

APRIL 2023

## Inside...

- 2 **Executive Board Listing**
- 2 **Chair Note**
- 2 **ASM – AWS NDT Education Session a Success**
- 3 **Sustaining Members**
- 3 **April Meeting Sponsor: element**
- 3 **ESD Gold Awards Banquet**
- 5 **Annual ASM & AFS Golf Outing Registration Form**
- 7 **March 13th Meeting Recap**
- 7 **March 23rd Student Night at Conor O'Neill's**

# Micro-Examiner

## Modern Casting 4.0

The metal casting process is evolving as new tools and methods become available. As computational materials development matures there will be new materials that will feed new designs. To take advantage of these new materials for lighter stronger parts new methods will be needed to fully take advantage of their properties. The additive manufacture (AM) of metal casting molds and cores is such a method. It allows the obvious improvement over traditional casting of removing the “draft” needed to remove the pattern reducing weight by 3-5%. Also it can allow internal cavities and other shapes that cannot be made by other methods. One of the drawbacks to AM for sand casting has been the overall cost but as we will discuss great progress has been made on that front. An additional but very important consideration must also be the role AM for sand casting will have on product development times, e.g., the rocket that was just launched was primarily produced by AM with the engine being 100% AM. It took two years from the start of design until the first launch.

**Bio: Daniel Shirkey** is President of the startup company LightSpeed Concepts Inc. designing and building 3D sand additive printers for agile design and production freedom for lightweight innovative castings. He has an MBA from the University of Michigan, a BSE from Grand Valley State University, and has attained technical depth and leadership breadth in engineering, project management, finance, lean culture, and operations prior to joining LightSpeed in 2021.

**Bio: Dr. John Biel** is the Director of Product Development at LightSpeed Concepts. He has a BSE, MSE and PhD in Material Science and Engineering from the University of Michigan. He has been a Principal Investigator for basic materials research projects and a Product Engineering Director for Tier 1 suppliers of steel and aluminum components and an Engineering Director in the aerospace electronics industry.

**Bio: Brandon Welker** is a Product Development Engineer at LightSpeed Concepts. He has a Bachelor of Science in Mechanical Engineering from the University of Michigan. He spent two years working as an intern for Joyworks LLC while getting his degree and then started full time at LightSpeed Concepts after graduating in 2019.



Speaker  
**Daniel Shirkey**  
President,  
LightSpeed  
Concepts Inc.



Tech Chair  
**Dr. Daniel Baker**  
Senior Materials  
Lab Engineer



Speaker  
**Dr. John Biel**  
Director, Product  
Development  
LightSpeed  
Concepts Inc.



Speaker  
**Brandon Welker**  
Engineer, Product  
Development  
LightSpeed  
Concepts Inc.

## 2022-2023 ASM Detroit Chapter Program

### April 10 – ASM Detroit and DWAFS Combined Meeting

Dan Shirkey, Dr. John Biel and Brandon Welker -  
LightSpeed Concepts Inc.  
“Modern Casting 4.0”  
Location - The Livonia Marriott

### May 8 – Woodside Lecture

Thomas Prucha, MetalMorphosis LLC  
“Metalmorphosis – Change and Transformation”  
Location: The Gazebo Banquet Center

### Aug. 11 – ASM & AFS Golf Outing

Location: Fellows Creek, Canton, MI

## ASM Detroit & DWAFS Combined Meeting

**Monday, April 10, 2023**

**Speakers: Mr. Daniel Shirkey, Dr. John Biel and Mr. Brandon Welker**  
**LightSpeed Concepts Inc.**  
**“Modern Casting 4.0”**

Location: The Livonia Marriott, 17100 N. Laurel Park Dr, Livonia, MI 48152

**Social Hour 5:30 pm • Dinner 6:30 pm • Announcements 7 pm • Speaker 7:15-8 pm**

**\*\*Special 22-23 season rate of \$20 a person with a reservation\*\*\* (\$5 for Students)**

**For reservations e-mail to [AsmDetroitChapter@gmail.com](mailto:AsmDetroitChapter@gmail.com) before Thursday, April 6th.**

