

MTI Begins Six Important New Projects

Building and Marketing a Flange Makeup Rig

MTI completed a project that developed training and qualification procedures for personnel responsible for making up flanged joints in pressure vessels and piping. In addition to the written procedures, a test rig was designed, with detailed drawings. Becht Engineering was contracted to provide this information.

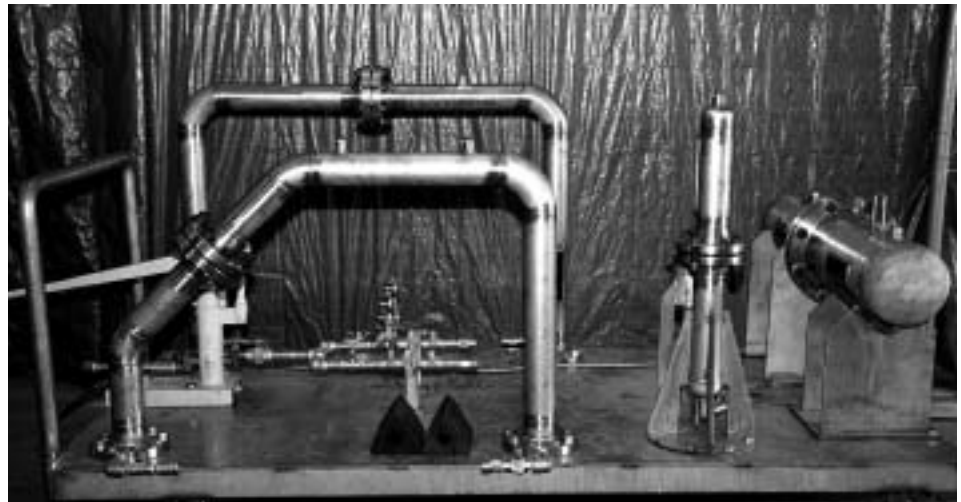
A second project was subsequently developed to construct a prototype test rig, according to the plans provided by Becht Engineering. MTI has fabricated this prototype rig as a demonstration unit and initiated a pilot program to prove the unit and training procedures at member company locations. Gary Grubert, Gasket Resources, Inc., project champion, is coordinating the pilot test program.

Training of personnel using these procedures and test equipment will reduce improperly aligned flange joints, leaks, and reworked joints due to damaged gaskets. This will increase the safety, reliability and integrity of pressure containing piping and vessels.

Following completion of the pilot program companies will have the option to build their own training rig or contract these services.

Instrument Reliability Manual

A team championed by Tim Murnane



FLANGE MAKEUP PILOT DEMONSTRATION TEST RIG

of Rohm and Haas conceived of a long-term project to develop a series of reliability manuals. The first project approved for funding was a reliability manual for instruments. Capstone was the successful bidder for the project. Capstone has completed a first draft of the manual though not yet a complete one.

The purpose of the instrument reliability manual is to fill a much-needed space in the technology that brings together reliability principles with hard information for dealing with specific types of process plant instrumentation issues. Examples include mean time between failures for specific types of instruments, installation guidance based on best practices, tips on calibration and preventive maintenance, benchmarks for cost structure and cost reduction, checklists for inspection, etc. It was generally agreed that although MTI

member companies have voluminous standards on instruments, these reliability how-to's are rarely addressed.

This project will be of even higher quality if we can get maximum participation from instrument engineers/spe-

(continued on page 2)

In this Issue

New MTI Projects	Page 1
New Members	Page 3
Presentations	Page 4
Publications Announcement	Page 5
European Meeting	Page 5
MTI Fellows	Page 5
Ceramics Seminars	Page 5
Events	Page 6

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.

New MTI Projects *(continued from page 1)*

cialists from MTI member companies. Their main responsibility is to review the drafts and contribute expertise. The final document will then become an even more valuable tool for linking reliability engineers to key instrument opportunities in their plants and the instrument engineers to the key factors that affect reliability of their components.

