

Innovative piping system design solution for distribution of steam from steam turbine to air cooled condenser system - ACC

Miša Jočić, PIPETECH
Zdravko Ivančić, NUMIKON d.o.o.
Thomas Behlinger, INNOSPIN AG

SECTION 1

SECTION 2

SECTION 3

SECTION 4

SECTION 5

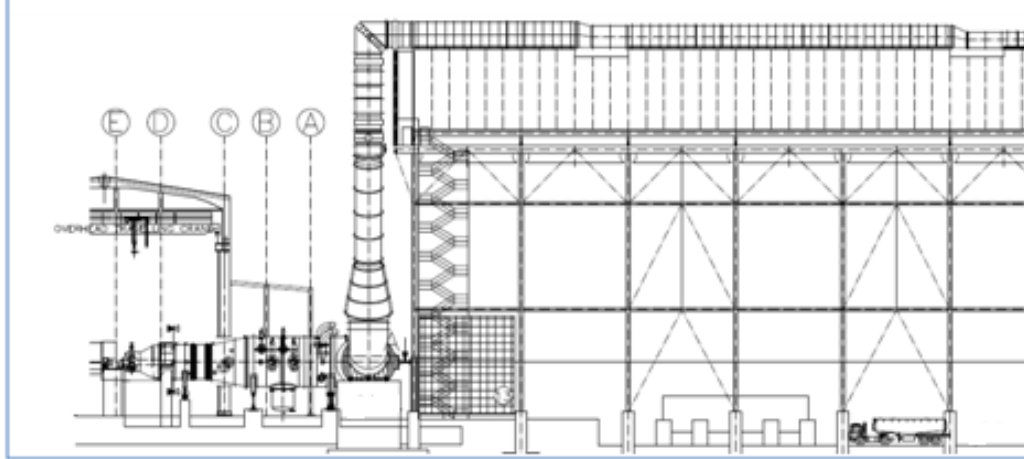
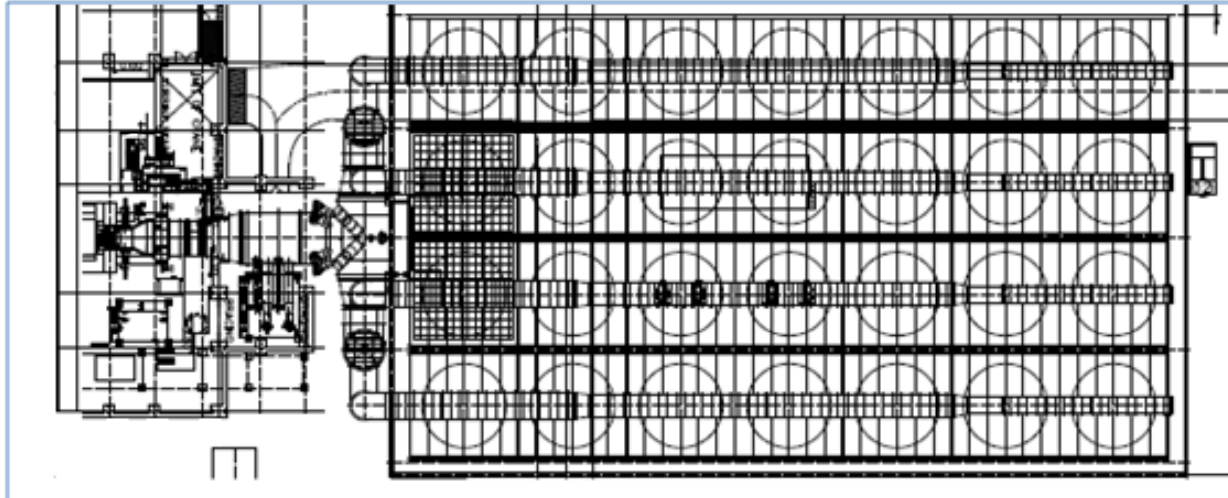
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SECTION 7

Abstract

- The paper will outline innovative piping design solutions for distribution of steam from the exit of combined cycle power plants steam turbine (total power 480 MW) to Air Cooled Condenser System – ACC.
- All required calculations had to be carried out using finite element analysis method – FEM (shell/plate).
- The innovativeness of the design solution is reflected in the design of supporting system.
- The design solution also involved installing In-line Pressure Balanced Expansion Joint to absorb piping thermal dilatation. Innovative design solution of the In-line Pressure Balanced Compensator has been patented.

