# An Analysis of Technology Trajectories for Industrial Applications of The Indirect Dimensional Acquisition Industry

by

William L. Indest

BSChE Chemical Engineering
University of Notre Dame, 1985

Submitted to the Alfred P. Sloan School of Management and the School of Engineering in Partial Fulfillment of the Requirements for the Degree of

**Master of Science in the Management of Technology**

at the

Massachusetts Institute of Technology
June 1999



Signature of Author: Signature redacted

William L. Indest
MIT Alfred P. Sloan School of Management
May 14, 1999

Certified By: Signature redacted

Russell W. Olive
Senior Lecturer
Thesis Supervisor

Accepted By: Signature redacted

David A. Weber
Director, Management of Technology Program

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## ABSTRACT

The indirect dimensional acquisition industry has undergone significant changes over the past several years facilitating major changes in its industry structure as well as future technology trajectories. This work explores these changes and the past and possible future technology trajectories of this industry, which is a subset of the process control industry. Existing suppliers in the field have employed diverse strategies but have implemented them poorly. These company strategies are explored and their weaknesses examined.

Further, a new technology strategy for a typical company in the industry is defined, taking advantage of deficient technology strategies employed by the existing competitors in the field.

Thesis Supervisor: Russell W. Olive
Title: Senior Lecturer

## Acknowledgement

I wish to sincerely thank my wife, Lisa, who's magnificent support during the writing of this thesis and my whole academic experience was without match. I wish to dedicate this thesis to my son Logan Joseph Indest, who was born during the Fall of 1998.

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## Executive Summary

The consolidation of the metals gauging industry from seven to three major suppliers has left the world wide metals industry with no North American producers of this "mission critical" equipment. If the measurement gauge does not work, the mill does not run, wasting hundreds of thousand of dollars of revenue opportunity *every hour*.

We will design, build, deliver, install and service the high precision metals gauging instrumentation which measures the thickness of flatsheet metal as it is being produced. Taking advantage of a lack of service and spare parts offering by current suppliers we will bootstrap the company with no outside investment.

### *Description of the Business*

MI will provide high-end value-added solutions to the flatsheet metals industry, focusing first on installed base utilization and optimization. The company will then evolve into a full scope supplier of systems and services.

The company's products and services are designed to meet a largely unfulfilled market need brought about by the recent consolidation of the industry. The current suppliers are distracted by post merger issues and are not focusing on meeting their customer's requirements.

MI's core competencies include unique technical know-how and market penetration capability. We will address the customer's biggest current headache with his installed gauging equipment and use the resulting cashflow and marketplace goodwill to bootstrap to a full scope company. Our customer base includes the "first tier" flatsheet metals producers of North America.

### *The Opportunity and Strategy*

Over the last several years, the metals gauging industry has consolidated from seven to three suppliers. Of these suppliers, none are headquartered in North America, leaving the American and Canadian customer base without access to a "domestic" gauging supplier. Because the equipment is mission critical to the operation of their rolling mills, and the current suppliers are unable to provide the services required, customers have become more and more desperate to find suitable alternatives.

### *The Target Market and Projections*

The Target market is the "first tier" steel and aluminum producers. These customers are frustrated with their current suppliers' inability to deliver and are anxious for a new entrant. Several customers have approached the founders separately to ask for help in facilitation of solving some of these problems. These customers and the other high end users of gauging equipment will be our initial target market.

During the first three years, we forecast to generate $1.1 million revenue in year one, $1.7 million in year 2 and $2.6 million in year 3. This exceptional market share is possible because customers have no other choice at this time. We estimate a 10% market penetration for each of these markets and then a growth rate of 5% per year through year 3.

### *The Economics, Profitability, and Payoff Potential*

Each market segment has its own pricing and margin model. The engineering business has a margin of 40%, the replacement business: 50 – 65%; and the hardware business: 25%. Profitability occurs in Month 6 and positive cash flows begin in the seventh month.

### *The Team*

After several years in the marketing of gauges to the metals industry for Asea Brown Boveri (ABB) and its predecessors, Indest took over as the GM of the ABB division in 1993 when the business was very unprofitable. The ABB division subsequently became known as Industrial and Research Measurement Systems (IRMS) when the division was purchased by a European measurement company, Industrial and Research Measurement Systems of Belgium (IRM).

Together with Al Carter, who was the engineering manager and responsible for manufacturing, Indest and the rest of the management team turned the business around, posting a profit after 5 months. Indest and Carter separately came to the conclusion that a market opportunity existed after both left IRMS in 1997. Carter and Indest have worked together for more than ten years.

### *Equity Financing*

Because MI will generate positive cash flows very quickly and the initial investments are low, no outside capital is being sought. The founders will bootstrap the firm with modest initial capital investments.

## The Industry, the Technology, the Company, and its Products and Services

The purpose of this section is to give the reader an overview of Measure It. Specifically, here we provide background information on the metals gauging industry; explain the technology used in the gauging equipment; explain our company idea; and present its products and service.

### *The Industry*

The metals gauging industry consists of those companies delivering high accuracy measurement devices called gauges to the flatsheet steel and aluminum industries. The segment of the industry on which we will concentrate is the measurement of flatsheet metals thickness, particularly aluminum and steel.

The aluminum and steel industries primarily consist of very large integrated or specialized companies who shape and treat either aluminum or steel. A typical integrated steel manufacturer, such as U.S. Steel (USS), makes steel from iron ore and scrap via the steelmaking processes, and then shapes the newly alloyed steel into various forms, such as I-beams for construction, and flatsheet for food cans and other uses. An aluminum producer similarly treats and shapes aluminum bauxite into end products, some of which are flatsheet products. The end of the process in both aluminum and steel is known as the "finishing end," and it is in this area of the metal producing plant that the gauge described in this plan is installed.

As the flatsheet metal is produced (i.e. thinned or "rolled" to a certain thickness), its thickness must be continuously measured online at very high speeds in order to ensure that the material meets the specified thickness quality standards and that metal is not being wasted. The measurement accuracy required is usually on the order of +/- 0.10% at measurement update speeds as fast as 0.5 milliseconds. These performance characteristics must be obtained in an environment that typically changes 150 degrees Celsius from the beginning of a coil (i.e. one length of metal flatsheet) to the end and that is typically shrouded in a kerosene or water vapor.

A typical rolling mill plant (i.e. United States Steel in Gary, Indiana) utilizes from 5 to 100 of these devices. (USS, Gary has approximately 80 in operation). The number utilized is completely dependent upon the number of rolling mills and downstream process machines that utilize gauges. Other downstream processes include slitters and levelers. Slitters don't actually reduce the thickness of the metal but "slit" it to the customer specified width and/or length. Gauges on these applications allow for a quality check before the material leaves the plant. When delivering especially critical material, the producer may measure the metal thickness twice in downstream quality control applications.

### *Recent History of the Gauging Industry*

The worldwide gauging industry has undergone significant changes over the last several years, creating our market opportunity.

- Prior to 1996, the major suppliers of gauges to the metals industry consisted of
  1. Asea Brown Boveri (ABB) with the AccuRay brand,
  2. Data Measurement Corporation (DMC),
  3. Isotope Measurement Systems (IMS),
  4. Eberline (A ThermoElectron company),
  5. Kirkendall Metrology Inc (KMI),
  6. Measurex and
  7. Loral Corporation with the Weston brand.

- In 1996, in order to strengthen their metals industry presence, Measurex Corporation purchased Data Measurement Corporation (DMC) for about $40 million.

- Quickly afterward, Measurex also purchased the metals gauging division of Loral Corporation. Loral was a relatively low price, small competitor that competed primarily in steel.

- Then, in quick succession, Honeywell Corporation purchased Measurex.

- One year later, in 1997, Honeywell/Measurex shed their metals gauging businesses including the DMC and Weston assets and people. The business was sold to Eberline (a Thermo-Electron company). Honeywell apparently concluded that Measurex paid an excessively high price for DMC and the sponsoring executive was fired.

- Meanwhile, in late 1996, ABB sold its gauging division to Industrial and Research Measurement Systems (IRM)[1] which is headquartered in Belgium.

- Finally, Kirkendall Metrology Inc.(KMI), declared bankruptcy in 1999

This fast paced shuffling of ownership has consolidated the worldwide metals gauging market from seven suppliers to three:

- Eberline
- Industrial and Research Measurement Systems (IRMS)
- Isotope Measurement Systems (IMS)

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[1] Industrial and Research Measurement Systems in Belgium (IRM) is the parent company; The subsidiary company in the U.S., with the same name but known as IRMS, absorbed the assets of ABB's AccuRay business.

### *The Metals Gauging Industry Today*

All suppliers except IMS have suffered from post-acquisition integration issues. IRMS' equipment delivery performance has suffered dramatically and they are losing the market's confidence and marketshare. Therefore, in order to maintain volumes, IRMS has lowered some systems prices below direct cost.

Eberline is saddled with the servicing the installed base for three companies which, combined, supplied thousands of systems to the market for several decades. Their small service capability, particularly in the U.S., has been overwhelmed.

Generally, the suppliers of gauging equipment offer services for the installed base as an afterthought, and poorly execute them. The market is desperate for the complex systems engineering capability the metals producers require to run their processes. The gauging industry's customers are frustrated and ready for a reputable new player.

With regard to outside regulation, because the gauging industry requires the use of radiation sources (man made and natural), the government of every venue in which the industry operates regulates it. These restrictions and regulations include two agencies of the U.S. government, at least one agency in each U.S. state, one agency in each country through which the isotopes are shipped, and at least one agency in each country where the equipment is installed. This expensive and complicated regime required in order to operate helps brandish the industry as somewhat *unattractive.* On the contrary, however, this unattractiveness helps provide a *barrier to entry* to the uninitiated. Few firms are willing to "pay the entry fee" to comply with the government regulations required. MI, however, has the experience and know-how to overcome this barrier and exploit it.

With the exception of the radioisotope material itself, the industry is a second tier electronics and commodity mechanical structure provider, so *supplier power* is moderate, and ebbs and flows with the rest of the industrial electronics industry. The significant exception to this, especially considering this business plan, is the supply of generators. To counteract this supplier power strength, MI is concluding an exclusive contract with the most advanced supplier, Tru-Focus.

The metals flatsheet industry is diverse, international, and quite segregated, with no customer comprising more than 5% of the industry. Therefore, *buyer power* is moderate as well. However, as the industry changes (the steel industry's minimills, for example) the buyer power will evolve also. Because minimills use usually single (or, at most, dual) process flows in a given facility, their dependence upon a given process's output is increasing over traditional integrated suppliers, and their buyer power may further diminish. Therefore, they are willing to pay more for high results, value added services, which is the niche MI plants to exploit.

In summary, the competitive marketplace has compressed from seven to three players over the last four years. The suppliers participated in this merger and acquisition activity to take advantage of process improvements and economies of scale. However, now all major suppliers of gauging equipment are headquartered and run from Europe. Also, each now have between four and eleven existing or recent electronics platforms to support, provide spares for, and maintain in the field.

While the major competitors are grappling with multiple platform, process and post-merger organizational issues, and having serious concerns regarding cannibalization of their existing installed bases, we have an opportunity to introduce a potentially disruptive technology with a well designed system upgrade platform.

Throughout its history, the gauging industry tended to focus its management attention and R&D funding on the already mature measurement technology rather than the "peripheral" portions of their scope of supply. This repeated emphasis on only one portion of the scope has resulted in the proliferation of poorly and incompletely designed electronics and Human-Machine-Interface (HMI) packages, which leaves an opportunity for an entrant.

The industry is ripe for an entrant with a service minded focus and the know-how to tackle the tough implementation issues that the current suppliers are not fulfilling.

### *The Technology*

This section discusses the past and present technologies of the industry, and how we believe these technologies will evolve into the future. Our role in this evolution is critical to our success as a new industry entrant.