The following MTI member companies constitute the project sub-team; Rohm and Haas Company, Dupont, Eastman Chemical, Bayer, Monsanto and Dow Chemical. Wider participation by additional MTI companies would make the manual of even greater value.

Guide for Design, Manufacture, Installation and Operation of FRP Flanges and Gaskets

Flange joint performance is one of the major reliability issues with FRP equipment. This project was developed to address these reliability issues. FRP flanges are designed and fabricated in many different ways. Issues with FRP flanges include:

- Flange Design,
- Flange fabrication methods,
- Use of proper bolt torque and gaskets, and
- Training of personnel on joint practices specific to FRP.

The project objective is to create a comprehensive training guide and reference document for design, fabrication, installation and operation of full face and lap joint style FRP flanges suitable for use by both engineering and craft personnel. This will include these five sections:

1. **FRP Flange Design:** The different available flange designs will be reviewed, evaluated and summarized, based on current knowledge.

2. **FRP Flange Fabrication:** FRP flange fabrication is a well developed field with diverse practices. Task 2 will review and summarize this available knowledge.

3. **Gasket Selection:** The choice of gaskets is critical for a reliable joint. Fortunately, the mechanical behavior of gaskets is well understood. Task 3 will summarize and present how to appropriately select gaskets for FRP flanges.

4. **Bolting Procedure and Torque Requirements:** The bolting procedure is also critical for a reliable joint. Task 4 reviews and summarizes available knowledge about bolting procedures.

5. **Bolting of Dissimilar Flanges:** FRP flanges sometimes must mate to metal or plastic-lined pipe flanges. This section will review and summarize recommended practices for bolting dissimilar flanges.

The project deliverable will provide member companies with information that enables them to improve the reliability of FRP flanged connections, with attendant cost, safety and environmental benefits.

- This document will be a design aid for everyone that requires guidance in the use of flanges in FRP piping and PCE.
- It will also be a comprehensive document for understanding the design, fabrication, installation, and maintenance of FRP flanges.
- Implementing the knowledge in this document will increase the reliability of FRP flanges.
- This document will define construction for flanges, as well as controls to ensure their proper manufacture.

- Everyone involved with FRP materials, from materials supplier and fabricator to end user, can benefit from this document.
- This document will be an effective Training Tool for proper bolting and assembly of FRP flange connections.
- This document may also serve as reference to documents such as ASME Section X, ASME RTP-1 as well as B 31.3.

Atlas of Microstructures

Centrifugally cast heat-resistant alloy tubes are widely used in the Chemical Processing Industry for the production of hydrogen, ammonia, methanol, ethylene, etc. The microstructures of these cast alloys change significantly after prolonged exposure to high temperatures and stress. The microstructural changes are considered a normal aging response. However, the microstructural changes anticipated for the latest heat-resistant alloys including HP modified, HP microalloyed, and 35Cr-45Ni alloys are not well documented. The object of this project is to develop an Atlas of Microstructures on commercially produced tubes that have undergone longtime creep testing.

Metal Dusting-The Past and the Future

The initial DOE funded project on Metal Dusting was completed at the end of 2003 and a final report was issued. Another report summarizing the Argonne sponsored workshop on metal dusting was also issued. The reports were sent to participating industrial members of the metal dusting project and to attendees of the workshop at Argonne.

A second 3-year project on metal dusting, funded by Industrial Materials of

(continued on page 3)

Welcome New Members

THE EQUITY ENGINEERING GROUP, INC. (E²G)

The Equity Engineering Group, Inc. (E²G) is the recognized leader on aging infrastructure service and support for the oil refining and petrochemical industries. E²G experts help improve plant profitability by supplying state-of-the-art products and services that ensure equipment operational availability, control inspection costs, and avoid costly shutdowns. Our engineers have worked for major refineries and chemical companies, both in plants and central engineering groups. This experience enables us to provide highly effective support, with an eye on reliability and high return on investment for plant owners and operators.