# 2022-2023 ASM-Detroit Chapter Executive Board

## CHAPTER OFFICERS

**Nicholas Lessnau**  
Chair

**Mark Harper**  
Vice-Chair

**Emily Wolbeck**  
Secretary

**Daniel Baker**  
Treasurer

**Julie Nimer**  
Chapter Administrator

## EXECUTIVE COMMITTEE MEMBERS

**Jason Coryell**  
Attendance/Publicity

**James Boileau**  
Young Members/  
Student Affairs - Chair

**JP Singh**  
National Affairs

**Kae Poor**  
Chapter Council Representative/  
Education/MEI/Roundtable Chair

**Tim Stachowski**  
Entertainment Co-Chair

**Trisha Rouse**  
Entertainment Co-Chair

**Manish Mehta**  
Awards/Recognition Chair

**Eric McCarty**  
Finance/Council of Fellows Chair

**Angella Sell**  
Membership/Sustaining  
Members Co-Chair

**Rajan Bhambroo**  
Membership/Sustaining  
Members Co-Chair

**James Boileau**  
Papers/Programs Co-Chair

**Robert Cryderman**  
Papers/Programs Co-Chair

**Kathy Hayrynen**  
ASM Teacher's Camp

**Peg Jones**  
ASM Teacher's Camp



## Chair's Note

Hello. It's me again. I was recently thinking that the toughest part about being chairperson for a one-year term is that you really start to hit your stride as the term comes to its' limit. Luckily, with an organization like the ASM- Detroit Chapter we retain most of our past chairpersons on the board and they assist those that come after them. You have me here for another month and then the face on your Micro-Examiner will be that of the wholly qualified Mark Harper. Before Mark even gets started as chairperson, I want to take some time to thank him for the work he has been putting in and for agreeing to take on everything that has been thrown at him.

As always, we are constantly on the look out for talent that will take us into the coming years and decades. If being a champion of supporting and promoting education in the field of materials interests you, please reach out to me for more information on how to get involved. Pull me aside at a meeting or shoot me an email at [Nicholas.Lessnau@MNP.com](mailto:Nicholas.Lessnau@MNP.com).

If you were lucky enough to join us at the March 13th meeting, then you sure got a treat. We got a taste of something that hits a little closer to home for each of us during Stephanie and Don Dunkin's talk "Material Science in Road Construction." I think it is easy for each of us to moan and groan as we drive to and from work while weaving construction barrels on those classic Michigan roads. I know that after this meeting, I have a better understanding and appreciation of the hurdles faced and considerations taken for all these road projects. When you see road construction as consistently as we do, it is relieving to know that there are real scientific efforts being made to bring environmental considerations into the fold for materials use and reuse. undertaken in our state. Thank you again to Don and Stephanie for making the long trek to Warren that day and for the great presentation.

Be sure to take a look at the chapter program for the final few meetings of our schedule. I look forward to seeing you all in April and May.

Nick

## ASM-AWS NDT Education Session a Success

A very successful 'Joint AWS-ASM Nondestructive Testing (NDT) Regional Education Program' was held at United Technical on February 25. The event was open to AWS and ASM chapters throughout Michigan and northwestern Ohio. Twenty four professionals attended to learn from experts in NDT from United Technical, Ford, Washtenaw Community College, Z-Check, and Michigan NDT.

Five NDE processes were covered with roughly 30 minutes of introduction presentation and 30 minutes of "hands-on" to try the process out or become more familiar with the equipment involved. The inspection processes included: *Ultrasonic and Phased Array Ultrasonic* (Ken Milbocker, United Technical); *X-Ray/Radiographic* (Martin Jones, Ford); *Dye Penetrant* (Ashley Jones, WCC); *Magnetic Particle* (Jordan Zaleski, Z-Check); and *Eddy Current and Phased Array Eddy Current* (Matt Lorenz, Michigan NDT).

