital Ratios										
Debt-to-Invested Capital	N/A	0.00%	0.00%	0.00%	0.00%	25.21%	12.84%	6.90%	3.85%	2.27%
Trade Capital to Invested Capital	N/A	17.04%	28.09%	57.32%	78.09%	93.95%	97.49%	98.88%	99.47%	99.73%
Rate of Return on Invested Capital	N/A	N/A	6.50%	40.45%	75.18%	161.30%	123.91%	101.98%	85.34%	65.96%
ROIC after depreciation & amortisation	N/A	N/A	-16.54%	19.21%	63.35%	155.24%	122.25%	101.29%	85.04%	65.82%
Invested Capital Turnover	N/A	N/A	50.14%	309.65%	485.27%	927.40%	652.47%	505.45%	376.08%	266.92%
Invested Capital to Equity	N/A	N/A	N/A	-500.01%	-1492.07%	413.09%	218.11%	141.70%	120.60%	111.72%

APPENDIX AB – FREE CASH FLOW (RTI DIRECT SALES)

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Free Cash Flow (Operational)										
FFO - Method 1	$0.00	$0.00	$167.23	$378.12	$764.37	$2,167.77	$4,304.08	$6,158.74	$8,380.61	$9,927.32
FFO - Method 2	$0.00	$0.00	$87.69	$378.12	$764.37	$2,167.77	$4,304.08	$6,158.74	$8,380.61	$9,927.32
FFO - Method 3	$0.00	$0.00	$87.69	$378.12	$764.37	$2,167.77	$4,304.08	$6,158.74	$8,380.61	$9,927.32
Incremental Investment	N/A	$1,350.00	$86.00	$566.59	$764.37	$3,434.11	$4,079.12	$5,942.46	$8,173.03	$9,728.43
Equals: FCF = FFO - II	**N/A**	**-$1,350.00**	**$1.68**	**-$188.47**	**$0.00**	**-$1,266.34**	**$224.96**	**$216.27**	**$207.58**	**$198.89**
Free Cash Flow (Financial)										
After-tax dist. To Debt-holders	N/A	$0.00	$0.00	$0.00	$0.00	-$1,266.34	$224.96	$216.27	$207.58	$198.89
Net dist. To Shareholders	N/A	$0.00	$1.68	$11.53	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Private Investment	N/A	-$1,350.00	$0.00	-$200.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Equals: FCF	**N/A**	**-$1,350.00**	**$1.68**	**-$188.47**	**$0.00**	**-$1,266.34**	**$224.96**	**$216.27**	**$207.58**	**$198.89**

APPENDIX AC – FORMULAS FOR RATIO ANALYSIS

Profitability Ratios:

Gross Profit Margin	$\frac{\text{Gross Profit}}{\text{Total Revenues}}$
EBITDA Margin	$\frac{\text{EBITDA}}{\text{Total Revenues}}$
Net Income / Sales	$\frac{\text{Net Income + Deferred Taxes}}{\text{Total Revenues}}$
Return on Assets	$\frac{\text{Net Income (after taxes)}}{\text{Total Tangible Assets (last year)}}$
Return on Equity	$\frac{\text{Net Income}}{\text{Total Equity (last year)}}$

Liquidity Ratios:

Current Ratio	$\frac{\text{Total Current Assets}}{\text{Total Current Liabilities}}$
Quick Ratio	$\frac{\text{Total Current Assets - Inventory}}{\text{Total Current Liabilities}}$
Working Capital	[Total Current Assets – Total Current Liabilities]

Turnover Ratios:

A/R Turnover	$\frac{\text{Total Revenues}}{\text{Accounts Receivable}}$

A/R Collection Period	$\frac{365}{\text{A/R Turnover}}$
Inventory Turnover	$\frac{\text{Cost of Goods Sold}}{\text{Inventory}}$
Inventory Conversion Period	$\frac{365}{\text{Inventory Turnover}}$
A/P Turnover	$\frac{\text{Total Revenues}}{\text{Accounts Payable}}$
A/P Deferral Period	$\frac{365}{\text{Accounts Payable Turnover}}$
Cash Conversion Cycle	(Inventory Conversion Period + A/R Collection Period) – A/P Deferral Period