Services include: Corrosion/Materials engineering consulting, Fitness-For-Service (FFS), finite element and remaining life analyses for vessels, piping, tanks and heaters; Risk Based

Inspection (RBI) implementation, maintenance and ever-greening; vessel re-rating; pressure relief system design; and turnaround planning and support. E²G is the official trainer, principal architect and committee chair for API 579 FFS; the official API RBI trainer and software project manager; and the official API trainer for Pressure Relief System Design. Software products include VCESage (fully up-to-date API 579-FFS capabilities, plus hot tapping, wind loading analysis and more). We are the official marketer of API RBI. E²G offices are located in Cleveland, OH; Houston, TX; Dallas, TX; and Elkton, MD.

Gerrit Buchheim is the TAC representative.

KOCH KNIGHT LLC

Koch Knight LLC has been an MTI member company since 2002. Koch Knight is an independent company

under Koch Chemical Technology LLC, a Group of the Koch companies that includes chemical process application companies such as Koch-Glitsch, Koch-Otto York, Brown Fintube, John Zink Company, and about 13 other organizations. Koch Knight is the non-metallic group of the Koch ChemTech companies, offering ceramic and plastic materials, vessel designs, process services, and construction to chemical producers manufacturing acids, acidic solids, chlorinated organics, and to the pressure oxidation/pressure leaching segments of the mining industry. Koch Industries, our parent company, is the largest privately held company in the USA, and includes a diverse portfolio encompassing oil refining, natural gas liquids processing, fertilizers, chemical processing equipment companies, synthetic fibers, trading in metal, energy and other commodities, and cattle ranching.

Kevin Brooks is the TAC Representative.

New MTI Projects *(continued from page 2)*

the Future (DOE), held a kick off meeting at Argonne on May 13, 2004. MTI member Dr. Ken Baumert is the lead industrial investigator and Dr. Ken Natesan is the lead investigator at Argonne. A project steering committee composed of MTI member companies who pledged "in kind" support of the project will oversee and set direction for the project. MTI will manage the overall project with Emory Ford as the assigned staff manager.

The initial project developed an improved understanding of the fundamental mechanism of metal dusting and Argonne designed and built laboratory testing facilities that permit metal dusting studies that closely mirror conditions in industrial processes. The

new project will focus on developing materials engineering data for application to industrial processes of interest to MTI.

User's Guide for Evaluating New High Tech Polymeric Materials

Chemical handling equipment frequently requires the use of polymeric materials as liners, coatings or solid plastic fabrications. New high tech polymeric materials and emerging application technologies could favorably impact chemical process operations. To understand this potential impact, member companies require a systematic approach for performing evaluation and testing of new materials and technologies.

The objective of this project is to provide a guide with decision tree methodology for evaluating a newly introduced polymeric material or polymer application technology. The guide will be based on current industry practices and include a polymer manufacturer and polymer material reference database.

The project will allow users in the chemical process industry to select suitable materials of construction for various items of process equipment from a list of existing polymeric materials. The methodology developed in this project will allow similar evaluation and appropriate use of new polymers and application techniques as they are developed.

Lee Craig retires from MTI

Lee Craig was honored at the February Meeting in Clearwater Beach, Florida for his 6 years as Associate Director of MTI. As of April 1 he has retired and plans to travel and spend time with his family. His tenure with MTI was the last in a long career (50+ years) after having worked for DuPont, Reynolds Metals Company, University of Miami, School of Marine and Atmospheric Science, Department of Ocean Engineering, Atlantic Richfield Company, Mobil Oil Company (Mobil Research and Development Co) and his own consulting company - Corrosion Prevention and Control.

One memory from his years with MTI is attending the International Workshop on Metal Dusting, which MTI helped sponsor, right after 9-11. "We didn't know how the attendance would be affected by the tragedy, but as it turned out, all but two registrants showed up, and they were personally willing to come, but their company policy kept them home. It was our way of saying that we wouldn't be intimidated by the terrorists!"

