



Exponent[®]
Engineering & Scientific Consulting

Blake Whitley, Ph.D., P.E.

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Professional Profile

Dr. Whitley's areas of technical expertise center around the physical and mechanical metallurgy of structural alloys. His experience includes metallurgical failure analysis, fracture mechanics, corrosion, heat treatment, materials processing, and advanced characterization techniques across a range of alloy systems including steels, cast irons, aluminum, nickel, copper, and titanium alloys.

Dr. Whitley's work supports the mining, energy production, oil and gas, rotating equipment, automotive, aerospace, locomotive, and metals production industries. He serves as Co-Chair for the Fractography session with the Failure Analysis Society (FAS) for the IMAT Conference.

Dr. Whitley is active within ASTM International, the Association for Iron & Steel Technology (AIST), and ASM International. He currently serves on the ASTM International Committees for Non-Destructive Evaluation (NDE), Fatigue and Fracture, and the Joint ASTM/NACE Committee on Corrosion. Dr. Whitley co-authored "Failures of Pipelines" in Volume 11A of the ASM Handbook and served as technical reviewer for the ASM Handbook chapters on "X-ray Spectroscopy in Failure Analysis" and "Scanning Electron Microscopy" in Vol. 11: Failure Analysis and Prevention. Dr. Whitley has previously served on the AIST Pipe and Tube Technology Committee.

Prior to joining Exponent, Dr. Whitley worked as a Senior Metallurgical Engineer with ATI Specialty Materials. During that time, he served as Project Lead and Technical Lead on multiple next generation alloy development efforts for the jet engine market. His primary focus at ATI was powder-based nickel superalloy development, with supporting roles in titanium alloy development and high speed steel process optimization. Dr. Whitley oversaw projects from initial concept, through the Research & Development phase, and into full-scale manufacturing.

Dr. Whitley's academic work at the Colorado School of Mines investigated the effects of thermomechanical processing routes and heat treatments for optimizing the induction hardening response of automotive shafts using microalloyed steels. During this time, he operated and managed a Gleeble 3500 thermomechanical simulator laboratory, and collaborated on projects involving thermomechanical processing of carbon and stainless steels, aluminum, titanium, niobium, and nickel alloys. Dr. Whitley has presented his work at 6 international technical conferences, and has delivered 4 invited lectures. His technical writing has earned recognition as the Bodycote Best Paper in Heat Treating, and American Foundry Society's Best Paper Award.

Academic Credentials & Professional Honors

Ph.D., Metallurgical and Materials Engineering, Colorado School of Mines, 2017

B.S., Metallurgical Engineering, University of Alabama, 2012

Tau Beta Pi, Engineering Honor Society

ASTM Committee on Non-Destructive Evaluation (ASTM E07)

ASTM Committee on Fatigue and Fracture (ASTM E08)

Joint ASTM/NACE Committee on Corrosion (ASTM J01)

Failure Analysis Society Co-Chair (Fractography Session, IMAT 2025)

Guest Lecturer for Graduate Engineering course, Arizona State University

Bodycote Best Paper in Heat Treating Award

ASM Rocky Mountain Chapter Executive Board Member

Licenses and Certifications

Professional Engineer Metallurgical, Arizona, #79116

Prior Experience

Senior Research & Development Engineer, ATI Specialty Materials, 2017-2018

Graduate Student Instructor, Colorado School of Mines, 2012-2017

Metallurgical Engineering Intern, ALSTOM Power, Summer 2011 & Summer 2012

Professional Affiliations

ASM International

ASTM International

American Welding Society (AWS)

Association for Iron and Steel Technology (AIST)

Publications

A. Hudgins, C. Roepke, B. James, B. Kondori, B. Whitley, Failures of Pipelines, ASM Handbook, Volume 11A, Analysis and Prevention of Component and Equipment Failures, 2021.

B. M. Whitley, J. G. Speer, R. Cryderman, J. Klemm-Toole, Understanding Microstructural Evolution During Rapid Heat Treatment of Microalloyed Steels Through Computational Modeling, Advanced Physical Simulation, and Multiscale Characterization Techniques, Journal of Materials Engineering and Performance, 2019.

J. G. Speer, B. M. Whitley, S. L. Kaster, K.O. Findley, D. K. Matlock, E. De Moor, Selected Developments

in Nb-Microalloyed Long Products and Forgings, 11th International Rolling Conference, 2019.

B. M. Whitley, J. G. Speer, R. L. Cryderman, R. C. Goldstein, K. O. Findley, D. K. Matlock, Effects of Microalloy Additions and Thermomechanical Processing on Austenite Grain Size Control in Induction-Hardenable Medium Carbon Steel Bar Rolling, International Conference on Processing & Manufacturing of Advanced Materials Processing, Fabrication, Properties & Applications (Thermec), Materials Science Forum, Vol 879, 2016, pp. 2094-2099.