The metals gauging industry was born and grew up together with the post World War 2 steel, and later aluminum industries as the requirement for the accurate measurement of the thickness of the metal as it was being produced became more prevalent. Specifically, the industry provides measurement devices to the steel and aluminum producers of the world by providing high speed, online thickness measurement of the hot and fast moving material. The measurement signals are interfaced to hydraulic and electromechanical control systems, usually provided by others, that *control* the thickness of the material as it is produced (as opposed to measure it).

The primary technology used in the industry today evolved together with similar technologies used to measure the basis weight and other characteristics of a variety of flatsheet materials, including paper, rubber, and plastics. By directing a beam of radiation, produced by either a natural (isotope) source or a man-generated () source, through the material to be measured (aluminum or steel), and measuring the amount of radiation that emerges from the other side, one can calculate the thickness of the material. The complete system usually consists of the sensor and a frame to support it; an interface box; and a computer to process the signals and provide a human-machine interface

(HMI). In the recent AccuRay[2] products, a self-contained processor board in the interface box called SSTRIO completes the basic signal processing. This unit is responsible for translating the raw radiation units into measurement units. A complete description of the operation and components of a gauge is included in Appendix A – Description of a Typical Gauging System.

This basic measurement technology is quite mature, and has been disseminated throughout most of the world's metals mills. Also, about half of the total systems in use today utilize tubes as the radiation source while the other half uses isotope material.[3]

These sources are self-contained radiation generators (analogous to a very high-energy light bulb) with very specific and controlled radiation output characteristics. As with any filament device, these devices fail and must be replaced. It is customary and expected that an generator will operate for two years or longer under "mill" conditions. This expectation is based upon decades of usage in this application. However, as requirements for measurement accuracy increased, the sophistication of the generator increased with it, and, in general, the working life of the product has deteriorated. This is critical because when a failure occurs ( or otherwise) with the gauge, the metals mill does not run. This results in significant lost revenue to the metals producer.[4]

Because of the modern stability requirements, only three vendors of devices even publish specifications that can meet the gauging industry's needs. However, we have found only one vendor that actually meets the required specifications – TriGem.

### *The Company*

MI provides high content value-added solutions to the flatsheet metals industry, focusing first on installed base utilization and optimization. The company will then evolve into a full scope supplier of systems and services.

The company's products and services are designed to meet a largely unfulfilled market need brought about by the recent consolidation of the industry. The current suppliers are distracted by post merger issues and are not focusing on meeting their customer's needs.

MI's core competencies include unique technical know-how and market penetration capability, as well as niche replacement parts. We will address the customer's biggest current headache with his installed gauging equipment and use the resulting cashflow and marketplace goodwill to bootstrap to a full scope company. Our customer base includes the "first tier" flatsheet metals producers of North America.

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[2] AccuRay is the trademark of the gauging equipment produced by IRMS.
[3] Indest estimate
[4] Lost revenue opportunity cost to the metals producer due to the unavailability of the rolling mill to the producer averages $300,000 per hour in aluminum and $180,000 per hour in steel.

An important aspect of MI's ability to sell and deliver these services and equipment to the customer is the company founders' reputation in the industry.

William Indest was the General Manager of the gauging division for IRMS and ABB, after 10 years of marketing metals gauging equipment. Indest's 14 years direct business and sales experience with and knowledge of and by the customer senior management will help MI to gain quick customer penetration.

### *Entry and Growth Strategy*

The metals industry is ripe for a new entrant to supply gauging products and services. This largely long-established industrial customer base has been used to purchasing such mission critical equipment as gauging from at least seven suppliers over the last several decades. The reduction of the majors players to only three suppliers, none of them headquartered in North America, has left the aluminum and steel industries feeling vulnerable.

The product strategy for MI is to combine differentiation with regard to critical parts and services and a low cost platform strategy for the system itself. Our initial introduction into the industry will focus primarily on services, an area that has been seriously ignored for the industry's entire history. Because the competition offers these needed services as an afterthought, and poorly executes them, the market is desperate for such high-level, value added services. We will meet their day-to-day needs via an unprecedented service level strategy. Services, including the generator supply, are the first area in which we will concentrate and will serve as our calling card to the industry.

Very quickly after differentiating ourselves in the services arena, we will introduce a new upgrade product for the *replacement* of existing electronics in the marketplace. First these electronics replacement efforts will be focused on the existing, aging installed base of the second largest gauging supplier, IRMS.

The main market requirement for this upgrade market is a low cost, high flexibility replacement for the electronics only. Specifically, due to obsolescence issues, gauge users are forced to upgrade either replacing the entire system or just the electronics portion. In many applications, as the measurement subsystem technology had matured prior to its original installation (up to twenty years earlier), the electronics portion is the only area that needs to be revitalized through replacement.

The implementation of the superior product strategy will incorporate several aspects: First, the competitive marketplace has significantly compressed over the last four years; the number of competing firms has decreased from seven to three. Major purchases, divestitures, and mergers were completed in order to try to take advantage of process improvements and economies of scale. As an (unintended) consequence, all major

suppliers of this equipment are now headquartered in Europe. Also, and more significantly, the major players now each have between four and eleven existing or recent electronics platforms to support, provide spares for, and maintain in the field. When faced with increasing competition, this industry tends to focus its R&D efforts on the already mature measurement subsystem (the frame and sensors) rather then the "peripheral" subsystems (the electronics). This has resulted in the proliferation of poorly and incompletely designed electronics and HMI packages, leaving an opportunity for an entrant.

With the major competitors grappling with multiple platform, process and post-merger organizational issues, and having serious concerns regarding cannibalization of their existing installed bases, we have an opportunity to introduce a potentially *disruptive* technology with a well designed system upgrade platform.

Another issue to our entrant entry strategy is the competitors' ability and willingness to develop such a solution themselves. The three major competitors' complementary assets are (or soon will be) very similar to our own: brand name, reputation[5] and expertise. We, however, will have excelled in value added services. Our competitors, on the other hand, have established development and product staging[6] organizations, but each is bogged down by post merger activities and the support of the multiple (four or eleven!) inherited systems. This "complimentary liability" will serve to focus the competition on their existing punch lists, and allow a "disruptive" platform strategy to entrench itself.

To put this in context, we will enter the marketplace with a "best in class" service strategy, solving today's customer problems with an unprecedented customer problem resolution service program. Next, we will introduce an upgrade path with a new electronics platform that seamlessly integrates with the customer's existing mill electronics through standard interfaces *and is priced up to 80% lower* than the then-current market prices for such upgrades. Our pricing flexibility is due to the significantly reduced cost product compared to the competitors'.

As our target customers and the majority of the marketplace are large corporations (Alcan and U.S. Steel, for example) they will benefit from economies of scale using an inexpensive but high quality and functionally complete unit throughout their facilities. U.S. steel alone utilizes over 200 gauging systems in North America and spends an estimated $1,500,000 a year on service, spares, and new systems. We will target the high end, influential users first; those large corporations who understand the danger inherent in the obsolescence and/or failure of forty systems (for example) throughout their corporation. These large installed base users have the assets to develop derivative products themselves, or force the mill electrics suppliers to do so. Therefore, we will benefit from a "Customer groove-in" effect as well as establishing the influential critical mass necessary for establishing our product as THE gauging electronics standard.

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[5] We will have established these by the time of the platform introduction through our "best in class" services strategy.

[6] All of the major competitors in this industry outsource almost all areas of manufacture, and "stage" or integrate the product before shipment to the customer.

Because the new platform will be open and encourage modular innovation by third parties and the end users themselves, value will be created and maintained. Users will be able to, for example, purchase an HMI software package from us, install it on their own PC (which allows them to maintain local control and vendor relationships) and plug it in to our platform. Alternatively, a mill electric's supplier can provide the gauge HMI, integrated with his HMI, at a much lower cost than the previous, separate solutions. Finally, special product quality reporting software, which some metals rollers consider core competencies in their quest to justify higher selling prices for higher quality, can be developed by the roller himself. Also, metals producers with multiple gauges will be able to re-implement homegrown custom modules cost effectively. These (one-to-many and many-to-many) effects will further the success of establishing the electronics as a standard. Taken together, all of these attributes, combined with the "best in class" service capabilities, will create unique value for the customer.

Our head-to-head competitive strategy for the electronics platform will include access up to but not including the ability for others to actually manufacture the hardware and core firmware. We will compete head-to-head based on our derivative products, primarily our service capabilities. It is from these products that we will extract our profit. It can be foreseen that with an exquisitely complete great product, and a full shelf of third party developed plug-ins, we also may be able to entice our competition to utilize our architecture as well.

After having differentiated ourselves with our value added services and having produced a low cost standard for the process industry, we will add the final module: the measurement subsystem. Our unique expertise in this area represents a core competency. This regular stream of in-house and third party complementary products will help ensure renewal of the electronics platform for the foreseeable future.

## Market Research and Analysis

This section conveys the significant market opportunity that exists in the metals gauging industry today.

### *Customers and Market Segments*

With our initial focus on services, critical spares, and upgrades, the initial markets for MI are the North American Steel and Aluminum producers, including specifically those plants that have current or last generation AccuRay. The next segment to be addressed will be those customers who have recent AccuRay equipment installed on a worldwide basis.

These plants are typically large, integrated operations where the buying decision is made either by the maintenance superintendent (especially in the case of services) or the engineering department, together with purchasing. Because this equipment is critical to the operation of the mill (and thus the customer's revenue generation) *generally* such decisions are *not* made on a price basis alone. Specifically, because of the lost revenue potential (up to $600,000 per hour), the customer is primarily concerned with reliability and measurement performance.

Our first customer focus will be first tier North American AccuRay users who desperately need services and generator spares. The customer will purchase parts and services from MI because we will be able to offer him the ability to utilize his current gauging system longer and we can provide him with technical capabilities not available elsewhere. Specifically, because the performance specifications required by our customers are so very tight, and the equipment suppliers (specifically IRMS) do not have the remaining expertise to help maintain their installed base (see the Competition and Competitive Factors section), the customers will welcome us with open arms. The lack of these capabilities by our major competitors results from their choices to emphasize other aspects of their businesses, specifically new system sales.

As of this writing, we have limited our customer testing to one beta test site for the generator (Logan Aluminum). Logan, located in Russellville, Kentucky, is the most advanced aluminum canstock plant within the Alcan family. Alcan is the largest aluminum producer in the world. Because of our close working relationship with Logan, we have generated significant interest within the Alcan system. However, each of the founders has been approached separately by other customers to provide services as described above, which we have politely refused. The marketplace is primed for our grand opening.

### *Market Size and Trends*

The purpose of this section is to explain in detail our market estimates and how they were developed as a basis for our marketshare and revenue projections. The marketsize can be

delineated into the three areas through which we will evolve: The services and critical spare parts business, the upgrade business, and the complete systems business.

An estimated 84 of the AccuRay gauging systems (gauges) installed include 10 – 60 kilovolt (kV) sources. In addition, we estimate an additional 50 units are kept onsite in the customer's inventory as spares. Therefore, the total WW installed market is 134 devices, of which approximately 70% are in North America. [7]

Of the 134 devices known to be installed (or at customer's site as spares)[8], we estimate 10% per year will be lost to competitive system replacements. IRMS is having great difficulty providing on time and quality installations, systems, services, and spares, including these crucial devices; they are losing marketshare in the systems business. Competitors are replacing IRMS AccuRay equipment with competitive equipment, including those containing devices. However, IRMS is installing new equipment (with very short lasting devices) at the rate of about 10 per year.[9] Therefore, the overall installed system base, considering IRMS equipment only, is 134 and decreasing about 5% per year. Further, considering that the normal life for the unit is considered two years[10], the potential annual market is 67 units today.

This erosion of the installed base makes obvious the need to proceed quickly to take advantage of what may be a temporary condition in the market (the lack of devices as spares to AccuRay equipment). [11]Table 1 shows the 5 year marketsize prediction.

