American Welding Society
Alberta Section

Seminar Announcement
September 24, 2010

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Advanced Ultrasonic Examination Methods for Weld Inspection

Closely associated with the implementation of modern manufacturing and welding fabrication methods is the development of advanced non-destructive testing (NDT) techniques. NDT techniques are critical to ensuring the quality and fitness-for-service of production welds. Historically, the industry has relied on traditional NDT techniques such as radiographic testing and manual ultrasonic testing. The former presents significant health hazards and requires production outages, while the latter is labour intensive and typically does not provide a permanent record of the inspection. However, with the advent of modern computer software interfaces, an entire new spectrum of non destructive testing techniques has been developed, such as phased array and time of flight diffraction ultrasonic testing. These techniques improve the quality, speed and accuracy of the ultrasonic inspection process.

The AWS Alberta Section is hosting a one-day education seminar that will showcase advanced ultrasonic examination methods for Alberta's energy and fabrication industries. The event will include ultrasonic testing equipment demonstrations and will be of value for anyone involved in welding, including: shop foremen, superintendents, quality control personnel, professional engineers, welding inspectors, welders, and students of metals-related disciplines.

WHEN: Friday, Sept 24, 2010 @ 7:30 am

WHERE: Alberta Innovates – Technology Futures, Edmonton South (formerly Alberta Research Council) 250 Karl Clark Road, Edmonton, AB

SCHEDULE:

7:30 am	Breakfast & Registration
8:30 am	Morning Presentations
11:30 pm	Buffet Lunch
12:30 pm	Keynote Speaker (Dr. H. Bhadeshia, University of Cambridge)
1:30 pm	Afternoon Presentations
4:00 pm	Equipment Demonstrations and Networking Reception (with hors d'oevres and cash bar, with beer & wine)
6:30 pm	End of Seminar & Networking Reception

COST:

Before Sept 17:	$250	for AWS, CWA, ASM, NACE, SME and other EATS Members
	$300	for Non-Members
	$55	for Student Members
On or after Sept 17:	$300	for AWS, CWA, ASM, NACE, SME and other EATS Members
	$350	for Non-Members or Walk-Ups
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Please Note: There will be a cash bar (with beer and wine) from 4:00pm until 6:30pm.

Register Early! Limited Space!

Our Presenters

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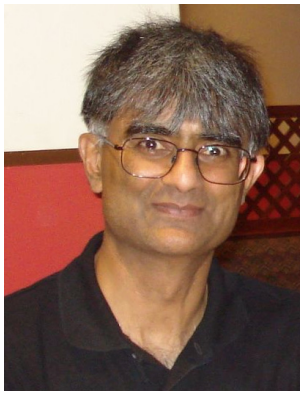
Keynote Speaker

Design of Welding Consumables for the Mitigation of Residual Stress

Dr. H. K. D. H. Bhadeshia, University of Cambridge

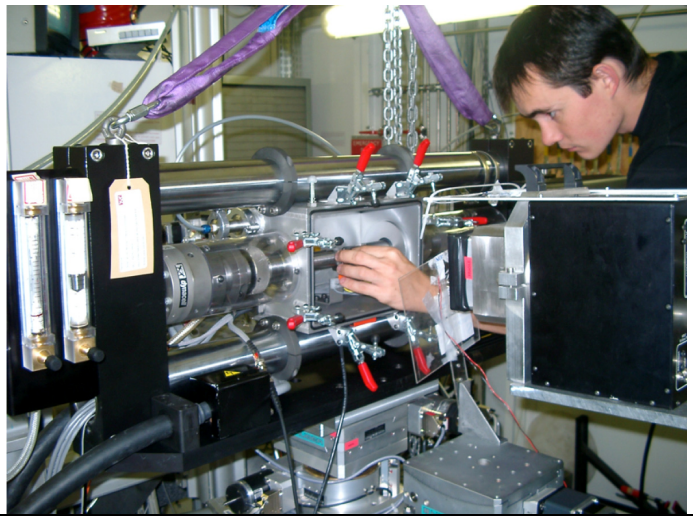


The matter of our everyday world is made up of atoms and it is the behaviour of collections of these entities which governs the properties of macroscopic samples. The choreography of atomic motions during transformation is particularly important when dealing with martensite or bainite. These phases evolve by the synchronised movement of atoms, leading to visible displacements which can in principle be exploited to do work, a phenomenon intrinsic to the mechanical behaviour of TRIP--assisted steels.

The subject of this lecture is somewhat different, i.e. the control of the transformation strains to compensate for the contraction when a constrained welded component cools. The talk will begin with a rigorous description of the deformation caused by the change of austenite into martensite or bainite. I will then go on to demonstrate how, following some leads from the early work of Alberry and Jones, welding alloys can be designed and implemented to leave the cooled welded assembly in a state which is free from pernicious residual stresses. The work covers both low-alloy and stainless steels.

Speaker Biography:

Harry Bhadeshia is the Tata Steel Professor of Metallurgy at the University of Cambridge, U.K., and Professor of Computational Metallurgy at POSTECH, South Korea. Much of his energy is devoted to the development of solid-state phase transformation theory, and its experimental validation, in the hope of inventing new steels and processes.



