

MATECH

Material Technologies, Inc.

(OTC BB: MTTG.OB)

Business Plan

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1 The Company

Material Technologies Inc. (Matech) is an engineering, research and development (R&D) company specializing in the development of technologies that measure microscopic fractures in metal structures and monitor metal fatigue. Matech has done significant work for the US Government in applying this technology to airplanes and turbine engines and to the inspection and monitoring of steel bridge components. Matech's unique expertise lies in its ability to comprehensively track the many aspects of structural integrity and to integrate them in real time.

Matech owns exclusive rights to the patents covering the Electrochemical Fatigue Sensor (EFS™) and the Fatigue Fuse (FF). To date, Matech has generated \$8.3 million of revenue from the Federal Government and has also received approximately \$5 million of private investment towards the development, testing and validation of the technology. Matech now is transitioning from an R&D engineering company to a commercial products/service company by applying its technologies to measurement and monitoring of metal highway and railroad bridges. Management expects to be in a position to tap an emerging billion-dollar opportunity and to market systems based on these technologies within six months of funding. Additional future applications for our technologies are in other civil structures such as windmill and antenna towers, highway sign structures, and aircraft structures.

2 Our Technologies

- The Electrochemical Fatigue Sensor (EFS™): The EFS is a device that measures the electrochemical/mechanical interaction to determine the state of fatigue damage in a metal structural member undergoing cyclic loading. In laboratory conditions, Matech has demonstrated that this technology can detect cracks in metals as small as 10 microns [0.0004 inches], exceeding current state of the art by ten times or more. The US Air Force Materials Lab at Wright-Patterson Air Force Base and Rockwell Scientific Corporation both have acknowledged this capability.
- The Fatigue Fuse (FF):
As a passive sensor, the Fatigue Fuse continuously monitors accumulated fatigue in real-time. Each Fatigue Fuse, comprised of several notched metal strips, is adhered to certain highly-stressed structural members. As the structure experiences varying stresses and strains, individual notches crack and separate from the main sensor at calibrated fractions of the design fatigue life of the structure, thereby indicating the amount of fatigue life remaining.

3 The Business Opportunity - The Application of EFS™ To Bridges

3.1 The Problem

The nation's surface transportation system is aging and needs extensive repair. The bridge infrastructure in particular is of serious concern. In 2000, the Federal Highway Administration

(FHWA, reported that 165,218 bridges, or 28% of the total national bridge inventory, require rehabilitation. Of these, some 83,630 are structurally deficient based on guidelines of the FHWA. Approximately 33.5% of the nation's bridges (about 196,000 bridges) are steel structures, with an average age in excess of sixty years. This situation amounts to a rapidly developing national disaster, collectively comprising almost \$400 billion of repair liability, impending accidents, and potential disruption of the nation's economic ability to move people and goods.

A major factor in the deterioration of steel bridges is fatigue of its key structural elements; that is, initiation of cracks under the repetitive loads of the bridge traffic, aggravated by the ravages of base metal corrosion over the years, and of course increased pressure by commercial interests for larger and heavier trucks. Cracks can degrade the ability of the structure to safely support its design loads and can lead to catastrophic failure.

Current federal legislation mandates that bridges be inspected every two years. A study conducted by the Federal Highway Administration's Non-Destructive Evaluation Validation Center (FHWA-RD-01-020-021) concluded that at least 56 percent of the average Condition Ratings derived from visual inspections of these bridges were inaccurate with a 95 percent probability. Another study indicated that visual inspectors miss 90% of significant structural cracks. This study also concluded in one observation that in-depth, visual inspections are "unlikely to correctly identify many of the specific types of defects for which this type of inspection is frequently prescribed." In other words, a totally different technology is required to make bridge inspections more accurate and meaningful.

3.2 The Solution

In the laboratory, the EFS can detect smaller growing cracks in titanium, aluminum, and many other metals as compared to any other practical technology for field application. It can also detect subsurface cracks.

Applying Matech's patented EFS™ technology to fatigue critical locations on a bridge (the known regions where fatigue cracks are most likely to be encountered), will give bridge inspection companies enhanced capabilities to more accurately and reliably detect fatigue cracks.

This in turn leads to better determination of the locations in need of repairs, and measuring the extent of the repairs needed, which will result in significantly less cost in overall maintenance.

3.3 Competitive Analysis

Matech's EFS is expected to become the nondestructive evaluation (NDE) inspection technique of choice. EFS is much easier to use and requires less training than the advanced or the newer innovative techniques currently under investigation and which are mostly impractical for use in the field. The EFS is in the highest performance class, has a moderate cost, and is cost effective. Additionally, it has relatively low-to-moderate complexity and training requirements, and moderate speed of implementation. Therefore, when bridge owners take these factors into consideration, the EFS provides the industry with the highest accuracy and best performance to cost and use ratios than any of its competitors.