Net Worth:

Tangible Net Worth	Subordinated Debt + Total Equity – Due by Officers & Affiliates – Intangible Assets

Invested Capital Ratios:

Debt to Invested Capital	$\frac{\text{(S-T Debt + L-T Debt + CPLTD + Other Liabilities)}}{\text{Invested Capital}}$
Trade Capital	Current Assets – (Accounts Payable + Accrued Expenses + Other Payables + Income Taxes Payable + Due to Officers & Affiliates)
Trade Capital to Invested Capital	$\frac{\text{Trade Capital}}{\text{Invested Capital}}$

Rate of Return on Invested Capital (ROIC)	$\frac{\text{EBITDA}}{\text{Invested Capital}_{(bop)}}$
ROIC after depreciation & amortisation	$\frac{\text{EBIT}}{\text{Invested Capital}_{(bop)}}$
Invested Capital Turnover	$\frac{\text{Total Revenue}}{\text{Invested Capital}_{(bop)}}$
Invested Capital to Equity	$\frac{\text{Invested Capital}_{(bop)}}{\text{Total Equity}_{(bop)}}$
Free Cash Flow	Funds from Operations – Incremental Investment

APPENDIX AD – COMPARATIVE RATIOS FOR MANUFACTURING OF CONSTRUCTION MACHINERY INDUSTRY

(NAICS code 333120)

Ratio	Industry Median 2003	RTI (Sales to JV) Average 2005 - 2012	RTI (Direct Sales) Average 2005 - 2012
Interest Coverage	2.28	137.50	65.38
Revenues / Total Assets	0.97	2.41	2.05
Revenues / Working Capital	3.96	3.97	3.25
Current Ratio	1.63	3.96	4.49
Quick Ratio	0.54	3.32	3.91
Working Capital / Total Assets	0.20	0.60	0.64
Gross Margin	15.15	49.46	53.71
Net Profit Margin	5.27	8.77	11.09
ROA	0.84	25.38	35.11
ROE	1.80	39.13	51.51

APPENDIX AE – COMPARATIVE RATIOS FOR RENTAL EQUIPMENT INDUSTRY

(NAICS code 532412)

Ratio	Industry Median 2003	Joint Venture Average 2005 - 2012
Interest Coverage	-0.56	53.97
Revenues / Total Assets	0.67	1.02
Revenues / Working Capital	2.93	5.82
Current Ratio	1.55	4.15
Quick Ratio	0.77	4.07
Working Capital / Total Assets	0.09	0.22
Gross Margin	23.90	73.38
Net Profit Margin	-11.76	18.34
ROA	-1.16	36.60
ROE	8.02	46.30

APPENDIX AF – RATIOS TO DETERMINE OPERATING RISK

RTI - Sales to JV	2005	2006	2007	2008	2009	2010	2011	2012
EBITDA	$23.39	$172.52	$541.29	$1,823.99	$4,089.87	$6,371.98	$9,317.92	$11,501.10
Fixed Costs	$226.48	$1,222.61	$2,401.08	$6,266.69	$11,490.90	$15,377.22	$17,825.70	$18,732.42
Sales	$609.78	$3,146.98	$6,348.54	$16,993.54	$31,263.56	$42,245.46	$51,195.39	$55,732.40
EBITDA Margin	3.84%	5.48%	8.53%	10.73%	13.08%	15.08%	18.20%	20.64%
(CM/$)	40.98%	44.33%	46.35%	47.61%	49.84%	51.48%	53.02%	54.25%
DOL - Method 1	10.68	8.09	5.44	4.44	3.81	3.41	2.91	2.63
DOL - Method 2	10.68	8.09	5.44	4.44	3.81	3.41	2.91	2.63
Break-even Sales	$552.70	$2,757.82	$5,180.64	$13,162.46	$23,057.03	$29,868.57	$33,620.93	$34,531.30