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[7] Source: Former General Manager (Indest) estimate.
[8] Source: Founders' estimate
[9] Source: Discussions with customers.
[10] Source: vendor's literature and customer expectations. This analysis is very conservative given that the very opportunity of this venture is IRMS' inability to provide tubes lasting the "normal life." Informal discussions with customers and others have concluded that the mean tube life at several multi-tube installations has shrunk to less than six months with some serial failures as quickly as 4 days.
[11] Possible solutions to this mid term issue is the ability to expand into providing spares and upgrades to customers using vendors equipment other than AccuRay. Older Weston (Loral) equipment, in particular, has been abandoned by the equipment provider, Eberline.

Table 1
Unit Marketsize Estimates

| Year | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| **Marketsize** | | | | | |
| **Units** | 134 | 127 | 121 | 115 | 109 |
| **Growth** | -5% | -5% | -5% | -5% | -5% |
| **Renewal Rate** | 50% | 50% | 50% | 50% | 50% |
| **Net Units** | 67 | 64 | 60 | 57 | 55 |
| **Potential Revenue/Unit** | $ 36,000 | $ 36,000 | $ 36,000 | $ 36,000 | $ 36,000 |
| **Net Marketsize X-ray ($)** | $ 2,412,000 | $ 2,291,400 | $ 2,176,830 | $2,067,989 | $ 1,964,589 |
| **Retrofit Services (Each)** | $ 4,000 | $ 4,000 | $ 4,500 | $ 5,000 | $ 5,000 |
| **Total Addressable Retrofits** | 50 | 50 | 0 | 0 | 0 |
| **Net Marketsize Retrofits ($)** | $ 200,000 | $ 200,000 | $ - | $ - | $ - |
| **GRAND TOTAL YEARLY MARKETSIZE** | $ 2,612,000 | $ 2,491,400 | $ 2,176,830 | $2,067,989 | $ 1,964,589 |

After year 5, the marketsize will continue to dwindle based solely upon the IRMS/AccuRay installed base. However, by that time, MI will be servicing its own installed base.

Each of the installations must be retrofitted with small enhancements to directly accept the new device. We estimate that each device will require $4000 (32 hours) of services to complete the retrofit[12]. As 100 units exist, the total marketsize for this effort is $ 400,000 spread over two years (given the tubes life expectancies) results in a yearly marketsize of $200,000 per year.

The marketsize for the value added services product is more difficult to estimate. Many of these services are being provided by the original equipment manufacturers (OEMs) as well as other third party entities (mainly OEM alumni). However, because MI is providing unique services not currently available, using known data, such as OEM service revenue levels, is misleading and underestimates the potential. The value-added services that we will offer are presented in detail in Appendix B – Detailed Description of Service Products. Because of their complexity, these high-end services are usually provided by the gauge supplier's development engineers rather than service technicians. In the case of IRMS, the technical know-how to perform some of these services has left the company and not been replaced. Twenty of the original thirty three ABB division employees have separated from IRMS since the IRMS buyout of the ABB metals gauging division.

[12] This time estimate is based upon past experience, and selling the services at the rate of $125 per hour, which is customary in this industry. Travel and Living Costs are not included in this estimate, but are charged to the customer at actual.

In the case of Eberline and IMS, the engineering functions are headquartered in Europe and are largely inaccessible to a North American customer.

Given all of these factors, the domestic service market, for installed AccuRay systems only is estimated to be $3,000,000 per year and the non-AccuRay gauging domestic service market is estimated at another $8,000,000 per year. These are based upon our knowledge of prior years ABB service revenues for the gauging industry and the relative size of the AccuRay installed base versus their competitions'. Also, these estimates include spare parts as well as field services. Because, as the systems begin to age, each system's service needs will increase, but the number of systems will decrease (not taking into account new systems), we estimate this market will be flat when considering only the installed base as of today. However, as we populate IRMS and other installed base with our upgrades, our addressable market will grow.

We define the system upgrade market as those orders where the vendor installs a new set of electronics and interface boxes with the existing AccuRay frame and sensors. Based on the number of systems installed, and attrition due to competitive replacement, we estimate that this market comprises from $6,000,000 to $8,000,000 per year.

These estimates are based upon our knowledge of the volumes prior years' revenues from upgrades and replacements, which averaged approximately $6,000,000 per year. The increase in the marketsize reflects the relatively few number of new mills being built that require new systems. Also evident is the increased cost effectiveness of upgrading versus replacing. This cost effectiveness will be largely due to our offering of a lower priced upgrade unit.

In the past, the domestic portion of these upgrades was approximately 80%. Because of the ABB structure, sales outside of North America were largely out of the Columbus business unit's control. Therefore, many international AccuRay installations were replaced by competitive systems rather than being upgraded.

When expanded beyond the AccuRay installed base, the upgrade market potential drastically increases. Assuming that the fraction of new versus upgrade systems applies for Eberline and IMS as it did for ABB, the potential market for upgrading Eberline and IMS installed base is at least double that mentioned above. This estimate of $12,000,000 to $16,000,000 per year may be conservative when one considers the strategy of both companies has been to force their installed base to replace the entire system. This is particularly true with Eberline who has inherited more than 50% of their installed base from acquisitions, and they do not support their former competitor's equipment well.

As we are addressing only the North American market at this time, and approximately 50% of the Eberline and IMS installed base is international, the non-AccuRay domestic upgrade market is similar in size to the AccuRay upgrade market: $6,000,000 to $8,000,000.

Therefore, the total domestic upgrade market is $12,000,000 to $16,000,000 with an initial targeted market of $6,000,000 to $8,000,000. Upgrades of non-AccuRay equipment will be considered on a case by case basis, but are not considered a core strategy.

Using the above assumption that the upgrade and complete systems marketsize are approximately equal, then the total new systems market size for North America is $16,000,000. Comparing these assumptions to the total revenue of the major gauging suppliers (shown in Table 2), these results pass the reasonableness test.

Therefore, the overall North American marketsize that MI is pursuing is $25,000,000 to $27,000,000 per year once the full systems are being regularly shipped in year three.

### *Competition and Competitive Factors*

Table 2
A Brief Summary of Gauging Competitors

| Company Name | Abbreviation | Headquarters | Estimated Yearly Revenue |
|---|---|---|---|
| Industrial and Research Measurement Systems s.a. | IRM s.a. | Belgium | $25,000,000 |
| Eberline | Eberline | Germany | $30,000,000 |
| Isotope Measurement Systems | IMS | Germany | $15,000,000 |

Given the industry factors reviewed earlier and our market entry plan, we must consider the competition from the perspective of each market segment. Considering that the immediate competition for the spares, most of the services, and the upgrades is IRMS, IRMS is presented in detail. We will be attacking its installed base and one of its more profitable product lines, the spare parts business.

#### IRM/IRMS

Industrial and Research Measurement Systems (IRMS) is the wholly owned U.S. subsidiary of IRM s.a. of Belgium.[13] IRMS purchased the Metals Gauging Division of ABB (Asea Brown Boveri) in November of 1996 and formed its new U.S. subsidiary in Columbus Ohio. IRM's business prior to acquiring ABB's Metals Gauging consisted of approximately $10,000,000 in revenues with $1,500,000 in net profit.

[13] Throughout this plan, IRM refers to the Belgian parent and IRMS refers to the U.S. subsidiary in Grove City, a suburb of Columbus, Ohio.

IRM's line of business consists of precision measurement devices for the metals industries, primarily based upon laser technologies. The synergy and lack of overlap between the ABB and IRM businesses was the main justification for the purchase of the business.

The customer view of IRMS today from a delivery and service viewpoint is dismal. IRMS is having difficulty meeting system ship date commitments, which are critical in the capital equipment business.

MI anticipates that IRMS will conclude that the only way to remain a part of the services value chain for this part with their installed base will be to use our (by then) proven product. Having anticipated this action, we have exclusive rights to sell these products to any customer (including IRMS) that wishes to use them for metals gauging applications. IRMS will be forced to purchase the unit from MI (or through us from our vendor) at list price, which we have established at 10% lower than IRMS' current market price of $36,000. Therefore, our profitability is maintained and protected and we are treating all customers equally as required by law.

We anticipate that they will be forced to either exit from this portion of the business or purchase from us. However, if they are able to provide a form fit working product, we will have to compete head-on based upon our by then established industry reputation. Based on the performance characteristics of our vendor's other products, we are confident of a significant edge.

With the services product IRMS has a robust organization for providing lower- and mid-level servicing of the equipment in the field. They do not have the technical capability to provide the high-end systems engineering services we are making the hallmark of our service business. This difference is one of our core competencies and a significant differentiator.

## Eberline

Eberline is a German subsidiary of Thermo Electron and is the dominant player in the worldwide gauging market. Of note is the fact that with the Eberline purchase of the DMC/Weston assets, there are no major American owned or headquartered players in the metals gauging market. Eberline is the clear market leader, gaining marketshare from IRMS in the U.S. using Data Measurements' and Weston's in-place sales and staging infrastructure.

Eberline is a full scope gauging supplier but has dissolved the U.S. R&D functionalities of the purchased Data Measurement and Loral gauging divisions, leaving many older customers with inadequate support. They are struggling to reconcile and provide support to their eleven prior systems that are still in use. In general, because of their dominant

position among the three remaining gauging suppliers, the only option they offer existing customers for system revitalization is complete replacement. This bold attitude has dismayed many long time Data Measurement and Weston customers who are looking elsewhere for solutions.

Eberline's R&D capabilities are very highly regarded, but their ability to vary from a standard solution is considering lacking. Their manufacturing is primarily in Germany and is therefore unionized. In general, their cost structure is high.

### Isotope Measurement Systems (IMS)

IMS is a German provider of gauges that began by supplying high end, specialty applications. Rather than use a single source and detector to measure one place in the width of the strip, IMS' profiling product uses multiple sources and detectors to measure multiple spots along the strip's width. This profile measurement is useful for control only in hot mill applications, because that is the only process where the strip profile can be corrected. In Germany in particular, IMS has provided the full range of gauges including normal (so called single point) applications. Since the consolidation of the industry, however, IMS has begun selling single point gauges in North America as well.

## *Estimated Marketshare and Sales*

For the replacement market, based on our current knowledge of the competitor's lack of viable product, and our customer's overwhelming need, we believe we have the opportunity to take 50% of the addressable domestic marketsize within one year and 75% after year 2. This aggressive penetration is possible because of the unique market situation described. There are no other viable alternatives at this time!

As we plan to concentrate on North American customers initially, and expand to international customers after year 2, the international penetration will be 50% in year 3 and 70% in year 4 and thereafter.

For the consulting services business, our market penetration estimates are more conservative. Given our access to the market both through our contacts and our then-current supply business, we will be limited only by our ability to recruit the right level of talent to fill the positions. Considering a 70% utilization rate, and $125 per hour, we will generate $175,000 per man per year. We are conservatively considering hiring one person per year through year 5.

Revenue flows for the upgrade business will begin in earnest in year 2 when we have the electronics platform completely tested and ready to ship. Considering our initial addressable market, the domestic AccuRay market, is about $6,000,000 per year, we conservatively estimate that we can take 10% of that market in the third year, and an

additional 5% each for the next four. Our main advantages will be price and flexibility, and our main disadvantages will be customer loyalty to their established brand. However, we feel this market penetration is conservative based on IRMS' and others' continually dwindling market reputation.

The factors affecting our market penetration of the domestic complete systems revenue flows are similar to the upgrade flows, except delayed a year. Specifically, we believe we can penetrate 10% of the domestic complete systems market in year 3 and grow it by 5% in years 4, 5 and 6.