Project



Conditions set for the project

For stated project it was necessary to find the ducting concept that will satisfy the following conditions:

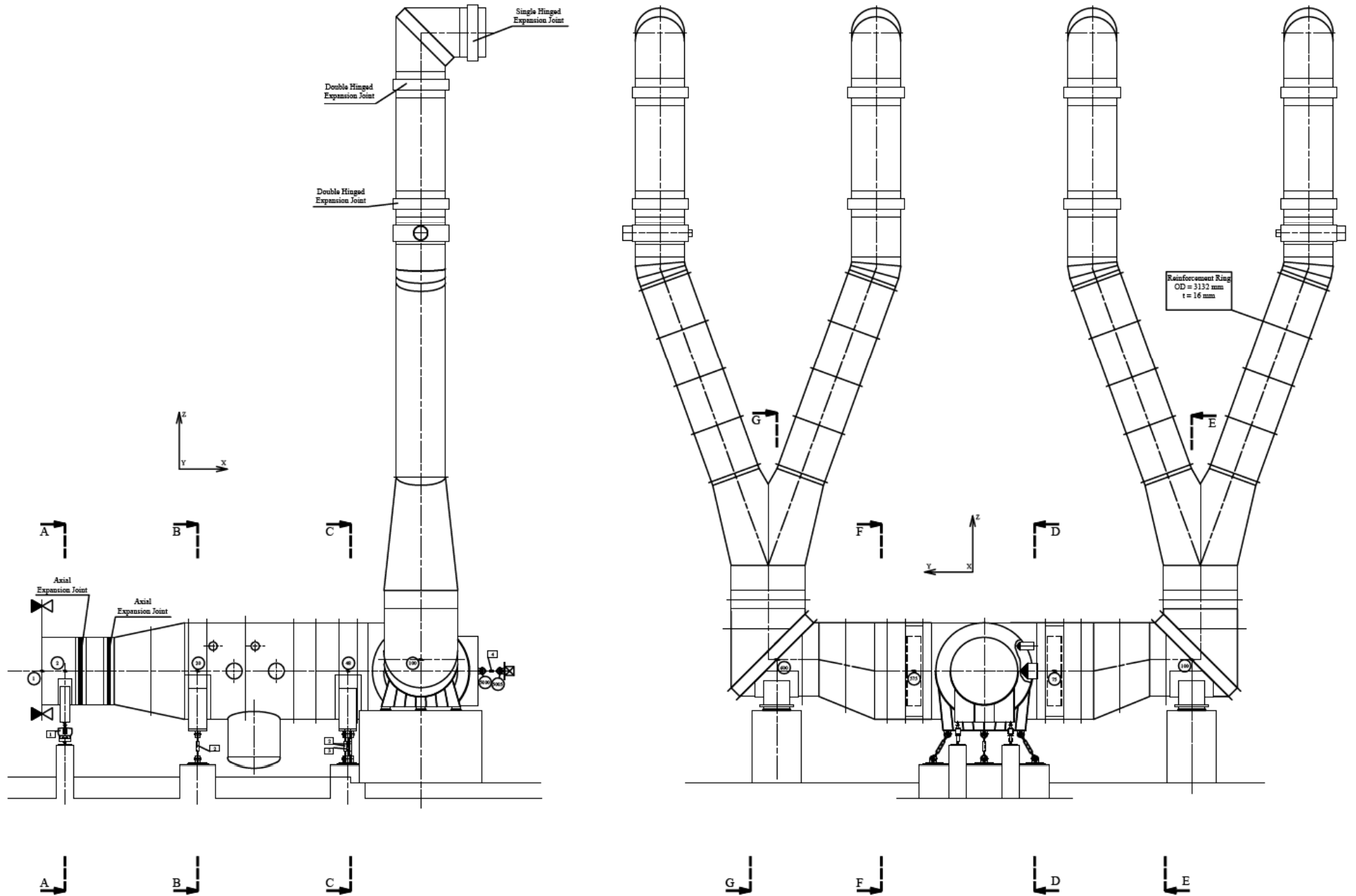
- Stresses have to be within the allowable limits (meaning that the system is flexible enough with no significant restrictions on the free thermal expansion of the ducting system).
- The forces on the connection to steam turbine have to be within the allowable range.
- The forces on supports have to be in real terms, which will allow easy construction of supports.
- Price => could not create a technical solution that is too expensive.