Joint Venture	2005	2006	2007	2008	2009	2010	2011	2012
EBITDA	$382.48	$1,633.00	$5,540.47	$13,346.26	$34,709.71	$63,183.00	$95,116.52	$127,679.35
Fixed Costs	$174.30	$720.76	$1,425.71	$3,184.81	$5,950.87	$8,078.96	$10,419.43	$12,663.84
Sales	$1,143.97	$3,740.60	$9,746.71	$23,787.21	$53,439.57	$88,381.48	$125,983.24	$162,977.32
EBITDA Margin	33.43%	43.66%	56.84%	56.11%	64.95%	71.49%	75.50%	78.34%
(CM/$)	48.67%	62.92%	71.47%	69.50%	76.09%	80.63%	83.77%	86.11%
DOL - Method 1	1.46	1.44	1.26	1.24	1.17	1.13	1.11	1.10
DOL - Method 2	1.46	1.44	1.26	1.24	1.17	1.13	1.11	1.10
Break-even Sales	$358.12	$1,145.43	$1,994.78	$4,582.74	$7,821.14	$10,019.79	$12,438.17	$14,706.23

RTI - Direct Sales	2005	2006	2007	2008	2009	2010	2011	2012
EBITDA	$87.69	$455.11	$1,092.15	$3,298.59	$6,636.00	$9,530.53	$12,991.61	$15,401.20
Fixed Costs	$227.99	$1,261.27	$2,500.26	$6,593.71	$12,197.39	$16,542.65	$19,281.44	$20,327.21
Sales	$676.95	$3,483.55	$7,049.27	$18,965.86	$34,941.54	$47,234.19	$57,250.67	$62,324.31
EBITDA Margin	12.95%	13.06%	15.49%	17.39%	18.99%	20.18%	22.69%	24.71%
(CM/$)	46.63%	49.27%	50.96%	52.16%	53.90%	55.20%	56.37%	57.33%
DOL - Method 1	3.60	3.77	3.29	3.00	2.84	2.74	2.48	2.32
DOL - Method 2	3.60	3.77	3.29	3.00	2.84	2.74	2.48	2.32
Break-even Sales	$488.92	$2,559.86	$4,906.18	$12,641.68	$22,629.79	$29,968.67	$34,204.25	$35,458.60

APPENDIX AG – SUSTAINABLE GROWTH RATE

RTI (Sales to Joint Venture)										
Ratio	**Formula**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Profit Margin	Net Income / Sales	N/A	-47.17%	-2.11%	3.75%	6.28%	8.16%	9.56%	11.62%	13.22%
Asset Turnover	Sales / Assets	0.00%	54.32%	185.22%	259.51%	323.44%	355.21%	299.97%	249.87%	197.74%
Financial Leverage	Assets / Shareholders Equity	N/A	83.15%	159.93%	171.51%	274.49%	295.27%	254.61%	214.09%	181.61%
Equals: ROE		N/A	**-21.30%**	**-6.25%**	**16.67%**	**55.72%**	**85.57%**	**73.01%**	**62.17%**	**47.46%**
Retention Ratio		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Equals: SGR		N/A	**-21.30%**	**-6.25%**	**16.67%**	**55.72%**	**85.57%**	**73.01%**	**62.17%**	**47.46%**

Joint Venture										
Ratio	**Formula**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Profit Margin	Net Income / Sales	N/A	-8.02%	3.66%	16.17%	13.40%	22.52%	28.97%	33.30%	36.70%
Asset Turnover	Sales / Assets	0.00%	81.28%	90.83%	106.94%	101.21%	116.19%	121.53%	108.28%	91.64%
Financial Leverage	Assets / Shareholders Equity	N/A	93.83%	303.59%	233.03%	276.93%	284.35%	229.36%	203.03%	179.18%
Equals: ROE		N/A	**-6.12%**	**10.08%**	**40.30%**	**37.56%**	**74.39%**	**80.74%**	**73.20%**	**60.25%**
Retention Ratio		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Equals: SGR		N/A	**-6.12%**	**10.08%**	**40.30%**	**37.56%**	**74.39%**	**80.74%**	**73.20%**	**60.25%**

