Residual Stress Summit

Mike Steinzig

RS Summit history

- Originally conceived as a North American conference on Residual Stress (to compete with ICRS and ECRS)
- First instance held in Los Alamos, 2003
- Six total Summits have been held
  - Los Alamos, NM 2003 (Hytec, Inc)
  - Vancouver, BC 2005 (University of British Columbia)
  - Oak Ridge, TN 2007 (ORNL facilities)
  - Lake Tahoe, CA 2010 (conference center)
  - Idaho Falls, ID 2013 (at a hotel)
  - Dayton, OH 2017 (University of Dayton Research Institute)
- Attendance has been 40-80 people

Our cadence is getting slower (as are the organizers)

Non-traditional conference ideas

- *The central objective of the meeting is to bring together residual stress users (who have "problems" and are in search of "solutions") and developers (who have "solutions" and are in search of "problems").*
- Single track, with all participants attending each talk
  - Identify a facility with suitable capability
- Facilitate discussion amongst participants
  - long lunches on site, scheduled breaks, poster sessions
- Themed topics where possible (multiple speakers on one topic)
- All speakers are invited to maintain specific focus points
- Typically longer talks than standard conference (30 minutes)
- If an industrial facility, then involve local technical support for topic and tours

Other Efforts

- Honoring our community: Iain Finnie Award
  - Wayne Kroenke 2007
  - Wylie Cheng 2010
  - Bob Bucci 2013
  - Lyndon Edwards 2017
- Demonstrations and Instruction
  - Round robin in Titanium
  - Hole drilling workshop
- Organizers
  - Steinzig/Schajer/Prime (03/05)
  - Hill Noyan (2007)
  - Local organizers from the site location

2003 Summary

- Two industrial applications sessions (RS problems in industry)
- Standards and comparison studies
- One full day on measurement techniques and demonstrations
- ~30 attendees

Participants

- ALCOA
- American Stress Technologies
- ATK Thiokol Propulsion
- Bettis/Bechtel Atomic Power Laboratory
- Boeing Company, St Louis
- Boeing Integrated Defense Systems
- Boeing A/F-22
- Caterpillar
- Dana Corp
- Don Bray Engineering
- Hill Air Force Base
- Hydro-Quebec
- JENTEK Sensors Inc.
- John Deere Tech Center
- Los Alamos Nat. Laboratory
- National Physical Laboratory
- NIST
- Pella Windows
- PROTO Manufacturing
- Sandia National Laboratory
- Savannah River Company
- StressTech Oy
- SUNY, Binghampton
- TEC
- Texas Tech University
- University of Alabama
- University of British Columbia
- University of California, Davis

2003 stated objectives

- To provide a forum where developers and practitioners can share practical RS information
  - Developers: to learn the practical needs and challenges of industry
  - Practitioners: to learn how to choose and use appropriate measurement methods
- To facilitate personal connections between the two groups

  - Most attendees liked the format and the result, and said they would attend others
  - Mix of highly technical and concentrated material with practical bent

2005 Summary - UBC

Technology

"Requirements of a Practical Residual Stress Measurement Technique" *Ceydet Noyan* Columbia University

"Engineered Residual Stresses" *Michael R. Hill* University of California, Davis

"Heat Treating and Quenching Stresses and Distortion" *George Totten* and *Victor Li* Portland State University

"The Recent Development of the Global Industrial Approach for Residual Stress Consideration: Measurement, Process Simulation and Design Issues" *Jian Lu* LASMIS, University of Technology of Troyes, France

"Direct Measurements of the Effect of RS on Fatigue Crack Growth Using Thermoelasticity", *Eann Patterson* Michigan State

"Modeling of Residual Stress in Machined Workpieces and its Effect on Part Distortion" *Luis Zamorano* Third Wave Systems

"Residual Stresses, Fatigue Crack Growth, and Life Prediction", *R. Craig McClung* Southwest Research Institute

