

GOT RESIDUAL STRESS

ASM INTERNATIONAL RESIDUAL STRESS TECHNICAL COMMITTEE

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EDUCATION SUB-COMMITTEE

Jeffrey R. Bunn

THE HOTTEST RESIDUAL STRESS TRAINING?

See Next Page for Details.

Jeff Bunn is the chair of the Education subcommittee of the RSTC. The educational subcommittee is dedicated to educating students and professionals on all aspects of residual stress. How residual stresses form, how they can and should be considered in design as well as how they can be measured are all areas of interest to the education subcommittee. This has been done by collecting various educational materials from RSTC members - who have developed strong educational aides over their careers. The subcommittee also organizes educational symposia at various ASM and other materials science organizations meetings. The committee can utilize the expertise found within the subcommittee to spread knowledge of residual stress to other materials science and engineering professionals. The subcommittee is still growing and we plan to be giving our first educational workshops in 2022.

RESIDUAL STRESS 101



This course aims to cover a broad, practical introduction to residual stresses for students, researchers, and industrialists with an interest in the subject. We cover the most practically important aspects of residual stress, things that are fairly simple but often counterintuitive, poorly understood, or just not widely known. Most of this material is not covered by coursework for engineers or material scientists. We will answer the most important questions: What are residual stresses and where do they come from? What effects do they have? How are the stress components throughout a body interrelated? How can you measure residual stresses? How can you use residual stress knowledge in models to predict failures or other issues? How can you use superposition to simplify many calculations? Along the way we will point out pitfalls to avoid and mistakes that appear in the literature.

The training will be held ahead of the SEM Annual Meeting in Pittsburgh on Sunday June 12, 2022.

Register at this link: <https://sem.org/annual>



The RSTC is picking up momentum, and we need your help to continue to move forward. Our subcommittees are making strong progress, and we've added a technical talk to our meetings. Here is where you can make a big difference. Your input is vital to our success.

1. Please pass along notifications for conferences that are of interest to you and your fellow members that address the various aspects of residual stress.
2. Volunteer to give a technical talk at one of our monthly meetings or suggest a topic and speaker.
3. Fill out the Google form at <https://forms.gle/3YwCTEWGz9NtG5nHA>. This form lets us know who you are, your subcommittee interests, and gives us permission to show your contact information. We need to have an accurate listing of our members as we continue to grow.
4. Comment, make corrections/suggestions to our RSTC advertisement slide found at the end of this newsletter.
5. Let us know about your accomplishments. We would love to add a "Members in the News" section to the newsletter and broadcast your personal successes.

Instructors:

Michael Prime
Los Alamos National Laboratory;

Michael Hill
University of California, Davis;

Adrian DeWald
Hill Engineering, LLC;

Iuliana Cernatescu
Pratt & Whitney;

Jeff Bunn
Oak Ridge National Laboratory;

Gary Schajer
University of British Columbia

RSTC Sub-committees and Leads

Education

-Jeff Bunn-

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Residual Stress Standards

-Dale Ball-

Dale.L.Ball@lmco.com

Handbook

-Dave Furrer & Mike Hill-

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Conferences/Presentations

-Lesley Frame-

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Newsletter

-Beth Snipes & Ben Wang-

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EXPERIMENTAL DETERMINATION OF PRECISION, RESOLUTION, ACCURACY AND TRUENESS OF TIME-OF-FLIGHT NEUTRON DIFFRACTION STRAIN MEASUREMENTS

I.C. Noyan, J.R. Bunn, M. Tippet, E. Payzant, B. Clausen, and D.W. Brown

A simple statistical analysis which yields the precision, resolution, accuracy and trueness of diffraction-based lattice strain measurements is discussed. The procedure consists of measuring the thermal expansion induced in each component of an ideal non-reacting two-component crystalline powder sample in situ. One component, with a high coefficient of thermal expansion (CTE), serves as an internal thermometer. The quantities of interest are obtained by determining the smallest statistically significant thermal lattice strain which can be detected through diffraction analysis in the second, low-CTE, component in response to controlled temperature changes. This procedure also provides a robust check of the alignment of the diffraction system and is able to reveal the presence of systematic errors. The application of this technique to a time-of-flight engineering diffractometer/strain scanner is presented.

Full Article Link

<https://www.osti.gov/biblio/1649487>



Jeff Bunn is the lead instrument scientist at the residual stress diffractometer (HIDRA) located at the High Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory. He obtained his B.S. in Engineering from The University of Tennessee at Martin in 2007 and his Ph.D. in Civil Engineering from the University of Tennessee at Knoxville in 2014. He first came to ORNL in 2006 as an undergraduate intern working at the High Temperature Materials Laboratory utilizing x-ray and neutron diffraction for strain determination in engineering materials. Following his Ph.D., he returned to ORNL as a postdoctoral research associate in the Chemical and Engineering Materials Division and in 2014 and was hired permanently as an instrument scientist in 2017. His past and current research interests are within applied materials research of engineering materials. Some of the broad research topics he has explored are concerning material responses to complex loadings (biaxial torsion, combined tension and torsion, or proportional loadings) measured by neutron and x-ray diffraction. His research has been recognized for material responses to joining, such as welding. He also has worked on new data analysis tools for reduction and visualization of neutron and X-ray data. He has a continued interest in neutron imaging for the purpose of strain, texture and phase in engineering materials.

RSTC EDUCATION SUB-COMMITTEE CHAIR

GET THE WORD OUT

Help advertise ASM-RSTC

Are you benefiting from your participation in ASM-RSTC? Do you have colleagues that are not members? Are they aware of what we do? Our Vice Chair, James Pineault, has put together a one-page description of our committee with the intent of attracting new members. Below is the draft. **WE NEED INPUT FROM YOU.** Do you have additions, corrections, suggestions for making this invitation a powerful attractor to our committee? Please make your suggestions known by contacting James Pineault, xrdlab@protoxrd.com. We want others to join in the fun and benefit, too! Please respond by **May 15, 2022**.

Upcoming Conferences

SEM, Jun. 13, 2022
<https://sem.org/annual>

DXC, Aug. 1, 2022
<https://www.dxcicdd.com/registration/>

Int Conf on Shot Peening (ICSP), Sept. 4, 2022, (Milan)
<https://www.icsp14.org>

IMAT 2022, Sept. 13, 2022
<https://www.asminternational.org/web/imat-2022>

Fatigue 2022, Oct. 16, 2022, (Hiroshima)
<https://www.showsbee.com/fairs/Fatigue-Congress.html>

ICMFF13, Nov. 2022
<https://na.eventscloud.com/website/33078/icmff13-conf/>

Int Conf Fracture, Jun. 11, 2023
<http://www.icf15.org>

Residual Stress Summit (America), TBD
<https://rssummit.org/>



ASM International Residual Stress Technical Committee



Why Join the ASM RSTC?

- Stay up to date on the latest developments in the measurement and analysis of residual stress - the RSTC meets on a monthly basis.
- Network with other professionals in both industry and academia who focus on the measurement and analysis of residual stress.
- Activities include: Industry Standards, Residual Stress Handbook, Newsletter, Education and Chapter Outreach, Professional Meetings, Conferences, Symposia, University Outreach, Technical topic presentations, and more...
- You don't need to be an ASM member to join the committee meetings and benefit from them - get involved today!
- Not sure? Contact beth.snipes@gmail.com for more information.