RTI (Direct Sales)										
Ratio	**Formula**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Profit Margin	Net Income / Sales	N/A	-32.99%	3.99%	8.40%	10.34%	11.85%	12.76%	14.46%	15.80%
Asset Turnover	Sales / Assets	0.00%	57.00%	196.50%	264.40%	254.14%	276.10%	235.96%	199.35%	160.42%
Financial Leverage	Assets / Shareholders Equity	N/A	87.97%	157.58%	183.53%	364.92%	315.97%	245.76%	202.63%	173.06%
Equals: ROE		N/A	**-16.54%**	**12.37%**	**40.78%**	**95.85%**	**103.36%**	**74.01%**	**58.40%**	**43.85%**
Retention Ratio		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Equals: SGR		N/A	**-16.54%**	**12.37%**	**40.78%**	**95.85%**	**103.36%**	**74.01%**	**58.40%**	**43.85%**

APPENDIX AH – PROJECTED INCOME STATEMENT (SALES TO JV) WITH 50% INCOME FROM JOINT VENTURE

Income Statement	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All data in ($000s)										
Revenues										
Sales, Parts, Rentals	$0.00	$0.00	$593.64	$3,040.56	$6,193.70	$16,742.40	$30,801.53	$41,621.14	$50,438.81	$54,908.77
50% NI from JV	$0.00	$0.00	-$71.72	$27.36	$787.89	$1,590.48	$6,016.27	$12,800.62	$20,975.88	$29,904.05
Consulting	$0.00	$0.00	$16.14	$106.42	$154.84	$251.14	$462.02	$624.32	$756.58	$823.63
Total Revenues	**$0.00**	**$0.00**	**$538.06**	**$3,174.34**	**$7,136.43**	**$18,584.02**	**$37,279.83**	**$55,046.08**	**$72,171.27**	**$85,636.45**
Cost of Goods Sold										
Sales, Parts, Rentals	$0.00	$0.00	$353.97	$1,721.44	$3,344.24	$8,735.44	$15,374.77	$20,080.04	$23,547.38	$24,949.80
CAT OEM Costs	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Gross Profit	**$0.00**	**$0.00**	**$184.09**	**$1,452.89**	**$3,792.19**	**$9,848.58**	**$21,905.05**	**$34,966.04**	**$48,623.89**	**$60,686.65**
SGA										
Sales	$0.00	$0.00	$11.87	$152.03	$309.68	$837.12	$1,540.08	$2,081.06	$2,521.94	$2,745.44
Engineering	$0.00	$0.00	$28.32	$120.50	$200.65	$524.13	$922.49	$1,004.00	$1,177.37	$1,247.49
Disbursements	$0.00	$0.00	$3.54	$17.21	$33.44	$87.35	$153.75	$200.80	$235.47	$249.50
R & D	$0.00	$0.00	$0.00	$182.43	$495.50	$1,674.24	$3,696.18	$6,243.17	$7,565.82	$8,236.32
Legal	$0.00	$0.00	$24.78	$34.43	$33.44	$87.35	$153.75	$150.60	$153.06	$149.70
Administration	$0.00	$0.00	$35.40	$206.57	$451.47	$1,179.28	$2,037.16	$2,505.99	$2,778.59	$2,494.98
Travel	$0.00	$0.00	$7.08	$34.43	$66.88	$174.71	$307.50	$401.60	$470.95	$499.00
Bad Debt Expense	$0.00	$0.00	$5.94	$30.41	$61.94	$167.42	$308.02	$416.21	$504.39	$549.09
Office Salaries	$0.00	$0.00	$25.50	$135.00	$220.00	$390.00	$490.00	$540.00	$560.00	$560.00
Management Salaries	$0.00	$0.00	$90.00	$340.00	$590.00	$1,312.50	$2,190.00	$2,250.00	$2,362.50	$2,550.00
Total SGA	**$0.00**	**$0.00**	**$232.42**	**$1,253.01**	**$2,463.01**	**$6,434.11**	**$11,798.91**	**$15,793.43**	**$18,330.09**	**$19,281.50**
EBITDA	**$0.00**	**$0.00**	**-$48.33**	**$199.88**	**$1,329.18**	**$3,414.47**	**$10,106.14**	**$19,172.60**	**$30,293.80**	**$41,405.15**
Depreciation	$0.00	$0.00	$186.00	$145.20	$101.64	$71.15	$49.81	$34.86	$24.40	$17.09
Amortization	$0.00	$0.00	$125.00	$93.75	$70.31	$52.74	$39.55	$29.66	$22.25	$16.69
Interest	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Taxes	$0.00	$0.00	$0.00	$0.00	$131.56	$605.57	$1,424.98	$2,246.72	$3,302.43	$4,084.66
Net Income	**$0.00**	**$0.00**	**-$359.33**	**-$39.07**	**$1,025.67**	**$2,685.00**	**$8,591.80**	**$16,861.37**	**$26,944.72**	**$37,286.71**

