

EDUCATION

Ph.D. Materials Science Engineering • University of Nebraska - Lincoln, NE

M.S. Mechanical Engineering (Metallurgy Option) • University of Nebraska - Lincoln, NE

B.S. Mechanical Engineering (Metallurgy Option) • University of Nebraska - Lincoln, NE

Licensed Professional Engineer (P.E.)

- OH (E-63399)
- SD (9297)
- NE (E-15403)

OVERVIEW

Dr. Medlin has over 25 years of experience leading multidisciplinary failure analysis and design projects in metallurgical and materials science engineering, corrosion engineering and biomedical engineering for a variety of companies and firms. He has testified internationally as an expert witness in cases involving medical device, automotive, aerospace, heavy equipment, fire investigations, firearms, ammunitions, and marine applications.

Specific areas of experience include: Failure Analysis & Remedial Action, Applied Research & Development, Medical Device Design and Validation, FDA 510k Submissions, Bearing and Gear Investigations, Welding Metallurgy, Corrosion Evaluations and Testing, Mechanical Testing, Heat Treatment Issues, Metallurgical Related Fire Investigations, and Lectures on many Metallurgical and Biomaterials Engineering Topics.

Dr. Medlin is a Fellow of ASM-International, a distinguished honor in the field of metallurgical and materials science engineering. He is also a Technical Advisor Member of the Association of Firearm and Tool Mark Examiners (AFTE).

EXPERIENCE

2015-PRESENT

Senior Managing Consultant • **EAG Laboratories**- Los Angeles, CA and Omaha, NE

- Conducts forensic engineering investigations, failure analysis, engineering design, expert testimony and maintenance metallurgical engineering problem solving. Dr. Medlin has been a technical expert in national and international litigation involving biomedical engineering, corrosion engineering, materials and metallurgical engineering, design and safety issues. He has also been involved with research and development projects for numerous corporations

2011-2015

Senior Managing Consultant • Engineering Systems Inc. (A consulting engineering & investigation company) Omaha, NE

- Conducted forensic engineering investigations, failure analysis, engineering design, expert testimony and maintenance metallurgical engineering problem solving for a variety of companies and firms.

DANA J. MEDLIN, PH.D.

2011- PRESENT

Adjunct Professor • South Dakota School of Mines and Technology, Department of Materials and Metallurgical Engineering, Biomedical Engineering Graduate Program, Rapid City, SD

- Graduate student guidance, graduate student committee member, Metallurgical Engineering and Biomedical Engineering program advisor, and research project consultant.

2005-2011

NUCOR Professor of Metallurgy • South Dakota School of Mines and Technology- Rapid City, SD
Department of Materials and Metallurgical Engineering

- Responsible for teaching undergraduate and graduate courses in materials and metallurgical engineering, developing a research program in physical and mechanical metallurgy, undergraduate and graduate student advisor, student recruitment, regional consultant for industry, etc. Awarded Tenure April 2011.

2010 – 2011

NUCOR Professor of Metallurgy • Director of the Biomedical Engineering Graduate Program

- Responsible for managing the Biomedical Engineering graduate program at SDSM&T, managing graduate students, teaching courses, directing research projects, managing budgets, and coordinating research and teaching efforts with the University of South Dakota

2005- 2011

Private Engineering Consultant • Medlin Engineering Services

- Conducted forensic engineering investigations, failure analysis, engineering design, and maintenance metallurgical engineering problems for several companies and firms.

2000-2005

Global Metallurgy & Materials Leader and Principal Engineer • Zimmer, Inc. (A major manufacturer of orthopedic, spinal and dental medical devices)

- Coordinated materials research efforts between the different research organizations: Spinal - Minneapolis MN, Dental-Carlsbad CA, Orthopedic Europe – Switzerland, and Orthopedic US – Warsaw IN. Led efforts to eliminate research redundancies, reduce research outsourcing, unify corporate specifications and test procedures, resolve systemic manufacturing issues, prioritize research projects, develop “best practice” recommendations, etc.
- Team leader in the process development of metallurgically attaching Trabecular Metal (tantalum foam) to titanium substrates (three U.S. patents). Key member of project team responsible for metallurgically attaching the Trabecular Metal coating to new products including: modular acetabular cup, modular hip stem, and minimal invasive surgical hip stem. Instrumental in process validations and solving several production rollout problems. Modular acetabular cup project went from concept to full production.
- Managed the Corrosion Laboratory and doubled the testing capability in two years. Performed and directed corrosion tests and analysis including long-term immersion testing and potentiodynamic anodic polarization (PAP) testing. Designed corrosion test protocols for several new products.
- Project manager with the development of surface carburization heat treatment for austenitic stainless-steel trauma products (plates and screws) and Co/Cr/Mo metal-on-metal hip and knee components. This process showed a 35% performance improvement and development work is being applied toward production components.
- Designed test protocols for new product static and dynamic mechanical testing including:

bending fatigue, uniaxial fatigue, shear, tensile, fracture toughness, coating adhesion, corrosion testing, residual stress, chemical analysis, microstructural characterization, etc.

- Managed three projects evaluating new implant material evaluations and new process evaluations. Two of the new implant materials are being considered for future product application.
- Experience with Food and Drug Administration (FDA) medical implant regulations, 510k submissions, IDEs, testing requirements, process validations, test protocols, etc.
- Performed failure analysis on implants and reported failure source and possible corrective actions.
- Heat treat furnace and process equipment procurement and validation.
- Continuous involvement with solving production problems such as: machine tool and tool coating problems, laser welding problems, TIG welding issues, surface quality issues, machining scrap issues, casting defects, electro polishing problems, NDT issues, and heat treat issues.