In Memory of C.P. Dillon

MTI lost a great friend on Wednesday, April 7, 2004. C. P. "Paul" Dillon passed away after a brief illness. He reportedly was on the phone discussing corrosion when he suffered a massive heart attack. Paul was credited as being the "Father of MTI" and the spark that got the organization launched and continued his input as a recent and frequent contributor to the online MTI Forum. His legacy lives on in the many books and articles he authored but his passionate dedication to the field will be missed by all who sought his counsel.

Recent Presentations at MTI Meetings

Mixed Acids

Dr. Narisi Sridhar, Southwest Research Institute, presented the results of the Mixed Acids program to the TAC at the meeting in San Antonio in October 2003. Dr Sridhar had collected information on corrosion rates of commercially available alloys in various acid mixtures. Corrosion data are readily available in single acid systems but they are much more difficult to find for mixed acid systems. The database created and the final report are available on a CD from the St. Louis office. Using the information presented and any graphics package, one can create three-dimensional diagrams of corrosion rate versus temperature and concentration.

A Review of Current Anchored Thermoplastic Concrete Protection Liner Technology

Christine Osborne of Henkel Technologies presented a state of the art seminar on the technology and application of anchored thermoplastic concrete protection liners during TAC 83. These liners are used to line internal or external surfaces of cast-in-place or precast concrete structures to:

- Protect the concrete from corrosion, and to

- Prevent the infiltration and exfiltration

Her presentation addressed:

- Use and functional alternatives
- Cost and service life considerations
- Capabilities, performance metrics, and design features
- Installation/application methods
- Thermoplastic welding technology

The presentation is available as a download from the MTI Website and serves as a training guide for this technology.

Digital Radiography

In February 2004, Tom Crump, Level III, Inc, presented information on the emergence and application of Digital Radiography. Dr. Gary Cariveau, who was unable to attend the meeting as a result of a last minute conflict, developed the presentation. The overview provided information on digital versus film applications and the various forms of digital radiography. Examples were provided from actual data on full vessel screening of rail cars. This technique is currently under evaluation for the MTI project (#149-02) that is evaluating potential techniques for determining the thickness of refractory material under operating conditions. This work is being performed at Texas Research Institute in Austin, Texas.

Attend the Stainless Steel World America 2004 Conference & Expo

MTI members have a special opportunity to attend the Stainless Steel World America 2004 Conference & Expo at a reduced rate. MTI members can register as a delegate for \$550 instead of the standard rate of \$864. The event will take place in conjunction with MTI's fall meeting and will be held from 20-22 October at the Doubletree Hotel Houston-Post Oak. The conference will strongly focus on applications and practical field experiences and will cover all corrosion resistant metallic materials. For further information on the conference and expo please visit www.stainless-steel-world.net.

MTI Presents Fellow Awards

Two new MTI Fellows were named at the February meeting in Clearwater Beach, Florida. Warren Pollock and George Elder became the 6th and 7th MTI Fellows joining Paul Dillon, Bert Krisher, Sheldon Dean, Galen Hodge, and Bob Puyear whom the MTI Board of Directors has recognized as individuals instrumental in developing MTI's current prominence over the 25+ years of its existence.



Warren I. Pollock

Warren I. Pollock, DuPont, served as the first TAC Chairman for four years and considered it a significant milestone in his profes-

sional career. He provided leadership and guidance that was essential to the organization at that time. It was his concept that the Technical Advisory Council should function as an advisory board that would determine the direction and scope of the technical program. Warren was also one of the strongest advocates for making MTI an international organization. When given the Fellow Award, he praised the consistently high level of professionalism of the organization and gave a short tribute to the late Mars Fontana, the first Executive Director of MTI.



George Elder

George B. Elder, Union Carbide, also a member of the group in the bar who had the vision for MTI served MTI as a Member of the Board

of Directors. He was a major contributor to the early efforts to publicize and promote the idea of such an organization. He was very active and effective in the discussions that defined the Charter, By-Laws, and organizational structure of MTI. George served as acting Executive Director during the period of incorporation and until Mars Fontana was hired. Following his retirement from Union Carbide, George became a consultant to NiDI. In that capacity, he continued to be an effective advocate for MTI, representing NiDI at a number of TAC meetings.