### *Ongoing Market Evaluation*

As our competition and we sell directly in North America, ongoing evaluation of the market and our competition in particular is relatively easy. Especially now with the decreased number of players in the market, the customer base is concerned about access to viable suppliers. Therefore, after an order has been placed with a competitor, it is typical that the customer will "coach" the losing suppliers as to why they lost the order. Also, installation lists are prevalent and readily available.

We will continually monitor changing market conditions through our sales force, industry trade organizations and journals, and through close contact with our customers.

## Marketing Plan

This section describes our action plans in relation to implementing the marketing strategies outlined.

### *Overall Marketing Strategy*

These customers are in most cases the "high end users" for whom our value-added services will be most valuable. We will approach these customers through directed, customized mailings, which will focus on their particular equipment and how our program will assist them. We will also use direct sales techniques to contact them. And finally, because of the common urgent need in an industry that is very cooperative, our reputation will spread by word of mouth.

The contract with the supplier includes established list pricing with 50 to 60% margins for MI, depending on yearly volumes. The cost of the services is the fully burdened hourly cost of the technician performing the work, which is estimated to be $65 per hour. These services will be sold for $130 per hour (base rate) up to $200 per hour (consulting rate).

For the replacement and services business, we will emphasize our one-of-a-kind product that is available no where else. Specifically, the working generators cannot be purchased except through us, and the services provided are unique to MI. Further, the warranty policy for the generators will be unique in the industry.

The upgrade systems will focus on a low cost, low price approach to fixing a customer's problem, specifically the fact that his system electronics are obsolete. Simplicity will be the main thrust of our upgrade selling arguments, plus the fact that the designers of the original system are part of MI.

### *Pricing Strategy*

The products will be priced according to their value-added to the market, and competitive forces, as follows:

| | |
|---|---|
| Generator replacement parts: | $32,000 |
| Services | $125 to $250 per hour |
| Simple System Upgrades | $60,000 |

Simples system upgrades consist of replacing the system electronics only and having the customer purchase his own Human-machine-interface (HMI) which will usually be a personal computer running MI supplied software. Following our strategy to produce the low cost system electronics and provide our value added in the services and peripherals, our pricing will be the lowest. Competitive pricing, which includes the required HMI, for example, ranges from $20,000 to $60,000.

### *Sales Tactics*

MI personnel will accomplish the selling directly. Specifically, in the first year, Will Indest will sell the generators, services, and service contracts. At the beginning of year 2, it is anticipated that a second sales person will be added. Therefore, our initial labor costs for sales are already considered within the salaries of the founders and the marketing mailing costs are negligible (less than $1000). One expense that must be considered is travel and living expenses for sales calls, which are not reimbursable. We estimate these costs to total $95,000 per year .

### *Warranty Policies*

> The service aspect of the MI product is key to our success, especially compared with the policies of the competition.

Because we are using services as our "foot in the door" in the industry, we will aggressively pursue fulfilling the warranty for the smallest excuse. For the

replacements, the vendor, TriGem, is covering the equipment warranty for the entire warranty period, as a part of our exclusive warranty. Based on our testing at the beta test site and our audit of TriGem' other related products, we have confidence that the majority of the units will last through the warranty. The services warranty and the replacement labor costs are insignificant, but will be fully accrued. As detailed earlier, these warranties are key tactics for our quick and successful re-entry into the market.

### *Advertising and Promotion*

Advertising in trade magazines will not be utilized in the first two years. Rather we will establish ourselves in the customer's mind as the premier supplier of our described products personally and by word of mouth and through informational pages on the internet. Because the targeted customer base is well known to the founders (and the founders are well known to all levels of the targeted customer base), our promotion will consist of personal, customized letters of introduction and description of our product, emphasizing our reliability and warranty. The subtle emphasis will be upon the founders' reputation.

After we establish ourselves and enter the upgrade market, trade show presence at The Aluminum Association show (every two years) and the American Iron and Steel Exposition (every two years) will be a necessity. Both are considered "must be seen" events in the industry. Except for occasional and sporadic trade magazine advertising, the competition's public promotion is similar to that described for MI. Our difference will be our ability to deliver the product.

The reliability will be materialized to the customer via actual results data[14], and the warranty will be materialized via a *very simply* written warranty statement as described above.[15]

### *Distribution*

Distribution of the services and equipment will be via MI personnel and directly from the MI facility near Columbus, Ohio. Large equipment shipping and crating will be outsourced. Similar methodologies are used by all of the competitors.

[14] Our Beta test site has agreed to let us share unnamed data sets with other potential users.
[15] The warranty will be finalized with corporate counsels' review.

## Design and Development Plan

The purpose of this section is to detail our action plans to develop our technologies to saleable products.

### *Proprietary Technology*

The beginning phases of this venture depend upon access to (and control of) the device design and application.

Our new device vendor (TriGem) has the proprietary knowledge necessary to design and build an exceptionally performing source for the thickness gauges. This capability is unique in the industry. Measure It has the expertise to apply these devices in the existing AccuRay (and possibly other vendor's) installations. This expertise could be duplicated with significant effort (2 – 4 person-years) by the chief engineers of our major competitors (Eberline, IRMS, IMS).

### *Development Status*

#### TriGem device:

The TriGem device has been designed, and several prototypes have been built by TriGem. As of this writing, one grounding issue and several vibration problems have been found and fixed. The current challenge relates to a vibration-related issue, and a modified design is scheduled to be installed mid May 1999

#### The Services Products:

The development of the service products has mainly focused around how we will market the specialized services to maximize our market impact. Much thought has already been given to this differentiation strategy, and the specific service products are described in detail in Appendix B – Detailed Description of Service Products.

#### The Upgrade Electronics Product:

The schedule for the design of the replacement electronics product is for completion in 1999.

#### The Complete Systems Product:

This development project consists mainly of adding the frame and sensor modules to the upgrade product described above. The detailed planning for this project will begin

concurrently with the completion of the detailed board design anticipated in December of 1999.

For the augmented MI products, the design risks are minimal. The biggest risk with the niche value added services is the ability to attract and keep business. Based on the founders' knowledge of the market and its players, and the competitions' (particularly IRMS') inability to service the industry, we believe that our ability to fulfill the market demand for service orders will be the limiting factor. Each founder has been approached by some of the largest metals producers in both steel and aluminum and been asked to provide (or facilitate) such services. Given this market situation, our ability to grow profitably without over extending ourselves will be our biggest risk.

With regard to the upgrade platform product development, the biggest risk is the ability to contain detailed design as well as implementation costs. The design costs will be maintained by the use of aggressive cost project management as both founders have done throughout their careers. The implementation costs refer to the interface of the new upgrade platform to other system components.

## Operations Plan

The purpose of the operations plan is to explain how we will actually deliver the products and services to our customers.

### *Operations Overview and Strategy*

The business is delivering services fulfilled by employees, spare parts manufactured by third parties, and, eventually, upgrade and complete systems, the components of which will also be manufactured by others. Therefore, the business can be best characterized as a service, parts logistics, and staging operation.

The decision to outsource most "manufacturing" is based upon several years of costs analyses completed by the founders in prior years. Specifically, because of the relatively low volume and high quality and precision requirements necessary to build the materials required, the capital expenditures necessary to do it in house would be exorbitant. Further, rather than giving up flexibility by tying ourselves to equipment that might not be appropriate for the next product, we will make up the possible cost difference in outsourcing by extremely diligent low cost product design.

We have developed relationships with a variety of tradesman and services vendors throughout central Ohio. Vendors as diverse as ABB for sensor manufacturing and a local machine shop for frame manufacturing are already known to and by the founders. Alternatives for each class of vendor have also been established. In a previous position with ABB, Carter was responsible for evaluating and hiring sub-suppliers to build components for metals gauging equipment.

With their higher volumes and European unions to contend with, our competition generally manufactures in house at relatively high costs.

### *Geographic Location*

The business will be located in Columbus, Ohio, or a suburb, which is within 300 miles of 60% of the domestic customers. Also Columbus has world class import and export facilities and is a hub for American West airlines. The cost of labor and of living compared to other Midwestern cities is relatively low, and Columbus has a large base of industrial suppliers.

### *Plant, Property and Equipment*

It is anticipated that we will lease a facility on the East side of Columbus (because of proximity to the airport) totaling 1500 square feet. Included will be approximately 500 feet of office space and the remaining dedicated to a shop floor and inventory. This facility will allow us to fulfill the revenue flows outlined for the first three years. Following this milestone, industrial office and staging space is plentiful in Columbus, and we will move to larger facilities as necessary.

With regard to tools and equipment needed beyond normal electrical and electronics test needs ($12,000 in year one[16]), no special manufacturing equipment is required. It is assumed in our financial plans that the test equipment will be purchased, but, alternatively, most of the equipment can also be leased.

### *Inventories*

The only significant components anticipated in the first years of this business are the generators and the upgrade component. Remembering that we are using the supply as our reputation builder, it is critical that we stock enough of the generators onsite in Columbus to maintain our high response reputation. Our competition in this arena sometimes cannot ship product for months.

For the upgrade component, because we don't know complete cost structures yet, we are assuming a constant stocking level of $50,000 from year 3 onwards.

### *Operations Organization*

The delivery arm of MI will be organized with technicians and engineers reporting to Carter, who did a similar function in this industry for ABB and IRMS. No further organizational branching in Operations is anticipated.

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[16] This includes two laptop and one desktop personal computer, a basic took kit and a digital oscilloscope.

### *Regulatory Issues*

As detailed earlier in the industry description, because this industry uses radiation producing devices (although at low levels), many activities are regulated. Most regulations refer to the use of naturally occurring radiation emitters (isotopes), which are regulated by the US Nuclear Regulatory Agency, as well as each state. MI, however, does not anticipate the use, shipping, or handling of such devices in our facilities. When we do service on isotope base equipment in our customer's facilities, their license applies.

The regulations governing the generation of radiation by man made devices (i.e. generators) are much more lenient and are regulated by the U.S. Food and Drug Administration (the FDA). As we do plan to work with and install such devices in our facilities and in the field, care will be taken and specific radiological processes will be defined and rigorously enforced. The tasks of overseeing these important safety regulations, and all other safety related issues, is the responsibility of Al Carter. Carter will function as MI's Radiation Safety Officer (RSO).

## Management Team

### *Organization*

MI's organization will initially consist of the two founders and one employee: Indest, Carter, and Wolfeld.

Indest, as CEO, will work full time in the business and be responsible for the completion of the detailed business implementation strategies and the initial (and subsequent) customer interfaces. In addition, Indest will coordinate all activities regarding the incorporation of MI and the interaction with outside entities (consultants, attorneys, etc.) to ensure a smooth initial startup. The organizational culture we wish to instill in the organization is one of trust, empowerment, and mutual benefit. To that end, all employees will participate in some fashion in the company's success via a bonus plan based on company cash flow.

Founder Carter will continue his outside employment as a manufacturing engineer at a local high technology company[17] through the first year, but will join MI as a full time employee at the beginning of year two. Carter will function as the technical lead for the company through year one, and draw a salary. Niklas Wolfeld is an alumnus of IRMS also, and will function as the company's hands-on service provider.

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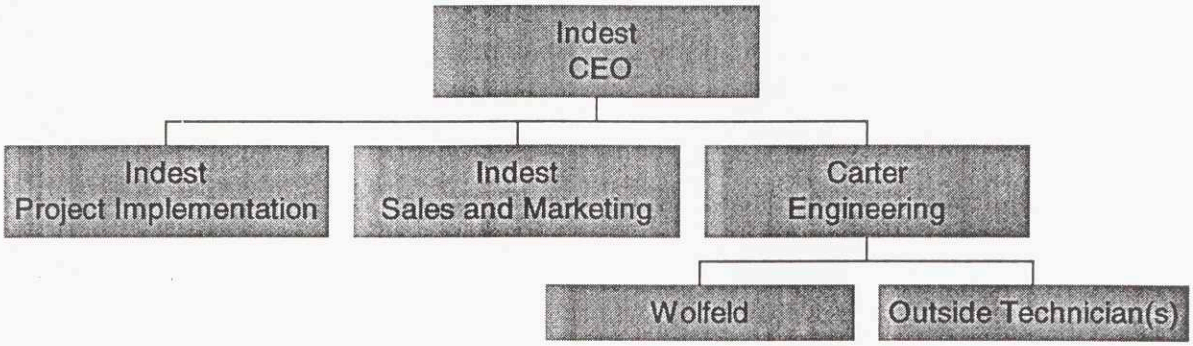
[17] Carter's current employer, Applied Innovation, has no interest in or conflict of interest with IS, its customer, or suppliers.