1998-2000

Specialist and Principle Engineer • The Timken Company (An alloy steel and bearing manufacturing company), Bearing Metallurgy and Materials Department, Canton, OH

- Promoted to Specialist May 2000.
- Aerospace Division Plant Metallurgist February 2000 to April 2000. Managed 3 engineers and 6 technicians. Managed all metallurgical and heat treat quality issues. Supervised furnace validations and documentation for production deviations. Interfaced with customer design engineers concerning new product designs and made recommendations of potential design options.
- Principal Engineer September 1998 to May 2000.
- Instrumental in the microstructural design of "Debris Resistant Bearings" and the heat treatment processing. Interfaced with the customer to optimize the static and dynamic properties for this particular application. Team leader in resolving heat treatment and carburizing problems during initial rollout into production. This project went from concept to production rollout.
- Performed basic static and dynamic mechanical testing on standard test samples and prototype components.
- Involved with testing, evaluating, and reporting several production cost reduction and improvement projects including: machining tools and machining tool coatings, machining coolants-rates-surface quality, optimizing heat treatment times and temperatures, and induction hardening processes.
- One of two corporate experts with x-ray diffraction for phase identification, residual stress, and texture measurements. Procured and validated a new state-of-the-art XRD system.

1997-1998

Materials Specialist and Supervisor of Analytical Services Group • LTV Steel Company (Producer of flat rolled and coated sheet steels).

- Supervised the personnel (2 engineers and 5 technicians) and analytical research equipment at the Customer Technical Center. Analytical equipment included: complete metallography laboratory, 2 scanning electron microscopes, FTIR, x-ray diffraction, laser surface profilometer, numerous hardness testers, and corrosion testing.
- Evaluated metallurgy quality problems with sheet steel and coatings, mechanical property and

1993-1997

fatigue evaluations, corrosion testing, electrochemical plating and coatings, performed failure analysis and managed research and development projects.

- Wrote technical reports and communicated with customers about product defects, failures, and complaints.
- Assisted customer product development projects with potential new sheet steel design options with several companies including Ford, GM, Chrysler, Maytag, GCC, etc.
- Team Leader to determine methods to improved sheet steel quality by detecting and resolving inconsistent heating/cooling in the rolling mill process.
- Procured and validated glow discharge spectrometer for the laboratory. Led efforts to change carrier gas to Argon. This was the first LECO-GDS system to successfully do this.

Research Assistant Professor • Colorado School of Mines- Golden, CO

- Managed 6-10 graduate student projects. Graduate student and academic thesis advisor.
- Performed research projects for Chrysler Motors, GM Powertrain, Ford Research, Caterpillar, Timken Company, Torrington, and American Axle.
- Conducted research and supervised graduate and undergraduate research in the ASPPRC.
- Presented and published technical research results.
- Wrote and submitted research grant proposals.
- Performed static and dynamic mechanical testing and managed the fatigue laboratory.
- Taught undergraduate/graduate metallurgical and materials science engineering courses. Also taught short courses on metallurgical engineering to industry.
- Conducted failure analysis, engineering design and maintenance metallurgy for several companies and firms.

1998-1993

Graduate Research & Teaching Assistant • University of Nebraska-Lincoln- Lincoln, NE

- Assisted with M.S., Ph.D. degrees and consulting on research projects.
- Advisor: Dr. W.N. Weins

1987-1988

Undergraduate Research Assistant • University of Nebraska, Lincoln, NE

- NACE undergraduate research grant, corrosion and hydrogen permeation studies.
- Advisor: Dr. D. L. Johnson.

1986

Engineering Associate • Kawasaki Motors Inc.

SKILLS

- Experienced in metallurgical, materials, corrosion and biomedical engineering.
- Specializes in the design, performance and analysis of engineering materials and components used in a variety of engineering applications including medical device, automotive, heavy equipment and marine.
- Failure Analysis & Remedial Action, Applied Research & Development, Medical Device Design and Validation, FDA 510k Submissions, Bearings and Gears, Welding Metallurgy, Mechanical Testing.

- D.J. Medlin and J. D. Fuerst, "Metallographic Preparation and Microstructural Characterization of Additive Manufactured Tantalum and Titanium Alloy Porous Coatings for Biomedical Applications", ASTM Symposium Commemorating 100 Years of E04 Development of Metallographic Standards, ASTM E04 Committee, Atlanta, GA, November 16, 2017.
- D.J. Medlin, "STEELS: Processing, Structure and Performance", 3-day (24 hours) Short Course, Taught at ASM-International, Materials Park, OH, July 31 – August 2, 2017.
- D.J. Medlin, "Professional Engineering Examination Review Course for Metallurgical Engineering", The Metallurgical Society, Professional Engineering Examination Committee, Warrendale, PA, 4-hour course, August 18, 2017.
- D.J. Medlin, "Metallurgy for the Non-Metallurgist", Association of Firearm and Tool Mark Examiners, Annual 2017 Meeting, Denver, CO, 8-hour Seminar, May 19, 2017.
- D.J. Medlin, "STEELS: Processing, Structure and Performance", 3-day (24 hours) Short Course, Taught at ASM-International, Materials Park, OH, April 10-12, 2017.
- D.J. Medlin, "The Basics of Corrosion", 47th Northern Plains Corrosion Control Course, National Association of Corrosion Engineers, Omaha, NE, January 17, 2017.
- D.J. Medlin, "The Corrosion of Medical Devices", 47th Northern Plains Corrosion Control Course, National Association of Corrosion Engineers, Omaha, NE, January 18, 2017.
- D.J. Medlin, "Professional Engineering Examination Review Course for Metallurgical Engineering", The Metallurgical Society, Professional Engineering Examination Committee, Warrendale, PA, 4-hour course, August 27, 2016.
- D.J. Medlin, "STEELS: Processing, Structure and Performance", 3-day (24 hours) Short Course, Taught at ASM-International, Materials Park, OH, August 8-10, 2016.
- D.J. Medlin, "Metallurgy for the Non-Metallurgist", Association of Firearm and Tool Mark Examiners, New Orleans, LA, 8-hour Seminar, June 3, 2016.
- D.J. Medlin, "STEELS: Processing, Structure and Performance", 3-day (24 hours) Short Course, Taught at ASM-International, Materials Park, OH, May 23-25, 2016.
- D.J. Medlin, "Failure Analysis of Pipelines and Other Components", 46th Northern Plains Corrosion Control Course, National Association of Corrosion Engineers, Omaha, NE, January 19, 2016.
- D.J. Medlin, "Microbiological Influenced Corrosion of Engineering Components", 46th Northern Plains Corrosion Control Course, National Association of Corrosion Engineers, Omaha, NE, January 19, 2016.
- D.J. Medlin and J. D. Fuerst, "Corrosion of a Nickel-Free Austenitic Stainless Steel Alloy Spinal Implant", Materials Science & Technology 2015, October 8, 2015, Columbus, OH.
- D.J. Medlin and J.D. Fuerst, "Failure of a Cast CoCr Canine Hip Implant", Materials Science & Technology 2015, October 7, 2015, Columbus, OH.
- J.D. Fuerst, S. Sanders, C. Bigelow, and D.J. Medlin, "Unique Conditions of Microbial Influenced Corrosion", Materials Science & Technology 2015, October 5, 2015, Columbus, OH.
- D.J. Medlin, "Professional Engineering Examination Review Course for Metallurgical Engineering", The Metallurgical Society, Professional Engineering Examination Committee, Warrendale, PA, 4-hour course, August 20-21, 2015.
- D.J. Medlin, "Metallurgy for the Non-Metallurgist", Association of Firearm and Tool Mark Examiners, Dallas, TX, 8-hour seminar, May 28, 2015.
- J. Fuerst, D. Medlin, M. Carter, J. Sears, G. Vander Voort, "LASER Additive Manufacturing of Titanium-Tantalum Alloy Structured Interfaces for Modular Orthopedic Devices." Journal of Metals, Vol. 67, No.4, April 2015, p.775-780
- D.J. Medlin, "Failure Analysis of Pipelines and Other Components", 45th Northern Plains

