



# GLOBAL CONNECTIONS

 *Materials Technology Institute*

2020 ANNUAL REPORT





# GLOBAL CONNECTIONS: STRONGER TOGETHER

## MTI'S VISION

A global network recognized as the preferred source of material technology solutions for industrial process companies.

## MTI'S MISSION

MTI maximizes member asset performance by providing global leadership in materials technology for industrial processing companies to improve safety, sustainability, reliability and profitability.

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MTI overcame new challenges in 2020 elevating the value of Global Connections. The year began with the successful Global Solutions Symposium and soon after, took a turn as the COVID-19 virus surged throughout the world. Driven by providing ongoing value to members, despite the evolving pandemic, MTI was well equipped and adapted to the new “virtual reality” everyone was facing.

In person meetings transitioned to virtual GlobalTAC Meetings to provide all MTI members the opportunity to connect and continue participating in project team meetings and technical presentations. MTI witnessed members from AmeriTAC, AsiaTAC and EuroTAC coming together virtually for these events. Technical project work continued with six completed projects, 11 new project teams formed, and 11 projects funded. AsiaTAC held a virtual Fall Meeting, which also drew members from outside the region to connect online. MTI offered virtual training courses and a roundtable as another way for members to continue learning and connecting with each other. MTI resources, such as the TAC forum, live and on-demand webinars, and a new mentor match program were also options for members to stay engaged and benefit from membership.

Thank you to all members for your ongoing participation and realizing the value of Global Connections through MTI!

# REPORT OF THE CHAIR — BOARD OF DIRECTORS

Greetings fellow members. I hope that this letter finds you, your loved ones and your colleagues well during these challenging times. On behalf of your Board of Directors, I am pleased to present the MTI Annual Report for the 2020 calendar year.

First, let me extend my sincerest gratitude and acknowledge both the MTI Board and the MTI Staff. These groups performed amazingly in pivoting to a new way of working once COVID-19 changed how our organization conducts itself. In 2020, we learned MTI's leadership team and worldwide community of members can be very adaptable.

The year began with the highly successful 2020 Global Solutions Symposium in Baton Rouge, Louisiana. The Symposium is highlighted elsewhere in this report, but I wanted to share one of my take-aways. In approving the Symposium, several Key Performance Indicators (KPIs) were established to assess its success. Every KPI was achieved, which is very impressive for a first-time event. This resulted in the almost immediate start of planning for another symposium in 2022.

Once the effects of the pandemic were fully felt, MTI had to find new ways to continue delivering value to its members. All TAC meetings shifted to a virtual format when it became clear that in-person meetings were not possible. AmeriTAC meetings were planned to allow increased participation from the other two TACs, resulting in two "Global TAC" meetings. Participation from members substantially increased. In fact, our June GlobalTAC Meeting included participants from 22 countries, and our October GlobalTAC session drew participation from 21. The virtual meeting format also allowed members to participate in AsiaTAC and strengthen those ties.

The pandemic did impact what I believe is a primary benefit of MTI: face-to-face networking. Yet, all other MTI activities continued to progress, including projects and training. Webinar attendance, website traffic and TAC forum engagement all increased. In October, we even held our first ever virtual Annual Members Meeting.

Leading up to that online session, Designated Representatives were able to vote on project funding and other issues electronically, which was successful as measured by higher-than-average participation.

It's important to note that, despite the obvious challenges, MTI membership held steady in 2020. In an effort to increase membership in a challenging economy, the organization developed and implemented an Introductory Participant Program, whereby a prospective producer member can join for one-year at a reduced cost, with limited benefits. We hope that this program draws the interest of producer company prospects and demonstrates some of the tremendous value that MTI generates for our technical community. Ultimately, we hope that leads them to join us as fully benefitted members.

Another positive outcome from the unforeseen challenges we faced in 2020 was reduced meeting costs, which helped MTI remain financially sound. Yet, your leadership team was sensitive to the pandemic's economic effects on the financial health of our member organizations. As such, the Board of Directors unanimously passed a dues reduction for 2021. MTI will continue to monitor the economy and will respond accordingly as the world recovers from the pandemic.

In closing, on behalf of the Board, I would like to thank YOU for your participation in MTI. Whether it be through joining projects, answering TAC Forum questions, or any other way, your virtual networking kept MTI strong and delivering value for your organization's dues.

Additionally, I would also like to thank you for the opportunity to serve the Membership. I look forward to returning to our regular in-person meetings in 2021 and seeing you all face-to-face at some point in the near future.



**David Barber**  
Chair, MTI Board of Directors

# BOARD OF DIRECTORS



Left to Right:

**Jeremy Nelson,**  
AmeriTAC Vice Chair  
Koch Industries, Inc.

**George Donald**  
NOVA Chemical Company

**TP Cheng,**  
AsiaTAC Chair  
ITRI

**Eileen Chant\***  
Becht

**Srini Kesavan**  
FMC

**Debra McCauley,**  
Vice Chair  
Chemours

**David Barber,**  
Chair  
Dow

**Nina Young**  
Chevron Phillips  
Chemical Company

**Bill Bieber**  
Webco Industries

**Maria Jose**  
Landeira  
Oestergaard  
Haldor Topsoe A/S

**Dale Heffner**  
Electro Chemical

**Chuck Young**  
Tricor Industrial

**Marc Cook,**  
AmeriTAC Chair  
Dow

Pictured Below:

**Anette Hansson,**  
EuroTAC Chair  
Haldor Topsoe A/S



*Members of the Board of Directors (BOD) function as the keepers of MTI's strategic objectives. They provide consistent, valuable input, while maintaining the MTI mission.*

*BOD Members serve as non-biased leaders to help make decisions that balance the needs of member companies and representatives with those of the overall organization.*

*Members of the Board of Directors represent the interest of all people serviced by MTI.*

\*Resigned November 2020



# LETTER FROM THE EXECUTIVE DIRECTOR

MTI thrived during the pandemic in 2020 although the year was not without its challenges. Thanks to many members and the hard work of MTI Staff, those challenges were met, and expectations were exceeded. Obviously, our biggest challenges came from complications from the COVID-19 pandemic. And because it was a pandemic, all geographic regions of MTI activity were affected. The year began with our first Global Solutions Symposium when face-to-face meetings were still the norm. The symposium is highlighted in this Annual Report and featured excellent technical content, an opportunity for suppliers to showcase their products and multiple opportunities to network with members and guests. The general theme following the event was “We need to do this again.” Organization of the 2022 Global Solutions Symposium in Orlando in February is well on its way.

The abbreviated AmeriTAC meeting at the symposium was the only face-to-face TAC meeting of the year. However, our members and staff rapidly adjusted to virtual TAC meetings. While there were fewer opportunities for individual networking, the virtual TAC meetings touched all the other bases. Project Team meetings, Structured Forums, Training, TAC Forum Information Exchange and Project Funding all moved our organization forward, including the official actions of our Annual Members Meeting. The virtual meeting format provided even more than usual interaction between our three regional TACs. It also saw an increase in participation of members that would not ordinarily attend the face-to-face meeting. However, as valuable as these meetings proved to be, there is a strong desire to return to in-person meetings as soon as possible.

Despite the pandemic, project work continued as planned. We wrapped up six projects in 2020 including the very comprehensive Guidance for Failure Mechanisms publication and an extensive training program on the current technologies involving the use of elastomeric materials. Project development also continued

through the year with approval of ten new projects with contracted funding totaling just over \$500,000. Among these were a second follow-on project focused on non-destructive detection of HTHA and the development of a corrosion awareness training program for technical and engineering personnel new to the CPI. Further details on these projects are contained elsewhere in this publication.

MTI remains financially sound. The Board of Directors took action to reduce 2021 dues 10% from the 2020 level instead of the typical increase of 3%. This action was taken to recognize the negative financial impact the pandemic had on some member companies. In addition, our expenses were significantly under budget in 2020 for several reasons. First, virtual meetings are less expensive than face-to-face meetings. Second, while we did approve ten new projects, many of these were not approved until late in the year and others that were budgeted did not move forward as planned. Third, the symposium generated revenue in lieu of a costly TAC meeting. MTI Staff and the Directors continue to monitor expenses to ensure the highest possible value is delivered for your membership dues.

Our membership for 2021 remains strong despite the unusual year and uncertainty associated with the pandemic. Many members expressed that with restricted travel and interaction, networking in the MTI community was even more valuable than usual. Thanks to all our many Member contributors for their participation in leading the organization, developing projects, and sharing their expertise with the MTI community. Your participation leverages your organization’s dues to the maximum advantage.

**Paul Whitcraft**  
*Executive Director*



# MTI DIRECTORS AND STAFF



**Heather Allain**  
*Associate Director*



**Robert Freed**  
*Associate Director*



**Patrice Houle**  
*Associate Director, Europe*



**Byron Keelin**  
*Director of Operations*



**Pradip Khaladkar**  
*Associate Director*



**Paul Liu**  
*Associate Director, Asia*



**Daniel Rasmussen**  
*Membership  
Communications &  
Marketing Manager*



**Kirk Richardson**  
*Director of  
Marketing & Sales*



**Christine Matthes**  
*Accounting and  
Project Controller*



**Lindsey Skinner**  
*Director of  
Communications &  
Business Development*



**Paul Whitcraft**  
*Executive Director*

# MTI FELLOWS

Robert Sinko — 2020  
Gary Whittaker — 2016  
Gene Liening — 2016  
Emory Ford — 2015  
Pradip Khaladkar — 2014

James M. Macki — 2011  
William C. Fort III — 2010  
W.B.A. (Sandy) Sharp — 2006  
Robert A. McTamane — 2006

Greg Kobrin — 2005  
George Elder — 2004  
Warren Pollock — 2004  
Robert Puyear — 2002

Sheldon Dean — 2001  
Paul Dillon — 2001  
Galen Hodge — 2001  
Bert Krisher — 2001

# MEMBER RESOURCES

For more than 40 years, MTI and its members have pooled together time and expertise to create a wealth of critical industry information. Becoming an MTI member gives your company access to decades of research, instant access to industry experts, and recent reports and findings that can be applied to some of today's most pressing processing industry challenges.

## TECHNICAL COMMUNITY

The MTI TAC Forum serves as a one-stop shop for immediate expert analysis. It is largely looked upon as one of the most essential member benefits. Our engaged community offers rapid and reliable solutions to crucial questions in real-time. Tapping into some of the greatest minds in the world in their respective niches gives your company the unique opportunity to connect with the processing industries' best. Decades of TAC Forum posts and responses are also archived and available to search in the TAC Forum community, allowing members access to critical information. This benefit alone can provide substantial value and make it well worth becoming an MTI member.