None of the competing technologies can detect growing fatigue cracks, an important factor in determining whether a crack is still active or not; non-active cracks do not have to be repaired

The closest competing technology presently is Eddy Current. The industry has found that the use of Eddy Current technology for the detection of surface breaking cracks in the area of welded connections has shown some promise. One advantage of eddy current technique over the other visual techniques is that it detects cracks through paint, eliminating any paint removal from the steel. Disadvantages of this technique include limited crack size detection, about 100 times larger than the EFS, and its electromagnetic (EM) technique is subject to outside interference from other stray EM sources that can affect its performance.

Similarly, another competing technology is Acoustic Emission. Acoustic Emission inspections suffer from outside acoustical noise interference that is present in high levels in the field. Coupled with the high complexity and training required to take advantage of its relative performance advantages, makes this technology difficult to implement on a practical level. In some instances, some bridge owners have employed this technology on steel bridges for monitoring known cracks to determine if the cracks may be growing under fatigue loading.

More advanced NDE techniques such as Magnetic Particle and Ultrasonic Inspection are presently widely used only during the fabrication of steel bridges and not for in -service inspections. Some newer innovative technologies have shown promise, including Forced Diffusion Thermography and Microwave Crack Detection, but have not been widely used in the field. Although highly effective techniques in theory, like Acoustic Emission, all of these newer technologies have training and complexity issues making them impractical for use in the field.

To summarize:

Comparison of Nondestructive Inspection Methods for Bridges

Technique	RELATIVE EFFECTIVENESS	Areal Coverage	Simplicity	Training Economy	Equipment Economy	Speed	Detect Crack Growth?
Matech EFS Electrochemical	9	6	5	7	8	4	10
Eddy Current Electromagnetic	8	7	4	4	7	8	0
Ultrasonic Acoustic	8	5	4	4	7	5	0
Radiography	7	5	2	2	3	3	0
Magnetic Particle (enhanced visual & Electromagnetic)	6	6	7	6	8	7	0

Penetrant (enhanced visual)	5	7	7	6	8	7	0
Acoustic Emission (acoustic)	4	8	4	2	1	2	7
Unaided Eye (visual)	1	10	10	4	10	10	0

EFFECTIVENESS is the primary basis for rating NDI methods; the other aspects are of secondary importance, except for the ability to detect whether a crack is growing.

4 The Market-Steel Bridges

4.1 Market Size

The initial market is targeted at steel bridges that require in-depth inspection (82,274 bridges) due to their condition; however, all bridges require a biennial inspection. Current statistics on bridges from the Federal Highway Administration:

- 589,950 bridges are listed in the National Bridge Inventory (NBI)
- 196,455 steel bridges require biennial inspections
- 46,434 steel bridges are structurally deficient
- 35,840 steel bridges are functionally obsolete
- 82,274 steel bridges require in-depth inspection (41.9% of steel bridges)
- deteriorated bridge area is increasing at the rate of 6.7% per year
- backlogged repair costs are escalating at 1.1% per year

4.2 Market Needs Assessment

Although the market for NDE technologies for the bridge industry began as a result of the 1967 collapse of the Silver Bridge in Point Pleasant, West Virginia, the 36 years since have seen little progress and investment. The market is therefore in its early stages of development and represents one with exceptional growth potential. There are a few old techniques and several new emerging technologies that are vying for this large untapped market. Despite some competition, Matech is strategically positioned to capture a large portion of the market because of its superior and unique technology. Matech has also created a separate niche within the entire NDE market by offering a product that has its own category.

After the Silver Bridge collapse, the Federal Highway Administration (FHWA) developed the National Bridge Inspection Standards (NBIS), which established the current required biennial bridge inspection. The National Bridge Inventory (NBI) database contains and maintains the data from these inspections, which has shown that for the past thirty years since the NBIS was

adopted, bridge inspections have relied largely on visual inspection to evaluate bridge conditions. Some advances in bridge inspection techniques have occurred since the enactment of NBIS; however, there has not been much success in implementing them. Nevertheless, there is a growing use of Bridge Management Systems (BMS) by some bridge owners to assist in bridge evaluation. Unfortunately, these systems still lack the more detailed and quantitative information required to properly assess a bridge's fatigue condition and to make these BMS tools truly effective. To accomplish this requires use of more accurate and cost effective quantitative NDE technologies such as those provided by the Matech EFS.

Federal government, states, and other agencies repeatedly estimate costs for maintaining the U.S. bridge inventory based on experience for repairing "deficient" bridges, as well as maintaining those teetering on the edge of deficiency or danger. These costs range predominantly between \$0.5 million and \$5.0 million per bridge, with an average of \$2.6 million per bridge. This puts the current budget exposure for U.S. bridge maintenance and repair at more than \$384 billion and climbing. In the seven years since the Intermodal Transportation Efficiency Act (ISTEA) was established, a wide range of solutions have surfaced, including new durable bridge components, high technology sensors, and sophisticated bridge management computer programs. Although this has helped the situation somewhat, these advances have been unsuccessful in providing, in real-time, comprehensive information of what has deteriorated, where, and to what extent. Many alternative efforts focus on a single potential failure mechanism but are not able to reliably determine the number and location of all the significant deterioration possibilities.

