# *NUCLEAR ENERGY UNIVERSITY PROGRAMS*

## Effect of Post-Weld Heat Treatment on Creep Rupture Properties of Grade 91 Steel Heavy Section Welds

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**Collaborators:**
None

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**Initiative:** Gen IV

**Abstract**

This project will conduct a systematic metallurgical study on the effect of post-weld heat treatment (PWHT) on the creep rupture properties of P91 heavy section welds. The objective is to develop a technical guide for selecting PWHT parameters, and to predict expected creep-rupture life based on the selection of heat treatment parameters. The project consists of four interdependent tasks:

- Experimentally and numerically characterize the temperature fields of typical post-weld heat treatment procedures for various weld and joint configurations to be used in Gen IV systems.
- Characterize the microstructure of various regions, including the weld fusion zone, coarse-grain heat-affected zone, and fine-grain heat affected zone, in the welds that underwent the various welding and PWHT thermal histories.
- Conduct creep and creep-rupture testing of coupons extracted from actual and physically simulated welds.
- Establish the relationship among PWHT parameters, thermal histories, microstructure, creep, and creep-rupture properties.