## COMMUNITY CONNECTIONS

The ability to reach multiple experts on a wide range of technical subjects and to quickly receive trusted information is often looked upon as a primary member benefit. MTI's community-based website is equipped with the TAC Forum, project team communities, an online Mentor Match program and a searchable MTI directory, which allows access to a global network of knowledgeable materials technologists and facilitates rapid communication. Among our ranks are some of the world's foremost leaders in the realm of materials science as it applies to the process industries.

## EDUCATION OFFERINGS

Beyond our numerous online community benefits, MTI provides ample opportunities for members to network and engage in virtual and face-to-face events geared toward finding solutions to today's industry challenges. Thousands of knowledgeable members and subject matter experts have attended our niche roundtables, global TAC meetings, educational training sessions and webinars, seminars and facility tours. These professional development solutions are often custom designed for members and focused on specific industry challenges and topics.

## ONLINE TECHNICAL RESOURCES

The MTI website and e-Library includes extensive, dependable knowledge in the form of books, technical bulletins, reports, presentations, webinars on-demand and recorded training videos. The expanding archive of technical information is included with MTI membership. Books are made available to members 18 months before the general public, keeping members up-to-date and ahead of the curve. The vast MTI e-Library also has comprehensive search capabilities, giving members quick access to topics such as materials selection and stability, aging plant maintenance, corrosion, exciting new inspection methodologies and much more!

# 2020 AT A GLANCE – PARTICIPATION OPPORTUNITIES



## TECHNICAL COMMUNITY

- 144 Posts
- 640 Replies
- 23 Responses to Material Suitable in 15% H2SO4 Service (Topic with Most Replies)
- 115 Posts received 2 or more replies
- 46 Member Companies posted seeking solutions and guidance



## EDUCATION OFFERINGS

- 45+ Hours of Technical Content
- 3 Virtual GlobalTAC Meetings
- 1 Virtual Roundtable
- 1 Global Symposium
- 4 Technical Webinars
- 2 Virtual Technical Training Programs
- 1700+ Attendees



## COMMUNITY CONNECTIONS

- 9 Resource Communities
- 29 Concept & Potential Project Communities
- 8 Project Development Communities
- 20 Funded Project Communities
- 15 Formal Mentors and Growing (as of November 2020)
- 1690 Members in the MTI Global Network



## TECHNICAL RESOURCES

- The knowledge housed in the MTI e-Library continues to expand – 50+ Technical reports, presentations and other documents added in 2020
- The MTI website offers 13 Technical Webinars on-demand
- 15+ recordings from the 2020 virtual training sessions, roundtable and Industrial Technology Demonstrations are available on the MTI Website



# MTI LAUNCHES FORMAL MENTORING PROGRAM

After months with limited access to networking events and face-to-face meetings, MTI and its members needed to find a way for the network of materials engineers to stay connected and continue their personal and professional development. The Mentor Match Program, which made its debut in November 2020, was one solution allowing members to stay connected through one-on-one mentoring relationships.

“Informal mentoring is common at MTI, and we wanted to provide a more formal program that allows mentors and mentees to meet more frequently and help these connections to flourish,” explains Daniel Rasmussen, Mentor Match Program Coordinator. Members can sign up to be a mentor, mentee, or both but whichever direction a member chooses, there will be plenty of opportunities to gain valuable knowledge and guidance.

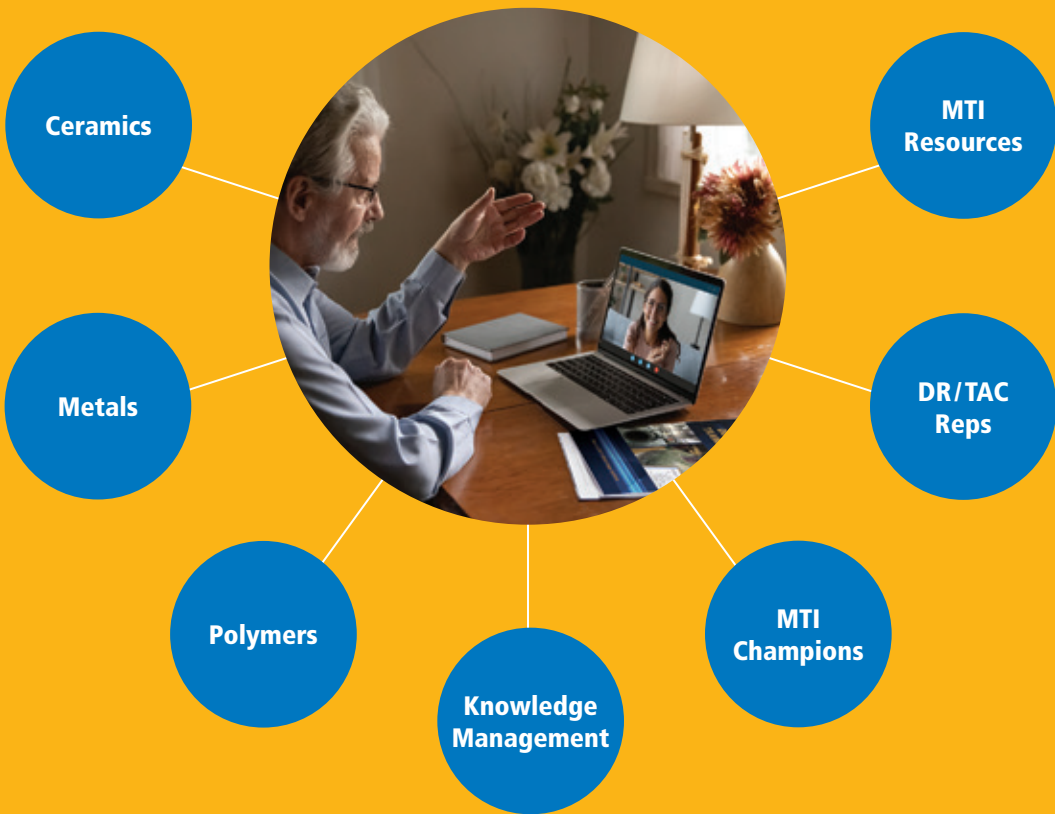
Maria Jose Landeira Oestergaard (Haldor Topsoe), who was involved in the implementation and beta

testing of the program, immediately signed up to participate as a mentor. She says she has already gained value from the relationship. Her preference is to focus on personal development over technical development, and she notes that a highlight is not only seeing a mentee grow as an engineer, but also as an individual by improving personal competencies, which will benefit mentees in their current work environment and future career.

“Being a mentor is as much giving as it is getting; it is a benefit for both parties and a golden opportunity to grow,” she concludes.

Rasmussen says MTI hopes the program will ease the struggles of limited one-on-one professional development and feelings of isolation throughout uncertain times, but that it also continues to serve as a valuable member resource beyond when the world reopens, and MTI members can meet in person again.

## MTI Mentor Match Categories



# 2020 GLOBAL SOLUTIONS SYMPOSIUM



## Addressing Upgrading Technology and CPI Challenges — Symposium Provides Attendees with Technical Content, Marketplace and Global Connections

The Materials Technology Institute (MTI) held its first Global Solutions Symposium, February 19-20, 2020, at the Hilton Capitol Center in Baton Rouge, LA. The Symposium exceeded expectations, with a record MTI meeting registration of 201 members and non-members. And for the first time, MTI opened a Global Solutions Marketplace of 30 industry partners to offer attendees a chance to network with potential vendors to help meet their company's needs.

At the time, MTI and its members were not aware, but it would be the only face-to-face meeting in 2020. The event provided a high level of technical content through keynotes and learning sessions, plus the added benefit to network with fellow attendees and vendors by visiting the Global Marketplace to get “Symposium Passport Stamps” during the receptions and meals.

On Wednesday, February 19, the Symposium opened with a welcome and keynote from Shannon Craig, BASF Vice President, Technical Expertise and Discipline Engineering, about Impacting the World and how BASF and MTI have been working together for 40 years to make a difference. MTI honored BASF with its 40-year anniversary award following the presentation. The rest of the afternoon offered attendees the chance to choose from two technical learning tracks with a total of 11 presentations.

Emerging Technology featured six presentations: Practical Case Study of Fabrication Issues Experienced with Duplex 2205 Pressure Vessel Heads; New Epoxy Vinyl Ester Resins for CR Composites; Alloy 699 XA – An Emerging New Alloy developed for the Metal Dusting Challenges; RFID Sensors to Monitor CPI Equipment Integrity; Intelligent Tubes, Digitalization in the Steel Industry; Surface Treatments to Improve Heat Flux and Temperature Distribution in Process Tubes.

Running opposite the Emerging Technology session was a track focused on Turnarounds with five presentations: Risk Based Work Selection – Optimizing Scopes; Detecting Fatigue Cracks in PSA

Vessels Used for H2 Purification; Application of High Velocity Thermal Spray; Avoiding Pitfalls During Turnarounds Using RBI; Microbiologically Induced Corrosion – Detection Prevention and Treatment.

The meeting continued Thursday with a morning keynote, “Managing Knowledge: It’s not just Training Anymore,” by Peggy Salvatore, Author and SME, where she provided thoughts and concepts to carry into the Knowledge Management (KM) track and workshop focused on aging plants, aging workers and knowledge transfer throughout the remainder of the day.

Alongside the KM track, MTI offered two technical learning sessions for attendees interested in corrosion and other materials-related topics. The Thursday morning technical track concentrated on High Temperature Corrosion with four presentations: Coatings for Protection Against Metal Dusting; High Temperature Hydrogen Attack, NDT and Metal Extraction for Highly Effective Evaluation of Assets; Review of Existing Facilities for Risk of HTHA; and Simulation and Evaluation of NDT Methods with HTHA Damages – MTI Project 305. To conclude the two-day event, the afternoon technical track also featured four presentations: A Practical Approach to CUI Risk Assessment; CUI Estimation Model; Looking at CUI Risk Mitigation Differently – Managing CUI by Consequence of Leak; and Update on MTI Standard on TSA Pipe.

Attendees at the MTI 2020 Symposium were universally positive about the value of their attendance – 93 percent of attendees surveyed indicated that the combination of high-quality technical presentations coupled with the ability to network with peers and SMEs in the industry made the 2020 Global Symposium a valuable event to attend. The success of the event has inspired MTI to host another Symposium in 2022.