Because of the variable loading conditions present at a bridge, fatigue cracking remains an as yet unsolved problem in terms of both structural safety and maintenance. The whole market is interested in finding NDE methods for the detection and evaluation of fatigue cracks in bridges.

4.3 The Customer Profile

The U.S. client base for EFS™-based monitoring consists of the U.S. Government, the 50 states and their local government agencies, 42 bridge authorities, 3 military agencies, 48 railroads, 28 privately owned entities and approximately 200 first and second level bridge inspection companies.

Ultimately, it is expected that Matech's technology will be paid for by municipalities and state departments of transportation. Although these bridge "owners" are responsible for the maintenance and repair of the bridges that fall within their jurisdiction, some of the funds are provided directly from the federal budget. Sometimes bridge owners perform "first level" visual inspections that are required every two years, using either in-house resources or a contracted, specialty bridge inspection company. Most owners are not equipped to perform an in-depth inspection. After the first level inspection, if they determine that a particular bridge needs additional or "secondary level" inspection, the secondary inspection is contracted out.

Currently visual inspection is the primary technique used for first level inspection. The individual experience of the inspectors varies, so results have been inconsistent and inaccurate. There are limits to what even a qualified inspector can determine through visual means alone; an FHWA study has revealed that 90% of significant fatigue cracks may be missed by visual inspectors. Ultimately the EFS™ technology will prove to be a more cost effective and accurate technique for performing first-level inspections and is expected to enhance the current condition ratings from a 56% inaccuracy level to a much more accurate and satisfactory level.

Part of our marketing campaign will help educate and influence bridge owners and first level

bridge inspection companies on the viability of this technology. As potential customers and future users of our technology, bridge owners must be cognizant of the EFS™. Although they may not initially be implementers, they are major influencers of the technology; therefore, Matech will target them from a marketing and sales standpoint.

5 Marketing Plan

5.1 Marketing Strategy

We can differentiate our product in the marketplace based on its ability to detect the smallest cracks in the steel bridge structure, as well as cracks under the surface. Further development will also differentiate our product based upon its ability to estimate crack growth rate.

Our unique positioning will be "low-cost insurance against unforeseen steel bridge structural failures and unnecessary and costly repairs," resulting in greater confidence in bridge load rating and more efficient use of maintenance and repair funds.

Matech's technology will be sold as an economical, more efficient and cost effective method for inspecting bridges. By using the technology either in conjunction with visual inspections, or as an in-depth inspection technique, it will aid in better utilization of the maintenance and repair budget. First we will target the required biennial inspection and then we will target its use as an implementation technology for secondary inspection of deficient bridges in advance of conducting repairs, in order to:

- Provide continuous structural data well in advance of repair implementation.
- Focus and refine repair needs for prioritization and replacement decisions.
- Provide means for reducing costs and down times.
- Reduce equipment set up and removal-associated stoppages.
- Minimize ongoing repair-associated disruption, such as lane closure and periodic stoppages.
- Minimize lane closure to reduce bridge load.
- Reduce number of posted bridges with limited load capacity which causes commercial vehicles to by-pass bridges, leading to greater costs and lost business in the adjoining communities.
- Prevent catastrophic bridge failure causing loss of or injury to life, commercial relocation, and property damage.

5.2 Pricing/Packaging

Matech's pricing strategy satisfies the following prerequisites:

- Optimize the perceived value of the Product, thus fostering market acceptance.
- Ensure maximum gross margin.
- Foster high volume licensing revenue.

Unit revenue is based upon an average two span steel bridge. Matech will collect license fees of \$1,000 per inspection. The inspection cost of a steel bridge by existing bridge inspection service companies using existing non-destructive testing (NDT) methods is \$10,000, for reference.

We are confident that our pricing strategy is realistic for the following reasons:

1. Since we are creating a new market segment and no other companies offer similar products to ours, there is no pricing precedent. Therefore, the market will perceive the suggested price as the highest at which they consider our product an excellent value.
2. The additional price raises the perceived value since our price includes extra features and functionality that competitors cannot match.

Our productized electronics package for EFS will be a major contributor to our marketing success, by helping promote the right brand image. We define this as follows:

"Electrically and environmentally safe, leading edge, powerful technology but simple and easy to use, meanwhile being extremely valuable and of the highest quality."

Other considerations contributing to the package design are cost, durability, survivability, usability, and flexibility.

5.3 Promotion

Our major objectives from a marketing perspective are to educate the market and our target customers about the technology, and is easy and affordable to use. The products will be publicized and promoted through trade publication advertising, trade shows and direct mail. In addition, we will hold inhouse seminars to assist in developing customer education in use of the technology. The goal is to work with senior federal, state, municipal, and authority officials to incorporate our technology on new, renovated, or existing bridges in high profile locations, as a matter of ongoing policy. Although sales inevitably begin as a top down event, it will soon migrate to the equivalent of middle management. So we will also target our marketing efforts to the middle management and technicians who will be the implementers and users of the technology.

