Field Modifications

**Overview**

Modifications to nuclear plant components are often required as components age. These modifications may be required to improve access for inspection or maintenance, to repair in-service degradation and damage, or to address other plant-related needs. BWXT’s experience designing and providing field services to nuclear pressure vessel equipment enables our engineers to design and qualify practical vessel modifications that are optimized for field installation.

**Applications**

BWXT’s experience and capabilities include qualification of a large range of field modifications, including:

- Modification of openings
- Field-installed inspection ports and handholes (often without the need for welding to the pressure boundary), including unreinforced or partially reinforced designs
- Installation of Helicoils™ to repair damaged threads
- Installation of Hydra-Nuts™
- Operation with damaged or missing studs on openings
- Changes of gasket materials

**Capability and Tools**

BWXT has developed extensive knowledge in bolt design and analysis, gasket selection, gasket seating design, gasket analysis and seal-weld analysis through years of experience with gasketed and seal-welded openings subject to pressures in excess of 3000 psi.

BWXT performs gasket analyses using a variety of methods, both rule-based (ASME and PVRC methods) and numerical-based, using commercial Finite Element (FE) codes (ANSYS®, ABAQUS™).

Capabilities include:

- Selection of gaskets based on joint behaviour, gasket stiffness and leakage requirements
- ASME Code design of gasketed joints/bolts, including thermal transient and fatigue analysis
- Selection of bolt assembly preloads for good gasket seating and no-leakage during operation
- Gasket and bolt design using the PVRC method, including interpretation of Room Temperature Tightness (ROTT), gasket test data and their application to bolt design
- Finite element modeling of non-linear gasket behavior including elastic-plastic modeling for the prevention of gasket leakage
- Prediction of joint rotation and optimization of joint geometry
- Fatigue analysis of seal welds
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