

Roadmap for Process Equipment Materials Technology

MTI published its first Technology Roadmap in 1998. The roadmap was created in a meeting facilitated by Energetics Corporation and funded by the Department of Energy's Office of Industrial Technology. The purpose was to define the materials technology and development needs of the chemical industry.



FACILITATED GROUP MEETING HELD NOVEMBER, 2002

This roadmap led to the development of five projects that were funded by the Department of Energy. These initial projects will be complete at the end of 2003. Some of the projects will receive additional funding for continued work.

In the five years since the initial roadmap was developed, a number of changes have occurred in technology and in DOE funding strategy. The MTI membership recognized the changes and, with help from DOE, engaged

Energetics to run a second facilitated group meeting to create a new MTI Technology Roadmap.

The facilitated group meeting was held in November of 2002. A selected group of more than 40 world-class experts in materials and materials technology met in Baltimore for a two-day meeting. The result of that meeting was the creation of MTI's second Technology Roadmap.

The new Roadmap has expanded its scope from primarily metals to include polymers and ceramics. It is organized around four major themes:

- Knowledge Management,
- Prediction of Materials Properties,
- Condition Assessment and
- New Materials for Challenging Process Conditions.

The roadmap also identified several needs that cut across more than one of these themes and three overarching challenges, that we named Grand Challenges. These are:

- Condition Assessment,
- Modeling and Prediction of Materials Performance and
- Delivery of Materials Engineering Information.

The new Roadmap will be issued at the October MTI meeting. The summary of technology needs can influence the basis of MTI's future project development activities. It serves as an indicator to potential project partners



40 WORLD-CLASS EXPERTS MET IN BALTIMORE

the areas where MTI members are seeking opportunities for leveraged funding.

The new Roadmap positions MTI as the leader in technology planning for the future in materials of construction for the process industries.

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Materials Technology Institute, Inc. (MTI) is a unique, cooperative research and development organization representing private industry. Its objective is to conduct generic, non-proprietary studies of a practical nature on the selection, design, fabrication, testing, inspection, and performance of materials and equipment used in the process industries.

European Meeting

On November 13 and 14, MTI along with NiDI will host a European meeting of MTI members and prospective members in Maastricht, the Netherlands. This meeting will be held in conjunction with the Stainless Steel World Annual Stainless Steel Conference to afford people the opportunity to attend both meetings with one travel away from the office. Invitations have been sent to all member company representatives and a list of their European affiliates.

This two-day meeting is intended to encourage and strengthen communications between process industry materials engineers in Europe and North America. The topics to be discussed at this meeting are current

issues and future trends, as viewed by representatives drawn from both sides of the Atlantic. MTI and NiDI aim to stimulate input from delegates and to help focus attention on areas that warrant future study. The following topics are presently planned for discussion:

- Rouging
- Metal dusting research update
- Stainless steels for corrosion control in utility systems
- Austenitic stainless steels – sourcing "H" vs. "L" grades
- Heat treatment of stainless steel lined vessels and towers.
- Risk based inspection (Round Robin results and RIMAP program)

- Overview of European Pressure Equipment Directive
- Update on SCC survey and SCC in HF and in caustic
- Update on current MTI Projects
- Discussion of future MTI activities in Europe
- Fugitive Emissions

The meeting will be held in the Van der Valk Hotel in Maastricht. The hotel is a short bus ride from the convention center where the Stainless Steel World meeting will be held. On the evening of 13th November 2003 a dinner has been arranged at a local restaurant. There is no charge for attending this meeting and the dinner.

New MTI Fellow Announced

At the June 2002 meeting in St. Louis, Chairman Gene Liening presented the MTI Fellow Award to Bob Puyear. Bob was one of the original small group that helped create the organization 25 years ago and determined how it would operate. This was during the two years of development prior to MTI's incorporation in 1977. He served as the first Chairman of the Board from 1977 to 1979 and remained on the Board until 1990. He later served a second 3-year stint as Chairman. During his tenure on the Board he guided the organization to develop the flowchart that is still used today in determining the dues

of member companies. Bob was referred to by Bob McTamane's firm as the "conscience of the organization".