The Company will also seek the endorsement of key personnel from government agencies, the bridge design and construction industry, and insurance companies, as positive influencers of the buying decisions on the part of their peers and the marketplace in general.

The Company will hire a recognized marketing professional who has significant experience with government policy driven markets and who has demonstrated success selling and understanding technical products and/or systems in the public sector (government, states, municipalities, authorities, etc).

To enhance our marketing efforts, PONTIS, a quasi-government agency that collects inspection data from state agencies, is expected to provide contacts in the 40 states that are its members. In addition, three states (Pennsylvania, Utah, and New Jersey) have already invited Matech to participate in demonstration inspections using EFS . These inspections were successfully completed in October and November 2006.

5.4 Sales & Distribution Strategy

We will hold in-house conferences, where we will invite and pay the costs to bring in key decision makers for a two-day educational seminar that also includes a live bridge demonstration. We will use this powerful means of demonstrating the ease of use and benefits of the EFS technology.

The Company will bring the EFS monitoring service to the market through its dealer's direct sales staff. To support additional and more rapid market penetration, we anticipate licensing the technology directly to the bridge inspection companies. They will perform all of the testing and associated data analysis and report generation and will contract directly with the end user. We will collect a licensing fee of \$1,000 per bridge inspection (average two span bridge), plus about \$1,000 for consumable sensors. Matech will sell Field Test Kits to the bridge inspection companies for \$25,000 each. Matech will sell, lease, or arrange for third party financing of the EFS test kit for its clientele. The cost of these items will be considered part of the owner's maintenance budget, which will make an easier entry into the market than would be the case if it were considered a capital budget item. Initially, we will seek partnerships with a select few bridge inspection companies to assist in market introduction of the technology. These companies will function as our customer, strategic partner, and subcontractor. As a strategic partner, we will use their existing industry contacts, as well as marketing and sales teams and programs to provide initial market penetration. As a customer, they would purchase the required test equipment and consumable supplies from Matech on an on-going basis. As a sub-contractor, we will work with them on performing the bridge inspections. We will contract them to provide the majority of the physical labor to carry out the bridge inspections. We will provide the manpower necessary to perform training for application of EFS, data reduction and analysis and bridge inspection reporting that is delivered to the bridge owner.

The level of sales is assumed to be 5,000 bridges for the first year after funding, which we estimate will be accounted for by 10-15 bridge inspection companies as our initial customers. At the end of the second year after funding, Matech is projecting 20,000 bridges (approximately 20% of the annual market).

Although there are no obstacles for greater market penetration we are being cautious because the EFS inspection method is new to the marketplace. It first has to be recognized, accepted, and users must be trained. Since this is different from what they are doing today, we recognize a major focus of our marketing and sales efforts will be on educating the customer, which takes time and money. Therefore, we place heavy emphasis on educational advertising and publicizing the technology in the initial period. The ability to verify if repairs to fatigue cracks are effective is an important attribute of EFS, and will be a significant contributor to its cost/benefit.

. Upon successful completion of the development work to verify EFS' ability to determine crack growth rate, the demand for this service would get an additional boost. Therefore, greater market penetration is an opportunity we will exploit.

6 Market Development/Penetration Strategy

6.1 Market Development

Marketing efforts to enlist and train existing bridge inspection companies in the art of using EFS as a crack detector on steel bridges will focus on our technology as a complement to their existing inspection capabilities. We anticipate that to penetrate the market we will have to accomplish this in three phases.

6.2 Phase-1: Test Launch

Matech has already performed beta tests on ten bridges around the US to perfect the overall inspection technique (preparing and applying sensors, running a heavy truck over the bridge, data

acquisition and processing, etc.). Productization of the electronics and sensors, and continued development of software for efficient data reduction is in process.

Matech has already performed demonstration inspections on several bridges in those states that have agreed to assist us in demonstrating our technology; see Section 5.3 above. We have used these tests to verify the proper testing methodologies and procedures. For each of these states which designated bridges for us to examine, we have prepared a comprehensive report of the results. In most of these cases we were asked to examine existing cracks, some of which were repaired, to determine whether they were still actively growing or not.

6.3 Phase-2: Market Entry or Formal Launch

Once comfortable with the test launch period, we will work with two or three pre-selected strategic partners to implement the EFS solution for actual customers. The observations made and results obtained will aid us in refining the process even further. During this period we will begin to step up our marketing efforts, increasing the exposure of the technology and EFS Solution. Some of it has already been accomplished with presentation to three major industry meetings and displays, attended by many state departments of transportation officials and inspection company representatives.

6.4 Phase-3: Market Rollout or National Launch

Once comfortable with the formal launch, Matech will begin its aggressive marketing campaigns and sales efforts to begin penetrating the market by signing up licenses. We anticipate that we will use our own inspection crews for some of the initial inspections until our licensees have sufficient trained personnel to assume the responsibility for the inspections. Some of the licensee training will take place by their personnel participating with our crews in these initial inspections.