Corrosion Control Course, National Association of Corrosion Engineers, Omaha, NE, January 14, 2015.

- D.J. Medlin, "Microbiological Influenced Corrosion", 45th Northern Plains Corrosion Control Course, National Association of Corrosion Engineers, Omaha, NE, January 13, 2015.
- J. Fuerst, D.J. Medlin, and J. Sears, "Laser Powder Deposition of ALMGB14-T1B2 Wear Resistant Coatings for Biomedical Applications", Materials Science and Technology 2014 Symposium on Boron Compounds and Nanomaterials, Pittsburg, PA, October 15, 2014.
- J. Fuerst and D.J. Medlin, "Evaluation of the Failure of Two Grade IV CP Titanium Spinal Fusion Rods." Materials Science and Technology 2014 Symposium on Failure Analysis and Prevention, Pittsburg, PA, October 14, 2014.
- J. Fuerst and D.J. Medlin, "Tibial Non-Union as a Cause for Fracture Fixation Screw Failure", Materials Science and Technology 2014 Symposium on Failure Analysis and Prevention, Pittsburg, PA, October 14, 2014.
- M. West, J. Kellar, G. Crawford, W. Cross, D. Medlin, "Using Blacksmithing as the Foundation of Curricular, Research, and Outreach Activities", 2015 TMS Annual Meeting & Exposition, March 18, 2015, Orlando, FL.
- D.J. Medlin, "Failure Analysis of Pipelines and Other Structures." 44th Northern Plains Corrosion Control Course, National Association of Corrosion Engineers, Omaha, NE, January 15, 2014.
- D.J. Medlin, "Metallurgy for Beginners." 44th Northern Plains Corrosion Control Course, National Association of Corrosion Engineers, Omaha, NE, January 15, 2014.
- D.L. Johnson, R.J. DeAngelis, D.J. Medlin, J.D. Carr, D.L. Conlin, "Advances in Chemical and Structural Characterization on Concretion with Implications for Modeling Marine Corrosion." Journal of Metals, Springer Link, May 2014, Vol 66, Issue 5, pp 817-822.
- D.J. Medlin, J.D. Carr, D.L. Johnson, D.L. Conlin, "Metallurgical and Corrosion Assessment of Submerged Tanker S.S. Montebello", Materials Performance, NACE International, Vol. 53, No.1, January 2014, p.74-78.
- D.J. Medlin, "Failure Analysis and Product Development of Medical Devices", Failure Analysis Symposium, The Microscopy and Surface Analysis Chapter, Medtronic, Minneapolis, MN, December 10, 2013.
- Donald L. Johnson, D.J. Medlin, James D. Carr, Robert J. DeAngelis, David L. Conlin, "Review of USS Arizona Corrosion with Modeling Applications at Diverse Marine Sites", Conference Proceedings of Department of Defense Virtual Corrosion Conference, September 16-17, 2013, Chapter 3A, Paper #2, www.corrdefense.org/External/ReferenceLibrary
- D.J. Medlin, D. Johnson, J.D. Carr, R. DeAngelis, D.L. Conlin, "New Assessment Methodology for Long Term Corrosion Rate Trajectory Applied to Shipwrecks, Munitions and Offshore Structures." NACE- Risk Management of Corrodible Systems, June 19, 2013. Washington D.C.
- D.J. Medlin, "Pipeline Failure Analysis and Investigation", 2013 South Dakota/North Dakota/Wyoming Pipeline Safety Operator Training Course, South Dakota Public Utilities Commission, Rapid City, SD, April 04, 2013
- D. Medlin, "Failure Analysis for Beginners." Forty-Third Northern Plains Corrosion Control Course, Omaha, NE, January 16, 2013.
- D. Medlin, "Metallurgy for Beginners." Forty-Third Northern Plains Corrosion Control Course, Omaha, NE, January 15, 2013.
- D. Medlin, "Component Failure Analysis." Underground Storage Tank Course, State of Iowa Department of Resources, Des Moines, IA, November 8, 2012.
- D.L. Johnson, D. Conlin, L. Murphy, J. Carr, D. Medlin, Montebello Assessment Report, ESI File No.: 37081M, Submission to Office of Marine Sanctuaries, NOAA, Silver Spring, MD, June 14, 2012.

