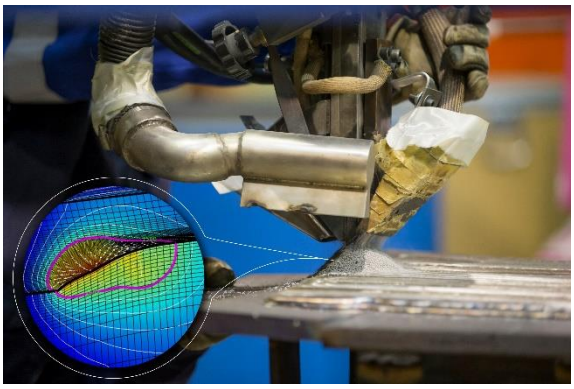
framatome

Numerical welding simulation

Determination of residual stresses and deformations

Simulate your welding operations to optimize your processes and increase the lifespan of your components



Challenge

Welding is essential in industry, but it remains a complex manufacturing process. It alters the material, creates heterogeneities and residual stresses, which can lead to out-of-tolerance distortions or reduce component lifespan.

- You need to define or adjust a manufacturing sequence.
- Assess the impact of a production deviation.
- Specify uncertainties on process parameters.

These analyses often require extensive experimental test campaigns that are heavy, time-consuming, and costly.

Solution

Our welding simulation solution addresses these challenges by offering:

- Virtual tests to complement and reduce experimental campaigns.
- Accurate knowledge of the residual state after manufacturing stresses and distortions to anticipate risks.
- A realistic estimation of component lifespan, more precise than conservative approaches based on industry rules.

We analyze your specific issue, define requirements, and design a targeted modeling strategy by integrating:

- 2D or 3D thermo-metallurgical and thermomechanical models, covering multiple welding passes.
- Support to optimize welding parameters and sequences.
- Collaborative research programs to push innovation further.

Your performance
is **our** everyday **commitment**

Customers benefits

- Unique expertise in welding simulation
- Dedicated in-house industry tools
- Industrial know-how built on strong ties with the group's manufacturing plants

Key figures

3 modeling scales: arc-pool, weld, and structure

100+ welding passes accounted for in our simulations

References

Nuclear manufacturing and services:

- PWR (900MW, 1300MW, EPR): Modeling the behavior of bimetallic joints
- RJH: Qualification of aluminum structure assemblies related to in-service performance
- EPR2: Determination of welding-induced distortions in stainless steel vessel internals
- And more: CNES, Framatome Space...

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