Synchrotron experiments to help design welding alloys

Introduction to Ultrasonic Phased Array and TOFD Inspection
Dr. Eric Sjerve, IRISNDT Corp

Phased array and TOFD (time of flight diffraction) are both well established inspection techniques routinely used for industrial inspection. Both techniques are based on sending high frequency ultrasonic vibrations into metals, with the goal of inspecting the material for either manufacturing or in-service flaws that could be detrimental to service. It is the construction codes, like ASME, that dictate how the inspection technique will be configured and how calibration is performed. They also provide acceptance criteria to which ultrasonic signals are compared for determination of acceptability. This presentation will provide an introductory discussion of both phased array and TOFD as they apply to industrial inspection. Included in this will be the physical basis of the techniques, how calibration is performed and some ASME code background. Finally, some examples will be given of standard data displays for common inspections.

Eric Sjerve has a B.Sc. in Physics from the University of British Columbia (1990), and a Ph.D. from the University of Toronto in the area of applied laser physics (1996). He has been involved with commercialization of NDT technology for over ten years, primarily in the petrochemical sector in Western Canada. This time has primarily been spent working on practically-oriented technique development for field usage in a variety of different NDT methods such as automated ultrasonic testing, computed radiography and EMAT inspection. He is also the chairman of ISO TC135 SC3 in Canada and chairman of IIW sub-commission VC on ultrasonic testing of welds. The IIW work has been focused on publication of IIW Handbooks on automated ultrasonic testing, austenitic weld inspection and phased arrays, with future work involved in standardization of phased array ultrasonic inspection techniques. His position at IRISNDT is currently vice president working in the areas of technology development and recruiting.

Ultrasonic Phased Array and TOFD for Pipeline Applications
Dr. Michael Moles, Olympus NDT

Ultrasonics has become the inspection technique of choice for pipeline welds, especially with the advent of new, higher strength steels. The technology has developed significantly since the early developments in the 60's, and now offers major potential for rapid and reliable inspections. The developments have been multi-pronged: from multi-probe systems to phased arrays, the arrival of Time-Of-Flight Diffraction (TOFD), new imaging etc. For example, phased array AUT systems were first developed a decade ago, and proved to be much more flexible and capable than multiprobe systems, particularly for special offshore applications. More recently, a new pipeline AUT system has been developed, which incorporates all the techniques developed previously. Specifically, seamless pipe, thick section inspections, small diameter pipe inspections, clad pipe are included, and the system is significantly more powerful, faster and flexible. A number of technical improvements have been made to software, instrumentation, computers, umbilical and probe pan. The new system is designed round the current ONDT software, which should permit the multiple end-user requirements to be fulfilled. In addition, the University of Toronto and ONDT are working on new sizing techniques using digital signal processing for S-scans. However, developments in TOFD have not progressed to the same level, though they are expected to improve soon. Overall, the new system has all the old system capabilities, plus significantly increased applications capability. Lastly, the new system requires no additional training and qualification.

Michael Moles has thirty years in automated ultrasonic testing (AUT), primarily with the nuclear, petrochemical and aerospace industries. He has over one hundred presentations and refereed papers. His educational background includes a Ph.D. in Metallurgy and M.B.A. in Marketing. Michael is a Registered Professional Engineer in Ontario, and a member of ASNT, ASME, AWS, CINDE, and ASTM. He is certified to CGSB Level II in Industrial Ultrasonics. He has been employed in sales, marketing and long term planning with Olympus NDT (formerly R/D Tech) for thirteen years. Michael is also an Adjunct Professor at the University of Toronto, Department of Mechanical and Industrial Engineering.

Phased Array (PA) and Time of Flight Diffraction (TOFD), Reliable Ultrasonic Test Methods for Piping Welds

Peter den Boer, Applus RTD Canada

The use of PA and TOFD ultrasonic techniques for the examination of process piping welds has advanced significantly in recent years. The imaging capabilities of both methods are very complementary. Through the publications of ASME Code Case 2235 for pressure vessels and CC181 for process piping, alternative acceptance criteria are in place to be fully Code compliant. By combining both methods a very high probability of defect detection and sizing can be achieved.

The TOFD technique has been demonstrated much longer than PA, consequently it has been used on many different applications, specifically inspection of High Density Polyethylene (HDPE) pipe. The excellent corrosion resistant properties of HDPE makes it suitable for the mining and petrochemical industry, but also, for essential service water applications. The incremental use of HDPE pipe for critical applications makes the examination of these joints necessary to ensure environmental integrity but also to provide added insurance for the end user and regulatory body.

Peter den Boer is Manager of Advanced NDE for Applus RTD. He is responsible for development, implementation and management of Advanced NDE services. He has twenty-nine years in providing weld inspection services within the Nuclear, Pipeline and Petrochemical industries. He is a member of ASNT and CINDE and (co)author of several papers and an Electrical Engineering graduate.

Phased Array and TOFD for In-Service Examination of Piping and Pressure Vessels

Brian Reed, Acuren Group

The use of phased array ultrasonics and TOFD (time of flight diffraction) for new-construction examination of piping and pressure vessels is increasing, and these methods offer benefits for in-service examination as well. A prime advantage is that there is no need for entry into a vessel.

In addition, phased array and TOFD provide:

- Detection and on-stream monitoring of defects.
- Defect height, length, and remaining ligament.
- Display and positioning of reflector image in relation to the weld volume.
- Information required for fitness-for-service assessments.

This presentation discusses these advantages based on field experience in phased array and TOFD in lieu of internal inspection.

Brian Reed has worked in the NDT industry since 1989 and worked in the field of advanced ultrasonic applications for the last 11 years, performing TOFD, Phased Array, automated corrosion mapping and advanced crack sizing techniques. He is currently in charge of advanced ultrasonic services for Acuren in Western Canada.

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Advanced Ultrasonic Examination Methods for Weld Inspection

Seminar Registration Form & Invoice

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