7 Operations

The Company will have a geographically distributed sales force and a central corporate operation. The central operation will have five primary departments:

- Customer Service – Will provide analysis of the data collected on each bridge during the EFS™- based inspection, will provide direct onsite support of the bridge inspection process and provide training of bridge inspectors in the use of EFS™. Customer service will also provide quality assurance of the EFS™ inspection process.
- Engineering – Will provide ongoing R&D to improve the EFS™ methods of use and analysis techniques, including the applications of the technology.
- Warehousing and Distribution – Will store and distribute EFS™ field test kits and consumables for bridge inspection companies.
- Administration – Will be responsible for Accounting, Human Resources and Purchasing.
- Manufacturing – The commercial product packaging of EFS™ sensors and other equipment will be outsourced. The cost will be about \$250,000 for development. Subsequent manufacturing of the EFS™ will be outsourced as well, at an estimated cost of \$15,000 per test kit. Quality assurance testing of the EFS™ commercial test kits will be conducted by the Customer Service department at Matech prior to distribution.

8 Financial Summary

The Company's three-year financial projections are tightly integrated with the Company's marketing and operations plans. Therefore, Management believes these are realistic representations of the potential revenue stream, and also the financial and human resources required to support the revenue stream. However, the following financial projections, the underlying assumptions, and the projected value of the Company are based on Management's best estimates and experiences. No assurance can be given that the projections will be met.

8.1 Revenue

Management anticipates a very steep growth curve resulting from the successful expansion of its network relationship with bridge inspection companies. The Company expects annual revenue to reach \$50 million in the 3rd operating year. Sales projections are supported by thorough market research and detailed analyses of business demographics and legal requirements.

8.2 Funding Requirements

The Company team has invested heavily in research and development, market research, product conceptualization and development and other due diligence to start up the new company division. Management seeks a total equity investment of \$10 million for this effort. A pro forma income statement is on the next page.

Pro Forma Income Statement
(all amounts in thousands)

		<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
Revenues:	Pa- 1700 Bridges @5K each	8500		
	Cost of Inspections @4K each	<u>6800</u>		
	Gross Profit	<u>1700</u>	<u>8000</u>	<u>12000</u>
Expenses:	Working Capitol - Pa. Corp	1500		
	Marketing Expenses	725	1000	666
	Engineering R & D	600	600	600
	Lease Expense	72	86	104
	Legal & Professional	120	120	120
	Accounting & Misc.	120	120	120
	Office Expense	48	48	48
	Payroll	1500	1779	1805
	Employee Benefits (25% of payroll)	375	446	451
	Telephone	48	60	60
	Travel	180	200	200
	Misc.	180	223	209
	Outstanding Debt	<u>2000</u>	<u>0</u>	<u>0</u>
	Total Operating Expenses	<u>7468</u>	<u>4682</u>	<u>4382</u>
	PROFIT OR (-LOSS)	-5768	3318	7618
	WORKING CAPITOL	<u>4232</u>		
	Net Total Required Funds	<u>-10000</u>	<u>-6682</u>	<u>936</u>
		<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
Revenues:	Pa- 1700 Bridges @5K each	8500		
	Cost of Inspections @4K each	<u>6800</u>		
	Gross Profit	<u>1700</u>	<u>8000</u>	<u>12000</u>
Expenses:	Working Capitol - Pa. Corp	1500		
	Marketing Expenses	725	1000	666
	Engineering R & D	600	600	600
	Lease Expense	72	86	104
	Legal & Professional	120	120	120
	Accounting & Misc.	120	120	120
	Office Expense	48	48	48
	Payroll	1500	1779	1805
	Employee Benefits (25% of payroll)	375	446	451
	Telephone	48	60	60
	Travel	180	200	200
	Misc.	180	223	209
	Outstanding Debt	<u>2000</u>	<u>0</u>	<u>0</u>

Total Operating Expenses	<u>7468</u>	<u>4682</u>	<u>438</u>
PROFIT OR (-LOSS)	-5768	3318	761
WORKING CAPITOL	<u>4232</u>		
Net Total Required Funds	<u>-10000</u>	<u>-6682</u>	<u>93</u>
(carry forward tax loss)			

9 Management

Robert M. Bernstein, Chairman of the Board and Chief Executive Officer

From 1961 to 1981, Mr. Bernstein acted as a consultant specializing in mergers, acquisitions, and financing. From 1981 to 1986, Mr. Bernstein was Chairman and Chief Executive Officer of Blue Jay Enterprises, Inc., of Philadelphia, Pennsylvania, an oil and gas exploration company. In October 1988 he became President and CEO of Matech. Since that time Mr. Bernstein has been responsible for generating in excess of \$8,000,000 in revenue from the U.S. Government for research and development contracts. Mr. Bernstein received a Bachelor of Science degree from the Wharton School of the University of Pennsylvania and held a Certified Public Accountant license in Pennsylvania until August 1972.