- D. Medlin, "Corrosion of Pipelines and Other Underground Structures." Nebraska Pipeline Seminar, Grand Island, NE, April 4, 2012.
- D. Medlin, "Failure Analysis of Medical Implants", American Society of Mechanical Engineers, Continuing Engineering Education Course, Omaha, NE, April 3, 2012.
- J. Fuerst, J. Sears, D. Medlin, K. Kennedy. The Minerals, Metals & Materials Society (TMS) 141st Annual Meeting & Exhibition, Randall M. German Honorary Symposium on Sintering and Powder-Based Materials, "LASER Powder Deposition of AlMgB14-TiB2 Ultra-Hard Coatings on Titanium, Steel, and Cast Iron Substrates," Orlando, FL, March 11-15, 2012.
- J. Fuerst, J. Sears, D. Medlin, K. Kennedy, The Minerals, Metals & Materials Society (TMS) 141st Annual Meeting & Exhibition, Biological Materials Science Symposium "LASER Powder Deposition of Titanium - Tantalum Alloys Surfaces for Use in Biomedical and Corrosion Resistant Applications." Orlando, FL, March 11-15, 2012.
- D. Medlin, "Corrosion of Medical Implants." Keynote Address, National Association of Corrosion Engineers Short Course, Omaha, NE, January 17, 2012.
- D.L. Johnson, D.J. Medlin, L.E. Murphy, J.D. Carr and D.L. Conlin, "Corrosion Rate Trajectories of Concreted Iron and Steel Shipwrecks and Structures in Seawater--The Weins Number.", CORROSION, vol. 67, No. 12, pp. 125005-1 125005-9, December 2011.
- J. Fuerst, J. Sears, M. Huber, M. Carter, D.J. Medlin, G.F. Vander Voort, "Laser Powder Deposition of Titanium – Tantalum Alloys Structured Interfaces for Use in Orthopaedic Devices." Materials and Processes of Medical Devices Conference, Minneapolis, MN, August 8-10, 2011.
- J. Fuerst, J. Sears, K. Kennedy, M. Carter, D.J. Medlin, "The Functionality of Ti-15Mo in Creating 3-D Porous Surfaces via Laser Powder Deposition for the Use in Dental Prosthetics." Materials and Processes of Medical Devices Conference, Minneapolis, MN, August 8-10, 2011.
- D. Conlin, D. Johnson, D. J. Medlin, and J. Carr, "Risk assessment Issues for Potentially - Polluting Wrecks -USS Arizona." World of Wrecks Conference II, Maritime Institute of Technology and Graduate Studies, Linthicum Heights, Maryland, June 6-7, 2011.
- Kelley, A., Ryno, T., and Medlin, D. "Effects of Thermal Aging on SAC305 Solder-Copper Substrate Interface", Proceedings of the International Forum-Competition of Young Researchers: Topical Issues of Subsoil Usage" Saint Petersburg Mining Institute, GV Plekhanov. Saint Petersburg, Russia. April 20, 2011.
- Kelley, T. Ryno, and D. Medlin, "Effect of Thermal Conditions and Durations on Reaction Kinetics and Phase Transformations within SAC 305 Solder", IPC APEX Expo 2011 Conference Proceedings. Las Vegas, NV, April 13, 2011.
- J. Sears, J. Fuerst, and D. Medlin, "Laser Additive Manufacturing for Surface Modification of Orthopedic Medical Devices", MS&T Conference and Proceedings, Houston, TX, October 19, 2010, pp. 434-441.
- T. Ryno, A. Kelley, J. Metzger, D. Medlin, "Effect of Soldering Parameters on the Reaction Kinetics and Phase Transformations of SAC-305 Solder.", MS&T-10, Conference Proceedings, Houston, TX, October 18, 2010, pp 636-647.
- D. Johnson, D. Medlin, J. Carr, D. Conlin, M. Russell, "Modeling the Decay Trajectory of Shipwrecks and Artifacts in Seawater – The Weins Number.", MS&T Conference and Proceedings, Houston, TX, October 19, 2010.
- J. Fuerst, J. Sears, D. J. Medlin, D. Neufeld, T. Yescas. "LASER Deposited Engineered Surfaces for Orthopaedic Implants for Increased Device Longevity." Medical Device Materials V: Proceedings of the Materials and Processes for Medical Devices Conference. Minneapolis, MN, August 10-12, 2009, Ed. J. Gilbert, pp 195-200.
- Kellar, J., Howard, S., West, M., Cross, W., Medlin, D. and Kellogg, S., "The Samurai Sword Project and Opportunities for Metallurgical Programs," MS&T 2009, Conference Proceedings,