During the first year, in addition to Wolfeld, outside technical resources will also be utilized for in-house and field engineering including other IRMS alumni. None of these resources have contractual commitments to or are otherwise bound to IRMS or any related or unrelated organizations.

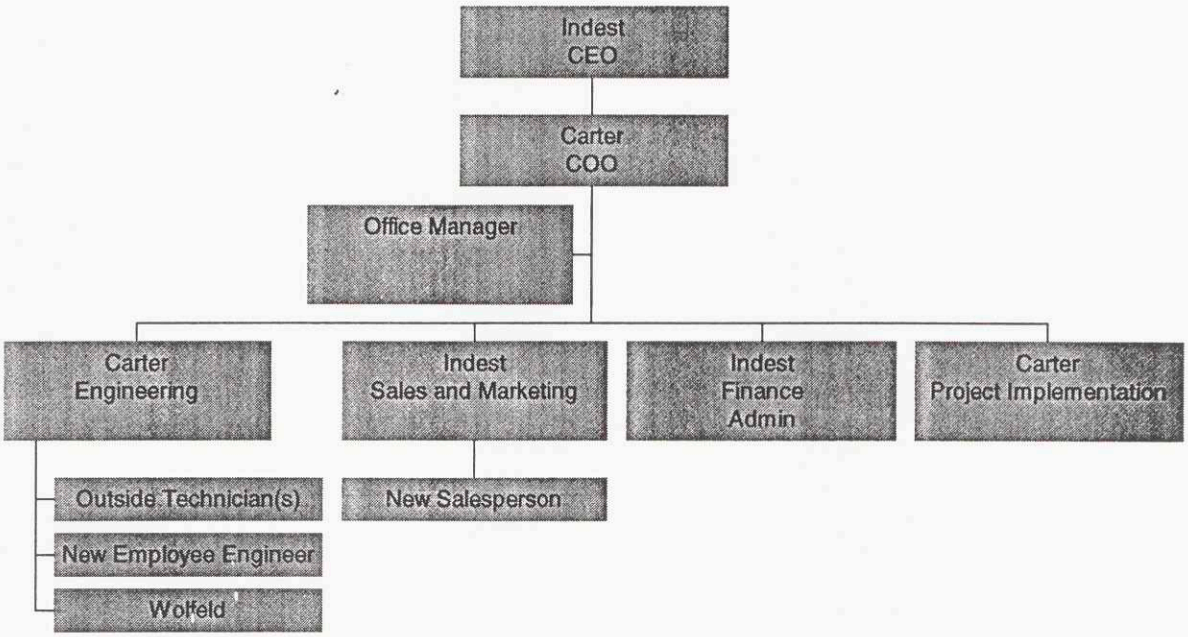
Figure 1
Year One Organization




During year one, Carter will maintain primary responsibility for all of the technical aspects of the business and Indest will develop the commercial, financial, implementation (delivery), and administrative aspects of the business.

By the end of year one (or sooner), Carter will convert to a full time employee as COO. Indest will continue in his sales and marketing role but Carter will take over the delivery function (project implementation).

Figure 2
Year Two Organization




### *Key Personnel*

Regarding experience in these positions and with these responsibilities, both Indest and Carter have worked extensively together over the last twelve years in this field. In the IRMS organization, Indest was the VP and general manager of the metals gauging division and Carter served as the chief technologist.

After graduating from the University of Notre Dame with a BS in Chemical Engineering, Will Indest[18] joined AccuRay Corporation in 1985 as a systems engineer for the metals gauging division. Indest's career with AccuRay (and its successor companies: Combustion Engineering and ABB) spanned field engineer, project management, account management, division level marketing management, and finally division general management for 5 years. During his tenure as general manager, Indest and his management team, including Carter, returned the division to profitability after years of losses. [19] Upon the metal gauging division's purchase by IRMS, Indest served as the Vice President of the systems division. Indest left IRMS in November 1997 and returned to school. He will receive an MS in Management of Technology from the MIT Sloan School of Business in June of 1999.

After serving the U.S. Air Force, Carter received his BS degree in Electrical Engineering in 1980 and his BS in Applied Physics in 1985, both from the Missouri State University.

[18] Please see Appendix D for complete resumes for Indest and Carter
[19] See Indest resume in Appendix D for more details.

Carter's career with AccuRay and its successor companies has spanned promotions over several years including engineer, senior engineer, chief engineer, manufacturing manager, R&D project manager, and R&D manager. Carter was the manager responsible for the redesign and cost reduction program that helped re-establish profitability in the ABB business. Carter left IRMS in March of 1998 and has since been employed as a manufacturing engineer at a Columbus telecom concern, Applied Innovation.

Carter and Indest have a healthy working relationship including a high mutual respect and open, frank communications. Both founders signed Key Employee contracts with IRMS but the included non-compete clauses have expired and are no longer applicable. Two Ohio law firms who advise Indest and Carter have verified this conclusion and both are of the opinion that neither individual would be in breach of law or contract with the implementation of this business plan.

### *Management Compensation and Ownership*

During the first year, Indest's compensation will be $200,000 per year, with $30,000 per year paid on a monthly basis, and the remainder accrued as salary payable. In his last position with IRMS, Indest's total compensation, including bonus at targeted values was $200,000 per year.

Carter's first year compensation will be $100,000 per year with the entire amount accrued as salary payable. When Carter joins as a full time employee, his salary will be $120,000 per year with the entire amount payable on a monthly basis. Carter's current salary at the unrelated company is $35,000 per year, and his total compensation at IRMS was $250,000 per year.

Each of the founders will initially purchase 50% of the company equity for $25,000 each, with their salary payable converting to equity once it remains on the balance sheet for one year. [20] Therefore, at the beginning of year 3, for example, Carter's salary payable accrual for year one will revert to common shares at a price as agreed by the Board of Directors.

It is anticipated that further major stockholder employees may join the company. A separate agreement among shareholders (the Shareholder's agreement) will be executed.

### *Other Investors*

As the business will be entirely bootstrapped using the founders' paid-in-capital and cash flows from the sales of services and devices, no outside equity financing is anticipated. Debt financing will be required to normalize cash flow and will be sought beginning year one.

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[20] This accounting is not yet reflected in the financial statements.

### *Board of Directors*

The Board of Directors will consist of

| | |
|---|---|
| Outside Director | From Columbus Business Community |
| Outside Director | From Metals Industry |
| Lisa Oboe | (Corporate Secretary and Treasurer) CPA and VP-GM of BT Office Products |
| Will Indest | CEO |
| Al Carter | COO |
| Russ Olive | MIT Sloan School of Management |

### *Supporting Professional Advisors and Services*

In addition to the outside technical professionals identified previously, MI will utilize the following professional services.

| | |
|---|---|
| Legal Counsel: | Porter, Wright, Morris and Arthur<br>Columbus, Ohio<br>Amy D. Klaben, Partner<br>Curt Lovlin, Partner |
| Accounting Services: | Price Coopers<br>Columbus, Ohio<br>Nadia Aludini, Partner |
| Banking Services (anticipated): | Bank One<br>Columbus, Ohio |
| | Huntington National Bank<br>Columbus, Ohio |
| Software Design and Implementation | Objective Control<br>Columbus, Ohio<br>Bob Wilhelm |
| Field Technical Services | Ron Geiger<br>Glenn Brotherton |

## Critical Risks and Problems

As detailed in the Marketing sectionand through the business plan, the initial cashflows of MI are dependent upon the success of the TriGem device and our ability to generate service revenue quickly. Therefore, the most critical early risks are

a) Delay of the beta site success. If the TriGem tube is viable, but late, MI' losses due to delays are limited to the up front equipment capital expenditures, and Indest's and Wolfeld's salary. No major marketing efforts will take place until the beta site is proved successful.

b) TriGem succeeds with the product design, but cannot deliver the volume required (or the quality required). Also, TriGem is a small shop with most of its technical resources existing in one man. If George Howard, the company owner, should become unavailable for whatever reason, MI must have access to the technology to build elsewhere.

As a part of the contract, MI has the right to full technological disclosure should TriGem fail to deliver for any of the reasons above. With the excellent documentation available via this contract, we can build the devices ourselves, or subcontract them to another Please refer to the Operations section of the plan for a more detailed discussion of this possibility, and our recourse.

## The Financial Plan

The purpose of this section is to summarize the financials results of MI utilizing the action plans detailed here. In addition to the financials presented here, detailed financial statements are included in Appendix D – Detailed Financial Statements.

Since this is a new venture, no prior years' financial statements are available. MI will post accounting profits beginning in month six, and positive cash flows beginning about month seven. A breakeven analysis is also included.

### *Profit and Loss Forecasts*

Detailed P&L forecasts and assumptions can be reviewed in Appendix E. However, the following summary data (Table 7) shows that MI will turn a profit quickly due to the unique market situation with devices, which will allow us to use the generated cash for development of our other products.

Table 7
Forecasted Profit and Loss Statements
('000's of Dollars)

| | YTD 3 Months | YTD 6 Months | YTD 9 Months | YTD 12 Months | EOY Year 2 | EOY Year 3 |
|---|---|---|---|---|---|---|
| Revenue | 48 | 367 | 733 | 1114 | 2271 | 3518 |
| Costs | 102 | 352 | 635 | 1095 | 1882 | 3163 |
| Net Income | -54 | 15 | 98 | 19 | 389 | 355 |

### *Cash Flow Analysis*

Detailed cash flow analyses are also shown in Appendix E. It should be noted that except for a small loan needed to bridge the second quarter of the first year of about $25,000, the required funding will come from the paid in capital and cash flows from the ongoing operations. MI is truly a bootstrapped venture.