MTI Presence in Europe

MTI held a meeting in Maastricht, the Netherlands, in conjunction with the Nickel Development Institute on November 13 & 14, 2003. The meeting was attended by 45 delegates from MTI member companies and invited guests plus 7 staff persons from MTI and NiDI. Presentations and discussion were as follows: Metal Dusting, Weld Overlayments on Waterwalls, Risk Based Inspection, Rouging, Fugitive Emissions and Testing Procedures for Packing Materials, CUI, Sourcing of Stainless Steels, and Failure of Formed Heads. MTI staff personnel updated the group on current project activities and the new Roadmap for Materials of Construction in the CPI. Minutes of the meeting are available on the non-members page of the website.

MTI will hold a EuroTAC meeting in Maastricht, the Netherlands November 11-12, 2004, Thursday and Friday morning following the Valve World Conference and Expo. The program will include a mini-forum and discussions on Fugitive Emissions.

Training Seminar for Using Ceramics in the CPI

The Ceramics Advisory group has identified a need for training MTI members in the technology and application of ceramics as MOC in the CPI. To this end, in February 2004, William Headrick, R. E. Moore & Associates, presented a CPI-focused short course on Ceramic MOC used in the chemical processing industries. This was a focused 2-hour overview of a normally 2-day short course. A more in depth and focused 4-hour follow-up short course was presented during the June 2004 meeting with the title "Selection Criteria for Refractories Used in the Chemical Processing Industries". Both courses are available for downloading from the MTI Website.

MTI Publications

MTI is pleased to announce the release of six new publications.

The **Materials Selector Series** is now complete with the publication of **MS-5 Nitric Acid** (May 2004), **MS-6 Ammonia and Caustic** (July 2004) and **MS-7 Phosphoric Acid** (July 2004). We are also busy updating **MS-1 Sulfuric Acid** for a second edition release due in August 2004. The second edition will include information on dilute sulfuric acid as well as updated metals and non-metal information on concentrated sulfuric acid.

The second edition of **Materials Selection for the Chemical Process Industry** by C.P. Dillon will be available in July 2004. McGraw-Hill originally published this book in 1992. Sheldon Dean with the assistance of MTI members edited and updated this publication for release in 2004. The publication covers over fifty chemical process environments with information regarding materials of construction for the complete process environment.

Guidelines for Troubleshooting Water Cooled Heat Exchangers will be available July 2004. This comprehensive treatise provides information on design considerations, materials of construction, cooling water treatment, system operations and economics. This publication is the result of the dedicated efforts of Art Freedman, Bert Krisher and Dan Steinmeyer under the direction of Freedman Associates.



1215 Fern Ridge Parkway, Suite 206
St. Louis, MO 63141-4405
www.mti-global.org

PRSR. STD.
U.S. POSTAGE
PAID
ST. LOUIS, MO
PERMIT NO. 3252

Address corrections or list of deletions should be sent to the address above.

Upcoming Events

MEETING	DATES	LOCATION
MTI PT Meetings	OCT 18	Doubletree Post Oak
MTI TAC	OCT 19	Houston, TX
MTI Annual Members Meeting	OCT 19	
MTI BOD	OCT 20	
MTI EuroTAC	NOV 11-12	Van der Valk Hotel Maastricht, The Netherlands
MTI PT Meetings	FEB 21	Renaissance at
MTI TAC	FEB 22	International Plaza
MTI TAC	FEB 23	Tampa, FL
MTI BOD	FEB 24	
MTI PT Meetings	JUN 7	Marriott Country Club Plaza
MTI TAC	JUN 8	Kansas City, MO
MTI BOD	JUN 9	

Contact:

Submit all correspondence regarding MTI Communications to:

Materials Technology Institute, Inc.
Attn: MTI Communications
1215 Fern Ridge Parkway
Suite 206
St. Louis, MO 63141-4405

1-314-576-7712 (telephone)
1-314-576-6078 (fax)
mtiadmin@mti-global.org

Subscriptions:

For a free subscription, write to MTI or contact mtiadmin@mti-global.org