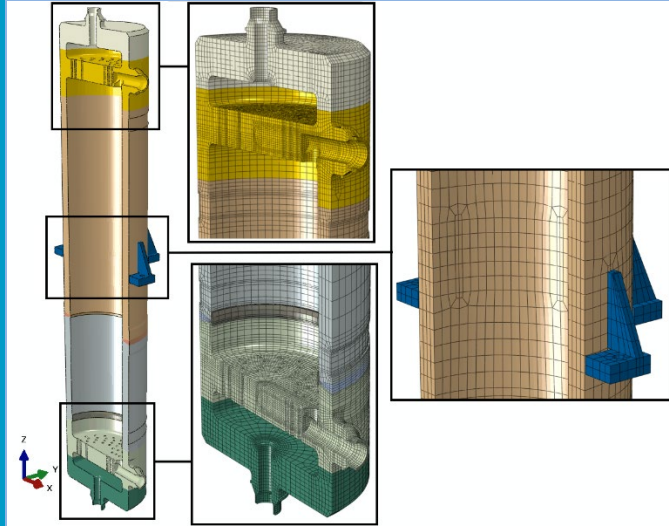




## Structural and Lifetime Assessment Department Integrity and Technical Engineering Division



# LOW CYCLE FATIGUE

Heat exchanger finite element model (FEM)

### Value for customers

- Long term experience with fatigue analyses at both system level and component level
- State-of-art fatigue analyses of structures and components based on detail knowledge of design and operation
- Problem/ requirement-based approach (both elastic and elasto–plastic approach)

### Application

- Identification of structures and components subjected to significant fatigue loading during operation and operational regimes critical for operation and long term operation (LTO)
- Justification of residual lifetime of structures and components - complex fatigue lifetime evaluation of structures and components
- Enhancement of operating parameters` monitoring to minimize unnecessary conservatism in fatigue analyses

### What we offer

- Analyses of operational history and its impact on fatigue life of structures and components
- Evaluation of static strength and fatigue lifetime of structures and components
- Fatigue finite element model (FEM) analyses including cyclic plasticity phenomena

### Contact details

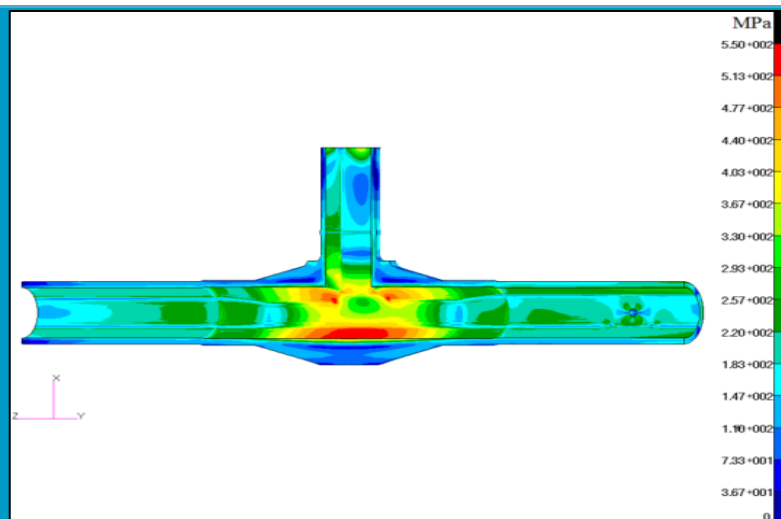
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- Broad experience in using FEM codes for thermal and strength calculations (ABAQUS, SYSTUS, MSC.MARC)
- Evaluation of fatigue with influence of corrosive environment (environmentally assisted fatigue) according to national and international requirements
- Elaboration of experimental fatigue curves in inert or corrosive environment and their implementation into required analyses
- Enhancement of temperature sensors` locations to identify fatigue-loaded structures and components
- Screening of structures and components subjected to significant fatigue loading during operation
- Fatigue evaluation of welds (construction singularities) using adequate procedures

### Our references

- Fatigue lifetime analyses of reactor pressure vessels (RPVs), RPV internals, heat exchangers, valves, piping and other components of nuclear power plants (NPPs) since 1990
- Analyses and enhancement of temperature sensors` locations for identification of critical points in pipeline systems for thermal fatigue monitoring for Temelin NPP and Dukovany NPP (requirements of Czech Regulatory authority for LTO of NPPs) since 2016
- Influence of periodic hydrogen discharge on pipelines` fatigue at NPP Dukovany, 2018
- Fatigue crack growth analyses of bolts of VVER RPV internals, 2023



Distribution of maximum Tresca stress during hydrogen discharge and subsequent thermal loading