In presenting the award, Chairman Liening remarked that Bob's influence is still felt today in MTI's organization and operating methods. His terms of service on the BOD and as the Designated Representative for Monsanto (15 years) are among the longest in MTI. Bob's consistent support of MTI over many years and his great influence on the organization make him highly deserving of the MTI Fellow Award.



CHAIRMAN GENE LIENING PRESENTS AWARD TO BOB PUYEAR



NANCY MILLER

Staff Changes in the St. Louis Office

Julie Fulton, Administrative Manager, moved with her family to the Charlotte, NC area this year. Debby Ehret took her place with a new title "Operations Director" to better reflect the scope of the responsibilities. Nancy Miller, Administrative Assistant, joined the staff and brings a ready smile and a variety of experience to the organization. Nancy says she has found in MTI a great staff to work with and friendly members. As always, the St. Louis staff is anxious to help the members get the most out of their membership in MTI. Please feel free to contact Debby, Lori or Nancy for assistance.

Flange Makeup Program

The Resource Advisory Group entitled "Mechanical Integrity and Equipment Reliability" has completed their first project: Flange Makeup Program. RAG Champion Bert Moniz believes this project accomplishes MTI's mission: to improve process safety, reduce operating costs and, for this specific program, to reduce leakage and fugitive emission monitoring. The Resource Group responsible for this project started with the knowledge contained in ASME's Post Construction Committee work on flanged joints. This document is intended for engineers, designers and maintenance personnel, guiding them in the proper selection, installation and testing of flanged joints in pressure equipment and associated piping.

Using this material as the basis, a training procedure was developed for use in instructing pipe fitters, mechanics and other workers who actually install flanged joints in equipment and piping. This procedure covered study material, the design of a test rig, which could be used to train the installers in actual techniques (including instrumental read-out of stresses placed on the joint by tightening the bolts and nuts), and quiz material used to test the grasp of the information by the trainees.

Bob Sherwood, who brought this project to a timely and successful conclusion, championed the Resource Group. The training procedure, rig design and testing were produced by Clyde Neely, of Becht Engineering.

After distribution of the documents and drawings to MTI members, it is planned to publish them for use by the engineering community at large, so that the benefits will be made available to anyone who has need of safer, more reliable, leak-free flanged joints.

Welcome New Members

3P PERFORMANCE PLASTICS PRODUCTS

3P Performance Plastics Products, member of the PlasticOmnium group, is the world leader in high value-added engineered solutions for the following markets: chemical, pharmaceutical, automotive, aerospace, semiconductor and for general industry and distributors. 3P specializes in high-temperature, high-strength and highly corrosive environments, providing standard and custom fluoropolymer lined pipe and fittings, high performance seals, tubing, bearings, basic shapes and PTFE tapes. 3P also supplies high-performance components for pumps, valves and compressors.

3P is an international organization with facilities in Europe and in the US.

Larry Liggett is 3P's TAC representative.

DSM

DSM is a strongly integrated concern active around the world with 200 offices and production sites in 40 countries.

Its activities are grouped into three clusters

- life science products
- performance materials
- industrial chemicals

DSM has taken leadership positions in a variety of markets. Worldwide DSM has about 20,000 employees with 8,000 in the Netherlands.

Harry Schrijen is DSM's TAC representative.

CPF Dualam Inc.

CPF Dualam Inc. supplies custom fabricated Dual-Laminate process vessels, towers, tanks and piping systems. CPF Dualam is the most established company in this field. Based in Montreal, it has supplied the CPI market with Quality equipment since 1956. CPF Dualam is also the inventor of the Dualam technology combining the corrosion resistance of advanced thermoplastics to the mechanical structural properties of composite materials. CPF Dualam operates two fabrication plants in the Montreal area and is particularly interested to expand its line of Dualam piping products.

Paul Habib, company president is the TAC representative.