# KEEPING CONNECTED THROUGH MTI EVENTS

## GlobalTAC Meetings and Virtual Training

The scope of MTI events changed drastically in 2020 due to the COVID-19 pandemic. One AmeriTAC meeting was held in person prior to the MTI Global Solutions Symposium, but the world quickly transitioned to a “virtual” one soon after. While the Spring AsiaTAC and EuroTAC meetings had to be canceled, MTI adapted by developing a virtual GlobalTAC to engage all three TAC regions in an online format, which significantly increased project participation and development. However, due to time zone challenges, it was not possible to accommodate for everyone. AmeriTAC and EuroTAC primarily participated in these events, while AsiaTAC developed their own virtual program for the Fall.

Attendees from 23 countries participated across the GlobalTAC meetings.

In addition to the regularly scheduled meetings, MTI hosted several training programs virtually. These training opportunities are highly regarded by members and engaged nearly 500 attendees between the three programs. Webinars are also important learning opportunities that MTI began offering in 2019. In 2020, the program scheduled four speakers on various topics of interest to MTI members with 350+ participants between the four webinars.

### TAC MEETINGS

#### AmeriTAC 131

- Date: February 18, 2020
- Baton Rouge, Louisiana
- 147 Attendees

#### Virtual GlobalTAC Summer Meeting

- June 22 – 25, 2020
- 243 Attendees
- Number of structured forums: 3

#### Virtual GlobalTAC Fall Meeting

- October 26 – 28, 2020
- 225 Attendees
- The first “MTI Technical Showcase Sessions” were held. Eight Member companies presented technical content related to how their companies serve the CPI. (Electro Chemical, Enerfab, NobelClad, Outokumpu, Sandvik, Schmidt+Clemens, Stress Engineering and Ward Vessel & Exchanger)

#### Virtual AsiaTAC Fall 2020

- September 15 – 16, 2020
- 71 Attendees
- Number of structured forums/technical presentations: 9

### VIRTUAL TRAINING

#### In-Service FRP Inspection Training

- September 30 – October 1, 2020
- 12 Presentations
- Total Attendance: 141

#### Elastomers Training

- October 26 – 27, 2020
- 11 Presentations
- Total Attendance: 163

#### Digitalization Roundtable

- November 10, 2020
- 9 presentations
- Total Attendance: 190



## Webinars

### How to Make PTFE Bellows a Reliable & Safe Component in Chemical Plants

**Date:** April 28, 2020

**Instructor:** Michael Bruemmer,  
Corrosion Resistant Products (CRP)

The presentation highlights the existing design standards and different practices to define max. pressure/temperature ratings, including the state-of-the-art definition for max. pressure/temperature ratings on PTFE Bellows. Furthermore, it helps to define expected lifetime for such critical components. The presentation also shows different manufacturing processes and the best manufacturing process for PTFE Bellows to achieve lowest stress and highest form stability for the PTFE.

### Working with Subject Matter Experts in a COVID-19 World

**Date:** July 23, 2020

**Instructor:** Peggy Salvatore,  
Author & Knowledge Transfer SME

In this presentation, we'll look at the human resource challenges of capturing knowledge from your experts and transferring it to the employees who need it as they are exacerbated during COVID-19. In this high-level overview of big challenges, we'll briefly discuss:

- Training and knowledge management in a remote working environment
- Hiring, onboarding, and re-boarding issues for training
- Off-boarding your experts

Then we'll take a slightly deeper dive into the Working With SMEs methodology regarding how to download expert knowledge by addressing the 10 common issues you encounter when capturing knowledge from your experts.

### Welding Metallurgy of Duplex Stainless Steels

**Date:** August 26, 2020

**Instructor:** Dr. Ravi Vishnu, Outokumpu

The historical evolution of different generations of duplex stainless steels will be traced and it will be shown how welding metallurgy has played a central

role in these developments. One impediment to the successful use of duplex stainless steels today is an incomplete understanding of the relevant standards governing welded constructions. An attempt will be made to present a nuanced understanding of different requirements in the codes related to welding. One common source of confusion is the differences in the requirements in many national and international standards. The differences will be highlighted, and an effort will be made to explain why they may have arisen.

### Sealing Non-Metallic Flange Joints – Challenges and Considerations

**Date:** December 9, 2020

**Instructor:** Matt Tones & Jim Drago,  
Garlock Sealing Technologies

A new FRP tank requires a metal gate valve with raised face flange to be joined to one of the tank's flanged nozzles. The rubber gasket originally specified won't work, due to media incompatibility...what's next? Non-metallic pipe systems are commonly specified when corrosion is of chief concern and the cost of exotic metals is high. There are basic and special considerations for the selection and application of gasket materials.



# 389

## Total Webinar Attendance



# TECHNICAL ADVISORY COUNCIL (TAC) REPRESENTATIVES

The Technical Advisory Councils – AmeriTAC, AsiaTAC and EuroTAC – are comprised of one representative from each member company. TAC Representatives are responsible for the distribution of MTI information and products and provide representation at regional TAC meetings. TAC meetings are organized and conducted by chairs and vice chairs elected from each region.

## TAC LEADERSHIP

### AmeriTAC

Marc Cook, Chair  
Dow  
Jeremy Nelson, Vice Chair  
Koch Industries, Inc.

### AsiaTAC

Tzu-Ping Cheng, Chair  
ITRI  
Alex Chen, Co-Vice Chair  
Dow  
Masao Nakahara,  
Co-Vice Chair  
Asahi Kasei Corporation

### EuroTAC

Anette Hansson, Chair  
Haldor Topsoe A/S  
Lars Rose, Vice Chair  
DuPont

## TAC REPS BY COMPANY

### Advansix

Tiffany New-Courtney <sup>1,2,3</sup>  
Senior Reliability Engineer

### Air Liquide

Jader Furtado <sup>1</sup>  
R & D International Expert –  
Physical Metallurgy  
Chen Ren <sup>2</sup>  
R & D International Expert –  
Physical Metallurgy  
Sophie Wastiaux <sup>3</sup>  
Asset Integrity Management

### Air Products and Chemicals, Inc.

Minfa Lin <sup>1,3</sup>  
Senior Principal Research  
Engineer  
Ryan Yang <sup>2</sup>  
Materials Engineer, Asia

### Albemarle Corporation

Shantie Kapoerchan <sup>3</sup>  
Reliability & Inspection  
Engineer  
Hardin Wells <sup>1,2</sup>  
Fellow – Mechanical  
Tech Service

### ArcelorMittal-Industeel

John Grocki <sup>1</sup>  
Materials Consultant  
Sandra Le Manchet <sup>2,3</sup>  
Corrosion Resistant Alloys –  
R&D and Marketing

### ARKEMA

Carlos Alvarado <sup>1</sup>  
Corrosion Principal Materials  
and Reliability Specialist

### Asahi Kasei Corporation

Masao Nakahara, AsiaTAC  
Co-Vice Chair <sup>1,2,3</sup>  
Senior Researcher,  
Plant Engineering Center

### Ascend Performance Materials

Mark Hilton <sup>3</sup>  
Engineering Fellow Materials  
Corrosion  
Xiaowei Ren <sup>1,2</sup>  
Materials and Corrosion  
Engineer

### ATI, Inc.

Marco Balke <sup>3</sup>  
Manager Quality  
Assurance + EHS  
Sabrina Meck <sup>1</sup>  
Sr. Product Development,  
Corrosion Specialist  
Wan gi Choi <sup>2</sup>  
Sales Manager

### BASF Corporation

Natalie Gelder <sup>3</sup>  
Materials Engineer Technical  
Inspection & Materials  
Engineering & Maintenance  
Ben McCurry <sup>1</sup>  
Materials & Inspection  
Engineer

### Becht

Jeremy Staats <sup>1,2,3</sup>  
Assistant Manager – Refining  
Corrosion and Materials  
Engineer

### BP

Thomas Eason <sup>1,2</sup>  
Inspection Manager  
Frederic Tabaud <sup>3</sup>  
Principal Engineer Materials  
and Corrosion

### Chemours

Jay Schickling <sup>1,2,3</sup>  
Principal Consultant –  
Ceramics and Refractories

### Chevron Corporation

Maricela Johnson <sup>1,2,3</sup>  
Materials Engineer

### Chevron Phillips Chemical Company

Nina Young <sup>1,2,3</sup>  
Sr. Corrosion &  
Materials Engineer

### ConocoPhillips

Stuart Wilson <sup>1,2,3</sup>  
Principal Engineer

### Corrosion Materials

Jacob Rodriguez <sup>1,2,3</sup>  
Technical Sales  
Engineer, Metallurgist

### Corteva Inc.

Ajit Mishra <sup>1,2,3</sup>  
Materials Engineering  
Consultant

### Dow

Alex Chen <sup>2</sup>  
Senior Reliability Manager  
Evelyn Dayss <sup>3</sup>  
Materials Engineer  
Dale Keeler <sup>1</sup>  
Non Metals TSTL

### DuPont Company

Lars Rose <sup>3</sup>  
Maintenance Manager  
Maurice Wadley <sup>1,2</sup>  
Materials Engineer

### Eastman Chemical Company

David Cole <sup>1</sup>  
Materials Engineer  
Will Hoskins <sup>2,3</sup>  
Materials Engineer

### Electro Chemical Co. – Superior Dual Laminates

Dale Heffner <sup>1,2,3</sup>  
Vice President

### Enerfab

Kelly Wyrrough <sup>1,2,3</sup>  
Technical Sales

### Equity Engineering Group, Inc.

Kenneth Kirkham <sup>1,2,3</sup>  
Principal Engineer

### ExxonMobil Research and Engineering Company

Ser-Hor Chong <sup>2</sup>  
Materials Engineer  
John Houben <sup>3</sup>  
Discipline Team Leader;  
Fabrication, Welding, Surface  
Engineering

Ivan Morales <sup>1</sup>  
Discipline Technology  
Lead – Materials

### FMC Corporation

Srini Kesavan <sup>1,2,3</sup>  
Principal Engineer – Materials

### Haldor Topsoe A/S

Maria Jose Landeira  
Oestergaard <sup>1,2</sup>  
Senior Manager –  
Mechanical Department  
Anette Hansson <sup>3</sup>  
Materials Specialist

### Haynes International Inc.

Dior Chen <sup>2</sup>  
Sales Engineer  
Vinay Deodeshmukh <sup>1</sup>  
Senior Staff Engineer  
Klaus Ohla <sup>3</sup>  
Marketing

### Huntsman Corporation

Maarten Langbroek <sup>3</sup>  
Materials Technology Engineer  
Andrew Rentsch <sup>1,2</sup>  
Materials Engineer