- Pittsburgh, PA, September 2009, pp 2787-2798.
- L. Nielson, T. Ryno, D.J. Medlin, C. Voyles, S. Richards, "Effect of Thermal Treatments on Copper Dissolution of SAC 305 Solder, MS&T 2009, Conference Proceedings, Pittsburgh, PA, September 2009, pp 2647 – 2659.
 - West, M., Medlin, D., Kellar, J., Mitchell, D., S. Kellogg, and J. Rattling Leaf, "Back in Black: Innovative Curricular, Outreach and Recruiting Activities at the South Dakota School of Mines and Technology," MS&T 2009, Conference Proceedings, Pittsburgh, PA, September 2009, pp 2776-2786.
 - J. Fuerst, J. Sears, K. Kennedy, D. Medlin, The Minerals, Metals & Materials Society (TMS) 138th Annual Meeting and Exhibition, "High Performance Titanium Osteoconductive Coatings for Medical Implant Applications," February 17, 2009.
 - Medlin, D., West, M., Mitchell, D., Kellar, J., and Kellogg, S., "Improved Materials Science Understanding with Blacksmithing," Proceedings (AC 2009-2228) ASEE 2009 Annual Meeting, Austin, TX, June 2009, <https://peer.asee.org/5751>.
 - D. Johnson, L. Murphy, D. Conlin, M. Russell, D. Medlin, "Recent Developments and Application of Concretion Equivalent Corrosion Rate (CECR) Methodology", International Journal of Archaeology, November 2008.
 - D.J. Medlin, "New Developments in Orthopedic Metallic Implant Materials", Materials and Processes for Medical Devices 2008, Keynote Presentation, Cleveland, OH, ASM-International, August 12, 2008.
 - S.K. Chimbli, D.J. Medlin, W. Arbegast, "Minimizing Lack of Consolidation Defects in Friction Stir Welds", Friction Stir Welding and Processing –IV, 2007 TMS Annual Meeting, February 26, Orlando, FL.
 - C. Standen, B. Jasthi, D.J. Medlin, W. Arbegast, "Liquid Metal Embrittlement of MP-159 Pin Tools", Friction Stir Welding and Processing –IV, 2007 TMS Annual Meeting, February 26, Orlando, FL.
 - C. Allen, D.J. Medlin, C. Oberebt, H. Mercer, W. Arbegast, "Friction Stir Welding of Aluminum Coal Railcars", Friction Stir Welding and Processing –IV, 2007 TMS Annual Meeting, February 27, Orlando, FL.
 - D.J. Medlin, "New Materials and Processes for Orthopedic Applications", Materials, Medicine, and Nanotechnology Summit, Cleveland Clinic, ASM-International, October 2, 2006, Invited Lecture.
 - D.J. Medlin, R. Shetty, and J. Scrafton, "Metallurgical Attachment of a Porous Tantalum Foam to a Titanium Substrate for Orthopaedic Applications", ASTM Symposium on Titanium, Niobium, and Tantalum for Medical and Surgical Applications, Journal of ASTM International, Volume 2, Issue 10, November/December 2005, paper ID JAI12777.
 - D.J. Medlin, G. Lucas, and G. Vander Voort, "Metallographic Analysis of Metallic Porous Coatings for Orthopedic Applications", Medical Device Materials – II, Medlin and Helmus Editors, ASM-International, May 2005, pp 75-80.
 - D.J. Medlin, "Future Challenges for Metals in Orthopedic Implant Devices", Advanced Materials and Processes, ASM-International, November, 2004, pp 11-12.
 - D.J. Medlin and R. Compton, "Metallography of Biomedical Orthopedic Alloys", ASM Handbook, volume 9, Metallography and Microstructures, American Society for Materials – International, Materials Park, OH, December 2004, pp 961-968.
 - D.J. Medlin, S. Charlebois, D. Swarts, R. Shetty, and R. Poggie, "Metallurgical Characterization of a Porous Tantalum Biomaterial (Trabecular Metal) for Orthopaedic Implant Applications", Medical Device Materials, Proceedings of the Material and Processes for Medical Device Conference, September 8-10, 2003, Editor S. Shrivastava, ASM-International, pp. 394-399.
 - C. Panchison, D.J. Medlin, and R. Shetty, "Laser Spot Welding of Fiber Metal Porous Surfaces for

Orthopaedic Implant Applications", *Medical Device Materials, Proceedings of the Material and Processes for Medical Device Conference, September 8-10, 2003*, Editor S. Shrivastava, ASM-International, pp. 54-60.

- D.J. Medlin, "Processing Microstructure and Performance of Metallic Orthopaedic Medical Devices", *Proceedings of Microscopy and Microanalysis 2003*, edited by D. Piston, J. Bruley, et.al., Cambridge University Press, San Antonio, TX, August 4, 2003, volume 9, p.542.
- C.R. Blanchard, D.J. Medlin, and R. Shetty, "Advances in Metals", in *Joint Replacements and Bone Resorption: Pathology and Clinical Practice*, edited by A. Shanbhab, H. Rubash, and J. Jacobs, Marcel Dekker Press, New York, 2003, pp 559-592.
- D.J. Medlin, "The Development of Metals Used in Orthopedic Implants", Notre Dame Chapter, American Society for Materials – International, Winona Lake, Indiana, March 25, 2003, (presentation only).
- D.J. Medlin, "Carburizing Concepts", *Materials Solutions Conference and Exposition*, St Louis, MO, October 10, 2000, (presentation only).
- D.J. Medlin, "Advances in Bearing Materials and Process Technologies", Canton-Akron Chapter ASM-International, Canton, OH, September 13, 1999 (presentation only).
- D.J. Medlin, B. Cornelliesson, G. Krauss, and D.K. Matlock, "Effect of Carbon Potential and Various Heat Treatments of the Bending Fatigue of Carburized Steel", *SAE Technical Paper #1999-01-0603*, Society of Automotive Engineers 1999 Conference and Exposition, March 1-4 1999.
- T.J. Favenyesi, D.J. Medlin, D.K. Matlock, and G. Krauss, "The Effect of Prior Microstructure on the Fatigue of Induction Hardened AISI-1050 Steel", *40th Mechanical Working and Steel Processing Conference Proceedings*, Iron and Steel Society, 1998, pp. 733-740.
- J. Cunningham, D. Medlin and G. Krauss, "Effects of Induction Hardening and Prior Cold Work on a Microalloyed Medium Carbon Steel", *Proceedings of the 17th Heat Treating Society Conference, The First International Induction Hardening Symposium*, ASM-International, September 16, 1997, Indianapolis, IN, pp. 575-584.
- W.N. Weins, D. Medlin and C. Wylie, "The Decomposition of Retained Austenite to Isothermal Martensite in Case Carburized 4320 Steel", *Symposium on Retained Austenite and Mechanical Behavior, 1996 Materials Week*, Cincinnati, OH, October 8, 1996, (presentation only).
- C. Ericksen, D. Medlin, and G. Krauss, "Effect of Bismuth, Selenium, and Tellurium on the Hot Workability of SAE-8620 Steel", *Symposium on the Effects of Residual Elements on the Processing and Properties of Steel Products*, *Proceedings of 38th Mechanical Working and Steel Processing Conference, Volume XXXIV*, Cleveland, OH, October, 14, 1996, pp. 601-610.
- D. Medlin, "X-ray Diffraction Techniques for Particle Size Analysis in Case Carburized Components", *Materials Science Seminar, Metallurgical and Materials Engineering Department, Colorado School of Mines*, September 12, 1996, (presentation only).
- D.J. Medlin, "The Metallurgy of Japanese Swords", *Faculty Lecture, Metallurgical and Materials Engineering Department, Colorado School of Mines*, July, 1996, (presentation only).
- W.N. Weins, J. Makinson, Y. Xu, R. DeAngelis, and D. Medlin, "Diffracting Particle Size Analysis of Martensite-Retained Austenite Microstructures", *Proceedings of 45th Annual Denver X-Ray Conference*, August 7, 1996, Denver, Colorado, pp. 212-220.
- J. Cunningham, D. Medlin, C. Van Tyne, and G. Krauss, "Induction Hardening of Microalloyed Medium Carbon Steel: Characterization of Pre-Hardened Microstructure", in *Fundamentals and Applications of Microalloyed Bar and Forging Steels*, The Metallurgical Society, July 10, 1996, pp. 491-506.
- D. Medlin, "Microstructures and Heat Treatment Response of Induction Hardened Steels", in *Heat Treating: Proceedings of the 16th Conference*, Edited by J.L. Dossett and R.E. Luetje, ASM Heat Treating Society, 1996, pp. 90-97.