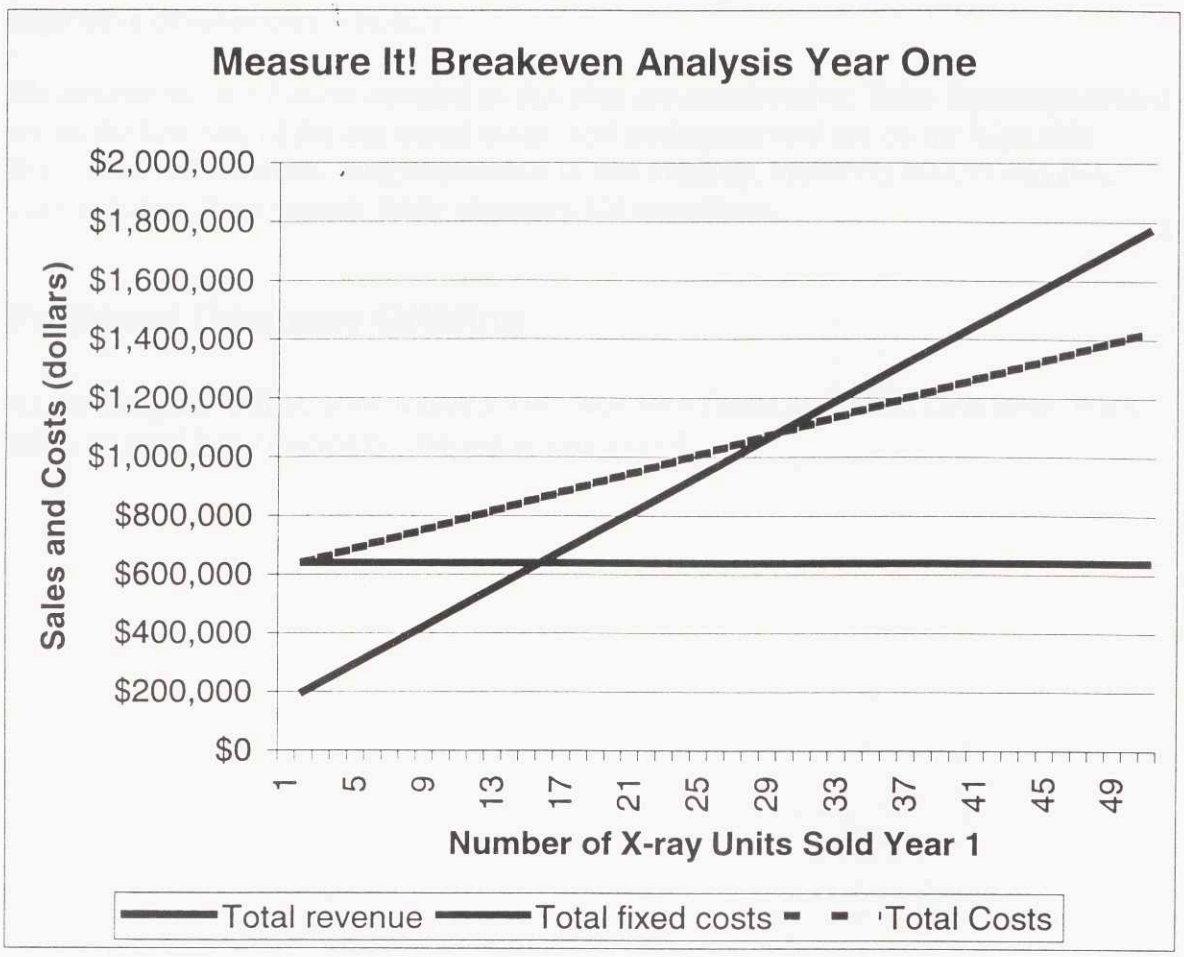
### *Balance Sheets*

Detailed balance sheets for the first three years are presented in Appendix E, with relevant assumptions, as well. Apparent from these analyses is the quick generation of cash, which will allow us to invest in development of the upgrade and systems businesses more quickly.

### *Break-even Analysis and Chart*

The breakeven analysis takes into account both revenues from services and from generator replacements. For this analysis, we considered that the first year services revenue was constant at $200,000, and that the services labor costs are fixed. This assumption is reasonable because we will have the service technician, Wolfeld on payroll regardless. Also included in the fixed costs is $200,000 of outside development contracts. If we do not reach the break-even point in selling units (about 28) then we can reduce or eliminate the outside R&D expenditures. Doing so, however, would delay our entry into the upgrade and system markets.

Figure 3




### *Cost Improvement and Control*

Indest will have primary responsibility (with the oversight of the board treasurer) for the accounting and control of MI. MI will utilize Quick Books by Intuit to manage the required accounting and finance functions. Controllable expenses will be spent at the most economical rates commercially available. (All air travel will be coach class, for example.) If required by a delay in the successful beta test, marketing and development costs can be delayed to maintain cash flow.

### *Financial Plan Summary*

Because of our unique product and service capabilities, MI is able to bootstrap its initial funding needs directly from company sales. Profitability occurs in month 6, and positive

cash flows occur in month 7. The breakeven point for number of units required for sale is 28 in the first year. However, this number can be significantly decreased with a less aggressive development schedule.

We believe that the figures detailed in this plan are conservative: Sales figures presented are on the low side of the estimated range, and costs presented are on the high side. Because of the founders' long experience in this industry, including budget and P+L responsibility, these figures fairly represent MI operations.

## Proposed Company Offering

As the company will be bootstrapped with founder's funds and initial cash flows from sales, no third party company offering is anticipated.

## Appendices

Appendix A – Description of a Typical Gauging System

Appendix B – Detailed Description of Service Products

Appendix C – Resume of Will Indest

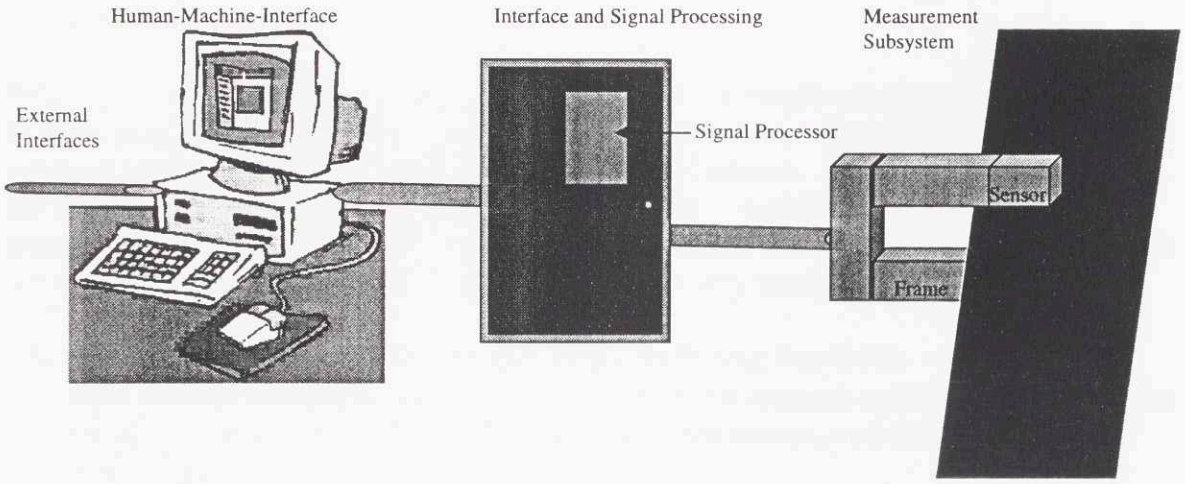
Appendix D – Detailed Financial Statements

## *Appendix A – Description of a Typical Gauging System*

A gauging system consists of three main subsystems, as illustrated in Figure A-1. These are the measurement subsystem, the "electronics," and the human machine interface (HMI).

The measurement subsystem, including the sensor itself (source and detector) the mounting frame, and any associated interface electronics, is the heart of the gauging system, and the component on which most historical research and development dollars have been spent. The basic technology of utilizing radiation absorption has not changed dramatically, but *incremental innovations* have resulted in the improvement of all measurement characteristics (i.e. accuracy, repeatability, sensitivity to sheet position, temperature sensitivity, and calibration techniques, for example).

**Figure A-1**
**Typical Metals Gauging System with Subsystem Functionality**




| | | |
|---|---|---|
| Secondary Measurement processing | Primary measurement processing | Primary measurement |
| Human-Machine Interface (HMI) | Proprietary interface to Measurement Subsystem (analog and/or digital) | or Isotope Source |
| Outside interfaces<br>Broadband<br>Serial<br>Parallel | | Ionization Chamber or Photomultiplier Detector |
| Video Interface | | Traversing C-frame |
| Recipe Management | | |
| Maintenance Interface | | |
| Logic control and safety interlocks. | | |

Most of these improvements involved the shaping (collimation) and filtering of the measurement beam to take advantage of previously understood physics, and the incorporation of significant improvements in measurement technology. Further, advancements have been made through materials improvements to reduce the variable unit costs.

Therefore, comparing the benefits of the measurement subsystem as measured by the specifications of the measurement (dynamic accuracy, for example), the technology can be considered mature, and at the top of the s-curve.

The "electronics" is the subsystem responsible for the conversion of the analog radiation level measurement to a useable thickness measurement (i.e. from nanoamps to millinches). In most systems, this consists of a printed circuit board located in the interface box. Since the introduction of this methodology to the marketplace in the early 1950's these subsystems have evolved dramatically from complex vacuum tube devices through the first analog printed circuit board technologies to industrial hardened personal computers today. The efficiency and apparent cost effectiveness of these units has decreased through their evolution, but, ironically, their quality and ease of use has diminished in the minds of many customers.

With the evolution of the gauging electronics, all of the neighboring systems electronics in the rolling mill have evolved also. For example, a metals rolling mill consists of a series of high power drives, and a high speed control system. Since the introduction of the radiation gauges, these systems too have evolved to significantly complex, often proprietary systems. Because, in general, these systems are *closed* (i.e. proprietary), the *interfaces* among these systems is critical and often very complex.

The electronics subsystems today consist of the following functions:

- Logic control: Moving the frame into and out of the process; opening and closing the radiation shutter; clamping the signal interface electronics, and other associated "relay" logic.
- Measurement signal processing: translating nanoamps to millimeters, for example.[21]
- Provision of user interface "screens" for the HMI is usually part of the software included in the electronics.
- Recipe handling, to deliver product specific calibration information to the measurement algorithm
- Report generation, producing standard and very customized reporting capability to the HMI or a host or peer system for customer use. This software is the most often customized portion of the system, and requires 80% of the delivery effort while affording less than 10% of the revenue.
- Computer interfaces, with the HMI (which is usually electronics specific) and one or multiple peer computer systems. These interfaces consist of simple parallel, serial,

[21] In the AccuRay product supplied by IRMS, a separate unit remotely mounted in the interface box processes the measurement signal. This unit is known as SSTRIO.

and broadband communications sockets utilizing some standard and some custom software protocols.

These interacting requirements for the electronics subsystems demand a complex solution in today's deliverable. In most cases, personal computers running Microsoft Windows NT with some type of advanced user interface application are used. Some suppliers utilize proprietary software and hardware that fulfills most or all of the requirements above. In general, these electronics subsystems are sold in today's marketplace for $20,000 to $80,000.

The HMI subsystem has been both a part of the electronics subsystem, and a separate device, depending upon the electronics technology. For the majority of its history, the HMI has therefore followed the same s-curve trajectories as the electronics.
The interfaces between the measurement subsystems is very similar across manufacturers.

When the incident radiation reaches the detector (receiver) on the opposite side of the metal sheet, the detector generates a signal that is in some way proportional to the radiation measured. This signal is either in the form of light pulses (as with a photomultiplier tube) or a very low current (as in the case of the more robust and preferred ionization chamber detector). In either case, the detector signal is further processed (usually to a more "transportable" DC signal) and forwarded to the electronics for signal processing.

In addition to the main measurement signal, a surprising twenty to forty auxiliary signals are utilized between the electronics and the measurement subsystem. Some of these signals, usually DC, are simple logic interlocks that are surprisingly important in this application due to the (FDA and NRC) regulations concerning the industrial uses of radiation. The interlocks for the shutter signal, which exposes the sheet to the radiation flux, are especially critical. In addition to the DC logic signal, the measurement "heads" are usually temperature controlled. Also, if an source is utilized, highly regulated power must be distributed and delivered to the source housing. These are examples of some of the non-logic AC and DC signals that exist between the electronics and the measurement subsystem.

In many larger mill installations, the HMI required by the gauging system is one of many that the operator has to use in order to properly run the rolling mill. To avoid this redundancy, many end users interface the gauging system to the main mill computer(s) to automatically enter the target thickness and alloy, for example. This prevents the operator from having to enter the same information multiple times. Further, except for maintenance, such configurations account for 50% of the installations of the last 5 years.

The report generation for a gauging system usually consists of multiple calculations and graphical representations of the quality and production data associated with a specific coil (or slab) of metal. The choice of which data to utilize and exactly how to calculate it is

highly subjective, and the exact methodologies used are considered core competencies by some metals producers.

## *Appendix B – Detailed Description of Service Products*

The Purpose of this Appendix is to explain, in detail, the various value-added services MI will offer to our customers.