### ITRI

Tzu-Ping Cheng <sup>1,2,3</sup>  
Technical Director

### Koch Industries, Inc.

Jeremy Nelson <sup>1,2</sup>  
Fixed Equipment Engineer  
Thierry Uilenburg <sup>3</sup>  
Materials Engineer

### Linde

James White <sup>1,2,3</sup>  
Associate Director

### LyondellBassell

Yingzi Chen <sup>1,2</sup>  
Principal Materials and  
Corrosion Engineer  
Christoph Hantsch <sup>3</sup>  
Mechanical Engineer/EWE

### MISTRAS Group

Jim McVay <sup>1,2,3</sup>  
Principal Advisor – Mechanical  
Integrity, Metallurgy &  
Corrosion

### Neotiss

Mathieu Lheureux <sup>3</sup>  
Technical Sales Manager  
Wendy McGowan <sup>1,2</sup>  
Senior Manager, Business  
Development

### New Castle Stainless Plate, LLC

Tony Palermo <sup>1,2,3</sup>  
Regional Manager

### Nickel Institute

Gary Coates <sup>1</sup>  
Technical Manager  
Philip Song <sup>2</sup>  
Manager China  
Benoit Van Hecke <sup>3</sup>  
Market Development Manager

### NobelClad

Young Shin Choi <sup>2</sup>  
Sales Manager  
Olivier Sarrat <sup>3</sup>  
Business Development  
Steve Sparkowich <sup>1</sup>  
Manager, Business  
Development & Materials  
Engineering

### NORAM

David Clift <sup>1,2,3</sup>  
Senior Project Engineer

### Nouryon

Ed Naylor <sup>1</sup>  
Senior Materials  
Engineering Associate  
Jan Van de Wetering <sup>3</sup>  
Expertise Head –  
Corrosion Engineering  
Wei Zhang <sup>2</sup>  
Leader of Quality Inspection

### NOVA Chemical Corporation

George Donald <sup>1,2,3</sup>  
Metallurgist

### Outokumpu, Inc.

Rodrigo Faveret Signorelli <sup>1,3</sup>  
Technical Manager  
Chang-Ching Sun <sup>2</sup>  
Market Development  
Director / BA

### P.A., Inc.

Otis Galloway <sup>1,2,3</sup>  
President

### Pfautler, Inc.

Lisa Desai <sup>1,2,3</sup>  
Director of Technology  
Sales, Americas

### Plymouth Tube Co.

John Woodward <sup>1,2,3</sup>  
Power-Process-Market and  
Technical Development

### RathGibson

Jim Baumann <sup>1,2,3</sup>  
Director – CPI Sales

### RL Industries

Brian Linnemann <sup>1,2,3</sup>  
VP Operations

### Rolled Alloys

Marc Glasser <sup>1,2,3</sup>  
Director of  
Metallurgical Services

### SABIC

Abdulmohsin Alsahli <sup>1,2,3</sup>  
Engineer

### Sandvik Materials Technology

Vikram Pandit <sup>2</sup>  
Technical Marketing Manager  
Marcelo Senatore <sup>1,3</sup>  
Technical Marketing Manager

### Schmidt+Clemens GmbH+Co KG

Dr. Dietlinde Jakobi <sup>1,2,3</sup>  
General Manager – Research  
& Development Services  
Centrifugal Casting Division

### Shell

Jorge Penso <sup>1,2</sup>  
Senior Inspection and Integrity  
Engineer  
Jan Vonk <sup>3</sup>  
Senior Materials & Corrosion  
Engineer

### Sitech Services

Peter Janssen <sup>1,2,3</sup>  
Corrosion & Materials  
Engineer

### Stress Engineering Services

Derrick Rogers <sup>1,2,3</sup>  
Business Development Leader

### Syncrude Canada Ltd.

Michael Anderson <sup>1,2,3</sup>  
Area Leader – Reliability &  
Performance Improvement

### TITAN Metal Fabricators

Larry Haubner <sup>1,3</sup>  
Vice President of Sales and  
Marketing

Sanghyuk Lee <sup>2</sup>  
General Manager

### Titanium Fabrication Corp.

Greg Dunn <sup>1,2,3</sup>  
Vice President,  
Sales & Marketing

### TOTAL, SA

Francois Dupoirion <sup>1,2,3</sup>  
Materials and Corrosion Expert

### Tricor Industrial Inc.

Charles Young <sup>1,2,3</sup>  
Business Development  
Manager / Metallurgist

### VDM Metals International GmbH

Helena Alves <sup>2</sup>  
Area Leader – Reliability &  
Performance Improvement  
Bao Jun Li <sup>2</sup>  
Managing Director, China  
Sereibot Yem <sup>1</sup>  
Senior Applications Engineer

### Victaulic

Daniel Christian <sup>3</sup>  
Director – Power Market Sales  
Europe-Middle East-India  
J. Michael Griffin <sup>1</sup>  
Director Engineering, Materials  
Technology  
Shuo Peng <sup>2</sup>  
Manager, Asia R & D Center

### Ward Vessel and Exchanger

Adam Renstrom <sup>1,2,3</sup>  
Regional Sales Manager

### Webco Industries, Inc.

Bill Bieber <sup>3</sup>  
Director Business Development  
Yong-Joo Kim <sup>1,2</sup>  
Vice President Process &  
Product Innovation

### Yara International

Linn Dring <sup>1,2,3</sup>  
Principal Materials Engineer



# DESIGNATED REPRESENTATIVES

Designated Representatives (DRs) function as the official member company delegate in matters of organizational voting and dues, and serve as the primary contact at the member company.

**Abdulmohsin Alsahli**  
SABIC  
Engineer

**Helena Alves**  
VDM Metals International GmbH  
Senior Vice President  
Research & Development

**Michael Anderson**  
Syncrude Canada Ltd  
Area Leader – Reliability & Performance Improvement

**David Barber**  
Dow  
Engineering & Maintenance  
Principal, Materials  
Engineering Discipline Global Improvement Leader

**Troy Bartley**  
Titanium Fabrication Corp  
Technical Sales

**Jim Baumann**  
RathGibson  
Director – CPI Sales

**Bill Bieber**  
Webco Industries, Inc.  
Director Business Development

**Holly Both**  
Plymouth Tube Co  
VP Marketing

**Yingzi (Julie) Chen**  
LyondellBasell  
Principal Materials and Corrosion Engineer

**Tzu-Ping Cheng**  
ITRI  
Technical Director

**David Clift**  
NORAM  
Senior Project Engineer

**Gary Coates**  
Nickel Institute  
Technical Manager

**Vinay Deodeshmukh**  
Haynes International Inc.  
Senior Staff Engineer

**Lisa Desai**  
Pfaudler, Inc.  
Director of Technology  
Sales, Americas

**George Donald**  
NOVA Chemicals Corporation  
Metallurgist

**Linn Dring**  
Yara International  
Principal Materials Engineer

**Francois Dupoirion**  
TOTAL, SA  
Materials and Corrosion Expert

**Thomas Eason**  
BP  
Inspection Manager

**Jader Furtado**  
Air Liquide  
R&D International Expert – Physical Metallurgy

**Otis Galloway**  
P.A., Inc.  
President

**Marc Glasser**  
Rolled Alloys  
Director of Metallurgical Services

**J. Michael Griffin**  
Vistaallic  
Director Engineering, Materials Technology

**Larry Haubner**  
TITAN Metal Fabricators  
Vice President of Sales and Marketing

**Dale Heffner**  
Electro Chemical Co.-Superior Dual Laminates  
Vice President

**John Houben**  
ExxonMobil Research and Engineering Company  
Discipline Team Leader; Fabrication, Welding, Surface Engineering

**Curtis Huddle**  
Eastman Chemical  
Metallurgist/Materials Engineer

**Dietlinde Jakobi**  
Schmidt+Clemens GmbH+Co KG  
General Manager – Research & Development Services  
Centrifugal Casting Division