- S.C. Jung, D. Medlin, and G. Krauss, "Effects of Subzero Treatments on the Bending Fatigue Performance of Carburized SAE-4320 and SAE-9310 Steels", in New Steel Products and Processing for Automotive Applications, SAE paper #960313, 1996 SAE Congress and Exposition, pp. 147-158.
- D. Medlin, G. Krauss and D. Matlock, "Effects of Shot Peening and the Bending Fatigue Performance of Carburized Steels", in New Steel Products and Processing for Automotive Applications, SAE paper #960316, 1996 SAE Congress and Exposition, pp. 167-175.
- D. Medlin, G. Krauss, and D. Matlock, "Fatigue and Fracture Mechanisms of Carburized Steel", Chrysler Motors Steel Research Symposium, Chrysler Motors Technology Center, Detroit, Michigan, March 4, 1996, (presentation only).
- K. Evanson, M. Patel, D. Medlin, and G. Krauss, "Bending Fatigue Behavior of Vacuum Carburized AISI-8620 Steel", in Carburizing and Nitriding with Atmospheres, Edited by J. Grosch, J. Morral, and M. Schneider, Cleveland, Ohio, December 1995, pp. 61-70.
- C. Wylie, D. Medlin, and W. Weins, "Isothermal Decomposition of Retained Austenite in Carburized SAE-4320 Steel", Proceedings of the 28th International Metallographic Society Convention, July 1995, (presentation only).
- D. Medlin, "Physical Metallurgy of Induction Hardened Components", Gear Research Institute, Annual Technical Meeting, August 30, 1995, Chicago, Illinois, (presentation only).
- W. Weins, J. Makinson, Y. Xu, and D. Medlin, "Techniques for the Determination of Particle Size and Texture in Retained Austenite/Martensite Microstructures and Interpretation of the Measurements", Advances in X-Ray Analysis, 36, 1996, pp. 473-479.
- D. Medlin, "Induction Hardening Response of 1550 and 5150 Steels with Similar Prior Microstructures, in Proceedings of the First International Conference on Induction Hardening Gears and Critical Components, Edited by R. Leachman, May 16, 1995, Indianapolis, Indiana, pp 57-67.
- D. Medlin, G. Krauss, and D. Matlock, "Grain Size Control of Carburized 8620 Steels", Chrysler Motors Steel Research Symposium, Chrysler Motors Technology Center, Detroit, Michigan, March 2, 1995, (presentation only).
- D. Medlin, G. Krauss, D. Matlock, M. Slane, and K. Burris, "Comparison of Bending Fatigue From Single Tooth Component and Cantilever Beam Specimen Testing of Carburized Steel", SAE paper #950212, SAE International Congress and Exposition, Detroit, Michigan, March 1, 1995.
- D.J. Medlin, W.N. Weins, J. Makinson, T.R. Smith, and M. Donnley, "Quality Assurance of Case Carburized Components Using X-Ray Diffraction Measurements of Retained Austenite", 43rd Denver X-Ray Conference Proceedings, Steamboat Springs, Colorado, August 3, 1994, (presentation only).
- D. Medlin, "Transformation of Retained Austenite Due to Rolling Contact Measured by X-ray Diffraction, Materials Science Seminar, Metallurgical and Materials Engineering Department, Colorado School of Mines, September 8, 1994, (presentation only).
- D. Medlin, W. Weins, and R. Lawrence, "Phase Transformations in a Case Carburized Bearing Steel Due to Rolling Contact", Microstructural Science, Vol. 20, 25th International Metallographic Society, Denver, Colorado, 1992, pp. 383-394.
- D. Medlin, "Transmission Electron Microscopy Techniques in Case Carburized Steel Materials", Electron Microscopy Society, Lincoln, Nebraska, September 14, 1990, (presentation only).
- D. Medlin, W. Weins, and A. Dhir, "Electron Microscopy of Case Carburized Tapered Rolling Bearing Steels", Microstructural Science, Vol. 18, Edited by T. Place, J. Braun, W. White, 22nd International Metallographic Society, Charlotte, NC, 1989, pp. 347-359.
- B. James and D.J. Medlin, Volume Editors, Medical Device Materials-VI, Proceedings of the

PATENTS

- Materials and Processes for Medical Devices Conference, August 8-12, 2011 ASM-International.
- M. Helmus and D.J. Medlin, Volume Editors, Medical Device Materials – II, Proceedings of the Materials and Processes for Medical Devices Conference, August 25-27, 2004, St. Paul, MN, ASM-International.
- H. Kuhn and D.J. Medlin, Volume Co-Editors, "Mechanical Testing and Evaluation", ASM Handbook, Volume #8, Tenth Edition, 1013 pages, ASM-International, September 2001
- D. Medlin and S. Fromm, "Method of Coating Tissue to Promote Soft Tissue and Bone Healing, Involving Nanotechnology, and Photonic Curing System for Use in Repairing Tissue", US Patent # 9,211,114, December 15, 2015.
- J. Fuerst and D.J. Medlin, "A Biomedical Implant", US Patent Application #14859583, September 9, 2015.
- Charlebois, Gilbertson, Medlin, Hawkins, et.al., "Method for Attaching a Porous Metal Layer to a Metal Substrate", United States Patent # 8,985,430, March 24, 2015.
- Charlebois, Gilbertson, Medlin, Hawkins, et.al, "Method for Attaching a Porous Metal Layer to a Metal Substrate", United States Patent # 8,191,760, June 05, 2012.
- D. Medlin and S. Fromm, "Method to Attach Nanostructured Hydroxyapatite to Autograft and Allograft Tissues for Bone Attachment", US Patent Application, #13353986, February 19, 2012.
- Charlebois, Clarke, Medlin, Scrafton, et.al, "Method for Attaching a Porous Metal Layer to a Metal Substrate", United States Patent # 7,918,382, April 05, 2011.
- Medlin, Charlebois, Clarke, Scrafton, et.al, "Method for Attaching a Porous Metal Layer to a Metal Substrate", United States Patent # 6,945,448, September 20, 2005.
- D. J. Medlin, "Case Hardened Orthopedic Implant", US Patent Application, in review, May 12, 2007.

