INTERNSHIP
ENGINEERING CRITICAL ASSESSMENT

PRINCIPIA

INTRODUCTION:

For several years, PRINCIPIA sustains his expertise through R&D, in particular in structural analysis. One of R&D axis is relative to the failure and ultimate strength assessment accounting the safety of welding including defects and flaws. Based on fracture mechanics principles, analytical method Engineering Critical Assessment is an efficient option to determine flaw acceptance criteria to avoid the welded assembly failure.

Nevertheless, the existing analytical models do not cover each geometrical configuration. FE approaches based on X-FEM method allow to assessing the stress intensification at flaw tip.

PRINCIPIA would like now to develop new analytical model to complete the existing, and to benefit from the efficiency of analytical approaches.

SCOPE OF WORK:

The scope of work includes the 3 following tasks:

- ✓ State of the art
- ✓ FE analysis of flaws not covered by existing analytical models of crack growing
- ✓ Development of analytical model similarly as proposed in standard ECA approach

State of the art

Review of different approaches used to assess ultimate strength of welding joints (analytical and by FEM, including X-FEM).

FE simulations

For some typical flaws outside the validity range proposed in BS7910, develop a FE model and adopt the best modeling strategy to catch the local stress intensification at crack tip and simulate the crack growth. Perform some sensitivity analysis in order to extract some characteristics of the typical flaws behavior

Analytical laws development

Based on the crack growth modeled by numerical approach, propose analytical model of crack growth, based on similar approach, e.g. BS7910 or IWS

DELIVERABLES:

Technical report including

- ✓ State of the art
- ✓ Advanced user guide of numerical approach (e.g. XFEM model)
- ✓ Advanced user guide of analytical method (e.g. crackwise)

GENERAL:

- ✓ Duration: 6 months
- ✓ Start date: Early 2020
- ✓ Location: PRINCIPIA offices in Nantes (Loire-Atlantique)
- ✓ To apply: job@principia.fr