"Stress Measurement in Nonmetallic materials: Applications to Measurement in the Earth" *Douglas R. Schmitt* University of Alberta

"Overview and Developments in Destructive Measurement Techniques" *Mike Prime* LANL, *Gary Schajer UBC*

"Overview and Developments of Nondestructive Measurement Techniques" *Clayton Ruud* Penn State

Industrial Experience

"Industrial Experiences", *James Pillers* The Boeing Company, Seattle

"Residual Stresses and Failures in Railroad Rail and Wheels: Experimental andAnalytical Techniques" *Jeff Gordon,* U.S. DoT

"Industrial Welding Residual Stress Problems, Measurements, and Predictions" *Pingsha Dong* Battelle

"RS distribution in chilled face, cast iron calendar rolls" + "RS development in A356 Automotive heels" *Steve Cockcroft UBC*

"Recent Residual Stress Activities at ALCOA" *R.W. Schultz and P.A.Vranka* ALCOA Technical Center

"Industrial Case Studies in Residual Stress: Putting Neutrons to Work for Industry" *Ronald Rogge,* NRC, Chalk River, Canada

"The Challenge of Computer Modeling the Effects of Fillet Rolling for Automotive Crankshafts" *Clifford Grupke* DaimlerChrysler

- 17 speakers, poster session
- Two non-technical, local speakers (lunch and dinner)
- Foreign travel may have reduced attendance

2007 summary - ORNL

Work up front in advertising is key!
1/2 of the attendees are speakers (demos/posters included)

2007 RESIDUAL STRESS SUMMIT
ENGINEERED RESIDUAL STRESSES

October 2-4, 2007
OAK RIDGE NATIONAL LABORATORY
OAK RIDGE, TN, USA

- THE 3RD BIENNIAL RESIDUAL STRESS SUMMIT
- OVER 20 INVITED TALKS on RESIDUAL STRESS
- FOCUS on *ENGINEERED RESIDUAL STRESSES*
- TOUR of the VULCAN NEUTRON FACILITY
- POSTERS and DEMONSTRATIONS

The Residual Stress Summit is a bi-annual meeting of researchers and practitioners interested in residual stress. The central objective of the meeting is to bring together residual stress users, (who have "problems" and are in search of "solutions") and developers (who have "solutions" and are in search of "problems"). The format of the Summit is designed to facilitate technical interchange among practicing engineers and researchers. The 2007 Summit has a theme of *Engineered Residual Stresses*, which encompasses methods for inducing, measuring, and predicting the effects of residual stresses. A coherent sequence of topics has been chosen related to new technologies, practical needs, and proven applications of engineered residual stresses. To keep the focus of the meeting, all talks are by invitation only. A demonstration and poster session will be held during the Summit to allow additional information to be conveyed to Summit participants. Additional information at www.rssummit.org

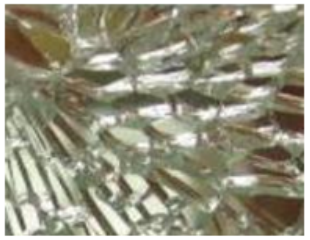
$400 registration fee includes a welcome reception/poster session, 3 exhibitor continental breakfasts, 2 working lunches, and a dinner/awards banquet.
$325 early bird registration fee until August 15.

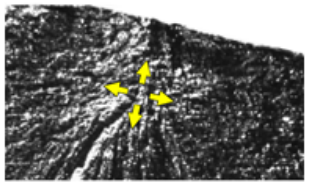
SPEAKERS:

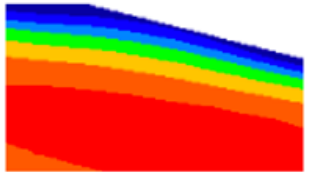
***Michael Shepard**, Air Force Research Lab*
***Paul Domas**, GE Aviation*
***Dean Jones**, Rolls Royce, PLC*
***Bob Morris**, Pratt & Whitney*
***John Cammet**, Cam-Met, Inc.*
***David Lahrman**, LSP Technologies*
***T. Gnaeupel-Herold**, NIST Center for Neutron Research*
***Paul Prevey**, Lambda Technologies*
***Lloyd Hackel**, Metal Improvement Company*
***Steven Thompson**, Air Force Research Lab*
***Gary Schajer,** University of British Columbia*
***Michael Lance,** Oak Ridge National Laboratory*
***Mark Croft**, Rutgers University*
***David Smith**, Bristol University, UK*
***Dale Ball**, Lockheed Martin Aeronautics Company*
***Adrian DeWald**, Hill Engineering, LLC*
***Lynn Ferguson**, Deformation Control Technologies*
***Cam Hubbard**, Oak Ridge National Laboratory*
***Xun-Li Wang**, Oak Ridge National Laboratory*
***Richard Burguete,** Airbus UK Ltd.*
***Aladar Csontos**, Nuclear Regulatory Commission*
***Roger England**, Cummins Engine*
***Troy Marusich**, Third Wave Systems, Inc.*
***Len Reid**, Fatigue Technologies, Inc.*

2010 Summary

- 71 attendees, 3 days
- Isolated conference center worked well
- Revisited measurement techniques
- 29 speakers +







Residual Stress Summit 2010

Tahoe City, California, September 26-29, 2010

The 2010 Residual Stress Summit continues the central objective of the Residual Stress Summit series, which is to bring together residual stress users (who have "problems" and are in search of "solutions") and developers (who have "solutions" and are in search of "problems").

First organized in 2003, the Summit is specifically designed to stimulate practical technical interchange among working engineers and researchers. A coherent sequence of topics has been chosen to focus on practical needs and applications. Three major thrusts in the 2010 agenda are welding residual stress, forging residual stress, and residual stress measurements. Experts in these fields are being specifically invited to speak and to share their knowledge and experience. To keep the focus of the meeting, all talks are by invitation only.

Summit participants are invited to give voluntary poster presentations. Also included are demonstration areas where residual stress related equipment and materials will be on display. Informal conference proceedings will be distributed following the event.

The 2010 Residual Stress Summit will be held Sunday to Wednesday, September 26-29, 2010 at the Granlibakken Conference Center and Lodge, Tahoe City, California.

For further details, see:

www.rssummit.org

2013 summary - INL

Industrial Talks

P. John Bouchard, Open University, *Residual Stress Driven Creep in Nuclear Power Plants*
Mark James, Alcoa, *Forging Residual stress (Follow-up from 2010 RS Summit)*
Brian Leitch, Chalk River Laboratories, *Residual Stresses in the NRU Vessel Weld Repair*
Iuliana Cernatescu, Pratt and Whitney, *Residual Stress Measurements on Bulk Residual Stress in Nickel Base Superalloy Aeroen*
S. Chandrasekar, Purdue University, *TITLE? (Mike Prime)*
Tony Parker, University of Cranfield, *Gun Tube Residual Stresses - Known Knowns, Known Unknowns, Best Guesses and Outstar*

Residual Stress Failure Case Studies and Forensics (Organized by Mike Prime)

Lyndon Edwards, Australian Nuclear Science & Technology Organisation, *How understanding RS can help solve industrial and f*
Michael Brauss, Proto Manufacturing, *X-Ray Diffraction Residual Stress Measurement in Failure Analysis*
Pete McKeighan, Exponent Failure Analysis Associates, *Broke Bits & Pieces: Self Stresses & Failure Analysis*
Michael Prime, Los Alamos National Laboratory, *Forensic determination of residual stress from fracture surfaces*

Residual Stresses in Shipbuilding (Organized by Mike Steinzig)

T.D. Huang, Ingalls Shipbuilding, *Solving residual stress induced distortion problems in ship structures*
Bud Brust, Engineering Mechanics Corporation of Columbus, *Residual stress in oil rig platforms*
Luke Brewer, Naval Postgraduate School, *Measurements of RS in ship repairs*