UNIVERSITY TEACHING EXPERIENCE

- "Forensic Engineering", undergraduate/graduate level, Materials and Metallurgical Engineering Department, South Dakota School of Mines and Technology, 3 credits, spring 2007, 28 students, new course at SDSM&T.
- "Corrosion Engineering", undergraduate/graduate level, Materials and Metallurgical Engineering Department, South Dakota School of Mines and Technology, 3 credits, spring 2007, 25 students.
- "Introduction to Biomaterials Engineering", undergraduate/graduate level, Materials and Metallurgical Engineering Department, South Dakota School of Mines and Technology, 3 credits, Fall 2006, 26 students, new course at SDSM&T.
- "Metallurgical Engineering Junior Design", undergraduate/graduate level, Materials and Metallurgical Engineering Department, South Dakota School of Mines and Technology, 3 credits, Fall 2006, 7 students.
- "Professionalism in General Engineering", undergraduate level, Materials and Metallurgical Engineering Department, South Dakota School of Mines and Technology, 1 credits, Fall 2006, 24 students.
- "Properties of Materials", undergraduate level, Materials and Metallurgical Engineering Department, South Dakota School of Mines and Technology, 3 credits, spring 2006, 65 students.
- "Mechanical Metallurgy", and laboratory, undergraduate level, Materials and Metallurgical Engineering Department, South Dakota School of Mines and Technology, 4 credits, spring 2006, 23 students.
- "Physics of Metals", and laboratory, undergraduate/graduate level, Materials and Metallurgical Engineering Department, South Dakota School of Mines and Technology, 4 credits, Fall 2005, 23 students.
- "Thermo-Mechanical Processing", undergraduate level, Materials and Metallurgical Engineering Department, South Dakota School of Mines and Technology, 3 credits, Fall 2005, 22 students.
- "Structure of Materials and X-Ray Diffraction", graduate level, Metallurgical and Materials Engineering Department, Colorado School of Mines, 3 credits, spring 1996, 14 students.
- "Materials Science Engineering", undergraduate level, Metallurgical and Materials Engineering Department, Colorado School of Mines, 3 credits, substituted on as needed basis, Fall 1995 - Fall 1996.
- "Materials and Manufacturing Methods in Engineering", undergraduate level, Metallurgy and

Materials Engineering Department, Colorado School of Mines, 3 credits, spring 1996, 28 students.

- "Dislocation Theory", graduate level, Metallurgical and Materials Engineering Department, Colorado School of Mines, 3 credits, fall 1995, 8 students.
 - "Mechanical Metallurgy", graduate/undergraduate level, Metallurgical and Materials Engineering Department, Colorado School of Mines, 4 credits (with lab), taught 25% of the course, fall 1995.
 - "Alloying and Phase Stability", graduate/undergraduate level, Metallurgical and Materials Engineering Department, Colorado School of Mines, 3 credits, substituted on as needed basis, spring 1995.
 - "Structure of Materials", undergraduate level, Metallurgical and Materials Engineering Department, Colorado School of Mines, 4 credits (with lab), Substituted on as needed basis, fall 1994.
 - "Selection of Metals: Aluminum and Aluminum Alloys", Short Course, Sponsored by ASM-Rocky Mountain Chapter, April 9, 1994.
 - "Steel and Alloy Design", undergraduate/graduate, Mechanical Engineering Department, University of Nebraska-Lincoln, 3 credits, fall 1993, 14 students.
 - "Corrosion Engineering", graduate/undergraduate, Mechanical Engineering Department, University of Nebraska-Lincoln, 3 credits, substituted on an as needed basis, fall 1992.
 - "Materials Science Laboratory II", graduate/undergraduate, Mechanical Engineering Department, University of Nebraska-Lincoln, 2 (3 hour) laboratories per week, fall 1991.
 - "Materials Science Laboratory I", undergraduate, Mechanical Engineering Department, University of Nebraska-Lincoln, 2 (3 hour) laboratory sections per week, spring and fall 1988-1990
-
- ASM Education Committee Chairman, ASM International, 2017-2018.
 - Association of Firearm and Tool Mark Examiners (AFTE) – Technical Advisor Member 2017 - Present
 - ASM Nominating Committee for Board of Trustees and Vice President, ASM-International, Materials Park, OH, April 15, 2016.
 - ASM Award Selection Committee, 2014 – Present.
 - ASM Technical Handbook Committee, 1997 - 2009, 2014 – Present.
 - "Materials Characterization", Editorial Review Board, 2006 – 2010.
 - Materials for Medical Devices Task Force, Original Committee Member, 2001 – Present.
 - Conference Co-Chairman, Materials and Processes for Medical Devices, August 8-10, 2011, Minneapolis, MN.
 - Conference Co-Organizer, Materials, Medicine, and Nanotechnology Summit, Cleveland Clinic, October 2-5, 2006, Cleveland, OH.
 - Conference Co-Chairman, Materials and Processes for Medical Devices, August 25-27, St Paul, MN.
 - Symposium Co-Organizer, George Krauss Symposium on Ferrous Metallurgy, ASM Materials Week, 1999, Cincinnati, OH.
 - Subcommittee E04, Metallography, Voting Member Status, 1999 – Present.
 - Subcommittee F04, Medical and Surgical Materials and Devices, Voting Member Status, 2001 – Present.
 - Director of the Biomedical Engineering (BME) Graduate Program.
 - BME Program Development Committee Member.
 - Tenure and Promotion Committee.
 - Materials Engineering & Science Graduate Committee.
 - Biomedical Engineering Graduate Committee.
 - SDSMT Scholarship Committee.
 - Various Search Committees (VP Academics, MET, BME, Chemistry, and ME)
 - Academic Advisor for SAE Supermileage Team.
 - Advisor for Blacksmithing Club.
 - Undergraduate and Graduate Student Advisor.
 - "Professional Engineering Examination Review Course for Metallurgical Engineering", The Metallurgical Society, Professional Engineering Examination Committee, Warrendale, PA, 4-hour course, August 20-21, 2015.