Dr. John W. Goodman: Chief Engineer/Director.

He has been Chief Engineer for Development of Matech's products since May 1993. He was recently Senior Staff Engineer, Materials Engineering Department of TRW Space and Electronics and was formerly Chairman of the Aerospace Division of the American Society of Mechanical Engineers. Dr. Goodman was with the U.S. Air Force as lead Structural Engineer for the B-1 aircraft; Chief of the Fracture and Durability Branch and Materials Group Leader, Structures Department, Aeronautical Systems Center, Wright-Patterson Air Force Base. He holds a Doctorate of Philosophy in Materials Science, from the University of California at Los Angeles. He also holds received a Masters of Science degree in Applied Mechanics from Penn State University and a Bachelor of Science degree in Mechanical Engineering from Rutgers University.

William I. Berks: Vice President / Director.

Mr. Berks managed the previous Matech contracts for the development of EFS at the University of Pennsylvania, Southwest Research Institute, and Optim, Inc. Mr. Berks has a B. Aero. E and MS in Applied Mechanics from Polytechnic Institute of New York and MS in Industrial Eng., Stevens Institute of Technology. With Matech since 1997, He has over 30 years experience in spacecraft mechanical systems engineering. He retired from TRW in November 1992 where he was employed for 26 years in a variety of management positions: Manager of the Mechanical Design Laboratory, the engineering design skill center for the design and development of spacecraft mechanical systems, which had as many as 350 individuals: Manager of the Advanced Systems Design Department, which was responsible for mechanical systems design for all spacecraft project: Assistant Project Manager for Mechanical Subsystems for a major spacecraft program, which included preparation of plans, specifications and drawings, supervision of two major subcontracts, and responsibility for flight hardware fabrication and testing. He holds six patents.

Miles M. Larson, Government Contracts Auditor

Miles Larson is a Certified Public Accountant in the state of California. In 1990 he was recipient of the Defense Contract Audit Agency (DCAA) Management Excellence Award which is bestowed annually to DCAA's most outstanding manager. In addition, Miles was the recipient of the DCAA Meritorious Service Award for outstanding contributions to the Agency's audit mission. (DCAA's 2nd highest award). He has twenty-five years of auditing experience with the

DCAA and four years with the US Army Audit Agency. Mr. Larson has eight years experience working as a consultant with Pricewaterhouse/Coopers. He received a Master of Business Administration from the University of Southern California and a Bachelor of Science degree, Business Administration from California State University, Long Beach. Mr. Larson is also a graduate of the Senior Defense Management Program at Harvard University.

9.1 Advisory Board

Nick Simionescu

Mr. Simionescu joined HNTB in 1974 and is a Vice President, Director of Business Development in the New York City office. He has over 37 years of management, construction, design, inspection and detailing experience. Mr. Simionescu is very familiar with the New York City infrastructure. For nearly 28 years he has been working in New York City, primarily on New York City Department of Transportation and New York State Department of Transportation projects. Mr. Simionescu holds an MS, Civil Engineering, Construction Institute of Bucharest, Romania, 1972 and a Certificate of Teaching, Polytechnical Institute of Bucharest, Romania, 1970. Mr. Simionescu has membership affiliations with the Municipal Engineers of the City of New York, the New York City Association of Construction Engineer Transportation Subcommittee and the New York Building Congress Transportation and Infrastructure Committee.

Campbell Laird, Ph.D. Chief Scientist

Dr. Laird's research has focused on the strength, structure and fatigue of materials, in which areas he has published in excess of 250 papers. He has been a Senior Lecturer at the Cambridge College of Arts and Technology, a tutor at the University of Cambridge, a Senior Research Scientist at Ford Motor Company, a Battelle Visiting Professor (Electron Microscopy) at Ohio State University, Columbus, OH, a Professor at the University of Pennsylvania, as well as the Chairman, Department of Metallurgy & Materials Science, Gast-Professor of Physics at the University of Vienna, and Visiting Professor of Bio-Metallurgy at the University of Sorbonne, Paris. He is presently Professor and graduate group Chairman in the Department of Materials, Science & Engineering at the University of Pennsylvania. Dr. Laird received his Ph.D., his MA and his BS from the University of Cambridge. He is the co-inventor of the Electrochemical Fatigue Sensor.

Samuel I. Schwartz, Infrastructure Consultant

Mr. Schwartz is President of The Sam Schwartz Company, a multi-disciplinary consulting firm specializing in traffic and transportation engineering. From 1990 to 1995, he was Senior Vice President responsible for transportation engineering, infrastructure, quality control and planning at Hayden/Wegman Consulting Engineers, Inc. He served as Chief Engineer/ First Deputy Commissioner for the New York City Department of Transportation from 1986 to 1990, where he was responsible for an 8,000 person agency, a \$350 million expense budget, and a \$700 million capital budget. He also served an extremely successful term as New York City's Traffic Commissioner from 1982 to 1986. Mr. Schwartz received his BS in Physics from Brooklyn College in and his Master in Civil Engineering from the University of Pennsylvania.