APPENDIX AI – PROJECTED BALANCE SHEET (SALES TO JV) WITH 50% INCOME FROM JOINT VENTURE

Balance Sheet	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
All data in ($000s)										
Assets										
Cash	$0.00	$330.00	$229.35	$188.73	$112.95	-$3.12	$1,151.75	$4,364.50	$9,449.87	$16,405.88
Accounts Receivable	$0.00	$0.00	$92.85	$578.12	$1,102.09	$3,131.84	$5,360.38	$7,196.58	$8,530.21	$9,285.01
Inventory	$0.00	$0.00	$83.79	$204.65	$425.70	$1,025.16	$1,353.06	$1,722.15	$1,824.06	$1,909.30
Prepaid Expenses	$0.00	$0.00	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50	$7.50
Total Current Assets	**$0.00**	**$330.00**	**$413.48**	**$979.00**	**$1,648.23**	**$4,161.38**	**$7,872.69**	**$13,290.73**	**$19,811.64**	**$27,607.69**
Long-term Assets										
Machinery & Equipment (gross)	$0.00	$300.00	$300.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00	$350.00
Accumulated Depreciation	$0.00	$0.00	-$90.00	-$168.00	-$222.60	-$260.83	-$287.58	-$306.30	-$319.41	-$328.59
Due by Officers & Affiliates	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Long-term Investments	$0.00	$0.00	-$71.72	-$44.36	$743.53	$2,334.01	$8,350.28	$21,150.90	$42,126.78	$72,030.83
Rental Fleet	$0.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00	$320.00
Accumulated Depreciation	$0.00	$0.00	-$96.00	-$163.20	-$210.24	-$243.17	-$266.22	-$282.35	-$293.65	-$301.55
Goodwill & Other Intangible Assets	$0.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00	$500.00
Accumulated Amortization	$0.00	$0.00	-$125.00	-$218.75	-$289.06	-$341.80	-$381.35	-$411.01	-$433.26	-$449.95
Total Long-term Assets	**$0.00**	**$1,120.00**	**$737.28**	**$575.69**	**$1,191.63**	**$2,658.22**	**$8,585.13**	**$21,321.23**	**$42,250.46**	**$72,120.74**
Total Assets	**$0.00**	**$1,450.00**	**$1,150.76**	**$1,554.69**	**$2,839.86**	**$6,819.59**	**$16,457.82**	**$34,611.96**	**$62,062.10**	**$99,728.43**
Liabilities & Equity										
Short-term Bank Loans	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Accounts Payable	$0.00	$0.00	$60.09	$255.11	$473.25	$1,552.10	$2,440.34	$3,502.69	$3,811.10	$3,992.64
Income Taxes Payable	$0.00	$0.00	$0.00	$17.59	$58.96	$274.84	$433.02	$663.44	$860.45	$1,058.52
Due to Officers & Affiliates	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Dividends Payable	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Current Portion of Long-term Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Current Liabilities	**$0.00**	**$0.00**	**$60.09**	**$272.70**	**$532.21**	**$1,826.94**	**$2,873.36**	**$4,166.13**	**$4,671.55**	**$5,051.16**
Long-term Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Deferred Income Taxes	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Total Long-term Liabilities	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Total Liabilities	**$0.00**	**$0.00**	**$60.09**	**$272.70**	**$532.21**	**$1,826.94**	**$2,873.36**	**$4,166.13**	**$4,671.55**	**$5,051.16**
Common Shares	$0.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00
Preferred Shares	$0.00	$600.00	$600.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00
Retained Earnings	$0.00	$0.00	-$359.33	-$418.01	$607.66	$3,292.66	$11,884.46	$28,745.83	$55,690.55	$92,977.26
Total Equity	**$0.00**	**$1,450.00**	**$1,090.67**	**$1,281.99**	**$2,307.66**	**$4,992.66**	**$13,584.46**	**$30,445.83**	**$57,390.55**	**$94,677.26**
Total Liabilities & Equity	**$0.00**	**$1,450.00**	**$1,150.76**	**$1,554.69**	**$2,839.86**	**$6,819.59**	**$16,457.82**	**$34,611.96**	**$62,062.10**	**$99,728.43**
Tangible Net Worth	**$0.00**	**$950.00**	**$715.67**	**$1,000.74**	**$2,096.72**	**$4,834.46**	**$13,465.81**	**$30,356.84**	**$57,323.81**	**$94,627.21**