A pizza lunch helped soften the blow of "working" on a Saturday and participant feedback indicated that the material was well presented and the format was very well received. Hopefully this can serve as a start of more collaborative educational efforts.





## The ASM Detroit Chapter Thanks It's Sustaining Members for Their Continued Support!

Aalberts surface technologies

AFC Holcroft

Ajax Tocco Magnethermic Inc.

Allied High Tech Products Inc.

Autokiniton

Auto/Steel Partnership

Bruker Nano Inc.

Buehler

Burris Law

Darrow Mustafa PC

Dubois - Heatbath Park  
Metallurgical

Element Materials Technology

Gasbarre Thermal Processing  
Systems

GM Global R&D Laboratories

Inductoheat

Kolene Corporation

MetLab Corporation

Michigan Metrology

MSU Libraries/Serials  
Acquisitions

National Element Incorporated

Nitro-Vac Heat Treating Inc.

OMNI Metals Laboratory  
Incorporated

Rolled Alloys

RTI Laboratories, Inc.

Solar Atmospheres  
Struers

Sun Tec Corporation

Surface Combustion  
Incorporated

Titan Metallurgy

United Technical Inc.

Upton Industries Incorporated

## April Social Hour Sponsor



### MECHANICAL, METALLURGICAL, CHEMICAL AND FAILURE ANALYSIS

Element Wixom is a full-service metallographic laboratory with testing capabilities that include:

- Metallurgical Testing
- Chemical Analysis
- Mechanical Testing
- Failure Analysis & Consulting
- Fatigue Testing (HCF & LCF)
- Wear & Abrasion Testing
- 3D Digital Image Correlation
- Salt Spray, Humidity & Cyclic Corrosion
- NADCA/H13 Die Steel Qualification
- Cleanliness Testing (ISO 16232 and VDA 19)
- Hot Hardness Testing (to 1600 °F)
- Circuit Board Sectioning and Inspection
- Residue Analysis (SEM/EDS/FTIR)
- Mixed Flowing Gas

Element Warren supports validation DV & PV as well as research and development to support your testing needs in increasingly complex vehicle systems. Testing capabilities include:

- Full-vehicle testing
- Fuels and fluids testing
- Polymer and composites analysis
- Materials testing
- Climatics and environmental simulation
- Corrosion testing
- Dynamics testing
- Hydraulic testing
- Hybrid and electric vehicle battery testing

### CONTACT US

**P: +1-888-786-7555**

<https://www.element.com/contact-us>



## ESD Gold Awards Banquet - 2023



ASM Detroit Chapter Board Members attending ESD Gold Awards Banquet from L to R – Dr. Daniel Baker (22-23 Chapter Treasurer), Mr. JP Singh, FASM (22-23 National Affairs Chair) and Mr. Eric McCarty, (22-23 Finance Chair)



On March 15th at the ESD Gold Awards Banquet, Dr. Daniel Baker (21-22 ASM Detroit Chapter Chair) receives the President's Award from Mr. Eric McCarty, (22-23 ASM Detroit Chapter Finance Chair)



regional sales manager

**Mark Bergel**

M: 231-342-5686

[mark.bergel@aalberts-st.us](mailto:mark.bergel@aalberts-st.us)

Aalberts surface technologies  
specialized heat treatment U.S.  
209 West Mount Hope Ave.  
Lansing, MI 48910

[www.aalberts-ht.us](http://www.aalberts-ht.us)



**SOLAR**  
ATMOSPHERES

Vacuum  
Heat Treating  
& Brazing Services

Five Locations  
• Michigan  
• Eastern PA  
• Western PA  
• South Carolina  
• California

ISO9001 • AS9100 • Nadcap

1-855-WE-HEAT-IT

[solaratm.com](http://solaratm.com)