R. Cryderman, B. Whitely, and J. Speer, Microstructural Evolution in Microalloyed Steels with High-Speed Thermomechanical Bar and Rod Rolling, in International Federation of Heat Treatment and Surface Engineering, Proceedings of the 23rd IFHTSE Congress, 2016.

B. M. Whitley, A. L. Araujo, J. G. Speer, K. O. Findley, D. K. Matlock, Analysis of Microstructure in Hot Torsion Simulation, Materials Performance and Characterization, ASTM, Vol. 4, No. 3, 2015, pp. 307-321.

B. M. Whitley, C. T. Easter, R. L. Cryderman, J. G. Speer, Thermomechanical Simulation and Microstructural Analysis of Microalloyed Medium Carbon Bar Steels, in Advances in Metallurgy of Long and Forged Products, Vail, CO, 2015, pp. 48-58.

B. M. Whitley, Novel Three-Dimensional Modeling Technology for Advanced Simulation, Printing, and Casting of A356 Impeller, International Journal of Metalcasting, 2013.

Technical Presentations

B. Whitley, J. Stewart, Weld Cracking on Igniter Tips Between Alloy 625 and 310 Stainless Steel, International Materials, Applications & Technology Conference, 2024.

B. Whitley, A. Sathe, Failure Analysis of an Overhead Crane Coupling, International Materials, Applications & Technology Conference, 2024.

B. M. Whitley, J. G. Speer, R. L. Cryderman, K. O. Findley, Effects of Thermomechanical Processing, Microalloying, and Rapid Heat Treatment on Microstructural Development, Carbonitride Precipitation, and Mechanical Behavior of Medium Carbon Steels, Materials Science & Technology Conference, 2019.

B. M. Whitley, B. Antolovich, L. Wilwert, Progress Toward Developing and Producing a Precipitation-Hardened Martensitic Steel Alloy for Engine Shafts, ATI technical presentation, 2018.

B. M. Whitley, F. G. Coury, J. Foltz, N. Philips, J. Avallone, Relationships Between the Thermodynamic and Thermomechanical Behavior of a Niobium-based Refractory Alloy for Rocketry Applications, ATI technical presentation, 2018.

B. M. Whitley, R. S. Minisandram, J. Shelton, Pilot Scale Development of Next Generation Nickel Powder Disk Alloys, ATI Technology Conference, 2017.

A. Tabei, B. M. Whitley, E. McDevitt, Development of a Conversion Process for Burn Resistant Ni-based Superalloy, ATI Technology Conference, 2017.

B. M. Whitley, J. G. Speer, R. L. Cryderman, Invited talk, Processing Factors Associated with Post-Induction Grain Size Refinement in Medium Carbon Steels, Semi-annual Review Conference of the Advanced Steel Processing and Products Research Center, 2017.

B. M. Whitley, J. G. Speer, R. L. Cryderman, R. C. Goldstein, K. O. Findley, D. K. Matlock, Effects of Microalloy Additions and Thermomechanical Processing on Austenite Grain Size Control in Medium Carbon Steel Bar Rolling, International Conference on Processing & Manufacturing of Advanced Materials Processing, Fabrication, Properties & Applications (Thermec), 2016.

B. M. Whitley, C. T. Easter, R. L. Cryderman, J. G. Speer, Thermomechanical Simulation and Microstructural Analysis of Microalloyed Medium Carbon Bar Steels, International Symposium on New Developments in Long and Forged Products (AIST), 2015.

B. M. Whitley, J. G. Speer, Physical Simulation of the Thermo-Mechanical Rolling Process, Invited Lecture at the Institute of Roll Design Conference, 2015.

B. M. Whitley, J. G. Speer, R. L. Cryderman, Thermomechanical Processing of Microalloyed Bar Steels for Induction Hardened Components, Invited Lecture for the Gerdau Metallurgical Research & Development Department, 2014.

B. M. Whitley, R. L. Cryderman, Simulating Induction Hardening on a Laboratory Scale for Analysis of Microstructural Evolution, Lecture for the Induction Engineering Team at Inductoheat, 2014

B. M. Whitley, L. Nastac, Novel Three-Dimensional Printing Technology for Advanced Modeling and Casting of A356 Impeller, Materials Science & Technology Conference, 2011

B. M. Whitley, Casting Smarter, Not Harder: Advanced Modeling and Casting of an Aluminum 356 Impeller, Invited Lecturer for Introduction to Materials Course, 2011.

B. M. Whitley, K. Castleberry, A. Murphy, B. Freeman, A356 Impeller: A Prototype Part Cast in a Silica Sand-Furan Mold, American Foundry Society Meeting, 2011.