

# CSI PROJECT

## To predict Primary Water Stress Corrosion Cracking kinetics of primary components

Primary Water Stress Corrosion Cracking (PWSCC) is a material failure phenomenon that occurs at grain boundaries of austenitic alloys used in nuclear power plants, when 3 conditions are gathered (see in Fig. 1). PWSCC is at the heart of various industrial concerns: (1) safety improvements (2) lifetime of primary circuits components (3) reduction of costs by selecting appropriate maintenance program (inspections, repairing and replacement of various primary components).

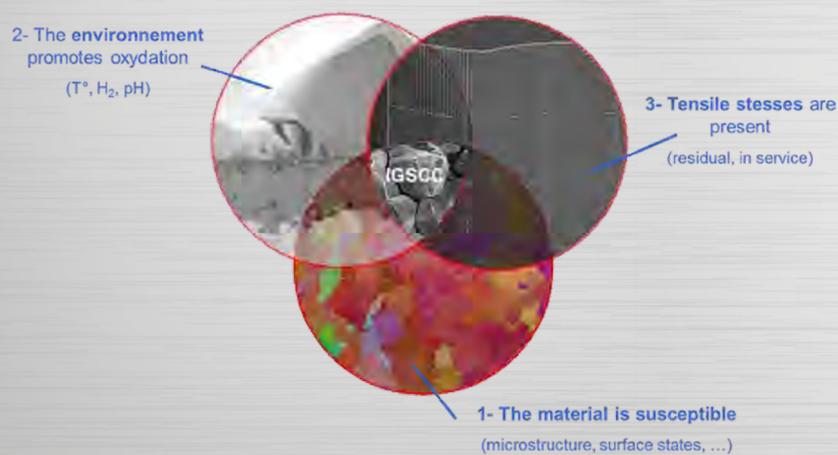


Figure 1: The conditions for Inter-Granular Corrosion Cracking (IGSCC)



Figure 2: Skills used by CSI project to develop PWSCC predictive tools

The ambition of CSI project is to provide to industrial end-users a fully comprehensive methodology to predict PWSCC in primary components. We develop two types of deliverables:

- **PWSCC models** that are adapted for industrial issues: usable at scale of large components, delivering quantitative data (crack depth vs. time), relying on physical mechanisms, easy to extrapolate.
- **Code\_Coriolis**: a numerical that uses the models to predict SCC location and kinetics in large components modeled in 3D.

These deliverables will contribute to:

- Support the lifetime extension of PWRs
- Better predict the future degradation of primary circuits components
- Provide technical support to select the proposed mitigations methods
- Optimize and justify the maintenance strategy: location and frequency of in service inspections, replacement of aged components
- Improve of the safety of the primary circuits

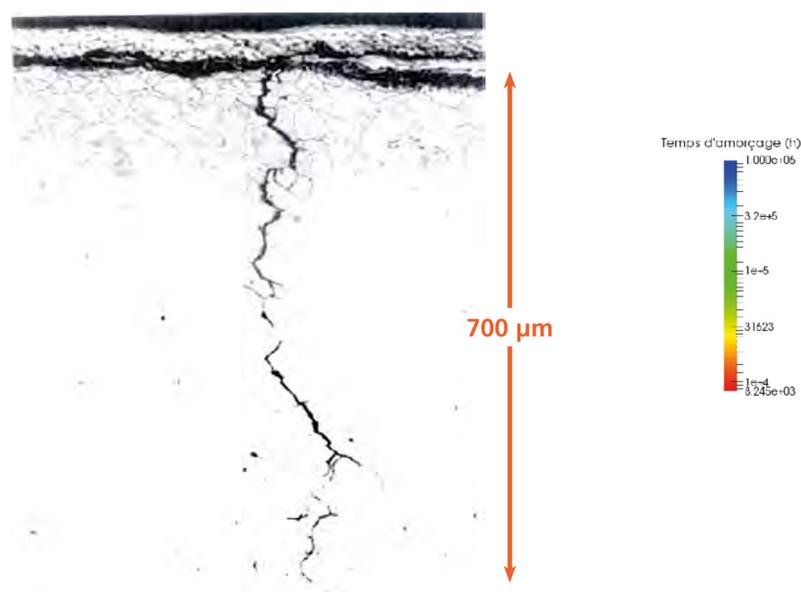


Figure 3: Example of IGSCC in a partition plate of a steam generator (alloy 600)

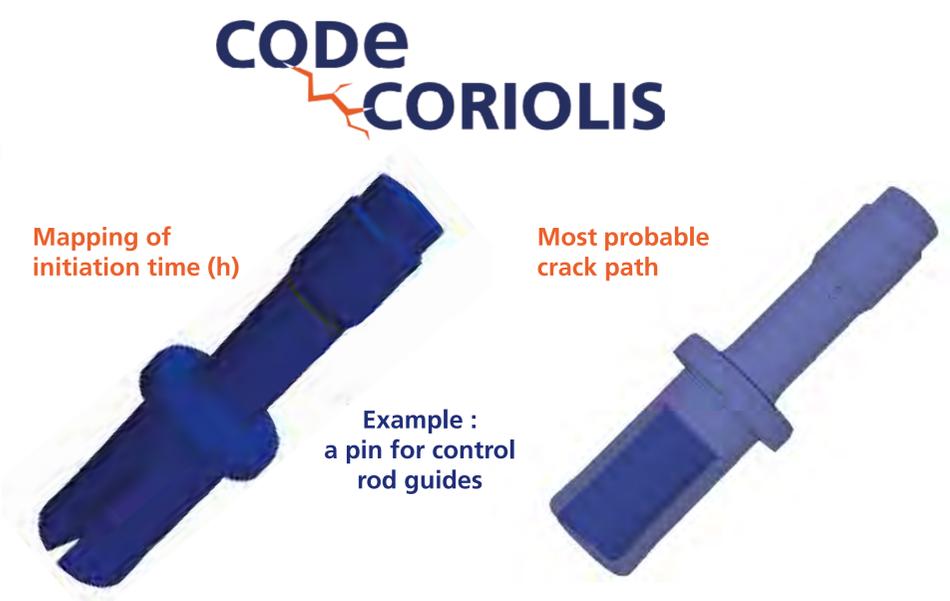


Figure 4: What you can do with Code\_Coriolis