

# (ME#29) WELDING DESIGN AND CONSTRUCTION TO THE AWS STRUCTURAL CODES (D1.1)

## COURSE OVERVIEW

This course will provide those involved in the design, construction and quality of welded steel structures an extensive study of the structural welding requirements of the American Welding Society's D1.1 Structural Welding Code – Steel. During the course, participants learn necessary background information on welding terminology, processes, materials and principles to properly understand and apply the code. Apart from that, participants will be introduced to the design for statically loaded structures, such as buildings, and the details of their connections and fabrication. The trainer will introduce design for fatigue applications, such as cranes and machinery, and methods to extend fatigue life or increased the allowable stress range. Participants will then be given extensive guidance regarding writing and checking Welding Procedure Specifications. Last but not least, participants will be introduced to design of statically and fatigue loaded tubular structural joints, then provides an engineering perspective into weld quality, inspection and nondestructive examination including fitness for purpose concepts. Discussion on stud welding and retrofitting of existing steel structures, and then focuses on the special concepts, systems, connections, details and materials used for structures in seismic areas. These techniques are also used for blast resistance systems. In addition to the AWS Structural Welding Code, the course will include cross-reference and comparisons to ISO and EN standards, and incorporate the latest International Institute of Welding recommendations to fatigue design and fatigue life improvement.

## WHO SHOULD ATTEND

Engineers, senior designers, maintenance, quality assurance, inspection and manufacturing personnel who works related with structural welding. Another means to broaden and update their knowledge on structural welding.

## LEARNING APPROACH

A comprehensive course which is designed to provide intensive instruction and guidance on understanding Code requirements. Each session will be conducted in lectures, discussion and problem solving format, given the participants the opportunities to interact directly with the instructor.

## INTERESTING TOPICS COVERED DURING THE COURSE

Introduction to AWS Structural Welding Codes	Fabrication	<ul style="list-style-type: none"> <li>▪ Principles of tubular design</li> <li>▪ Static design</li> <li>▪ Fatigue design</li> </ul>
Welding Nomenclature and Metallurgy	<ul style="list-style-type: none"> <li>▪ Filler metal controls</li> <li>▪ Welding conditions</li> <li>▪ Thermal cut edges</li> </ul>	Inspection
Welding Processes		
Base Metals and Filler Metals	Design of Cyclically Loaded Structures (Fatigue)	<ul style="list-style-type: none"> <li>▪ Inspection tasks</li> <li>▪ Visual weld quality acceptance criteria</li> <li>▪ Selection and specification of NDE</li> <li>▪ Inspectors and NDT technicians</li> </ul>
Design of Statically Loaded Structures	<ul style="list-style-type: none"> <li>▪ Principles of fatigue design</li> <li>▪ Joint classifications</li> <li>▪ Maximum stresses and stress ranges</li> <li>▪ Prohibited joints</li> <li>▪ Fatigue life improvement</li> </ul>	Repairs
<ul style="list-style-type: none"> <li>▪ Weld size, throat, and length</li> <li>▪ Skewed joints</li> <li>▪ ASD allowable stresses and LRFD design strengths</li> <li>▪ Permitted increases and required reductions</li> </ul>	Welding Procedure Specifications	Stud Welding
Welded Joint Details	<ul style="list-style-type: none"> <li>▪ Principles of writing and reviewing WPSs</li> <li>▪ Prequalification limitations</li> <li>▪ Qualification of non-prequalified steels, joints and processes</li> </ul>	Retrofitting Existing Structures
<ul style="list-style-type: none"> <li>▪ Prequalified groove weld details</li> <li>▪ Minimum and maximum weld sizes</li> <li>▪ Weld terminations</li> <li>▪ Eccentricity, Fillers, and Access holes</li> <li>▪ Weld backing and Weld tabs</li> <li>▪ Lamellar tearing</li> </ul>	Qualification of Welding Personnel	Welding for Seismic and Blast Resistance
		<ul style="list-style-type: none"> <li>▪ Older steels and weldability</li> <li>▪ Design considerations during retrofit</li> </ul>
		<ul style="list-style-type: none"> <li>▪ Principles of seismic behavior and performance</li> <li>▪ Principles of blast behavior and resistance</li> <li>▪ Structural and connection systems</li> </ul>