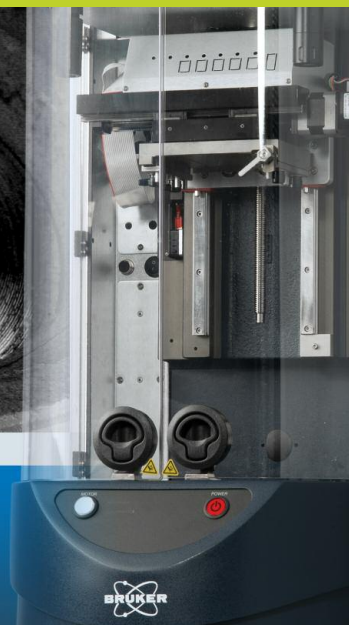
# Tribology and Mechanical Testers

CONTACT OUR TRIBOLOGY EXPERT

**Steve Papanicolaou**

+1.408.410.5391

[www.Bruker.com/tribology](http://www.Bruker.com/tribology)



**RTI LABORATORIES, INC.**

Environmental, Chemical & Materials Testing

- Full Service Independent Metallurgical Lab
  - Mechanical, Physical Testing and Chemical Analysis\*
  - SEM/EDS Analysis and Metallurgical Failure Analysis\*
- Environmental Exposure Testing
  - Salt Spray, Humidity & Corrosion Testing
- Materials Characterization & Analysis
  - Paint Failure Analysis and Product Deformation\*



**Lloyd Kaufman**

[lkaufman@rtilab.com](mailto:lkaufman@rtilab.com)

734-422-8000 x 109

**Materials Testing Division**

33080 Industrial Road  
Livonia MI 48150

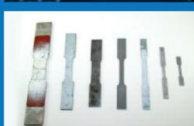


**ACCREDITED**  
Cert. # 0570.01/02/03

ISO/IEC 17025:2005 accredited lab service  
\*Parameters that are specifically referenced in scopes of accreditation



Contact us at  
[rtilab.com](http://rtilab.com)



**BUEHLER**  
Your Partner for Success

Proven Innovations for  
Metallography Laboratories

- ▲ Semi-Automatic Sample Preparation
- ▲ Hot Compression Double Mounting
- ▲ Automated Hardness Testing Systems
- ▲ Quick Ship Superior Consumables



Visit [www.buehler.com](http://www.buehler.com)  
or to shop consumables  
[www.shop.buehler.com](http://www.shop.buehler.com)

For More Information Contact:

**Jon Peavey**

(734) 276-5064 | [Jon.Peavey@buehler.com](mailto:Jon.Peavey@buehler.com)

**N&J NATIONAL ELEMENT, INC.**

**Largest Heating Element Bank In The World**

- Rod Elements • Ribbon Elements • Coil Elements
- Ceramic • Refractory • Roller Chain • Pintle Chain
- Chain Edge Belts • Hinge Plate Belts • Forced Air Plugheaters for Tempering • Annealing

[www.nationalelement.com](http://www.nationalelement.com)

1-800-600-5511 / [info@nationalelement.com](mailto:info@nationalelement.com)

**AFC HOLCROFT**  
industrial furnace solutions

Technology Leader for Thermal  
Processing Equipment

AFC-Holcroft, L.L.C.  
49630 Pontiac Trail  
Wixom, MI 48393-2009  
U.S.A.  
[www.afc-holcroft.com](http://www.afc-holcroft.com)

Phone +1 248-624-8191  
Fax +1 248-624-3710

[sales@afc-holcroft.com](mailto:sales@afc-holcroft.com)

Reliability at work



**SPECIALTY CORED WIRE  
COATED WELDING ELECTRODES  
TOOL STEEL MIG & TIG**

Tel: 810-227-3251  
Fax: 810-227-9266

12500 Grand River Road  
Brighton, MI 48116 U.S.A.  
[www.cor-met.com](http://www.cor-met.com)

Oil Quenchants • Molton Salts  
Polymer Quenchants

# DuBois

[www.duboischemicals.com](http://www.duboischemicals.com)

800 438 2647



# ASM Detroit Chapter & AFS Detroit/Windsor Chapter *Annual Golf Outing*



ASM and AFS have a rich history in supporting the following: Provide scholarships to university students; Promoting career fairs, science fairs and ASM's annual Teacher's Camp; Visits to middle schools to encourage science and math careers.