APPENDIX AJ – KEY RATIOS (SALES TO JOINT VENTURE) WITH 50% INCOME FROM JOINT VENTURE

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Profitability										
Sales Growth	0.00%	N/A	N/A	489.96%	124.82%	160.41%	100.60%	47.66%	31.11%	18.66%
Gross Profit / Sales	N/A	N/A	34.21%	45.77%	53.14%	52.99%	58.76%	63.52%	67.37%	70.87%
SG&A / Sales	N/A	N/A	43.20%	39.47%	34.51%	34.62%	31.65%	28.69%	25.40%	22.52%
EBITDA/Sales	N/A	N/A	-8.98%	6.30%	18.63%	18.37%	27.11%	34.83%	41.97%	48.35%
Net Income / Sales	N/A	N/A	-66.78%	-1.23%	14.37%	14.45%	23.05%	30.63%	37.33%	43.54%
Return on Assets	N/A	N/A	-24.78%	-3.40%	65.97%	94.55%	125.99%	102.45%	77.85%	60.08%
Return on Equity	N/A	N/A	-24.78%	-3.58%	80.01%	116.35%	172.09%	124.12%	88.50%	64.97%
Liquidity										
Current Ratio	N/A	N/A	6.88	3.59	3.10	2.28	2.74	3.19	4.24	5.47
Quick Ratio	N/A	N/A	5.49	2.84	2.30	1.72	2.27	2.78	3.85	5.09
Working Capital	$0.00	$330.00	$353.39	$706.30	$1,116.03	$2,334.44	$4,999.33	$9,124.60	$15,140.09	$22,556.53
Capitalisation										
Total Liabilities / Total Assets	N/A	0.00	0.05	0.18	0.19	0.27	0.17	0.12	0.08	0.05
Debt Service										
EBITDA / Interest Expense	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EBITDA / (Intr. Exp. + CPLTD)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total Debt / EBITDA	N/A	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Debt / TNW	N/A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Turnover Ratios										
Accounts Receivable Turnover	N/A	N/A	5.8	5.5	6.5	5.9	7.0	7.6	8.5	9.2
A/R Collection Period	N/A	N/A	63.0	66.5	56.4	61.5	52.5	47.7	43.1	39.6
Inventory Turnover	N/A	N/A	4.2	8.4	7.9	8.5	11.4	11.7	12.9	13.1
Inventory Conversion Period	N/A	N/A	86.4	43.4	46.5	42.8	32.1	31.3	28.3	27.9
Accounts Payable Turnover	N/A	N/A	9.0	12.4	15.1	12.0	15.3	15.7	18.9	21.4
A/P Deferral Period	N/A	N/A	40.8	29.3	24.2	30.5	23.9	23.2	19.3	17.0
Cash Conversion Cycle	N/A	N/A	108.6	80.5	78.6	73.9	60.7	55.8	52.1	50.5