Dynamic Materials Corporation

Dynamic Materials Corporation is the world's leading manufacturer of explosion clad metal products. The Clad Metal Div. manufacturing plant in Mt. Braddock, PA, USA, is the newest and most efficient explosion cladding facility in the world. Explosion clad is also manufactured at the Nobelclad factory in, France, and the Nitro Metall factory in Sweden. Clad plate products are primarily used in construction of pressure vessels, heat exchangers, and other equipment for corrosive environments in the Chemical Process and Oil and Gas industries. Explosion cladding is a versatile technology which is suitable for manufacturing clad of a broad alloy range including titanium, zirconium, aluminum, copper and nickel alloys, and stainless steel.

John Banker is the TAC representative.

OLI Program: Prediction of Corrosion in Mixed Solvents

When MTI began to try to identify potential topics for cooperative research in 1999, Westvaco and DuPont proposed similar projects to solve industrial corrosion problems by using increasingly available computer power to understand process environments and their effects on process equipment materials. Preliminary discussions, and a meeting at Oak Ridge National Laboratory, focused the effort on non-aqueous and mixed solvent environments, because corrosion in these environments is much less understood than in aqueous environments. The project "Prediction of Corrosion in Mixed Solvents" began in March 2000, with OLI Systems of Morris Plains, New Jersey as the primary contractor. The Oak Ridge National Laboratory was an additional participant and the US DOE provided most of the funding. The three-year program had four major tasks to accomplish as follows:

1. Development of stability diagrams (e.g. Pourbaix Diagrams) for alloys and their components in aqueous environments.
2. Development of a model for thermodynamic and transport properties of mixed-solvent electrolytes.
3. Development of software for generating stability diagrams for metals in mixed-solvent systems.
4. Development of a kinetic model of metal corrosion in mixed solvents.

To assist MTI and the Industrial Steering Group participants (Westvaco, DuPont and Dow Chemical), in evaluating the validity of the thermodynamic models proposed by OLI, four professors specializing in areas critical to the project were invited to join an academic review board. These were Gerry Frankel - Ohio State; Mark Orazem - U of Florida; Lloyd Lee - U of Oklahoma; Zi-Kui Liu - Penn State. They met once each year to review the progress on the

contract and submitted reports to the industrial participants, OLI and MTI. All their reviews were very positive.

The project did not start from scratch but built upon OLI's previously developed thermodynamic model for multi-component, multiphase aqueous systems, software for generating stability diagrams for pure elements in nonideal aqueous solutions, thermodynamic models for water-dominated systems, and transport property models for aqueous systems. Expertise in thermodynamics of alloy constituents at Oak Ridge provided the basis for a model of the thermodynamic activity of individual elements in alloys commonly used for process equipment.

While not all the models developed in this program have been completed in commercial form, during the months of May and June MTI and OLI held training sessions on the available software. This software is capable of generating stability diagrams for each element of each of a large number of commonly used alloys. To generate the same stability diagrams for the mixed solvent systems it was necessary to integrate the program for generating stability diagrams with the newly developed mixed-solvent electrolyte model and develop a Windows-based user interface. The programs are accessed via a Windows-based user interface that has been developed. The models for mixed solvent systems are now being added to this program and the final product should be released before the end of this year.

The last task was to predict the effects of environmental variables on the rates of general corrosion of common engineering alloys through the development of a kinetics model of metal corrosion in mixed solvents. OLI had developed a simple electrochemical model of general corrosion, and coupled it with the thermodynamic speciation model. However, the project partners wanted to develop a more realistic model of the metal/fluid matrix with a user interface. The proposed model



PICTURED (L-R) GALEN HODGE, STEVE GRISE, DOUG RIEMER AND JIM BERTHOL



BALTIMORE OLI SEMINAR

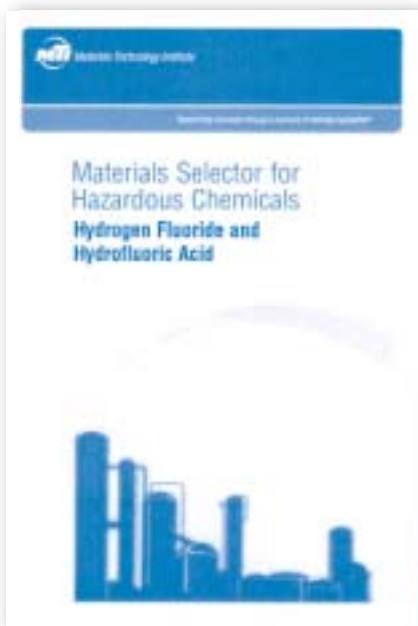


ATTENDEES FROM NAVAL SURFACE WARFARE CENTER

turned out to be very complex; in fact, the academic review board suggested that it was "beyond the reasonable scope of the project". The work needed has been defined and OLI is seeking funding for it. One problem is the lack of literature data with which to validate a working system.