## REGISTRATION

### DATE

Friday, August 11, 2023

### TIME

Registration 8:30 am  
Shotgun Start 9:00 am

### PLACE

  
**FELLOWS CREEK**  
GOLF CLUB & BANQUET CENTER  
2936 S. Lotz Rd.  
Canton, MI

### COST

**\$125 per player**

Includes:

- 18 Holes
  - Golf Cart
  - Course Contests
  - Prizes
  - Beverages
  - Lunch
  - Dinner
  - Basket of Cheer Raffle
- ...and Lots of FUN!*

### FOR GENERAL QUESTIONS & COMMENTS

Tim Stachowski  
email: tjssilenus@yahoo.com  
phone: 517-927-3637

### MAIL TO

Julie Nimer  
ASM Detroit Chapter  
P.O. Box 1398  
Warren, MI 48090-1398

### SCAN/EMAIL TO

asmdetroitchapter@gmail.com

**MAKE CHECKS PAYABLE TO  
ASM-DETROIT**

**Completed Form and Check Are Due by July 28, 2023.**

## Register Your Team Today!

### FOURSOME: \$500

Player 1 Name \_\_\_\_\_

Email \_\_\_\_\_ Phone \_\_\_\_\_

Player 2 Name \_\_\_\_\_

Email \_\_\_\_\_ Phone \_\_\_\_\_

Player 3 Name \_\_\_\_\_

Email \_\_\_\_\_ Phone \_\_\_\_\_

Player 4 Name \_\_\_\_\_

Email \_\_\_\_\_ Phone \_\_\_\_\_

### SINGLE: \$125

Player Name \_\_\_\_\_

Email \_\_\_\_\_ Phone \_\_\_\_\_

## Your Sponsorship is Greatly Appreciated!

Company \_\_\_\_\_

Address \_\_\_\_\_

City & Zip \_\_\_\_\_

Contact Person \_\_\_\_\_

Email \_\_\_\_\_

Phone \_\_\_\_\_

- |  |   |
|--|---|
| <input type="checkbox"/> \$500 - On Course Beverage Cart   | <input type="checkbox"/> \$400 - Closest to the Pin Competition |
| <input type="checkbox"/> \$500 - On Course Lunch           | <input type="checkbox"/> \$400 - Vegas Hole                     |
| <input type="checkbox"/> \$400 - Longest Drive Competition | <input type="checkbox"/> \$250 - Hole Sponsorship               |

*The event is ASM-Detroit Chapter's & Detroit Windsor AFS Chapter's yearly fundraising project and is only made possible by our generous Sponsors and Golfers. This is a unique opportunity for local business owners and Chapter Members to promote their goods and services. It's also a great place to network with others and have a great time!*





## Accredited Metallurgical & Mechanical Testing Laboratory

### One Source for Your Complete Project

**Weld Evaluation**  
PQR & WPS Documentation and Testing

**Non-Destructive Testing**  
Ultrasonic Testing (UT)  
Penetrant Examinations (PT)  
Magnetic Particle Examination (MT)  
Visual Inspection (VT)  
Radiographic/X-Ray Inspection (RT)



A complete list of services is available at [unitedtech1.com](http://unitedtech1.com)

#### Metallurgical and Mechanical Testing

Failure Analysis    Impact Testing - CVN  
Fatigue    Tensile Testing  
SEM/EDS    Micro & Macro Etch  
Chemistry    Mosaic Image Analysis  
Grain Size    Case Depth

✓ **PROVEN**    ✓ **TRUSTED**    ✓ **EXPERIENCED**

Destructive Testing | Non-Destructive Testing | Weld Engineering | Corporate Training  
Full-service company that has provided technical solutions for over 12 years



