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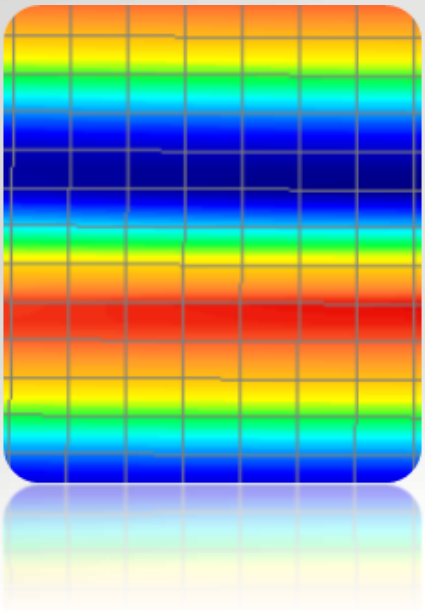
GOT RESIDUAL STRESS

ASM INTERNATIONAL RESIDUAL STRESS TECHNICAL COMMITTEE



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ASM INTERNATIONAL HANDBOOK SERIES

RESIDUAL STRESS HANDBOOK PROJECT IN-PROGRESS

By David Furrer

The Residual Stress Technical Committee has been working on a project to develop and publish a new ASM Handbook on Residual Stress. This new handbook is aimed at providing a primer on Residual Stress and many of the related issues relative to formation, reduction, optimization, and its impact on performance. This project is the second major project from the Residual Stress Committee, with the other the development of and issuance of a new SAE Standard on Residual Stress-Related Product Definitions. These projects are in addition to the other continued activities to develop symposia and collections of talks at conferences, education programs, student outreach efforts and the quarterly committee News Letter.

The Residual Stress Handbook (ASM Handbook Volumes 25A & 25B) will include 10 focused divisions with a combined total of 110 articles. Each division will include introductory or overview topics that help readers to understand the overall concepts within each division. Additional articles will delve deeper into the topics and will provide important guidance and background on the issues of residual stress. Each article will be filled with examples and practical application, in addition to copious references that can guide readers to further information for even greater research into specific detailed topics **(Con't p. 4).**

SAE FATIGUE, DESIGN & EVALUTION RESIDUAL STRESS COMMITTEE

By Casey Gales

Gales is active in the Society of Automotive Engineers (SAE) community. From 2014 to 2019 he was the Chair of the SAE Fatigue Design & Evaluation Committee (FD&E). During this time, he led the FD&E committee's work on the Total Life project. Members from industry (including Caterpillar, MTS, Hendrick's Trailer, HBK, John Deere, and others) and academia (U of Windsor, U of Waterloo, Iowa State, and more) collaborated to design and evaluate a method to predict the "Total Life" of a component. The challenge was how to predict the complete life of a specimen from the first load cycle to its inability to support load.

Most of this testing and evaluation was on the now infamous T-sample; more information can be found on the FD&E committee's website.

Fatigue Design & Evaluation Committee - Total Life Project

During the development of predicting total life, the FD&E committee realized the importance of the residual stress profile in the life calculations. To address this need, Gales founded the FD&E Residual Stress Sub-committee (RSC) in late 2014. The intent was to improve the understanding of the residual stress state in the T-sample. This led to many surface and through thickness RS measurements of the 25 mm thick welded specimen. Measurement methods included XRD, Neutron Beam, Energy Dispersive Diffraction, and Hill's Contour Method. Industry and academic partners have also provided predictions of residual stress for the Total Life project. More information can be found here.

FD&E Total Life T-Sample Residual Stress Analytical Predictions and Measured Results (sae.org)

The RSC has continued to push the understanding of RS and improve correlation between measurements and predictions. The committee has also studied the effect of RS relaxation due to low-cyclic, high-plasticity loading. Published information on RS relaxation can be found here.

Evolution and Redistribution of Residual Stress in Welded Plates During Fatigue Loading (sae.org)

Gale presented the project "Relaxation of Residual Stress in Welded Plates During Long Life Fatigue Loading" at ICF-15 in Atlanta in June 2023. Al Conle (U of Windsor), James Pineault (ProtoXRD and ASM RSTC Past Chair), and Gales will publish this topic through the International Journal of Fatigue in 2024.

