

CHTE – Center for Heat Treat Excellence at Worcester Polytechnic Institute (WPI)

□ Key People:

- Prof. Rick Sisson (sisson@wpi.edu)
- Prof. Diran Apelian and Prof. Brajendra Mishra

□ Current Heat Treat Related R&D Projects or Efforts:

- New: Distortion Prediction from Heating and Quenching
- New: Austempering Bainite Project
- New: Heat Treat for Additive Manufacturing
- Recent Past Projects:
 - Induction Tempering Property Comparisons with Furnace Tempering
 - Gas Quench Hardenability Standard and Method for Evaluating Gas Quenches
 - Alloy Life in Carburizing Atmospheres (Mechanisms and Recommendations)
 - NDT of Case Depth Using Barkhausen Noise Methods



Edison Welding Institute (EWI)

Structure Integrity and Modeling

- **Technical Contact:**

- Dr. Yu-Ping Yang (yyang@ewi.org)

- **Current AM and Weld Modeling Related R&D Projects or Efforts:**

- New: Develop part-scale modeling tools for laser powder bed fusion process
 - New: Distortion control and prediction of extruded aluminum ship panels
 - New: Residual stress measurement in shipbuilding environment
 - Recent Past Projects:
 - Development of an Excel-based tool to predict microstructure and hardness in a welded joint
 - ICME applications to optimize welded-structure designs
 - Integrated forming and welding modeling to predict structural performance
 - Multiphysics modeling of a welded furnace roll for improving creep-fatigue life
 - Developing friction stir welding process model for ICME application



LIFT – Lightweight Innovations for Tomorrow (Detroit MI)

□ Key People:

- Alan Taub (Chief Technical Officer)
- Philip Chizek (Director, Business Development & Member Relations)

□ Current Heat Treat Related R&D Projects or Efforts:

- Friction Stir Extruded Tubing for Automotive Frames (May 2017-Fall 2018)
- Cost-Effective, Advanced Mechanical Alloying, Powder Consolidation Processes for Sub-Micron Reinforced AL MMCs (June 2016-June 2018)
- Physics-Based Visco-plastic Model for Al-Li Forgings (Jan 2016-Dec 2017)
- Integration of ICME with Legacy and Novel TMP Processing for Assured Properties in Large Titanium Structures (Sep 2015-Mar 2018)
- Recent Past Projects:
 - Thin-Wall Aluminum Die Casting Development (Jul 2015-Jun 2017)
 - Thin-Wall Ductile Iron Castings for High Volume Production (Jun 2015-Jun2016)



Research & Development

Using Post-Sintering Forging for Improvement of Mechanical Properties of Additive Manufactured Parts: Experimental Characterization, Ohio University

Development of a Manufacturing Process for High-Power-Density Hollow Shafts, North Carolina State University

Hydraulic Press Update & Experimental Investigation of Die Surface Friction, Marquette University

High Strength, High Toughness Microalloyed Steel Forging Produced with Relaxed Forging Conditions and No Heat Treatment, University of Pittsburgh

Forging of Magnesium Alloys for Automotive Applications, University of Waterloo

Characterization of a High Entropy Alloy Welding Process for Application to Forging Dies, University of North Texas

Laboratory Testing to Identify Permanent PVD Coatings to Minimize Lubricants Use During Forging, Colorado School of Mines.

FIA-FIERF Key Contacts:

Karen Lewis, Executive Director, Forging Industry Educational and Research Foundation (FIERF), 1111 Superior Ave, Suite 615, Cleveland, OH 44114, Phone: 216-781-5040; Fax: 216-781-0102; Email: karen@forging.org

Rob Mayer, Chairman of the Technical Committee of Forging Industry Association (FIA) and President of Queen City Forging Co., 235 Tennyson St., Cincinnati, OH 45226, Phone: 513-321-7200; Email: rob@qcforge.com



Materials Science and Technology Division

Oak Ridge National Laboratory

□ Key People:

- Dr. Adrian Sabau (sabaua@ornl.gov)
- Dr. Gerard Ludtka (ludtkagm1@ornl.gov)
- Mr. Tom Muth (muthtr@ornl.gov)
- Dr. G. Muralidharan (muralidhargn@ornl.gov)

□ Current Heat Treat Related R&D Projects or Efforts:

- High Heat-Flux Processing Using Plasma-Arc Lamp and Lasers
- Thermal Modeling of High Heat-Flux Processes
- Effect of Magnetic Fields on Heat-Treat Processes (Thermomagnetic processing)
- Corrosion Resistant Alloys for Heat-Treat Furnaces and Environments
- Lower-Cost, High-Strength Alloys For High Temperature Use
- Thermo-physical property measurements for modeling



ASPPRC – Advanced Steel Processing and Products Research Center – Colorado School of Mines

- ❑ **Web Link:** <http://asprrc.mines.edu/>
- ❑ **Current Heat Treat Related R&D Project Areas:**
 - ❑ Steel alloy and heat treatment effects on microstructures and fatigue properties of carburized and nitrided steels
 - ❑ Effects of heat treatments on microstructures and hydrogen embrittlement
 - ❑ Development of microstructures for wear resistance
 - ❑ Simulation of induction hardening and tempering using Gleeble®3500 with property measurements
 - ❑ Heat treatment of sheet steel for high strength and formability
 - ❑ Thermomechanical processing and microalloy effects on microstructure and properties
 - ❑ Advanced characterization of microstructures using Dilatometry, SEM, EBSD, TEM, Atom Probe, TOF-SIMS, X-ray, and Mossbauer spectroscopy
- ❑ **Recent Past Project Areas**
 - ❑ Development of Q&P steel heat treatments
 - ❑ Simulations of hot and thermomechanical rolling using torsion on Gleeble®3500