See AZLA website for list of accreditation



Visit [unitedtech1.com](http://unitedtech1.com), call 248-667-9185 or email [sales@unitedtech1.com](mailto:sales@unitedtech1.com)

1081 E. North Territorial Rd  
Whitmore Lake, MI 48189



## INDUCTOHEAT

An Inductotherm Group Company

**Carl Wesolowski**  
[carlw@inductoheat.com](mailto:carlw@inductoheat.com)  
cell 248 376-6565

**Tim LeClair**  
[tcleclair@inductoheat.com](mailto:tcleclair@inductoheat.com)  
cell 248 556-6454

32251 North Avis Drive  
Madison Heights, MI 48071

[www.inductoheat.com](http://www.inductoheat.com)

## INDUCTION HEATING

**Paul Bogdajewicz**  
Regional Sales Manager  
[pbogdajewicz@ajaxtocco.com](mailto:pbogdajewicz@ajaxtocco.com)  
(317) 815-1126

**Chris Pedder**  
Technical Sales Manager  
[cpedder@ajaxtocco.com](mailto:cpedder@ajaxtocco.com)  
(248) 691-2290

**Cris Candela**  
Aftermarket Sales Mgr.  
[ccandela@ajaxtocco.com](mailto:ccandela@ajaxtocco.com)  
(586) 215-8709

[www.AjaxTocco.com](http://www.AjaxTocco.com)  
24/7 Customer Service  
800-547-1527



30100 Stephenson Hwy ■ Madison Heights, MI 48071

Induction Scanners    Power Supplies    Parts, Maintenance & Service

## 2022-2023 ASM Detroit Chapter STEM Outreach Sponsor!



# FLUXTROL®

Centre for Induction Technology™

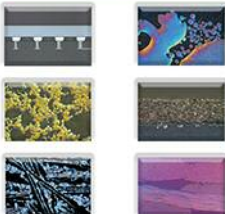
Thanks to Fluxtrol's generous donation we are able to offset the dinner cost at our monthly chapter dinner meetings for our STEM Outreach attendees. These attendees include: Teacher Scholarship Winners, University Scholarship Winners, Community College Scholarship Winners, Metro Detroit Science Fair Winners, and ESD Future City Winners.

College and university students can also attend our ASM Detroit Chapter dinner meetings for just \$5 thanks to this generous donation!



### Sample Preparation Solutions for YOUR Materials

- Metals
- Composites
- Plastics/Polymers
- Electronics
- Ceramics/Glass
- Thermal Sprays



[jbutchart@alliedhightech.com](mailto:jbutchart@alliedhightech.com)  
[www.alliedhightech.com](http://www.alliedhightech.com)



**Marc Glasser**  
Director of Metallurgical Services



125 West Sterns Road  
Temperance, Michigan 48182  
800-255-2340 734-847-9450  
Fax: 734-847-6917  
[mglasser@rolledalloys.com](mailto:mglasser@rolledalloys.com)



### Metallography & Hardness Testing

When it comes to your metallographic preparation and testing solutions, Struers delivers...

Powerful Equipment  
High-Quality Consumables  
Intelligent Support  
Outstanding Service

Contact Struers Account Representative  
Jeff Wiswary at +1 616 323.3483  
[jeffery.wiswary@struers.com](mailto:jeffery.wiswary@struers.com)  
[struers.com](http://struers.com)



### COMPLETE LINE OF THERMAL PROCESSING EQUIPMENT



Batch ■ Continuous ■ Atmosphere ■ Vacuum ■ Rebuilds  
Upgrades ■ Alloy Fabrications ■ Replacement Parts

734.656.2000 | 12250 Belden Court, Livonia MI 48150 | [GasbarrelFS@gasbarre.com](mailto:GasbarrelFS@gasbarre.com)

[www.gasbarre.com](http://www.gasbarre.com)



Intellectual Property Attorneys

300 River Place Drive | Suite 1775 | Detroit | Michigan | 48207-4291  
[burrislaw.com](http://burrislaw.com) | 313-393-5400



## March 13th Meeting Recap



Thanks to Fluxtrol for being our 22-23 Student Sponsor again this year! We had over 20 students attend the March 13th dinner meeting!