**Peter Janssen**  
Sitech Services  
Corrosion & Materials Engineer

**Maricela Johnson**  
Chevron Corporation  
Materials Engineer

**Srini Kesavan**  
FMC Corporation  
Principal Engineer – Materials

**Kenneth Kirkham**  
The Equity Engineering Group, Inc.  
Principal Engineer

**Sandra Le Manchet**  
ArcelorMittal Industeel  
Manager of Corrosion Resistant Alloys R&D Department

**Minfa Lin**  
Air Products and Chemicals, Inc.  
Senior Principal Research Engineer

**Brian Linnemann**  
RL Industries  
VP Operations

**Debra McCauley**  
Chemours  
Materials Principal Consultant

**Ben McCurry**  
BASF Corporation  
Materials & Inspection Engineer

**Wendy McGowan**  
Neotiss  
Senior Manager, Business Development

**Jim McVay**  
MISTRAS Group  
Principal Advisor – Mechanical Integrity, Metallurgy & Corrosion

**Sabrina Meck**  
ATI, Inc.  
Sr. Product Development, Corrosion Specialist

**Masao Nakahara**  
Asahi Kasei Corporation  
Senior Researcher, Plant Engineering Center

**Ed Naylor**  
Nouryon  
Senior Materials Engineering Associate

**Jeremy Nelson**  
Koch Industries, Inc.  
Fixed Equipment Engineer

**Tiffany New-Courtney**  
AdvanSix  
Senior Reliability Engineer

**Maria Jose Landeira Oestergaard**  
Haldor Topsøe A/S  
Senior Manager – Mechanical Department

**Andrew Olander**  
Corteva Inc.  
Materials Engineer

**William Paden**  
Ascend Performance Materials  
Principal Corrosion & Materials Engineering Specialist

**Tony Palermo**  
New Castle Stainless Plate, LLC  
Regional Manager

**Jorge Penso**  
Shell  
Senior Inspection and Integrity Engineer

**Adam Renstrom**  
Ward Vessel and Exchanger  
Regional Sales Manager

**Andrew Rentsch**  
Huntsman Corporation  
Materials Engineer

**Jacob Rodriguez**  
Corrosion Materials  
Technical Sales Engineer, Metallurgist

**Marcelo Senatore**  
Sandvik Materials Technology  
Technical Marketing Manager

**Rodrigo Faveret Signorelli**  
Outokumpu, Inc.  
Technical Manager

**Steve Sparkowich**  
NobelClad  
Manager, Business Development & Materials Engineering

**Arun Sreeranganathan**  
Stress Engineering Services  
Senior Associate

**Jeremy Staats**  
Becht  
Assistant Manager – Refining Corrosion and Materials Engineer

**Renaud Veslin**  
ARKEMA  
Material and Corrosion Referent

**Maurice Wadley**  
DuPont Company  
Materials Engineer

**Hardin Wells**  
Albemarle Corporation  
Fellow – Mechanical Tech Service

**James White**  
Linde  
Associate Director

**Stuart Wilson**  
ConocoPhillips  
Principal Engineer

**Kelly Wyrough**  
Enerfab  
Technical Sales

**Nina Young**  
Chevron Phillips Chemical Company  
Sr. Corrosion & Materials Engineer

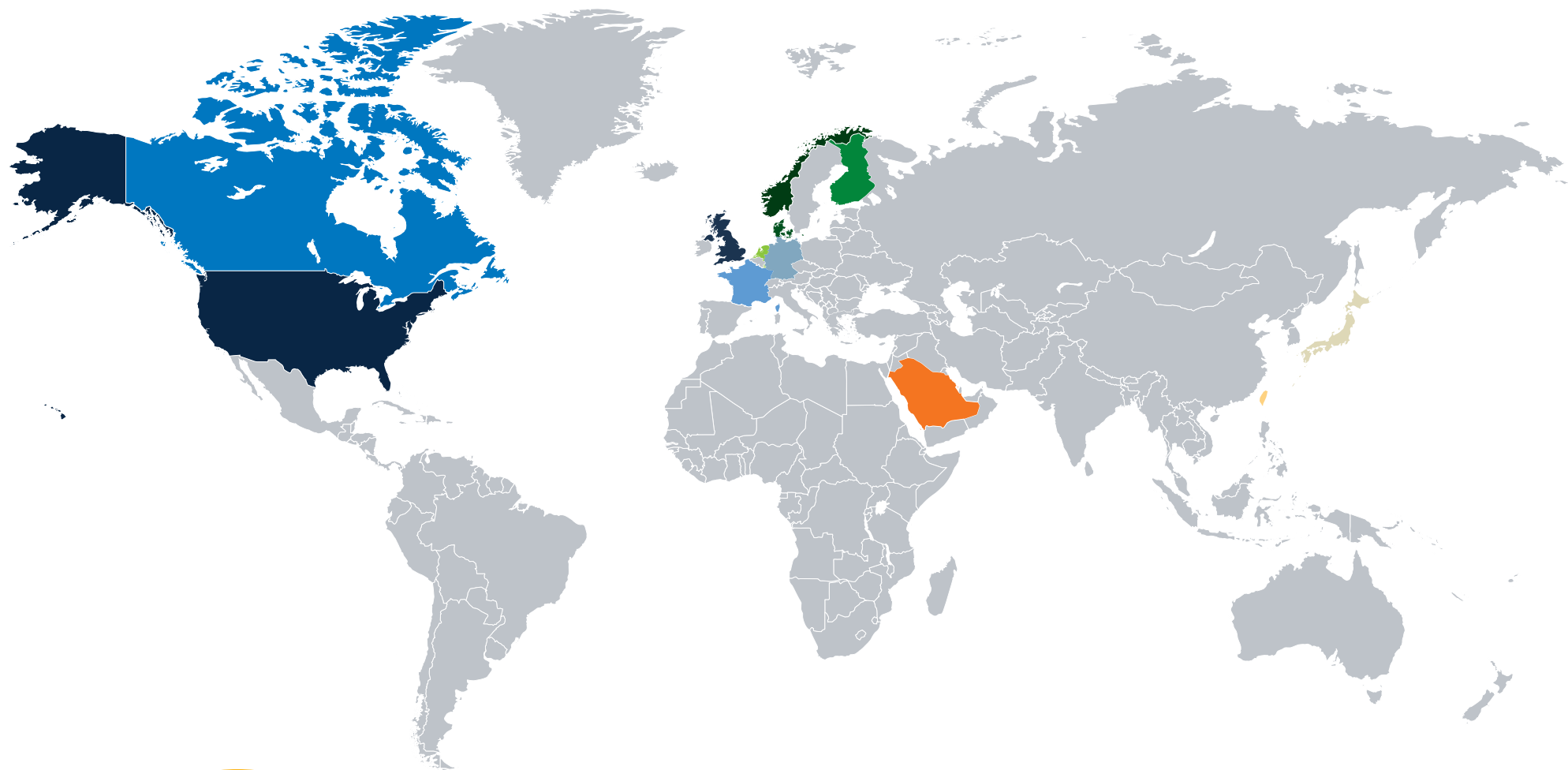
**Charles Young**  
Tricor Industrial Inc.  
Business Development Manager / Metallurgist

64  
Designated  
Representatives





GLOBAL COMMUNITY —  
2020 MEMBERSHIP



1690  
Total Members

12

Countries Serve as  
Member Company  
Headquarters

- |         |             |              |
|---------|-------------|--------------|
| Canada  | Germany     | Saudi Arabia |
| Denmark | Japan       | Taiwan       |
| Finland | Netherlands | U.K.         |
| France  | Norway      | U.S.A.       |

18

19

64  
Member  
Companies

31 + 31 + 2  
Producers      Suppliers      Organizations



2 Scholarships Awarded



Will Dixon,  
McGill University



Helen Nee,  
University of Akron

4 New Members



8 Membership Anniversaries in 2020

40 Years



20 Years



10 Years

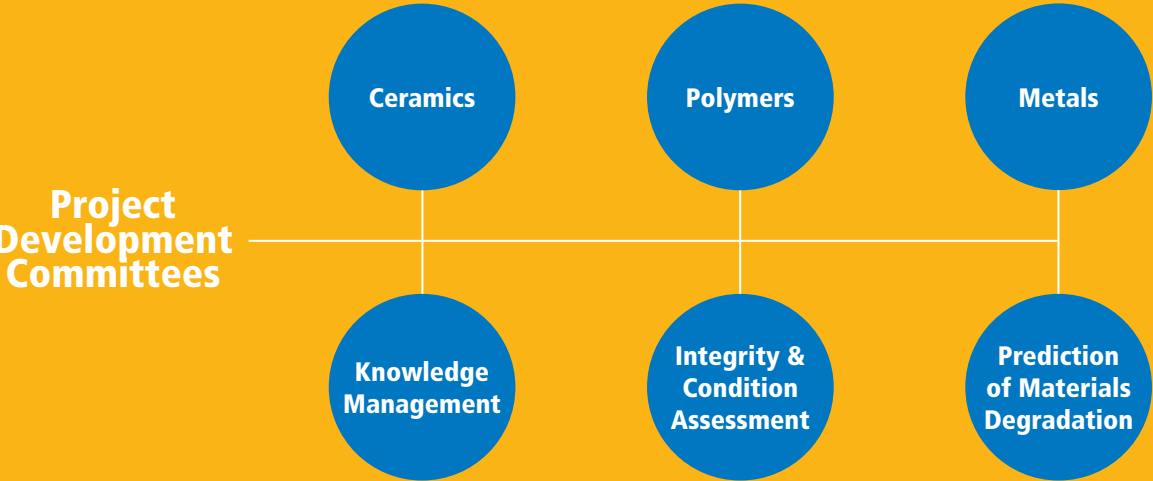


5 Years

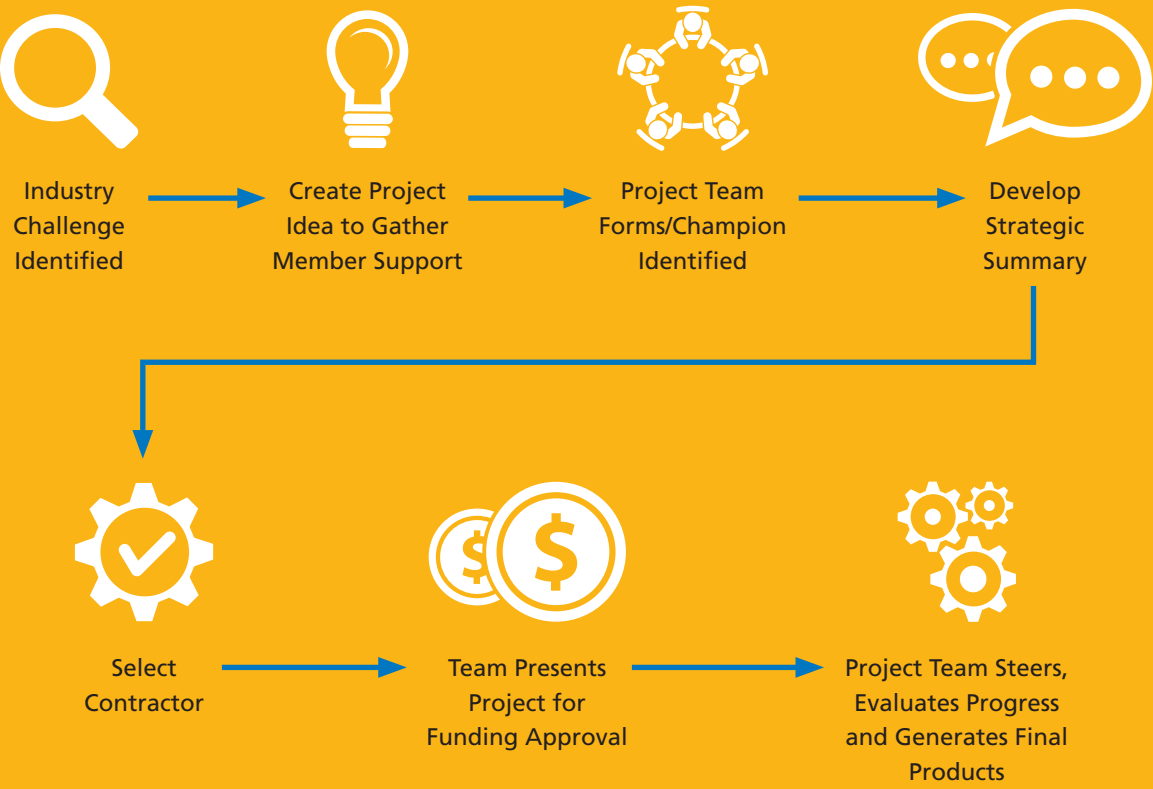


# MTI PROJECT COLLABORATION

Our member-driven projects are a key benefit of MTI membership. MTI's expert technical community provides member companies with opportunities to combine resources, leverage higher funding, utilize the power of networking and access a more diverse knowledge pool to solve critical industry challenges. The research conducted is a collaborative process, typically vetted through MTI's six Project Development Committees (PDCs), working toward generating strategic project ideas to benefit members and the industry.



