Unit 153: Welding Inspection

Unit code: J/615/3346
QCF level: 4
Credit value: 15

Aim

This unit has been designed to develop the learner's awareness of the principles and applications of welding inspection methods to ensure product compliance is assured.

Unit abstract

Many of the things we take for granted, such as motor vehicles, buildings and bridges, rely on welded joints to hold them together. Weld performance is not only dependent upon the skill of the welder or the precision of an automated system, but also on the quality of the inspection process. Weld inspection is a key part of the quality assurance process.

This unit introduces learners to the role of inspection in weld construction, the purpose and value of welding procedure and welder performance testing as well as the range of non-destructive testing methods that can be employed to identify weld imperfections that could lead to ultimate in-service failure.

The learner will also be able to demonstrate an understanding of a range of non-destructive methods, their application and limitations. Upon completion of this unit, the learner will be able to identify the most appropriate testing method with regard to material type, size and potential weld imperfections, as well as have an understanding of the economic impact resulting from failure of the joints for people, products and environment.

Learning outcomes

On successful completion of this unit a learner will:
Understand the role of inspection in weld construction

1 Understand the role of inspection in weld construction

2 Be able to identify weld imperfections, their cause and impact on the weld quality

3 Understand the different methods of NDT and their range of application

4 Understand the role of Quality Assurance during fabrication.

Unit content

1 Understand the role of inspection in weld construction

Understand the role and responsibilities of the welding inspector and the inspector's relationship with other welding and inspection personnel.

Terms and definitions: understand inspection and NDT terminology.

Understand the purpose of destructive and non-destructive testing.

2 Be able to identify weld imperfections, their cause and impact on the weld quality

Understand the requirements for material used for procedure and performance testing.

Clarify the characteristics of the fundamental types and possible position of weld imperfections, and their visibility with the current NDT techniques.
Understand the morphology of weld imperfections and their possible influence.

Recognise international/national standards codes for acceptance/rejections of weld imperfections.

3 Understand the different methods of NDT and their range of application

Understand fundamentals, applications and specifications, including interpretation of specific imperfections in weldments for: visual inspection; liquid penetrant testing; magnetic particle testing; radiographic testing; ultrasonic testing; eddy current testing principles.

Understand the economics of testing operations applied to welded fabrications.

4 Understand the role of Quality Assurance during fabrication

Understand the principles and levels of Quality Assurance.

Understand importance of accurate records and monitoring of activities.

Understand the responsibilities associated with inspection activities as they relate to staff, company organisation and records.

Risks related with a collapse or a failure of the joints for people, products and environment.

Learning outcomes and assessment criteria

Learning outcomes On successful completion of this unit a learner will:	**Assessment criteria for pass** The learner can:
LO1 Understand the role of inspection in weld construction	1.1 describe the role and responsibilities of welding inspectors 1.2 describe common inspection and NDT terms 1.3 explain the purpose and value of testing in relation to service performance 1.4 analyse the role of inspection in assuring product quality
LO2 Be able to identify weld imperfections, their cause and impact on the weld quality	2.1 identify different types of weld imperfections 2.2 identify the causes of weld imperfections, with reference to the different welding processes and welded materials 2.3 explain the requirements for materials used for procedure and performance testing 2.4 explain how defects can impact in-service performance
LO3 Understand the different methods of NDT and their range of application	3.1 identify the types and location of imperfections expected to be found using magnetic particle and dye penetrant testing techniques 3.2 describe the principles of ultrasonic and radiographic testing techniques 3.3 explain how accuracy of detection is related to NDT process, material type and size of construction 3.4 critically review the selection of NDT methods in terms of the economics of testing operations
LO4 Understand the role of Quality Assurance during fabrication	4.1 describe the role of the inspector during fabrication activities 4.2 explain the importance of keeping accurate records and monitoring of activities with respect to the inspection process 4.3 explain how residual stresses may affect the behaviour of a structure in service 4.4 explain the responsibilities associated with inspection activities as they relate to staff, company organisation, generation and retention of records 4.5 critically analyse the risks related with a collapse or a failure of welded joints for people, products and environment.

Recommended Resources

Welding Institute

The Welding Institute is the leading international membership body for welding and joining professionals.

http://www.theweldinginstitute.com/

British Institute of Non-Destructive Testing

British Institute of Non-Destructive Testing (NDT). Covering NDT in its widest sense. Each issue includes technical articles on a broad range of subjects and general news stories affecting the whole industry.

http://www.bindt.org/publications/insight-journal/

Textbooks

B. Stephen Wong. (2014) *Non-Destructive Testing – Theory, Practice and Industrial Applications*. LAP Lambert Academic Publishing. ISBN 9783659667565