



Unique Course Series

13 & 14 June 2019
Senlis - France

Cetim is honoured to announce the exclusive opportunity to meet this year in Europe

Pr. Pingsha Dong
(University of Michigan, USA)

and learn more on Residual Stress, Fitness for Service and Fatigue Design of welded structures

(Schedule and registration form enclosed)



About the Course

During the first day, this course will provide a unique opportunity for attendees to learn about welding-induced residual stresses and distortions which can have significant impact on the manufacturability and structural integrity of welded components:

- provide a critical assessment of the “state of the art” residual stress modeling, analysis, and measurement techniques
- demonstrate effective modeling and analysis procedures for various industrial applications
- train participants to define and solve day to day residual stress and distortion problems, e.g., how to effectively:
 - mitigate residual stresses and distortions
 - incorporate residual stresses in fracture and fatigue assessment procedures

The second day is dedicated to the details of the mesh-insensitive structural stress method for fatigue evaluation of welded structures, from its mechanics basis, numerical implementation to S-N data correlations and life predictions. Through this training courses, participants will become familiar with some of the most important issues associated with fatigue of welded joints and existing design and analysis methods.

Participants, with hands-on experiences gained during the training course, should be able to solve basic fatigue design problems or effectively interpret fatigue test data

A bound volume of all course notes will be provided to all registered participants.

Course Instructor

The course will be taught by Dr. Pingsha Dong of Battelle, who has published over 180 peer-reviewed papers in archive journals and major conference proceedings. He has lectured internationally as a keynote or invited speaker on fatigue/fracture of welded structures and advanced process computational modeling techniques for welding/joining processes. He has received numerous prestigious awards/recognitions, including *IIW Fellow (2015)*, *IIW Evgeny Paton Prize (2008)*, *R&D Magazine's R&D 100 Award (2006)*, *TIME Magazine's Math Innovator (2005)*, *Aviation Week and Space Technology's Aerospace Laurels Award (2004)*, *AWS's R.D. Thomas (2004)* and *Dr. R. Wasserman Awards (1998)*, *SAE's Henry Ford II Distinguished Award for Excellence in Automotive Engineering (2003)*, *ASME G.E.O Widera Literature Award (2002)*.

Venue

Cetim Senlis is located closed to Paris Charles de Gaulle airport (25km) and with direct access by car or taxi through the A1 highway, exit 8.

<https://www.cetim.fr/en/About-Cetim/Locations/Main-sites/Senlis>

Senlis is approximately located at 50km from Paris and from the Eiffel Tower.

Schedule

Day 1		Thursday - June 13 th	
Residual Stresses Distortions and Fitness for Service Assessment			
8.30 – 10.15	Why should we be interested in residual stresses?		
	<ul style="list-style-type: none"> • Weldability • Structural manufacturability • Structural integrity 		
	Residual stress/distortion development mechanisms		
	<ul style="list-style-type: none"> • 1-bar, 3-bar, and n-bar model based descriptions • Plastic zone versus shrinkage zone • Shrinkage mode versus distortion types • Basic principles for controlling residual stresses and distortions • Application examples 		
10.15 - 10.45	Coffee Break		
10.45 - 12.30	Basic requirements for FE modeling procedures		
	<ul style="list-style-type: none"> • Shrinkage force versus shrinkage strain method • Thermoplastic modeling procedures • Buckling distortion modeling method 		
	Comments on residual stresses		
	<ul style="list-style-type: none"> • Available techniques • Assumptions and limitations • Why measurements can be wrong! • How to interpret measurement results • How to devise an effective measurement plan • Some well-documented examples 		
12.30 - 13.30	LUNCH		
13.30 - 14.30	Residual stresses in weld repairs		
	<ul style="list-style-type: none"> • Key differences between repair and initial fabrication welds • Key controlling parameters • Mitigation techniques 		
14.30 - 15.30	Post-weld heat treatment (PWHT) and local PWHT		
	<ul style="list-style-type: none"> • Residual stress relief mechanisms in PWHT • Limitations of local PWHT • Alternative stress relief procedures 		
16.00 - 16.15	Coffee Break		
15.45 - 17.00	Residual stresses as secondary stresses for FFS or ECA		
	<ul style="list-style-type: none"> • Modern interpretations of primary and secondary stresses • Fracture mechanics treatment of secondary stresses • A full-field residual stress profile generation method • Residual stress profile extraction 		
	Closure and Q/A		
19.30	Diner		