# MTI PROJECT PROCESS



# 2020 PROJECTS OVERVIEW

8 Completed/Closed Projects	12 Newly Funded Projects	\$363.6K Approved Funding
36 Total Active Projects	64 Champions <sup>1</sup>	1,013 Project Team Members <sup>2</sup>

1) Some members may serve as the champion for more than one project.  
2) Members are counted per each project team signed up to participate in.

# POTENTIAL PROJECTS

When an industry challenge is identified and there is support from MTI members and a project champion to investigate a solution, a potential project is created. Below is the current list of projects MTI is working to develop. More information about each project is available at [www.mti-global.org/](http://www.mti-global.org/).

- 301: Microbiological Corrosion of Lean, Super, Hyper Duplex and Austenitic SS
- 310: New Test Method for Titanium Hydriding
- 316: Standard Defects for Heat Exchanger Calibration Tubes
- 318: Investigation of Low Toughness of Carbon Steel Piping Components
- 333: Safe-ended Tubes
- 335: Atlas of Microstructures for Alloy 625
- 344: Repository of Damage Images
- 351: PTFE Bellows Expansion Joint Integrity
- 357: Corrosion in Bio-oils
- 358: High Temperature - Low Chloride Pitting, Crevice Corrosion and SCC
- 359: Revising ASSET
- 365: SMR Cat Tubes: "Strategies for Replacement" Survey
- 368: Best Practices for Working with SME's
- 369: Business Cases for Knowledge Management Continuous Improvement
- 372: Small Samples Testing Technics
- 373: Refractory Ceramic Fiber Training
- 374: P91 Steel Welding Guidance





# 2020 COMPLETED PROJECTS

## 268 – Guidance for Failure Mechanisms

**Champion:** *Lars Rose (DuPont)*  
The idea behind this book was to create a publication that would not simply copy existing documents—such as the API 571 and its supplemental documents (for example, API RP 941 and API RP 939-C); the 2016 Handbook of Materials Failure Analysis with Case Studies from the Oil and Gas Industry, edited by A. Makhlouf; or the MTI document 170-05 (Guidance for Plant Personnel in Gathering Data and Samples for Materials Failure Analysis by David E. Hendrix)—but extend the content beyond these volumes and (because many failures may occur at very different industries) to make the topic of failure mechanisms more relevant to the chemical, pharmaceutical, and food processing industries.

## 296 – RFID Sensors Phase II

**Champion:** *Robert Sinko (Eastman)*  
This project further investigated various aspects of RFID sensor capabilities to monitor integrity condition and define the parameters and capabilities of the sensors in dual laminate equipment. The project looked at mechanical properties of dual laminates with embedded RFID sensors. Longer range sensor/readers were identified and tested, and a reader extension arm was developed. An app was developed to facilitate data collection and management. MTI owns two of these readers and additional tags and they are located at the MTI office. MTI members may use the remaining sensors and borrow the readers on a first come, first serve basis.

## #307 – Short Term Use of Duplex Stainless Steels at Elevated Temperatures

**Champions:** *Anette Hansson (Haldor Topsoe), Frederic Tabaud (BP)*  
This project resulted in a final report available on the MTI member website. The final report contains a literature survey of low-temperature embrittlement – 475 °C (890 °F) – of duplex stainless steel grades ASTM UNS S31500, S32750, S32304, S32205. The report aims to survey the effect of aging at temperatures between 250 and 400 °C (480 and 750 °F), which is a temperature span that is deemed relevant for industrial service conditions, which are limited to 316 °C (600 °F) in the American standard and 250 °C (480 °F) in the European standard for pressure vessels. Welding is clearly an important aspect of the application of duplex stainless steels and therefore weldments are also included in the survey.

## #342 – Global Solutions Symposium

**Champions:** *Meghan Oaks (BASF), Chuck Young (Tricor)*  
MTI's Global Solutions Symposium was held in Baton Rouge, LA, February 18-20, 2020. The event featured 23 presentations on Emerging Technology, Turnarounds, High Temperature Corrosion, Corrosion Under Insulation, and Knowledge Management. The technical program was designed by industry members for engineering, operations, and management personnel in Chemical Production, Fertilizers, Refining, Mining and other Process Industry organizations. In addition to the five technical tracks, the Symposium featured a "Global Solutions Marketplace" providing access to 30 industry partners, ranging from engineering companies to metals producers and fabricators.

## #350 – Elastomer Training

**Champion:** *Will Hoskins (Eastman)*  
The course, originally scheduled to be one day in conjunction with AmeriTAC 133, was conducted as part of the virtual GlobalTAC Fall 2020 meeting due to COVID-19. The course featured a basic overview of elastomeric materials and detailed sessions on CPI-specific elastomer applications by subject matter experts from elastomer manufacturers/suppliers, end users and MTI staff. Recordings are available to members on the MTI website.

## #370 – Digitalization Roundtable

**Champion:** *Abdulmohsin Alsahli*  
MTI hosted a virtual roundtable on Digitalization for Reliability and Integrity in the Petrochemical Industry, on Tuesday, November 10, 2020. Several distinguished Subject Matter Experts (SMEs) presented on different digitalization topics and how to utilize digitalization to improve petrochemical plant reliability and integrity. The objectives of the program were to provide attendees with insights on how to effectively implement digital transformation initiatives and to enable networking and the exchange of experiences with peer industry experts. The meeting was open to members and non-members, and the sessions were recorded and available on the MTI website.

## CLOSED PROJECTS

Occasionally, MTI closes projects when there is not enough member support or data for a project to move from the potential to funded phase. The explanation for each closed project is documented below.

## #290 – SSC Susceptibility of DSS

Project #290 never identified a project champion and there was no apparent interest to proceed with the scope development by Metals PDC members. The original project group was waiting to learn the outcome from a Joint Industry Project run by Southwest Research Institute to determine a path forward. That Phase I project was funded by approximately five companies. The Phase I JIP project is complete; however, the findings are only available to the sponsor companies. A Phase II project has been proposed by Southwest Research Institute. This proposal was requested and received. It was circulated to the #290 project team members for their review to determine potential interest from MTI. No responses to participate in the Phase II study were received.

## #313 – NH3 (Anhydrous) SCC Update

Project #313 never identified a project champion and there was no apparent interest to proceed with scope development by Metals PDC members. Based on the original interest of the project team, a literature search on this topic was conducted by NERAC. That literature search report is posted in the #313 community on the MTI website.



**Global Solutions Symposium**

201	30	4	19	2
Members	Exhibitors	Tracks	Technical Presentations	Keynotes



**Elastomer Training**

**Guidance for Failure Mechanisms**



**Digitalization Roundtable**



# PROJECT 268 RESULTS IN COMPREHENSIVE PUBLICATION

*Completes New Book: Guidance for Failure Mechanisms*

The idea behind this book was to create a publication that would not simply copy existing documents—such as the API 571 and its supplemental documents (for example, API RP 941 and API RP 939-C); the 2016 Handbook of Materials Failure Analysis with Case Studies from the Oil and Gas Industry, edited by A. Makhoul; or the MTI document 170-05 (Guidance for Plant Personnel in Gathering Data and Samples for Materials Failure Analysis by David E. Hendrix)—but extend the content beyond these volumes and (because many failures may occur at very different industries) to make the topic of failure mechanisms more relevant to the chemical, pharmaceutical, and food processing industries.

This idea was discussed among the MTI EuroTAC members during the 2012 and 2013 EuroTAC meetings in Frankfurt, Germany. The first proposal to generate a project out of these discussions was floated during the 2014 EuroTAC meeting at Aachen University, with Dr. Lars Rose of DuPont as the project champion. The official request for proposal (RFP) was filed in 2015.

“Due to the large scope and the high number of member companies having very strong opinions on where this project should go, it was very important to have regular teleconferences and re-discuss the current proposals at each EuroTAC before it could even get to the RFP, much less the bidding phase,” Rose remarks.

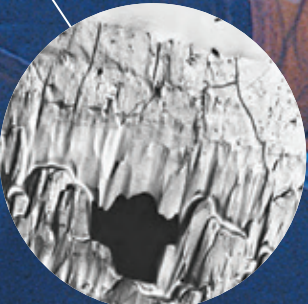
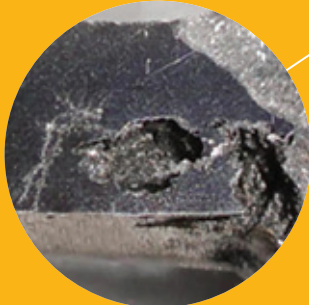
Even then, strong member participation led to the addition of some chapters, written by members of the team, and again regular meetings with the authors and supporting team members also led to some chapters being dropped in favor of topics of more interest to the chemical industry at-large, as well as the reviewers. Over the course of two years, the very diverse project team had assembled to fit

what could be dozens, if not hundreds, of individual scientific books on each failure mechanism into one single volume of 31 chapters.

The final product aims to be sufficiently interesting for doctoral materials engineers to read, yet comprehensible and concise enough to be given to any newly appointed field inspector. The book will help to identify failures in the field and learn how to prevent said failures, thereby improving the overall quality of inspections and, ultimately, reducing the incident and failure rate in the field. Or, in other words, achieve the perfect solution to the multitude of interests represented.

The result will hopefully be useful to and used by companies as one of the main go-to tools in materials inspection and selection. Once released to the public, it may be used as a guide to failure mechanisms for multiple industries. Although it is not comprehensive, it is meant to supplement the currently available mechanisms available in API 571 and point the reader to other helpful documents and references for greater depth than can be covered.

“Everybody who holds this document in their hand has a solid reference that can be used to identify, predict, treat, and prevent failures in their facilities that could result from one of the almost three dozen mechanisms chosen for this book,” concludes Rose. “These are not all-encompassing, and several other mechanisms exist, of course, but the major ones that may be expected at many of our plants are included. As a result, this work serves to reduce the risk of incidents and resulting personal injuries, as well as the loss of business opportunities, making the operation of chemical, petrochemical, pharmaceutical, and food/beverage industries much safer and more profitable.”



*The idea behind this book was to create a publication that would not simply copy existing documents but extend the content beyond these volumes and make the topic of failure mechanisms more relevant to the chemical, pharmaceutical, and food processing industries.*



# 2020 FUNDED PROJECTS

**Process Industry Corrosion Short Course (Project 336)**  
**Champions:** Bob Hurst (Becht), Jennifer Larimore (Chemours)  
**Amount Funded:** \$115,000  
This project will develop course materials to facilitate training of entry level engineers and technicians to the Chemical Process Industry. The objective is to fill the gap that exists for specific practical plant corrosion issues faced by engineers. The course will consist of electronic training materials divided into specific topics/modules and include written instructor/speaker notes to accompany the training materials.