APPENDIX AK – INVESTED CAPITAL (SALES TO JOINT VENTURE) WITH 50% INCOME FROM JOINT VENTURE

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Invested Capital (Asset Holders)										
S-T Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Dividends Payable	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CPLTD	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
L-T Debt	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Deferred Taxes	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Preferred Shares	$0.00	$600.00	$600.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00
Common Shares	$0.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00	$850.00
Other Contribution	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Retained Earnings	$0.00	$0.00	-$359.33	-$418.01	$607.66	$3,292.66	$11,884.46	$28,745.83	$55,690.55	$92,977.26
Other Financial Assets (bonds etc)	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Equals: Invested Capital (Asset Hldrs.)	**$0.00**	**$1,450.00**	**$1,090.67**	**$1,281.99**	**$2,307.66**	**$4,992.66**	**$13,584.46**	**$30,445.83**	**$57,390.55**	**$94,677.26**
Invested Capital (Investing)										
Current Assets	$0.00	$330.00	$413.48	$979.00	$1,648.23	$4,161.38	$7,872.69	$13,290.73	$19,811.64	$27,607.69
Less: Net Current Liabilities	$0.00	$0.00	-$60.09	-$272.70	-$532.21	-$1,826.94	-$2,873.36	-$4,166.13	-$4,671.55	-$5,051.16
Net Fixed Assets	$0.00	$1,120.00	$809.00	$620.05	$448.10	$324.21	$234.85	$170.33	$123.68	$89.91
Other Assets	$0.00	$0.00	-$71.72	-$44.36	$743.53	$2,334.01	$8,350.28	$21,150.90	$42,126.78	$72,030.83
Equals: Invested Capital (Investing)	**$0.00**	**$1,450.00**	**$1,090.67**	**$1,281.99**	**$2,307.66**	**$4,992.66**	**$13,584.46**	**$30,445.83**	**$57,390.55**	**$94,677.26**
Invested Capital Ratios										
Debt-to-Invested Capital	N/A	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Trade Capital to Invested Capital	N/A	22.76%	32.40%	55.09%	48.36%	46.76%	36.80%	29.97%	26.38%	23.82%
Rate of Return on Invested Capital	N/A	N/A	-3.33%	18.33%	103.68%	147.96%	202.42%	141.14%	99.50%	72.15%
ROIC after depreciation & amortisation	N/A	N/A	-24.78%	-3.58%	90.27%	142.59%	200.63%	140.66%	99.35%	72.09%
Invested Capital Turnover	N/A	N/A	37.11%	291.05%	556.67%	805.32%	746.69%	405.21%	237.05%	149.22%
Invested Capital to Equity	N/A	N/A	N/A	-303.53%	-306.69%	379.76%	151.63%	114.30%	105.91%	103.05%

APPENDIX AL – FREE CASH FLOW (SALES TO JOINT VENTURE) WITH 50% INCOME FROM JOINT VENTURE

Key Ratios	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Free Cash Flow (Operational)										
FFO - Method 1	$0.00	$0.00	$79.66	$213.80	$916.97	$2,242.37	$6,538.16	$12,366.30	$19,519.77	$26,668.66
FFO - Method 2	$0.00	$0.00	-$48.33	$199.88	$1,197.62	$2,808.90	$8,681.16	$16,925.88	$26,991.37	$37,320.49
FFO - Method 3	$0.00	$0.00	-$48.33	$199.88	$1,197.62	$2,808.90	$8,681.16	$16,925.88	$26,991.37	$37,320.49
Incremental Investment	N/A	$1,450.00	-$48.33	$430.27	$1,197.62	$2,808.90	$8,681.16	$16,925.88	$26,991.37	$37,320.49
Equals: FCF = FFO - II	**N/A**	**-$1,450.00**	**$0.00**	**-$230.39**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**
Free Cash Flow (Financial)										
After-tax dist. To Debt-holders	N/A	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Net dist. To Shareholders	N/A	$0.00	$0.00	$19.61	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Private Investment	N/A	-$1,450.00	$0.00	-$250.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Equals: FCF	**N/A**	**-$1,450.00**	**$0.00**	**-$230.39**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**	**$0.00**

APPENDIX AM - FINANCING REQUIREMENTS FOR EACH MODEL

Financing Needs	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
RTI (Sales to Joint Venture)										
Owners	$850									$850
Outside Investors	$500		$450	$250						$1,200
Bank Financing					$500					$500
Joint Venture										
Owners	$500									$500
Outside Investors	$1,000		$2,500	$3,000	$4,500	$3,500				$14,500
Bank Financing					$6,500	$6,000				$12,500
RTI (Direct Sales)										
Owners	$850									$850
Outside Investors	$500	$200								$700
Bank Financing					$1,500					$1,500
RTI (Sales to Joint Venture) with 50% Income										
Owners	$850									$850
Outside Investors	$600		$250							$850
Bank Financing										$0

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