Short Updates (Organized by Mike Hill)

Mitch Olson, Hill Engineering, *Contour Method repeatability and potential for round robin*
John Broussard, DEI, ASME Codes-*potential for residual stress effects*
Phillip Withers, Manchester University, *BP International Center and associated RS work*

Recommended Practices and Future Extensions (Organized by Gary Schajer)

Gary Schajer, University of British Columbia, *Hole-drilling and ring-coring*
Ed Kingston, Vegter, *Deep Hole Drilling*
Michael hill, UC Davis, *Slitting*
Adrian DeWald, Hill Engineering, *Contour Method*
Cevdet Noyan, *Columbia University, X-Ray Diffraction*
Phillip Withers, *University of Machester, Synchrotron Diffraction*
Ron Rogge, NRC, *Neutron Diffraction*
Drew Nelson, Stanford University, *Optical Measurement Techniques*
Michael Prime, Los Alamos National Laboratory, *Overview and Comparison*

- First time at a hotel – worked pretty well

2017 summary - Dayton OH

- 3 day session
- Central location with great tours
- 28 talks + posters and demos

Mark your calendars for the 6th Residual Stress Summit, to be held on Monday-Thursday October 23-26, 2017 at the University of Dayton Research Institute, in Dayton, Ohio, USA. The Welcome Reception is on Monday evening, October 23, followed by the technical sessions Tuesday-Thursday October 24-26. The Summit will showcase invited talks from acknowledged experts, topical updates, poster sessions and equipment demonstrations. The Residual Stress Summits are organized on a non-profit basis so as to be affordable and accessible meetings, see registration page.

The central objective of the Residual Stress Summit series is to bring together residual stress users, (who have "problems" and are in search of "solutions") and developers (who have "solutions" and are in search of "problems"). The Summit is designed to have a tightly focused format by choosing in advance a coherent sequence of topics directed at practical needs and applications. Experts in these fields are then invited to speak and to share their knowledge and experience. *All talks are by invitation only.*

Also included in the meeting are demonstration sessions where residual stress related equipment and materials are displayed. In addition, RS Summit participants are invited to give voluntary poster presentations and/or equipment demonstrations. The informal conference proceedings will include a list of attendees, demonstrators and affiliations, as well as the presentations from the speakers and poster presenters.

An optional Short Course on the Hole-Drilling Method for measuring residual stresses will be given immediately before Summit, on Monday morning, October 23, 2017.

The Summit Banquet will be held at the The Engineers' Club of Dayton, at which the Iain Finnie Memorial Award will be presented. Dr. Tom Crouch, Senior Curator, National Air and Space Museum, Washington DC, will give an after-dinner talk on early aviation history.

The organizers warmly thank the University of Dayton Research Institute for assisting with meeting coordination and organization of the v

We look forward to welcoming you to the 6th Residual Stress Summit, 2017 !

Michael Hill (University of California, Davis), 530-754-6178 *Michael Prime (Los Alamos National Lab), 505 667 1051*
Michael Steinzig (Los Alamos National Lab), 505-667-5772 *Gary Schajer (University of British Columbia), 604-822-6004*
Ismail Cevdet Noyan (Columbia University), 212-854-8919 *Kristina Langer (Air Force Research Laboratory), 937-241-5717*
Stefano Coratella (University of Dayton Research Institute), 937-212-9399

RS Summit 2024

- Fall would be a good time (ECRS in May of 2024)
- Location (location, location)
  - An industrial site with tours and RS work ongoing
  - Support for organizing the venue AND the technical content
- Volunteers/organizers for this and future Summits
  - Current organizers have tentatively agreed to do 1 more
- Sessions
  - Revisit past sessions (measurement techniques?)
  - Other industrial problems (casting RS, airplane industry)

Questions/Interest: Contact Mike, Mike, Mike, Cev, Gary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