Run-or-Repair Operability Decisions for Pressure Equipment and Piping Systems in Nuclear Plants

A Practical, Case Study-based Training Program
Led by:

George Antaki, P.E.

15 Hours • 1.5 CEUs • 15 PDHs

About this Master Class (MC115)

A plant objective is to attain the maximum economic benefit and service life from existing equipment without sacrificing integrity. This requires accurate assessment of the condition of the equipment and their suitability for operability. This two-day MasterClass provides an in-depth review of the rules and application of the ASME nuclear codes and standards, and the NRC regulations, in making run-or-repair operability decisions for pressure equipment, piping and tubing systems in nuclear power plants. The class is based on a series of Case Studies of abnormal conditions and how to diagnose their cause, how to determine the integrity of the system or component, how to decide whether to keep the system or component in service, and how to repair and prevent recurrence.

For more information and to register, visit
http://go.asme.org/mc115
The ASME Master Class Series focuses on applications and case studies of a particular topic. Each Master Class is led by an ASME Master, an expert in his professional discipline, who brings a wealth of knowledge and practical examples to the forum. Participants are expected to have prior knowledge of the topic area to gain the most from this interactive environment. Sessions are focused on real world examples and case studies, with active class discussion and analysis.

About this MasterClass

This two-day MasterClass provides an in-depth review of the rules and application of the ASME nuclear codes and standards, and the NRC regulations, in making run-or-repair operability decisions for pressure equipment (tanks, vessels, valves, pumps) and piping and tubing systems in nuclear power plants. The class is based on a series of Case Studies of abnormal conditions, and how to determine the integrity of the system or component, how to decide whether to keep the system or component in service, and how to repair and prevent recurrence. In making these assessments, we will discuss what guidance is available in ASME III Div.1, ASME XI, ASME B31.1, ASME QME, ASME O&M; what NRC regulations and licensing commitment to keep in mind; as well as what is not addressed in codes, standards and regulations, and is therefore at the discretion of the engineer. The abnormal conditions studied will include: Flow-induced vibration, waterhammer and pressure transients, pitting and corrosion, corrosion in buried pipes, stress corrosion cracking, over-pressure, failed supports, leakage of mechanical joints, potential interactions, and thermal-induced fatigue.

Upon completion, attendees will be able to

- Distinguish which parts of run-or-repair operability decisions are addressed in ASME nuclear codes and standards, in NRC regulations; and which parts are at the discretion of the engineer.
- Apply basic run-or-repair principles to diagnose the cause of damage or abnormal condition, and know what simplified and advanced methods and criteria are available for their analysis.
- Identify the criteria used for making operability decisions for several types of generic damage mechanisms, including fatigue, pitting, corrosion, cracking, overload, leaks, and component support failures.

About this ASME Master

George Antaki, P.E.

is a Fellow of the ASME, recognized for his expertise in design, analysis, and fitness-for-service evaluation of pressure equipment and piping systems. He is the Chairman of ASME B31 Mechanical Design Committee, Chairman of ASME III Working Group Piping Design, member of the ASME III Subgroup Component Design, ASME QME, and ASME Operation and Maintenance Subgroup Piping. He is the author of two textbooks on the subject of pressure equipment design and integrity evaluation: Piping and Pipeline Engineering and Fitness-for-Service for Piping, Vessels, and Tanks. Mr. Antaki has nearly 40 years of engineering experience in the power and process industries. He earned his degree in Nuclear Engineering from the University of Liege, Belgium in 1975, and his Master’s degree in Mechanical Engineering from Carnegie Mellon University in 1985.

MasterClass Requirements

This MasterClass is structured on the assumption that participants have a basic knowledge of ASME Nuclear Codes & Standards.

Participants are encouraged to bring examples of particularly challenging issues encountered on the job for in-class discussion.

Who Should Attend

This Master Class is intended for nuclear power plant staff engineers, designers, maintenance engineers, inspectors, and regulators who desire a practical roadmap for making run-or-repair and operability decisions based on the sound application of ASME codes and standards, NRC regulations, and nuclear engineering practice.
Run-or-Repair Operability Decisions for Pressure Equipment and Piping Systems in Nuclear Plants *(MC115)*

**AGENDA**

The contents are presented in several case studies, tentatively organized as shown below. The two-day schedule allows for ample discussion and interaction with attendees. The instructors reserve the right to modify the content to address the audience’s needs and preferences.

**Day One: 8:00am – 5:00pm**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>8:00 – 8:30</td>
<td>Overview of ASME nuclear codes and standards and NRC regulations in making run-or-repair operability decisions</td>
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<tr>
<td>8:30 - 10:00</td>
<td><strong>Case Study 1: Flow-Induced Vibration in Piping</strong>&lt;br&gt;Observations, measurements, causes, run-or-repair decision, role of regulations and codes-standards, options for prevention, options for mitigation</td>
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<td>10:00 – 10:15</td>
<td>BREAK</td>
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<tr>
<td>10:15 – 11:00</td>
<td><strong>Case Study 2: Waterhammer in Pressurized Water System</strong>&lt;br&gt;Observations, causes, run-or-repair decision, role of regulations and codes-standards, options for prevention, options for mitigation</td>
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<tr>
<td>11:00 – 12:00</td>
<td><strong>Case Study 3: Steam-Water Cavitation Waterhammer</strong>&lt;br&gt;Observations, causes, run-or-repair decision, role of regulations and codes-standards, options for prevention, options for mitigation</td>
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<td>12:00 – 1:00</td>
<td>LUNCH</td>
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<td>1:00 – 3:00</td>
<td><strong>Case Study 4: Corroded Tank</strong>&lt;br&gt;Inspection techniques, causes, run-or-repair decision, role of regulations and codes-standards, options for repairs</td>
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<td>3:00 – 3:15</td>
<td>BREAK</td>
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<tr>
<td>3:15 – 5:00</td>
<td><strong>Case Study 5: Corroded Piping System</strong>&lt;br&gt;Inspection techniques, causes, run-or-repair decision, role of regulations and codes-standards, options for repairs</td>
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End of Day 1
Day Two: 8:00am – 5:00pm

**Case Study 6: Pitting Corrosion of Vessel**
Inspection techniques, causes, run-or-repair decision, role of regulations and codes-standards, options for repairs

8:00 – 10:00

**BREAK**
10:00 – 10:15

**Case Study 7: Fatigue Failure by Thermal Transient**
Causes, role of regulations and codes-standards, options to prevent recurrence

10:15 – 12:00

**LUNCH**
12:00 – 1:00

**Case Study 8: Rupture of a Mechanical Joint**
Inspection techniques, causes, run-or-repair decision, role of regulations and codes-standards, options for repairs

1:00 – 3:00

**BREAK**
3:00 – 3:15

**Case Study 9: Leakage of Flange Joint**
Causes, role of regulations and codes-standards, options for repair

3:15 - 4:00

**Case Study 10: Corrosion in Metallic Buried Pipe**
Inspection techniques, causes, run-or-repair decision, role of regulations and codes-standards, options for repairs

4:00 - 4:45

**Summary and Wrap-up**
4:45 – 5:00