PROFESSIONAL AFFILIATIONS & ACTIVITIES

- -"Metallurgy for the Non-Metallurgist", Association of Firearm and Tool Mark Examiners, Dallas, TX, 8-hour seminar, May 28, 2015.
- Organizing Committee, First International Conference of Materials and Processes for Medical Devices, September 8-10, 2003, Anaheim, CA.
- Technical Programming Board, Annual ASM Materials Week Conference, 1998-2001.
- Co-Chair, ASM Heavy Equipment Committee, 1996-2001.
- Session Organizer and Chair – Heavy Equipment Sessions, Carburizing and Heat Treatments for the Heavy Equipment Industry, ASM Materials Week 2000, St. Louis, MO.
- Session Chair - Heavy Equipment Session, ASM Materials Week 1997, Indianapolis, IN.
- Session Chair, Microscopy and Microanalysis 2006, Chicago, IL, July 30 – August 3, 2006.
- Committee Judge, IMS Metallographic Contest, Microscopy and Microanalysis 2006, Chicago, IL, July 30 – August 3, 2006.
- Technical Session Organizer and Chairman, Metallography and Microstructure of Ferrous Components, 2001, IMS Materials, Week, 2001, Indianapolis, IN.
- Session Chair, 1999 IMS Materials Week, Cincinnati, OH.
- Program Director/Vice Chairman, Canton-Massillon Chapter, ASM-International, 1999-2000.
- Secretary, Canton-Massillon Chapter, ASM-International, 1998-1999.
- Executive Committee, Canton-Massillon Chapter, ASM-International, 1998-2000.
- Chairman, Rocky Mountain Chapter, ASM-International 1996-1997.
- Vice-Chair/Program Director, Rocky Mountain Chapter, ASM-International, 1996-1997.
- Secretary/Treasurer, Rocky Mountain Chapter, ASM-International, 1995-1996.
- Executive Committee, Rocky Mountain Chapter, ASM-International, 1995-1997.
- Membership Education, Rocky Mountain Chapter, ASM-International, 1994-1995

MEMBERSHIPS

- American Society for Materials International, Member (1988 – Present)
- International Metallographic Society, Member (1990 – Present)
- American Society for Testing Materials, Member (1998 – Present)
 - F04 (Medical Materials Subcommittee)
 - E04 (Metallography Subcommittee)
- The Metallurgical Society, Member (1996 – Present)
- Professional Engineering Examination Board, Member (2008 – Present)
- Professional Engineering Examination Review Committee, Member (2014–Present)
- Society for Biomaterials, Associate Member (2001 – Present)
- Society of Automotive Engineers, Member (1994 – 2001)
- The Iron & Steel Society, Member (1994 – 2001)
- National Association of Corrosion Engineers, Member (1998 – 1993, 2011 – Present)

HONORS & AWARDS

- LTV Steel Special Achievement Award for Analysis of Surface Defects in Sheet Steel Technology, Customer Technical Center Award, September 1998.
- 1997 Lindburg Best Technical Paper, ASM Heat Treat Society, "Effects of Induction Hardening and Prior Cold Work on a Microalloyed Medium Carbon Steel"
- Awarded Tenure and Professor, South Dakota School of Mines & Technology, 2011.
- Honored as the NUCOR Professor of Metallurgy, South Dakota School of Mines & Technology, May 2009.
- Honored as a Fellow of ASM, July, 2007, for outstanding contributions to the field of metallurgical and materials engineering, as well as leadership and contributions to ASM.

PROFESSIONAL SERVICE

- American Society for Materials International (ASM)
 - Member, 1988 – Present
 - Education Committee, 2017 - Present
 - ASM Nominating Committee 2016

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- ASM Award Selection Committee, 2014 – 2015
- ASM Technical Handbook Committee, 1997-2009 and 2014 – present
- Honored as a Fellow of ASM, July, 2007 - for outstanding contributions to the field of metallurgical and materials engineering, as well as leadership and contributions to ASM.
- "Materials Characterization", Editorial Review Board, 2006 – 2010.
- Materials for Medical Devices Task Force, Original Committee Member, 2001 – present
- Conference Co-Chairman, Materials and Processes for Medical Devices, August 8-10, 2011, Minneapolis, MN.
- Conference Co-Organizer, Materials, Medicine, and Nanotechnology Summit, Cleveland Clinic, October 2-5, 2006, Cleveland, OH.
- Conference Co-Chairman, Materials and Processes for Medical Devices, August 25-27, St Paul, MN

- Symposium Co-Organizer, George Krauss Symposium on Ferrous Metallurgy, ASM Materials Week, 1999, Cincinnati, OH.

International Metallographic Society (IMS)

- Member, 1990 - Present

American Society for Testing Materials (ASTM)

- Member, 1998 - Present
- Subcommittee E04, Metallography, Voting Member Status, 1999 - Present
- Subcommittee F04, Medical and Surgical Materials and Devices, Voting Member Status, 2001 - Present

The Metallurgical Society (TMS)

- Member, 1996 - Present

Association of Firearm and Tool Mark Examiners (AFTE)

- Technical Advisor Member 2017 - Present

Professional Engineering Examination Board (Metallurgical Engineering)

- Member, 2008 - Present
- Professional Engineering Review Committee and Presenter, 2015 - Present

Society for Biomaterials

- Associate Member, 2001 – Present

Society of Automotive Engineers (SAE)

- Member, 1994 – 2001

The Iron and Steel Society (ISS)

- Member, 1994-2001

National Association of Corrosion Engineers (NACE)

- Member, 1988 – 1993, 2011- Present