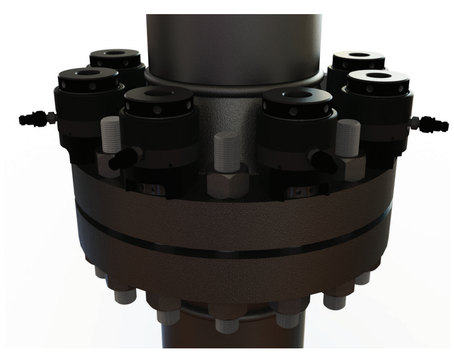
HPC-Cloud-based simulation of flange tightening

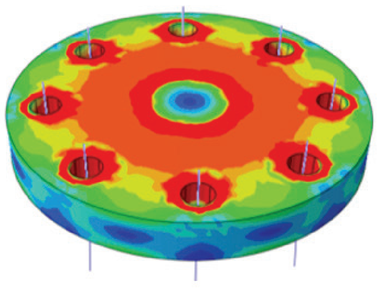
The Challenge

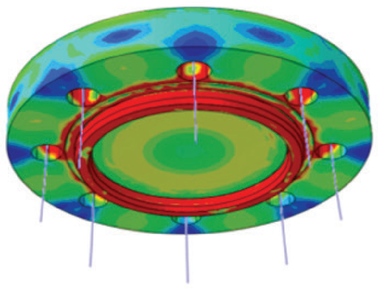
The challenge of this case study was to **simulate and optimise the tightening of flanged joints** that are used for high-pressure and hot gases or liquids. This required the development of a computer model for simulating the tightening process and a front-end application to control the simulations in order to improve the design of the tightening process and to reduce the damage of the flanges.

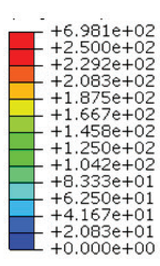
The Solution

- **A computer model was developed** which represented all the functional parts of a flange including the gasket and the tightening bolts.
- This model was driven by a user interface, which enabled **different tightening scenarios to be evaluated** and several sizes of case studies to be run.









The Benefits

- Based on previous experience in the field (when no simulations were carried out), a non-optimised tightening took more man-hours, while this type of process **reduces the labor costs**.
- The most important outcome is the reduction in downtime of industrial installations.
- A further benefit of HPC-based simulation is that it allows technicians to **avoid damage to flanges during the tightening** which is not possible using the usual experience-based method.

Organisations Involved

Domain expert: aimen CENTRO TECNOLÓGICO

End User: TexasControls

HPC Centre and HPC Expert: CESGA

FORTISSIMO

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SEVENTH FRAMEWORK PROGRAMME