### Base Curve and Product Calibration

Sensor measurement accuracy begins by establishing a linear base curve calibration, from which all measurements are referenced. Sensor base curve calibration is performed by utilizing traceable standards (samples) and computer generated calibration constants via a $5^{th}$ order polynomial equation. The measurement of customer supplied process samples in the gauging system will establish product slope and offset calibration terms by means of least squares fit linear equation.

### source replacement (TriGem MAX-4)

The TriGem MAX-4 source is a direct replacement for many of the older 20-60 kV units presently being used in Metals Gauging applications. It utilizes a state of the art digital high voltage power supply and a proven reliable tube design. The upgrade path, involving a retrofit kit, requires replacement of an obsolescent 12-volt power supply to an available 28-vdc unit, with wiring changes incorporated into the MAX-4 connector.

The new source is calibrated (kV and mA) to reestablish sensor measurement accuracy and analysis of sensor stability and statistical noise, relative to the new source, is performed for verification to specification.

### Gauge Troubleshooting and Preventative Maintenance

Troubleshoot failed or questionable gauging hardware to eliminate noisy or unstable measurement, and repair of erroneous digital/analog inputs and outputs involving intermittent problems or outright failures. Identify and replace defective components, verify system for proper and accurate operation.

Preventive maintenance is necessary to maintain measurement accuracy, this involves the cleaning, alignment and replacement of critical sensor components. Frame mechanical reliability is verified via proper alignment of moving components and adjustments to air pressures, including frame travel, swing head mechanisms and air wipes. Contamination of measurement system components is prevented by identifying worn or cracked mechanical components, gaskets, o-rings, seals, bushings, air and water fittings.

On Site Training

## Radiation Safety

Overview of various types and methods of radiation utilized in gauging applications. Discussions involving absorption methods by the human body and the long and short term effects, the purpose and use of dosimetry badges and maximum allowable doses. The training include methods for safe operation on and around gauging systems, involving maintenance and operator personnel, and the proper placement of radiation indicators and signs.

## Source Tuning and Calibration

Includes discussions involving the proper methods of establishing kV and mA setpoints for accurate sensor measurements and the effects of kV/mA adjustments. Methods of source performance analysis, long term maintenance techniques and detecting early warning signs of failure.

## Maintenance and Servicing

Topics include an overview of the gauging systems functionality, both from an electrical and mechanical perspective. Provides ability to trace signals, identify symptoms of common problems, and develop an understanding of the interplay between critical signals and components. Methods to troubleshoot intermittent problems, noise, and measurement accuracy problems. Review techniques for proper electrical connections, AC power requirements, grounding issues, shielding and noise immunity.

Philosophy associated with long term preventive maintenance and discussions to their proper approach. Replacement procedures for critical components such as ionization chambers, sources, sensor windows, electrometers and power supplies. Techniques for the troubleshooting and repair of frame and sensor mechanical components associated with sensor head alignment, detector swing head mechanism and air wipes.

## Measurement Theory of Operation

Measurement techniques are explored involving both nuclear and generated radiation. Discussions encompass the science and physics of radiation generation and detection, and the methods employed to derive accurate measurement information. Digital sampling techniques of analog measurement signals are reviewed and include an understanding of algorithms involved with this process. Other topics include the effect of chemical

composition on radiation absorption and compensation methods to maintain measurement accuracy.

## Documentation Services

### Customized AutoCAD drawings (electrical/mechanical)

Update standard drawings to reflect current gauging system configuration due to addition or deletion of system components. Provide "as installed" drawings of gauging system using customers title block and drawing conventions. Completed drawings can be provided in various formats, paper, Mylar, or electronic media.

## System Engineering

### Process Dynamic Studies

Measure and verify dynamic passline, temperature, airflow, cooling mists, vibrations, and electromagnetic interference analyze and correlate the effects on the gauging systems dynamic performance. Support the customer efforts to develop and implement a process to track dynamic variables over extended periods of time for the purpose of improving measurement accuracy.

### Product Calibration Sample Verification

Assist with the analysis of process variables and review product/process span (alloys/grades, pre-annealed/post-annealed, hardness etc.). Select material for sample processing and assist metallurgical lab with cutting, weighing, establishing laboratory sample values and qualifying each sample for symmetry and uniformity. Perform sample measurements in gauging system and establish results of gauge-to-lab correlation.

## Consulting for New Gauging Systems

Consulting services to assist the end user in establishing application requirements, development of hardware and software specifications and vendor evaluations. Services can expand to encompass the testing and evaluation of systems prior to purchase, assistance with installation and system startup.

## *Appendix C – Resume of Will Indest*

RESUME FOR WILLIAM L. INDEST

# QUALIFICATIONS SUMMARY

- Multi-discipline, results-driven, **turnaround general manager.**
- Multi-cultural Producer: Excelled in a very large corporate matrix, a small company atmosphere, and several organizational styles in between.
- Initiated, justified and led complex, self-funded R&D programs.
- High Achieving: Supervised divisions and companies in turnaround and startup situations, exceeding the results required.
- Opportunity Seeker: Always looking for and evaluating new options.
- Global Sales Strategist, Planner and Closer: $60 Million of capital equipment orders.
- Extensive Global Management Experience: Supervised sales and installations in 37 countries.
- Extreme customer advocate.

# EXPERIENCE

**VICE PRESIDENT – SYSTEMS DIVISION** **11/96 - 11/97**
**Industrial and Research Measurement Systems Inc. (IRMS Inc.)**
*(a $25 million, leading edge process instrumentation supplier to the metals industries. IRMS purchased the metals gauging division of ABB in 1996.)*

- Reported to the Chairman-of-the-Board, and was responsible for strategic marketing; sales; project management; R&D; manufacturing; software, electrical and mechanical engineering; field service and administration.
- Led the transition of the spin-off from operating as a division of a large multinational to a new, successful, separate ongoing entity.
- Negotiated the lease of new facilities, insurance, employee benefits, legal services and bonus programs that retained 100% of the chosen personnel during the transition.
- Reduced costs by $10,000 per month by recruiting and hiring a US company CFO.
- Increased orders by 55% (over budget) and retained 100% of the key, long term customers by developing, directing, and implementing an aggressive transition sales strategy.
- Justified and led an aggressive, self-funded R&D program.
- Increased the teamwork and efficiencies of the 33 personnel in my care by the aggressive development and communication of the company's goals and each individual's expected contribution.

**DIRECTOR, GENERAL MANAGER - METALS GAUGING** **9/93-10/96**
**Asea Brown Boveri, ABB Industrial Systems, Inc., Columbus, Ohio**
*(a $30 billion electrical engineering company. ABB purchased Combustion Engineering in 1990.)*

- **Led the turnaround** of the business through redefinition of the division strategy and a renewed customer focus; from a $1.7 million net income loss in 1993, to a $0.2 million profit and positive cash flow in 1994, with successively higher profitability and cashflows thereafter.

- Eliminated redundancies, reorganized the division's 24 personnel, and established and clearly communicated the division's priorities to effect the results turnaround.
- In 1995 and 1996, led the ABB operations team to successfully identify a buyer and then sell the business to IRMS, facilitating ABB's exit from a business that no longer strategically fit within their product portfolio.
- Grew the international portion of the business from 35% to 60% in 1996 over 1993 by establishing several new internal and agency sales channels on six continents.
- Negotiated internal and external supply chain contracts for manufacturing and raw material in the US and Europe resulting in the reduction of material costs by 15% in 1996 over prior years.
- Initiated, justified and led an aggressive self-funded R&D program, bringing two completely new products to market resulting in the recapture of the business' niche market leader status.
- Re-engineered 80% of the product portfolio resulting in an overall material cost reduction of 30% in 1996 over 1995 unit costs.
- Reduced electronics platform material costs 47% by leading the change of the software/hardware platform to a PC with MS Windows NT from an older, embedded processor technology.
- Grew division revenues by 40% from 1993 to 1996.

**PRODUCT AND MARKETING MANAGER** **1989 - 1993**

- Grew revenues by 35% over five years by managing and providing strategic sales management for the **worldwide sales and marketing** of AccuRay metals gauging products.

**ACCOUNT MANAGER** **1988 - 1989**
**Combustion Engineering, Nashville, Tennessee**
*(Combustion Engineering was a $2 billion industrial equipment company that purchased AccuRay Corporation in 1987.)*

- Exceeded quotas for both years while Selling AccuRay metals gauging equipment to 80 accounts within the Southern and Eastern United States, operating independently out of a home office in Nashville.
- Increased scope of application by adapting existing measurement techniques to two new applications ultimately resulting in $3 million in additional revenue.

**ACCOUNT ENGINEER** **1987 - 1988**

- Provided direct sales support to worldwide account managers, contributing to the increase of sales by 20% over earlier years.

**SYSTEMS ENGINEER** **1985 - 1987**
**AccuRay Corporation, Columbus, Ohio**
*(AccuRay was a $200 million process measurement and control company, which was purchased by Combustion Engineering in 1987.)*

- Installed and managed the installation of AccuRay systems for the metals, plastics, and paper tape industries resulting in the quick receipt of customer acceptance and final payment.

## EDUCATION

Masters of Science, Management of Technology, **MIT Sloan School of Management**, 1999

- An accelerated MBA program focusing on technology strategy and management.

Graduate Level Business Courses, **Harvard Business School,** 1999
Finance and Accounting, **Wharton School of Business, University of Pennsylvania**
- Executive Program, 1996

Bachelor of Science, Chemical Engineering, **University of Notre Dame**, 1985

## ORGANIZATIONS/AFFILIATIONS

Association of Iron and Steel Engineers, member
Aluminum Association of America, associate member and guest speaker
President, Lieb's Island Civic Association
President and CEO, FortyPlus of Central Ohio, 1998

## *Appendix D – Detailed Financial Statements*

## Table D-1 - Year 1 Income Statement

**Measure It!**
**Income Statement**
**Fiscal Year 1 ($000)**

| | Month 1 | Month 2 | Month 3 | Month 4 | Month 5 | Month 6 | Month 7 | Month 8 | Month 9 | Month 10 | Month 11 | Month 12 | Full Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Revenue | | | | | | | | | | | | | |
| Total Revenue | 16 | 16 | 16 | 88 | 109 | 122 | 122 | 122 | 122 | 127 | 127 | 127 | 1,114 |
| Cost of Goods Sold | | | | | | | | | | | | | |
| Total Cost of Goods Sold | 9.60 | 9.60 | 9.60 | 34.80 | 42.40 | 52.20 | 52.20 | 52.20 | 52.20 | 65.20 | 65.20 | 65.20 | 510 |
| Gross Margin | 6 | 6 | 6 | 53 | 67 | 70 | 70 | 70 | 70 | 62 | 62 | 62 | 604 |
| Development | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 108 | 8 | 108 | 291 |
| Marketing | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 168 |
| General and administrative | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 120 |
| Total operating expenses | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 32 | 132 | 32 | 132 | 579 |
| Income (loss) from operations | (25) | (25) | (25) | 22 | 35 | 38 | 38 | 38 | 38 | (70) | 30 | (70) | 25 |
| Interest income | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Interest expense | | | | | | | | | | | | | - |
| Net interest | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| Income (loss) before taxes | (25) | (25) | (25) | 22 | 35 | 38 | 38 | 38 | 38 | (70) | 30 | (70) | 26 |
| Income tax provision (benefit) | (7) | (7) | (7) | 6 | 10 | 11 | 11 | 11 | 11 | (20) | 8 | (20) | 7 |
| Net Income (loss) | (18) | (18) | (18) | 16 | 25 | 28 | 28 | 28 | 28 | (51) | 22 | (50) | 19 |
| Cumlative Net Income (loss) | | (36) | (54) | (38) | (13) | 15 | 43 | 70 | 98 | 47 | 69 | 19 | |