**Who Makes What 2 (Project 349)**  
**Champions:** Karen Picker (Sandvik), Bill Bieber (Webco)  
**Amount Funded:** No funding required  
This project will develop an improved online resource that will link available alloys in different product forms with available suppliers around the globe. This resource will allow MTI members to find appropriate suppliers for stationary products, such as fittings, tube, pipe and plate.

**PSA Structural Integrity Assessment – Phase I (Project 353)**  
**Champion:** Jader Furtado (Air Liquide)  
**Amount Funded:** \$32,200  
The purpose of this literature review (Phase I) is to justify the selected experimental program that will be executed later in Phase II, aiming at the creation of a mechanical properties database for PSA vessels. The data is required for carrying-out FFS (fitness-for-service) evaluations of H2 PSA subjected to fatigue cracking in H2 environment.

**Dual Laminate Training Course (Project 354)**  
**Champions:** Debra McCauley (Chemours), Dale Keeler (Dow)  
**Amount Funded:** \$25,000  
The objective of the Dual Laminate Training Course is to provide follow up training to the previous FRP trainings MTI offered. The scope of this project is intended to educate members, non-members, and third-party inspection resources. The information to be presented in this unique training course is a compilation of a very broad body of knowledge in one training package not found anywhere else. It is important to recognize that this knowledge would otherwise be acquired from many years of actual inspection work, trial and error.

**Fracture Toughness & Weldability of High Temperature Alloys (Project 356)**  
**Champions:** Jeremy Nelson (Koch Industries), Jose Ramirez  
**Amount Funded:** \$28,000  
This project will investigate the use of miniature specimens prepared from service-exposed high temperature alloys for fracture mechanics testing by comparing the results with full-size specimens from the same material. The focus of the test will be on measuring fracture toughness using miniature specimens and to develop guidelines for MTI members on how to use this technology to judge the suitability of aged alloys for further plant service and weldability. Due to the variety of testing technologies available, the project team will conduct a literature review of the state of the art in high temperature fracture toughness testing before beginning a lab testing program.

**Enrichment of the HTHA Damages Simulation Model to Take into Account Inclusions of Affected Welded Areas (Project 362)**  
**Champions:** Karl-Friedrich Schneider (BASF), Sophie Wastiaux (Air Liquide), Jose Ramirez (Air Products), Mark Lozev (Becht)  
**Amount Funded:** \$148,000  
The scope of this project is to perform a study in order to include in the simulation model developed in the P305: discrimination of the HTHA damages with inclusions by inserting them as a specific modeled item; validation of the model to samples with actual HTHA damage in the welded area.

**e-Library and Search Engine for MTI Documents (Project 363)**  
**Champions:** Curtis Huddle (Eastman Chemical)  
**Amount Funded:** \$63,800  
The current MTI e-Library provider will no longer host this type of service beginning January 1, 2022. The objective of this project is a comprehensive, accessible and user-friendly electronic library. It will meet the defined functional requirements for searching and retrieving information from MTI's knowledge base and integrates with our current website infrastructure powered by Higher Logic. MTI sought new vendors and selected TIND to host and integrate an e-Library solution for a new and improved MTI e-Library.

**Duplex Stainless Steels at Elevated Temperatures (Project 364)**  
**Champions:** Anette Hansson (Haldor Topsoe A/S), John Houben (ExxonMobil Research & Engineering)  
**Amount Funded:** \$23,700  
Following project 307, which was a thorough literature search on the topic of Duplex SS at elevated temperatures for short term exposures, this project was formed to fill in some of the gaps in knowledge of the effect on mechanical properties of DSS after repeated exposures, as well as the order of the aging exposures. A series of exposures will be conducted, and mechanical properties tested and compared to draw conclusions of the ability of these alloys to withstand short term exposure above recommended temperatures.

**2022 Global Solutions Symposium (Project #366)**  
**Champion:** Meghan Oaks (BASF), Chuck Young (Tricor)  
**Amount Funded:** No funding required  
Building on the success of the 2020 Symposium in Baton Rouge, this project will be used to establish the program for the symposium in February 2022 in Orlando. The focus of this event will be Practical Knowledge & Innovative Solutions for the Process Industries, featuring two education tracks and the Global Solutions Marketplace to meet with exhibitors.



PSA Structural Integrity Assessment – Phase I

Dual Laminate Training Course



e-Library and Search Engine for MTI Documents

Enrichment of the HTHA Damages Simulation Model to Take into Account Inclusions of Affected Welded Areas





MTI's founders designed the organization to multiply their return on investment by sharing the cost of non-proprietary research projects. That time-tested formula continues to work today, as members not only help fund these important activities but actively contribute to their success as Project Team participants. In 2020, MTI had more than 20 active projects in progress globally, generating answers that will help solve some of today's toughest materials engineering challenges.

## 2020 FUNDED PROJECTS (CONTINUED)

### Corrosion Data Collection for the Most Commonly Used Corrosion-Resistant Nickel Alloys – Phase II (Project #367)

**Champions:** Henry Ye (Chemours), Gary Coates (Nickel Institute)

**Amount Funded:** \$60,000

This project will collect existing corrosion data from trusted open sources and/or MTI member companies (established global suppliers of nickel alloys) who are willing to share the information. The team plans to continue the successful effort of Project 269 to collect existing and new corrosion data for 10 more nickel alloys. The same strategy, method, and process as Project 269 will be applied. The MTI contractor will analyze the data and develop an MTI Corrosion Reference Database using the existing data.

### Digitalization Roundtable (Project #370)

**Champion:** Abdulmohsin Alsahli (SABIC)

**Amount Funded:** No funding required

MTI will host a virtual roundtable on Digitalization for Reliability and Integrity in the Petrochemical Industry, on Tuesday, November 10, 2020. The roundtable will include discussions surrounding these key questions: What does digital transformation mean for the Petrochemical Industry? How could digital transformation improve plant reliability and integrity in the Petrochemical Industry? What are the challenges that can impact a successful transformational journey? Do you think existing technologies can enable digital transformation needs? The roundtable is intended for plant, engineering or materials personnel and managers, desiring to improve their knowledge, and understanding with respect to digitalization.

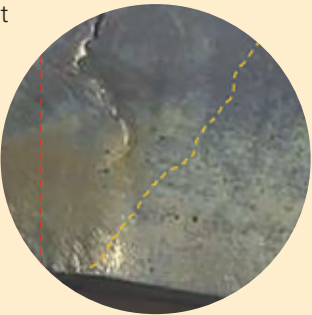
### ADDITIONAL FUNDING

#### Project #291 Stress Relaxation Cracking Testing of Alloy 800H

**Champions:** Oliver Durst (Air Liquide); Anette Hansson (Haldor Topsoe)

**Amount Funded:** \$15,800

This project is intended to first verify pre-conditions under which stress relaxation cracking (SRC) occurs for specific alloys. Subsequently, the project will develop a mitigation strategy, including the well-known heat treatment around 900°C and beyond. The Board of Directors approved a request for additional funding in February 2020 to perform further testing. Project #291 was originally funded in 2017.



Corrosion Data Collection for the Most Commonly Used Corrosion-Resistant Nickel Alloys – Phase II



Digitalization Roundtable



FINANCIAL STATEMENTS

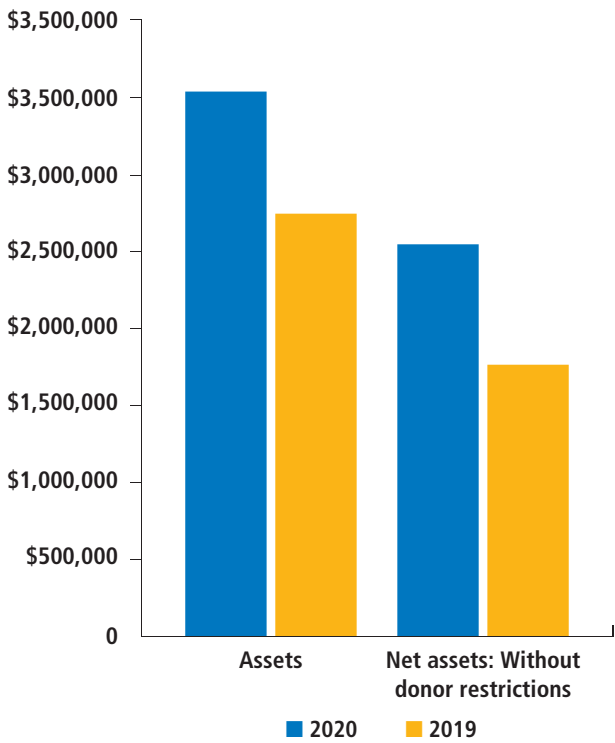
Years Ended December 31, 2020 and 2019

The 2020 MTI Annual Report demonstrates the wise investments and commitment by the MTI leadership, members and volunteers, who have guided and contributed to the organization’s ongoing success. Although our members are faced with many challenges in the industry, MTI is prepared to continue offering opportunities, with sensible oversight so that our members will benefit from “GLOBAL CONNECTIONS.”

The financial graphs listed in this annual report demonstrate the side-by-side comparison of 2020 and 2019 Statement of Financial Position, our Statement of Activities and the Statement of Cash Flow. As the association moves forward in 2021, MTI thanks all of the members, leaders and staff who have helped MTI grow and maintain its financial stability. MTI is firmly positioned, financially and strategically, as we continue to provide training, resources, networking and other benefits for our members. (A more detailed report of the Fiscal Year 2020 audit is available upon request.)