The OLI system that was demonstrated during the training sessions is a very powerful system. While not all of the objectives have been reached, this project has shown what can be accomplished through leveraging of MTI funds with other sources of revenues such as the DOE. Trial copies of the software for MTI members are available by contacting the office in St Louis.

Publications Announcement



MTI Materials Selector Series Publication Releases

MS-4 Hydrogen Fluoride and Hydrofluoric Acid is now available from MTI publications

The original basis for the monograph

on materials selection and corrosion in the manufacture, handling and utilization of hydrogen fluoride and hydrofluoric acid was the NACE/MTI Materials Selection Advisor (MSA) prepared by Tom Degnan. A first draft was prepared and edited by C.P. Dillon. It has now been completely reviewed, updated and rewritten by Hira Ahluwalia.

Information in this monograph is provided on the properties of hydrogen fluoride and hydrofluoric acid, production methods, health and safety issues, forms of corrosion, definitions, and relevant specific-ations for materials of construction, as well as pertinent laboratory and field corrosion data.

Acknowledgment

MTI gratefully acknowledges the support of the Nickel Development Institute (NiDi) in producing the Materials Selector for Hazardous Chemicals (MS) series of books.

NiDi is an international nonprofit organization serving the needs of people interested in the application of nickel and nickel containing materials.

Materials Selector Series for Hazardous Chemicals

Volume 1: Sulfuric Acid and Oleum, 2nd Edition (to be updated and released June 2004)

Volume 2: Formic Acetic and Other Organic Acids

Volume 3: Hydrochloric Acid, Hydrogen Chloride and Chlorine

Volume 4: Hydrogen Fluoride and Hydrofluoric Acid

Volume 5: Nitric Acid (to be released October 2003)

Volume 6: Ammonia and Caustic (to be released June 2004)

Volume 7: Phosphoric Acid (to be released January 2004)

MTI'S NEW LOOK

This issue of the MTI newsletter launches the new MTI look. Under the direction of the Board of Directors and through the efforts of marketing experts at Wehrman & Company in St. Louis, MTI has begun the process of developing a new "SingleVoice" branding system which will provide the tools to communicate MTI's mission and value to members and prospects while positioning MTI for future growth. The objectives are:

- Support MTI's Mission.
- Upgrade the MTI brand to be more current.
- Present our name more prominently.
- Define our brand message of value.

- Create a "common look" "one voice" program.
- Improve web site usability and functionality for members and visitors.
- Grow and support membership.
- Develop a more aggressive marketing strategy.

After the design for updating the logo was completed, the process continued with the creation of a tag line which captures the real worth of the organization to the members – "Maximizing resources through a global network of materials specialists". Members were surveyed and more than 30 responded when asked about the value of MTI membership, the organization's strengths

and weaknesses and other questions. Wehrman & Company will use this information to help MTI promote its strengths and further the message that an MTI membership is a valuable investment.

Perhaps unexpectedly, the exercise has strengthened current MTI members' commitment to the organization by forcing each member to identify why their membership continues to be relevant.





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Upcoming Events

<u>MEETING</u>	<u>DATES</u>	<u>LOCATION</u>
MTI RG Meetings	FEB 23	Sheraton Sand Key Hotel
MTI TAC	FEB 24	Clearwater Beach, FL
MTI BOD	FEB 25	
MTI RG Meetings	JUN 8	Sheraton Four Points
MTI TAC	JUN 9	St. Louis, MO
MTI BOD	JUN 10	
MTI RG Meetings	OCT 18	Doubletree Post Oak
MTI TAC	OCT 19	Houston, TX
MTI BOD	OCT 20	

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