Thanks to our Sustaining Members! Attendance on March 13th From Left to Right Eric McCarty- Auto/Steel Partnership, Chris Molencupp -Solar Atmospheres. Dr. David Sponseller- Omni Metals Lab, Justin Wend - United Technical, Andrew Wilder - Surface Combustion, Dr. Kathy Hayrynen- Aalberts surface technologies, Joe Butchart – Allied High Tech, Kae Poor- Autokiniton, Dr Daniel Baker – GM, Nikki Tiernan- Element, John Card- Burris Law, Don Cohen- Michigan Metrology, Mark Harper – Darrow Mustafa, PC, and Nicholas Lessau (22-23 Chapter Chair)

From Left to Right:  
Kae Poor  
(March  
13th Tech  
Chair),  
March  
13th  
Speakers



– Don and Stephanie Dunkin, and Nicholas Lessnau  
(22-23 Chapter Chair)

Thanks to our Social Hour Sponsor for March 13th, Solar Atmospheres!



## March 23rd Student Night at Conor O'Neill's



Thanks to our sponsor **Aalberts surface technologies** for sponsoring the AFS and ASM Student Night on March 23, 2023 at Conor O'Neill's, Ann Arbor.



ASM awarded two of our three 2023 University Scholarships at the March 23rd Student Mixer. Mark Harper (22-23 ASM Detroit Chapter Vice Chair) handed out the awards to Audrey Yung (left), a UofM student who received the Betty Blazok Foundation Scholarship and Xavier Lewis (right) from Michigan State who received the Marion Semchyshen Scholarship. Our third scholarship winner, Margaret Ensminger from Michigan Tech will receive her James Mansfield Scholarship award in April.





**SUN-TEC**  
HARDNESS TESTING SPECIALISTS

sunteccorp.com

**CERTIFIED**

Rockwell Type  
Knoop / Vickers  
Brinell, Portable  
Tensile / Compression  
Ductility Equipment  
Hardness Standards / Indenters

Metallographic  
Equipment Consumables  
Test Accessories  
Accredited Repair  
and Calibration



**element**



## METALLURGICAL, CHEMICAL & MECHANICAL TESTING

We exist to help make certain that the materials and products that we test, inspect, certify and calibrate are always safe, quality, compliant and fit for purpose.

- Cleanliness Testing (ISO 16232/VDA 19)
- Failure Analysis & Consulting
- Weld Procedure Qualification
- Wear & Abrasion testing
- NADCA/H13 Die Steel Qualification
- Hot Hardness Testing (up to 1400 °F)
- Salt Spray, Humidity & Cyclic Corrosion Testing (CCT)
- Fatigue Testing (HCF & LCF)
- IPC Certified Circuit Board Sectioning & Inspection



Europe: +44 808 234 1667 Germany: +49 800 000 5137 Americas: +1 888 786 7555

**MetLab**  
Corporation  
www.metlabcorp.com  
800-828-6866



FOR ALL YOUR METALLOGRAPHIC NEEDS SINCE 1968

**TITAN**  
METALLURGY, L.L.C.

We specialize in quick turnaround time and customer satisfaction.



YOUR SOURCE FOR  
METALLURGICAL TESTING,  
ANALYSIS & CONSULTATION.

10400 Capital St.  
Oak Park, MI 48237  
Telephone: (248) 543-3578  
testing@titanmetallurgy.com  
www.titanmetallurgy.com



**Surface  
Combustion**

**Industrial Furnaces and  
Thermal Processing Equipment**

1-800-537-8980  
surfacecombustion.com

Atmosphere

Batch

Continuous

Controls

Vacuum

Allcase® Batch Integral Quench Furnace

OEM Aftermarket Parts & Service

RX® Endothermic Gas Generators