Author's Bio: Casey Gales is a Senior Structural Evaluation Engineer at John Deere Construction and Forestry Division. Gales earned his B.S. in Mechanical Engineering at the University of Wisconsin Platteville. Gales is responsible for validating the machines' structures meet the needs of the customer. He has expertise in crack initiation prediction using field collected strain measurements, and he also performs material analysis method development and residual stress (RS) studies. The most exciting part of his job is operating heavy machinery and collecting vehicle data.

List of Upcoming Conferences and Key Dates:

- **IIW 2024, 77th IIW Annual Assembly and International Conference on Welding and Joining, July 7 - 12, 2024. Rhodes, Greece, https://www.iiw2024.com/**
- **Denver X-Ray Conference, August 5 - 9, 2024, Westminster, Colorodo, https://www.dxcicdd.com/**
- **18th International Conference on Advances in Experimental Mechanics, September 3 - 5, 2024, Liverpool, UK, https://www.bssm.org/events/conference/18th-conference-liverpool/**
- **IMAT-2024, September 30-October 3, 2024, Cleveland, Ohio, ASM Annual Meeting - International Materials, Applications & Technologies, https://www.asminternational.org/imat-2024/**
- **ICSP-15, 2025, International Scientific Committee for Shot Peening, September 22 - 25, 2025, West Lafayette, Indiana, https://www.shotpeening.org/**
- **ICRS 2025, 12th International Conference on Residual Stresses, October 20-23, 2025, https://www.asminternational.org/icrs-12/ – Contact Andrew Payzant payzanta@ornl.gov or Mike Prime prime@lanl.gov ASM to link up with ICRS – to be held in Detroit and will co-locate with IMAT in Detroit from October 20-24, 2025.**

Sub-committees and their chairs

Education – Jeff Bunn, bunnnjr@ornl.gov

Residual Stress Standards – Dale Ball, dale.l.ball@lmco.com

Residual Stress Handbook – David Furrer, David.Furrer@prattwhitney.com

Newsletter – Gary Styger, garystyger@gmail.com, Ben Wang, wang.ben@cummings.com, and Beth Snipes, Beth.Snipes@tec-usa.com

Professional Meetings, Conferences, Symposia - Rajan Bhambroo, rajan.bhambroo.18@gmail.com

University Outreach – Joe Rasche, joe.rasche@gmail.com

Technical Collaboration – Mike Hill, mrhill@ucdavis.edu

ASM Handbook Volumes 25A & 25B on Residual Stress

Division 1: Fundamentals and Technological Aspects of Residual Stress
Division Editors: Lesley Frame (lesley.frame@uconn.edu), Michael Hill, David Furrer

Division 2: Sources of Residual Stress and Distortion in Manufacturing
Division Editors: Nihad Ben Salah (nihad.bensalah@nbsmpconsulting), Scott McKenzie

Division 3: Residual Stress in Material Properties and Performance
Division Editors: Mark James (mark.james@howmet.com), Dale Ball, David Furrer and Zi-Kui Lu

Division 4: Engineered Residual Stress
Division Editors: Nihad Ben Salah (Nihad.bensalah@nbsmpconsult.com), Philippe Bocher

Division 5: Residual Stress Measurement and Documentation
Division Editors: Philippe Bocher (Philippe.Bocher@etsmtl.ca), Andrew Payzant, Mike Hill, James Pineault, Toshi Suzuki, Mohammed Belassel, Iuliana Cernatescu, Eckehard Mueller

Division 6: Modeling of Residual Stress
Division Editors: Lynn Ferguson (lynn.ferguson@dante-solutions.com), Mike Hill, Vasisht Venkatesh, and Gary Styger

Division 7: Residual Stress Quality Control
Division Editors: David Furrer (David.furrer@prattwhitney.com), Keith Jones, Iuliana Cernatescu, and Eric Burba

Division 8: Residual Stress in Design
Division Editors: Dale Ball (Dale.L.Ball@lmco.com), Mark James, and David Furrer

Division 9: Residual Stress in Failure Analysis
Division Editors: Beth Snipes (Beth.Snipes@tec-materialstesting.com), Seung-Yub Lee, Toshi Suzuki, and James Pineault

Division 10: Industrial Case Studies
Division Editors: James Pineault (xrdlab@protoxrd.com), Andrew Payzant, and Mike Hill