Table D-2 – Year 1 Balance Sheet

**Measure It!**
**Balance Sheet**
**For quarters ending in Fiscal Year One ($000)**

| | Month 0 | Month 6 | Month 12 |
|---|---|---|---|
| *(1)* Cash and cash investments | 50 | 8 | 44 |
| *(2)* Accounts receivable | | 177 | 191 |
| *(3)* Inventories | - | - | - |
| *(4)* Prepaid expenses | - | 5 | 5 |
| Total current assets | 50 | 190 | 240 |
| *(5)* Production and test equipment | - | 12 | 12 |
| *(6)* Electronic test equipment | - | - | - |
| *(7)* Computer equipment | - | - | - |
| *(8)* Leasehold improvements | - | - | - |
| Subtotal | - | 12 | 12 |
| Less accumulated Depreciation | - | (1) | (2) |
| Net plant and equipment | - | 11 | 10 |
| **Total Assets** | **50** | **201** | **250** |
| | | | |
| *(9)* Notes payable | - | 23 | - |
| *(10)* Accounts payable | - | 67 | 99 |
| *(11)* Taxes payable | - | 6 | 7 |
| *(12)* Warranty provision | - | - | - |
| *(13)* Accrued expenses | - | 40 | 75 |
| Total current liabilities | - | 136 | 181 |
| | | | |
| *(14)* Stock | 50 | 50 | 50 |
| Retained earnings (deficit) | - | 15 | 19 |
| Total stockholders' equity | 50 | 65 | 69 |
| **Total liabilities and equity** | **50** | **201** | **250** |

Table D-3 – Year One Cash Flow Statement

**Measure It!**
**Statement of Cash Flows**
**Fiscal Year 1 ($000)**

| | YTD Month 0 | YTD Month 6 | YTD Month 12 |
|---|---|---|---|
| Cash provided by (used in) | | | |
| Operations | | | |
| Net income (loss) | - | 15 | 19 |
| Add: charges against income not requiring use of cash: | | | |
| Depreciation | - | 1 | 2 |
| Net cash provided by (used in) operations | - | 16 | 20 |
| Other sources (uses) of cash | | | |
| (Increase)/decrease in accounts receivable | - | (177) | (191) |
| (Increase)/decrease in inventories | - | - | - |
| (Increase)/decrease in prepaid expenses | - | (5) | (5) |
| Increase/(decrease) in notes payable | - | 23 | - |
| Increase/(decrease) in accounts payable | - | 67 | 99 |
| Increase/(decrease) in taxes payable | - | 6 | 7 |
| Increase/(decrease) in warranty provision | - | - | - |
| Increase/(decrease) in accrued expenses | - | 40 | 75 |
| Sales of stock | 50 | - | - |
| Additions to property plant & equipment | - | (12) | (12) |
| Total other sources (uses) | 50 | (58) | (26) |
| | | | |
| Increase (decrease) in cash | 50 | (42) | (6) |
| Cash balance start of period | - | - | - |
| Cash balance end of period | 50 | 8 | 44 |

Table D-4 – Year Two Income Statement

**Measure It!**
**Income Statement**
**Fiscal Year 2 ($000)**

| | | Q1 | Q2 | Q3 | Q4 | Full Year |
|---|---|---|---|---|---|---|
| | Revenue | | | | | |
| | Total Revenue | 517 | 518 | 617 | 619 | 2271 |
| | Cost of Goods Sold | | | | | |
| | Total Cost of Goods Sold | 295 | 295 | 370 | 371 | 1331 |
| | Gross Margin | 222 | 223 | 247 | 248 | 941 |
| *3* | Development | 46 | 46 | 46 | 46 | 184 |
| *4* | Marketing | 27 | 27 | 27 | 27 | 108 |
| *5* | General and administrative | 27 | 27 | 27 | 27 | 108 |
| | Total operating expenses | 100 | 100 | 100 | 100 | 400 |
| | Income (loss) from operations | 122 | 123 | 147 | 148 | 541 |
| | Income tax provision (benefit) | 34 | 34 | 41 | 41 | 151 |
| | Net Income (loss) | 88 | 88 | 106 | 107 | 389 |
| | YTD Net Income (loss) | 88 | 176 | 282 | 389 | |

Table D-5 – Year Two Balance Sheet

**Measure It!**
**Balance Sheet**
**For quarters ending in fiscal year 2 ($000)**

| | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|
| *(1)* Cash and cash investments | 117 | 232 | 385 | 551 |
| *(2)* Accounts receivable | 259 | 259 | 309 | 310 |
| *(3)* Inventories | 25 | 50 | 50 | 50 |
| *(4)* Prepaid expenses | 5 | 5 | 5 | 5 |
| Total current assets | 406 | 546 | 749 | 916 |
| *(5)* Production and test equipment | 20 | 20 | 20 | 20 |
| *(6)* Electronic test equipment | - | - | - | - |
| *(7)* Computer equipment | - | - | - | - |
| *(8)* Leasehold improvements | - | - | - | - |
| Subtotal | 20 | 20 | 20 | 20 |
| Less accumulated Depreciation | (2) | (3) | (4) | (5) |
| Net plant and equipment | 18 | 17 | 16 | 15 |
| **Total Assets** | **423** | **563** | **765** | **931** |
| | | | | |
| *(9)* Notes payable | - | - | - | - |
| *(10)* Accounts payable | 139 | 139 | 177 | 177 |
| *(11)* Taxes payable | 34 | 69 | 110 | 151 |
| *(12)* Warranty provision | - | - | - | - |
| *(13)* Accrued expenses | 93 | 110 | 128 | 145 |
| Total current liabilities | 266 | 318 | 414 | 473 |
| | | | | |
| *(14)* Stock | 50 | 50 | 50 | 50 |
| Retained earnings (deficit) | 107 | 195 | 301 | 408 |
| Total stockholders' equity | 157 | 245 | 351 | 458 |
| **Total liabilities and equity** | **423** | **563** | **765** | **931** |

Table D-6 – Year Two Cash Flow Statement

**Measure It!**
**Statement of Year to Date Cash Flows**
**Fiscal Year 2 ($000)**

| | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|
| Cash provided by (used in) | | | | |
| Operations | | | | |
| Net income (loss) | 88 | 176 | 282 | 389 |
| Add: charges against income not requiring use of cash: | | | | |
| Depreciation | 1 | 1 | 2 | 3 |
| Net cash provided by (used in) operations | 89 | 178 | 285 | 392 |
| Other sources (uses) of cash | | | | |
| (Increase)/decrease in accounts receivable | (68) | (69) | (118) | (119) |
| (Increase)/decrease in inventories | (25) | (50) | (50) | (50) |
| (Increase)/decrease in prepaid expenses | - | - | - | - |
| Increase/(decrease) in notes payable | - | - | - | - |
| Increase/(decrease) in accounts payable | 40 | 40 | 78 | 78 |
| Increase/(decrease) in taxes payable | 27 | 61 | 103 | 144 |
| Increase/(decrease) in warranty provision | - | - | - | - |
| Increase/(decrease) in accrued expenses | 18 | 35 | 53 | 70 |
| Sales of stock | | | | |
| Additions to property plant & equipment | (8) | (8) | (8) | (8) |
| Total other sources (uses) | (16) | 10 | 57 | 115 |
| | | | | |
| Increase (decrease) in cash | 73 | 188 | 341 | 507 |
| Cash balance start of period | 44 | 44 | 44 | 44 |
| Cash balance end of period | 117 | 232 | 385 | 551 |

Table D-7 – Year Three Income Statement

**Measure It!**
**Income Statement**
**Fiscal Year 3 ($000)**

| | Q1 | Q2 | Q3 | Q4 | Full Year |
|---|---|---|---|---|---|
| Revenue | | | | | |
| Total Revenue | 854 | 854 | 904 | 906 | 3518 |
| Cost of Goods Sold | | | | | |
| Total Cost of Goods Sold | 530 | 530 | 568 | 569 | 2197 |
| Gross Margin | 324 | 324 | 336 | 337 | 1322 |
| Development | 111 | 111 | 111 | 111 | 444 |
| Marketing | 69 | 69 | 69 | 69 | 276 |
| General and administrative | 27 | 27 | 27 | 27 | 108 |
| Total operating expenses | 207 | 207 | 207 | 207 | 828 |
| Income (loss) from operations | 117 | 117 | 129 | 130 | 494 |
| Income tax provision (benefit) | 33 | 33 | 36 | 36 | 138 |
| Net Income (loss) | 84 | 84 | 93 | 94 | 355 |
| YTD Net Income (loss) | 84 | 168 | 262 | 355 | |

Table D-8 – Year Three Balance Sheet

**Measure It!**
**Balance Sheet**
**For quarters ending in fiscal year 3 ($000)**

| | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|
| *(1)* Cash and cash investments | 639 | 774 | 916 | 1,063 |
| *(2)* Accounts receivable | 427 | 427 | 452 | 453 |
| *(3)* Inventories | 50 | 50 | 50 | 50 |
| *(4)* Prepaid expenses | 5 | 5 | 5 | 5 |
| Total current assets | 1,121 | 1,256 | 1,423 | 1,571 |
| *(5)* Production and test equipment | 20 | 20 | 20 | 20 |
| *(6)* Electronic test equipment | - | - | - | - |
| *(7)* Computer equipment | - | - | - | - |
| *(8)* Leasehold improvements | - | - | - | - |
| Subtotal | 20 | 20 | 20 | 20 |
| Less accumulated Depreciation | (5) | (6) | (7) | (7) |
| Net plant and equipment | 15 | 14 | 13 | 13 |
| **Total Assets** | **1,136** | **1,270** | **1,436** | **1,584** |
| | | | | |
| *(9)* Notes payable | | | | |
| *(10)* Accounts payable | 247 | 247 | 266 | 266 |
| *(11)* Taxes payable | 184 | 217 | 253 | 290 |
| *(12)* Warranty provision | - | - | - | - |
| *(13)* Accrued expenses | 163 | 180 | 198 | 215 |
| Total current liabilities | 594 | 644 | 717 | 771 |
| | | | | |
| *(14)* Stock | 50 | 50 | 50 | 50 |
| Retained earnings (deficit) | 492 | 576 | 669 | 763 |
| Total stockholders' equity | 542 | 626 | 719 | 813 |
| **Total liabilities and equity** | **1,136** | **1,270** | **1,436** | **1,584** |

Table D-9 – Year Three Cash Flow Statement

**Meaure It!**
**Statement of Cash Flows**
**Fiscal Year 3 ($000)**

| | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|
| Cash provided by (used in) | | | | |
| Operations | | | | |
| Net income (loss) | 84 | 168 | 262 | 355 |
| Add: charges against income | | | | |
| not requiring use of cash: | | | | |
| Depreciation | 1 | 2 | 2 | 3 |
| Net cash provided by (used in) | | | | |
| operations | 85 | 170 | 264 | 358 |
| Other sources (uses) of cash | | | | |
| (Increase)/decrease in accounts receivable | (118) | (118) | (143) | (144) |
| (Increase)/decrease in inventories | - | - | - | - |
| (Increase)/decrease in prepaid expenses | - | - | - | - |
| Increase/(decrease) in notes payable | - | - | - | - |
| Increase/(decrease) in accounts payable | 70 | 70 | 89 | 89 |
| Increase/(decrease) in taxes payable | 33 | 65 | 102 | 138 |
| Increase/(decrease) in warranty provision | - | - | - | - |
| Increase/(decrease) in accrued expenses | 18 | 35 | 53 | 70 |
| Sales of stock | | | | |
| Additions to property plant & equipment | | | | |
| Total other sources (uses) | 3 | 53 | 101 | 154 |
| | | | | |
| Increase (decrease) in cash | 88 | 223 | 364 | 512 |
| Cash balance start of period | 551 | 551 | 551 | 551 |
| Cash balance end of period | 639 | 774 | 916 | 1,063 |