Day 2		Friday - June 14 th	
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Advances in Fatigue Design and Life Evaluation Methods for Welded Structure

8.30 - 10.00	Fundamental aspects of weld fatigue
	<ul style="list-style-type: none">• Some relevant terminologies and definitions• Unique fatigue issues associated with welded joints• A brief overview of conventional fatigue evaluation procedures:<ul style="list-style-type: none">○ Stress definitions and calculation procedures○ Code-recommended S-N curves and assumptions○ Unresolved critical issues
10.00 - 10.15	Coffee Break
10.15 - 11.30	Mesh-insensitive traction stress method – I
	<ul style="list-style-type: none">• Traction stress definition and mechanics basis• Numerical implementation• Simple calculation procedures• Measurement techniques and validations• Treatment of weld toe versus weld throat cracking
11.30 - 13.00	Mesh-insensitive traction stress method – II
	<ul style="list-style-type: none">• Generalized calculation procedure• Mesh-insensitivity validations• Multi-axial stress state• Examples
13.00 - 14.00	LUNCH
14.00 - 15.00	The Master S-N Curve Approach
	<ul style="list-style-type: none">• Fracture mechanics consideration• Master S-N curve formulation and validation• Treatment of load- versus displacement-controlled conditions
15.00 - 16.00	Fatigue evaluation procedures using traction stress based master S-N curve method
	<ul style="list-style-type: none">• Structural stress calculations – do's and don'ts• Other weld types, e.g., spot welds, laser welds, friction stir welds, etc.• Treatment of weld root/throat failure• Life prediction examples
16.00 - 16.30	Coffee Break
16.30 - 17.30	Special topics
	<ul style="list-style-type: none">• Treatment of low cycle fatigue using structural strain method• Structural strain based master E-N curve• Treatment of multi-axial fatigue and non-proportional loading• A hybrid method for simplified treatment of spot welds
17.30 - 18.00	Closure and Q/A

Registration form

Venue : Cetim, Senlis, 52 avenue Félix Louat, CS 80067 - 60304 Senlis Cedex - France

Online: <https://www.cetim.fr/formation>

Or please return the registration form to: formation@cetim.fr

For more information, please contact:

fabien.lefebvre@cetim.fr or jean-yves.barthelemy@cetim.fr

Question Answer Service - Tel: +33 (0)3 44 67 36 82 - Fax: +33 (0)3 44 67 36 94

Mr Mrs Ms

Surname First name

Quality

E-mail

Company

Address

Zip Code City

Country

Phone

Mobile

Siret N° Fiscal VAT Number

Business sector

These prices include contribution to Courses expenses, provision of course notes, lunches, coffee breaks, diner.

Registration fees	Prior to May 29 th 2019	After May 29 th 2019
1 day	850 € (without VAT)	1200 € (without VAT)
2 days	1500 € (without VAT)	2100 € (without VAT)

Payment must be made to the order of Cetim:

- by bank check
- by bank wire transfer
- by Credit card on-line payment on www.cetim.fr

CODE BANQUE CODE GUICHET COMPTE N° CLÉ RIB DOMICILIATION 30004 00074 00025684844 48 BNP PARIBAS IDF NORD FR76 3000 4000 7400 0256 8484 448 BIC BNPAFRPPCRO Please mention the invoice and customer member on your transfer order.
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This course is within the framework of vocational training and can be the subject of a training agreement.

You will receive an invoice with a confirmation of your registration.

Cancellation requests must be sent before Thursday 29th May 2019. Past this deadline, registration fees shall not be reimbursed. However participants may be represented by a deputy on request.

The organizers reserve the right to postpone the event, or to change the venue.

Official stamp	date	Name of undersigned	Signature