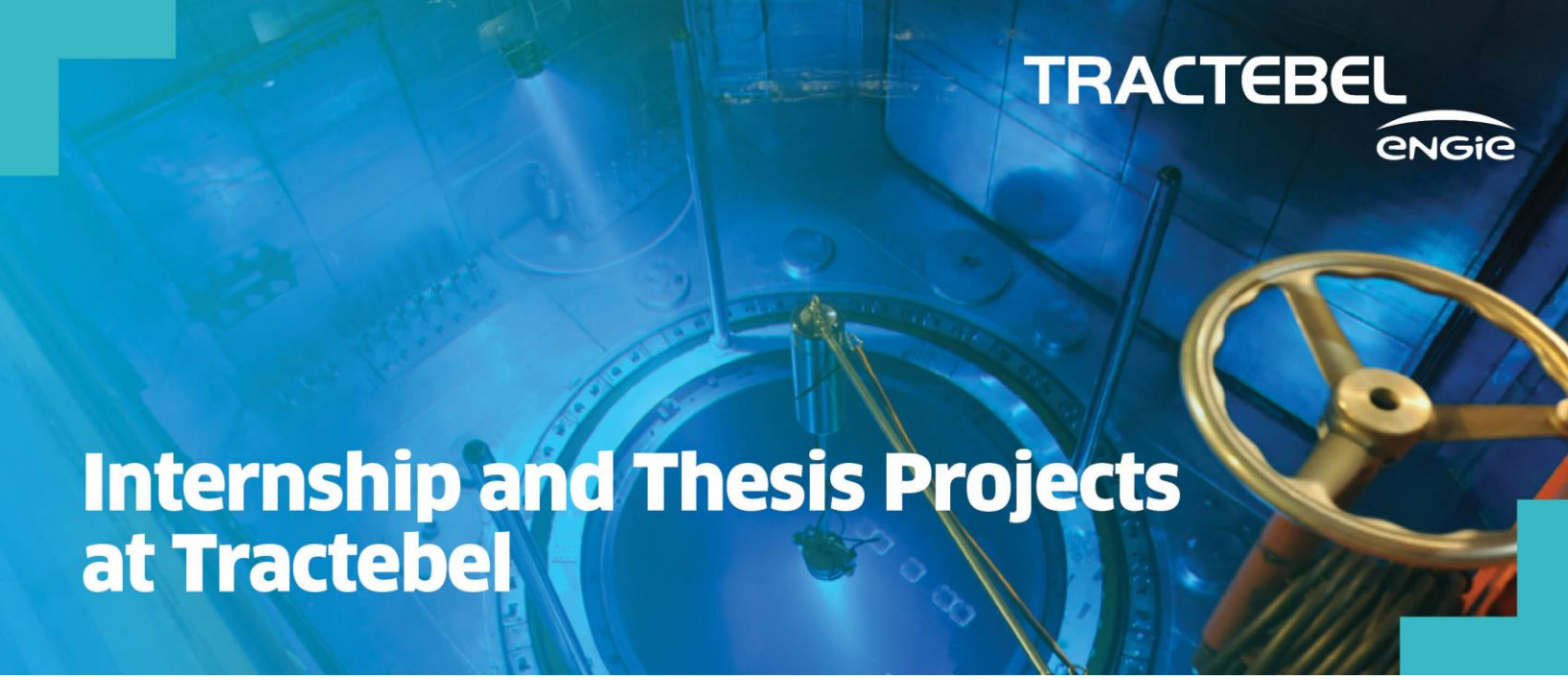

Internship and Thesis Projects at Tractebel

Internship

Comparison of interaction for cracks subjected to primary and secondary stresses

Damage & Fracture Mechanics

Business line: Nuclear - Mechanical Engineering Métier

Type: Internship (duration ~ 480h – 3 months)

Site: Brussels Engie Tower, partial homeworking allowed

Who is Tractebel ?

Tractebel, part of the Engie group, has over 150 years of experience and is one of the world's largest engineering companies. Tractebel offers its customers multidisciplinary solutions in the fields of energy, nuclear, hydraulic and infrastructure. Our teams are involved in all phases of a project, from feasibility studies to implementation.

What will you be working on?

When multiple crack-like flaws are detected in pressure retaining components during inspection, the first step of evaluation consists of determining whether the flaws shall be combined into a single flaw or evaluated separately. This combination process is done according to interaction rules provided in Codes and Standards (C&S); those rules being based on interaction analyses between the cracks using Fracture Mechanics concepts.

While it is well known that the interaction between cracks differs if the cracks are subjected to primary loads (e.g. pressure) or to secondary loads (e.g. thermal transients), the interaction rules of the C&S are independent of the nature of the loads.

Description of the work

This work aims at comparing crack interaction between two cracks subjected on one hand to pressure load and on the other hand to a thermal shock transient.

In that frame, it will be required to conduct a literature survey of different scientific papers written on the topic. Afterwards, crack interaction calculations will be carried out for

- different crack relative positions (i.e. distance between the cracks)
- different absolute positions (distance to the inner surface of the component)
- different crack aspect ratio (elliptical shape ratio)
- linear elastic and elastic-plastic regimes for different hardening rules
- different thermal transients

The expected result is to define an equivalent crack leading to the same crack driving force than the driving force of two cracks interacting shall be defined for each analyzed configurations. The calculations will be done using the Extended Finite Element Method implemented in Morfeo Crack

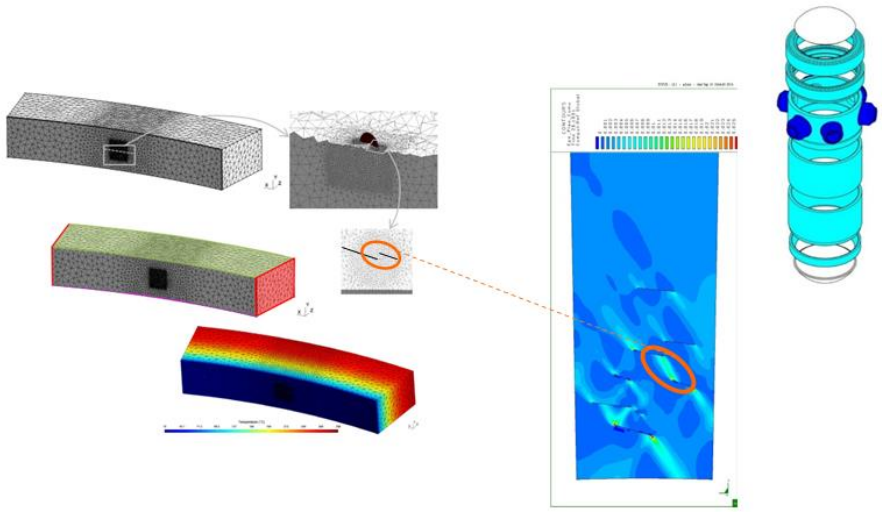

Figure 1 – Illustration of crack interaction analyses

What profile are we looking for?

- You speak fluently French or English.
- You are studying Mechanical, Physical, Electro-Mechanical or Civil Work Engineering.
- You are rigorous, motivated, you have autonomy
- You have computer skills

What do we offer?

- An interesting and varied thesis in a large nuclear engineering company.
- An environment that allows you to strengthen your technical skills.
- The opportunity to receive professional guidance by experts in different fields of engineering.

How to apply?

Do you think that Tractebel is the perfect fit for your internship?

Send us an e-mail to valery.lacroix@tractebel.engie.com with your CV and a few lines of motivation.

We hope to see you soon!