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Statements of Financial Position  
For the Years Ended December 31, 2020 and 2019



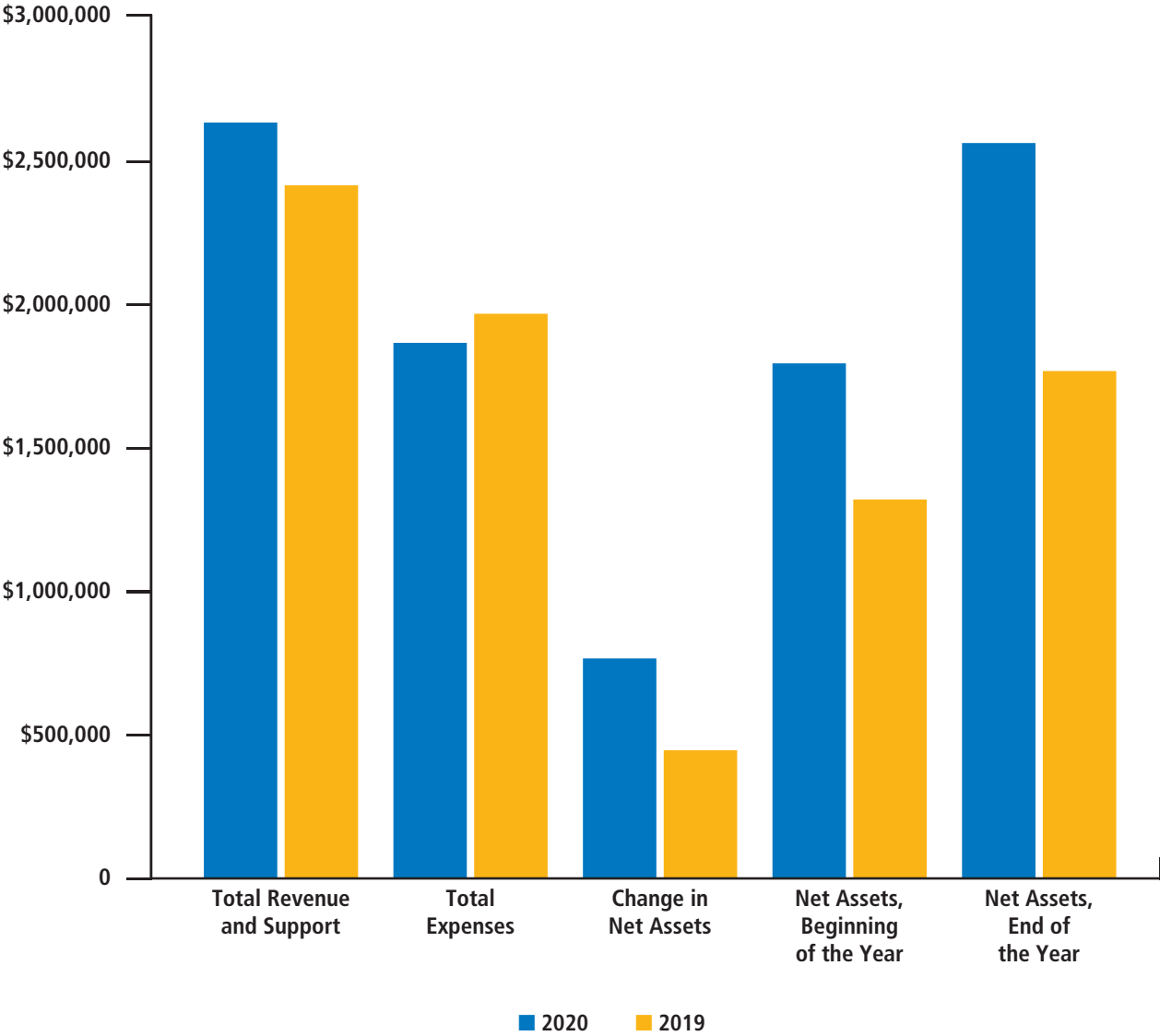
	2020	2019
Assets	\$3,502,874	\$2,747,548
Net assets: Without donor restrictions:	\$2,521,056	\$1,766,091

Statement of Cash Flows  
For the Years Ended December 31, 2020 and 2019

	2020	2019
Cash flows from operating activities:		
Change in net assets	\$754,965	\$446,850
Adjustments to reconcile change in net assets to net cash provided by operating activities:		
Depreciation	13,206	13,833
Investment (income) loss, net of fees	(70,647)	(39,554)
Changes in operating assets and liabilities:		
Decrease in assets:		
Accounts receivable	4,773	(4,773)
Accrued interest receivable	(2,153)	(4,620)
Prepaid expenses and deposits	4,568	(25,395)
Increase (decrease) in liabilities:		
Accounts payable	80,987	(7,437)
Accrued payroll	(7,164)	7,164
Accrued 401(k)	—	(6,085)
Accrued paid time off	4,246	(14,569)
Other accrued expenses	8,726	15,100
Deferred revenue	(86,434)	143,679
Net cash provided by operating activities	705,073	524,193
Cash flows from investing activities:		
Proceeds from redemption of certificates of deposit	709,793	750,495
Purchases of certificates of deposit	(1,150,000)	(1,165,000)
Purchases of property and equipment	(2,341)	(3,159)
Net cash used in investing activities	(442,548)	(417,664)
Net increase in cash and cash equivalents	262,525	106,529
Cash and cash equivalents, beginning of the year	393,660	287,131
Cash and cash equivalents, end of year	\$656,185	\$393,660

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Statements of Activities and Change in Net Assets  
For the Years Ended December 31, 2020 and 2019



	2020	2019
Total Revenue and Support	2,591,315	2,412,256
Total Program Services	1,375,015	1,419,508
Total Functional Expenses	1,836,350	1,965,406
Change in net assets	754,965	446,850
Net assets, beginning of the year	1,766,091	1,319,241
Net assets, end of the year	\$2,521,056	\$1,766,091

FINANCIAL STATEMENTS

Schedule of Functional Expenses  
For the Years Ended December 2020 and 2019

	Program Services				Supporting Services		Total	
	Projects 2020	Projects 2019	Meetings 2020	Meetings 2019	General and Administrative 2020	General and Administrative 2019	2020	2019
Wages and Benefits	\$395,543	\$305,152	\$252,950	\$299,033	\$188,813	\$246,416	\$837,306	\$850,601
Contractors	271,469	201,976	—	—	—	—	271,469	201,976
Other project expenses	106,805	11,538	—	—	—	—	106,805	11,538
Food and beverage	67,151	—	2,273	164,447	2,635	3,500	72,059	167,947
Employee benefits	9,227	8,021	18,454	16,043	33,831	29,312	61,512	53,376
Payroll taxes	28,203	23,167	18,036	22,702	13,463	18,530	59,702	64,399
Marketing	—	600	34,611	27,792	21,858	23,031	56,469	51,423
Rent and utilities	12,848	5,462	12,848	17,068	15,419	18,434	41,115	40,964
Software	3,717	1,878	3,717	1,878	32,541	30,911	39,975	34,667
Communications	1,481	1,992	1,481	1,922	36,065	10,282	39,027	14,196
Website	12,167	13,333	12,167	14,421	12,166	29,811	36,500	57,565
Office expenses	—	—	—	2,793	30,488	33,652	30,488	36,445
Professional services	6,824	7,980	—	7,980	20,940	31,444	27,764	47,404
Magazine	2,132	2,476	2,132	2,476	17,057	19,805	21,321	24,757
Publishing	19,587	1,401	—	—	—	—	19,587	1,401
Payroll Expenses	8,580	6,474	5,487	6,344	4,096	5,178	18,163	17,996
Speakers	8,514	—	8,514	1,972	—	—	17,028	1,972
Travel	—	21,393	11,542	74,164	2,477	9,209	14,019	114,766
Depreciation	—	—	—	—	13,206	13,833	13,206	13,833
Audio and visual	5,633	—	5,633	56,019	—	—	11,266	56,019
Insurance	3,692	3,654	3,692	3,654	3,693	3,655	11,077	10,963
Editing	9,388	5,330	—	—	—	—	9,388	5,330
Meeting Supplies	—	—	6,131	187	—	—	6,131	187
Miscellaneous expenses	—	—	—	—	5,776	7,027	5,776	7,027
Dues and subscriptions	—	—	—	—	5,045	2,957	5,045	2,957
Literature search	2,500	27,243	—	—	—	—	2,500	27,243
Postage	—	—	—	10,088	1,716	5,211	1,716	15,299
Printing expenses	—	3,699	—	3,699	50	3,700	50	11,098
Training expenses	—	—	(114)	7,462	—	—	(114)	7,462
Transportation	—	—	—	14,595	—	—	—	14,595
Totals	<u>\$975,461</u>	<u>\$652,769</u>	<u>\$399,554</u>	<u>\$756,739</u>	<u>\$461,335</u>	<u>\$545,898</u>	<u>\$1,836,350</u>	<u>\$1,965,406</u>

SCHEDULE OF ANNUAL  
MEMBERSHIP DUES FOR 2022

Sales \$US Billions	2022 Dues	Sales \$US Billions	2022 Dues
< 0.4 . . . . .	\$18,825	25.0 < 50.0 . . . . .	\$54,620
0.4 < 0.8 . . . . .	\$23,825	50.0 < 100.0 . . . . .	\$59,670
0.8 < 1.5 . . . . .	\$28,870	100.0 < 200.0 . . . . .	\$64,880
1.5 < 3.0 . . . . .	\$34,200	200.0 < 400.0 . . . . .	\$70,090
3.0 < 6.0 . . . . .	\$39,360	400.0 < 800.0 . . . . .	\$78,080
6.0 < 12.0 . . . . .	\$44,250	800.0 < 1,500.0 . . . . .	\$80,305
12.0 < 25.0 . . . . .	\$49,455		

BASIS FOR ASSESSING  
COMPANY’S MEMBERSHIP DUES

Dues for membership are determined from the dues schedule published in the Annual Report. Dues are based on the total sales of all divisions of the member company for the most recently audited fiscal year at the time of invoicing. For organizations that do not publish audited sales figures, such as privately held corporations and state-owned-enterprises, the total

sales must be certified by an officer. Membership dues for associations and other organizations, which do not have revenue from sales, will be considered by the Board of Directors on a case-by-case basis. The Board of Directors may make exceptions to this policy based on the discretion of the board.



# About Materials Technology Institute

The Materials Technology Institute, founded in 1977, is a unique, not-for-profit technology development organization representing private industry. It sponsors projects focused on both developing new technology and transferring existing knowledge to day-to-day practice. Practical, generic, nonproprietary studies are conducted on the selection, design, fabrication, testing, inspection, and performance of materials of construction used in the process industries. The scope of work includes evaluation of metallic and non-metallic materials, optimum design applications, fitness-for-service, mechanical integrity and life cycle determinations, and economic factors affecting performance of vessels, tanks, piping and other components.

Through membership and networking within MTI, companies can access solutions to nonproprietary problems of major concern to the process industries. Members can capitalize on the extensive expertise of member company representatives, leverage their technology investment by participating in the direction and results of MTI projects, and utilize MTI's books, reports, software and video training programs immediately as needed. Benefits to member companies are increased plant integrity, reliability and profitability.



Materials Technology Institute, Inc.  
1001 Craig Road, Suite 490 • St. Louis, MO 63146 U.S.A.  
+1 314.567.4111  
Email: [mtiadmin@mti-global.org](mailto:mtiadmin@mti-global.org) • Home Page: <http://www.mti-global.org>