Henryka Manes

Ms. Manes is the Founder and President of H. Manes & Associates, a consulting firm that enables environmental and high technology companies to export their products worldwide. She has a wide-range of experience with projects in more than 20 countries in Asia, Africa, Eastern Europe and South America. Prior to founding HMA, Ms. Manes was Director of Operations for the American Jewish Joint Distribution Committee's International Development Program and has worked with the World Bank, United States Agency for International Development, and the United Nations Development Program. Ms. Manes received her B.A. from Macalester College in St. Paul, MN, and did her graduate work at the University of Minnesota, Minneapolis, MN.

Marybeth Miceli

Ms. Miceli is currently Director of Marketing for Sam Schwartz, LLC, Engineering and Planning Consultants, New York, NY. where she also consults on infrastructure management, non-destructive testing, and fatigue testing. Previously she was with Lucius Pitkin, Inc., Engineering Consultants, where her responsibilities included Quality Assurance Manager, and Assistant Radiation Safety Officer. Among her duties was the supervision and performance of failure analysis investigations, fatigue testing investigations, and interfacing with government agencies on testing, regulations, and safety. She was a director of the American Society of Non-destructive Testing, and Chairman in 2003 of the Metro NY Chapter, She is also a member of the American Society of Metals. A graduate of Johns Hopkins University, she has an MS in Materials Science and Engineering, from Virginia Polytechnic Institute. She has published several papers on non-destructive testing of bridge components and other related subjects.

Brent M. Phares

Dr. Phares has over 15 years of management, inspection, research, and testing experience related to bridge structures. He currently is the Associate Director for Bridges and Structures at Iowa State University. In this position, Dr. Phares is responsible for the development and deployment of innovative bridge evaluation and techniques and for the development of applications for innovative materials in bridge engineering. In the past, Dr. Phares has served as a consulting Research Engineer at the Federal Highway Administration's Nondestructive Evaluation Validation Center where he led the execution of several validation and developmental studies. More recently, Dr. Phares served as President and CEO of a small engineering firm specializing in the evaluation of civil infrastructure based on innovative sensors and monitoring strategies. He is a registered professional engineer and serves as a voting member of many national and international technical committees.

APPENDIX

1 Market Overview

Considering just the specific population of what is defined as the "average bridge" – two-spans – there are 25,161 bridges that require immediate repair. The repair cost, as estimated by the FHWA and reported in the National Bridge Information System (NBIS) data is \$104 per square foot, equivalent to more than \$20 billion. To make matters worse, the budget studies of \$104 per square foot are supported by 1987 costs. Therefore counting sixteen years of inflation, the repair costs have increased significantly (>50%) from these levels.

Since the repair costs were skyrocketing, bridge owners were leaning toward replacing the bridges with new ones. Accordingly, in 1991, the Intermodal Surface Transportation Efficiency Act (ISTEA) mandate was set forth to try to rectify this situation by requiring that states seeking replacement bridges must **first demonstrate that they have in place an effective Bridge Management System (BMS)**. Unfortunately, no such system has ever appeared, because they failed to find a complete suite of technical solutions that was required. ISTEA then forced States to upgrade their current and grossly inadequate biennial inspection programs. The States were reacting to the demonstrated ineffectiveness of what amounted to visual examinations. They had on record the Mianus River Bridge, on Connecticut's Interstate 1-95, which collapsed in 1982 within two months of such an inspection. In addition, during August of 1998, an Amtrak derailment in Kingman, Arizona resulted from a bridge collapse that occurred just two hours after such an inspection. The issue of bridge inspection, maintenance, and repair and the costs associated are highly visible within the confines of Washington, DC.

2 Market Approach

2.1 Market Analysis

There is a heightened awareness of and growing federal funding available for extensive preventive maintenance and repair programs focusing on our nation's bridges. For example, from 1998 to 2002, the following expenditures were required to properly maintain and repair our nation's bridges:

- maintain current condition (structure) \$149 billion
- maintain current capacity (function) \$115 billion
- improve physical condition (structure) \$70 billion
- improve current capacity (function) \$24 billion
- combined four-year highway needs \$358 billion

The sources of funding for bridge maintenance and repairs come from the following:

- The Highway Trust Fund: its balance has grown from \$19 billion at the end of 1995 to \$60 billion in 2002.
- Beyond 2002, the Fund's balance increased at a rate of \$9.2 billion per year.
- A total program fund of \$270 billion accrued by 2002, using all of the current Federal \$.043/gallon gas tax.

2.2 Market Drivers

1. The negative state of the U.S. bridge infrastructure - The U.S. bridge infrastructure is in poor, and in many cases, unknown condition. There are 84,190 steel bridges in the inventory that require rehabilitation or replacement, of which 48,772 of that population are rated structurally deficient. Within this population, 35,418 are categorized in a critical group that is approaching emergency conditions. They have been subsequently "posted," meaning their original design load rating has been reduced in the face of known or suspected structural degradation.
2. New technology advantage - The available technology has been, until the advent of Matech's technology, inadequate to provide an integrated real time bridge monitoring system.
3. Increased traffic load weights - There is significant pressure from the commercial community to increase the allowable bridge loading weights (trucks). Certain states and bridge authorities have already succumbed to this demand. For instance, loggers in Colorado must cross some 759 deficient bridges throughout the State and transporters of sugar in Louisiana must cross some 2,850 deficient bridges throughout the State. Toll authorities are especially receptive to these types of demand because of the increased income that will result. Nevertheless, the load increases will accelerate stress and wear, in many cases, beyond original design considerations. This will cause a reduction in useful life and a degradation of safety for an already poor infrastructure.
4. ISTEA mandated bridge management systems as a future method for cost control and reduction, although they never promulgated final regulations to the states because there was no recognized means to implement the mandate. If Matech's solution can prove to wholly or partially solve this dilemma, there are political and economical incentives to implement the Company's technology.
5. PONTIS, the Federally developed computer Bridge Management System (and quasi-governmental agency) - Over the past few years, the Federal Highway Administration has been cooperating with the American Association of State and Highway Transportation Officials (AASHTO), the US standards body, in developing a computerized system intended to assist in spotting bridge problems early in life. Forty states have recently adopted this FHWA supported Bridge Management System, which is based upon PONTIS. Nevertheless, PONTIS relies upon the old-fashioned bridge-health data protocol system, where biennial visits and visual assessment form the basis of the bridge rating. Since data derived from existing bridge inspection procedures have been demonstrated to have major deficiencies, it is not surprising that this falls short of expectations.
6. Cost benefit analysis - Matech's technology will make it possible to clearly demonstrate a cost benefit advantage for use as a primary bridge inspection tool or method.
7. Economic impact losses - If a bridge is taken out of service partially or completely, traffic flow is slowed or interrupted, causing reduced mercantile flow or total economic catastrophe for the surrounding business community. The cost of economic impact varies widely with demographic complexity and variability associated with a given bridge.

8. TEA - 21, Transportation Equity Act - Late in 1998 the U.S. Congress passed the TEA-21 bill, funding the surface infrastructure with \$200 billion in appropriations. Congress, in late 1999, appropriated \$29 billion for the year 2000.

2.3 Market Constraints & Outside Factors

Legal/Political

The following political factors influence the market:

- The Federal government has taken a leading role in attempting to formalize the management of the nation's bridges. In October 1998, legislation was enacted that required the states to have a BMS (Bridge Management System) in order to qualify for federal bridge funds. Subsequently, since a BMS never materialized, the FHWA issued a broad area announcement in January 1998 inviting anyone with possible solutions to apply for federal funding.
- Maintenance of bridges has a particular relevance, because bridges represent critical nodes in the transportation system. Well-managed maintenance through a BMS contributes towards the optimum use of scarce resources to obtain the best results, defining when and how to intervene with a structure.
- In the US, the individual States are responsible for maintenance of the Interstate Highway network, although the Federal government predominantly funded its initial construction. This separation of funding for construction and maintenance contributes toward maintenance problems; in particular, it has led to a steady decline in maintenance and rehabilitation research.
- Since existing inspection methods rely heavily on visual inspection to identify problem areas, adverse field conditions often allows major flaws to go undetected.
- In 1981, TRB's (Transportation Research Board) "Ten Most Critical Transportation Issues" included transportation, maintenance, technology, management, and transportation system performance criteria and standards. It recommended the development of design and performance criteria for multimodal systems to make rational choices among design standards and rational choices of capital expenditures.
- The cost to an agency for a bridge is seldom a one-time cost. It is a long-term, multi-year investment. Several recent legislative and regulatory requirements recognize the potential benefits of managing bridge assets on a life cycle cost basis. Matech's technology will contribute to this by assisting bridge owners in identifying the best repair and functional improvement strategy plus accumulating the relevant data for a given bridge over its life cycle.

Lack of reliable, usable models has hindered implementation of the ISTEA mandate that life-cycle costs be considered in awarding bridge contracts on federally-funded projects, and resulted in lost opportunities to improve the allocation of increasingly constrained funds for infrastructure preservation and improvement.

Government

The federal, state, and local governments know the strategic importance of and growing reliance on our nation's highways and bridges. The result is an awareness of the need for and potential Federal funding required providing the extensive bridge preventive maintenance and repairing programs necessary to keep our nation's ground transportation infrastructure intact. The following are factors that influence the market and government policy.

- Every dollar invested in the highway system will return more than \$2.60 in benefits to the economy.
- Without preventative maintenance and repairs, our nation's roads and bridges will soon become major problems for travelers and shippers.
- Government has determined that bridge monitoring systems are essential for both structural and functional repair monitoring.
- There is a potential \$270 billion (2002 estimate) that could be made available to fund bridge preventive maintenance and repairs if all of the federal gas tax were applied as allowed.