The goal we have set

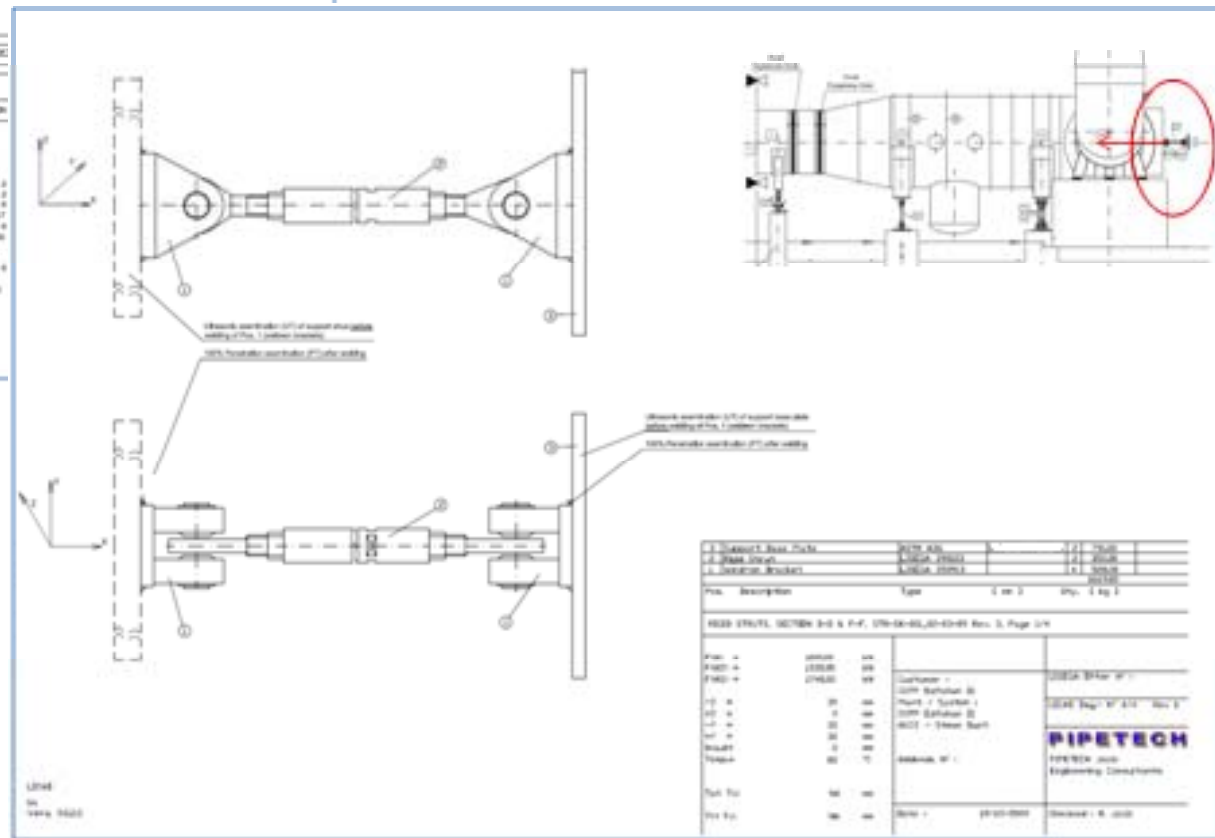
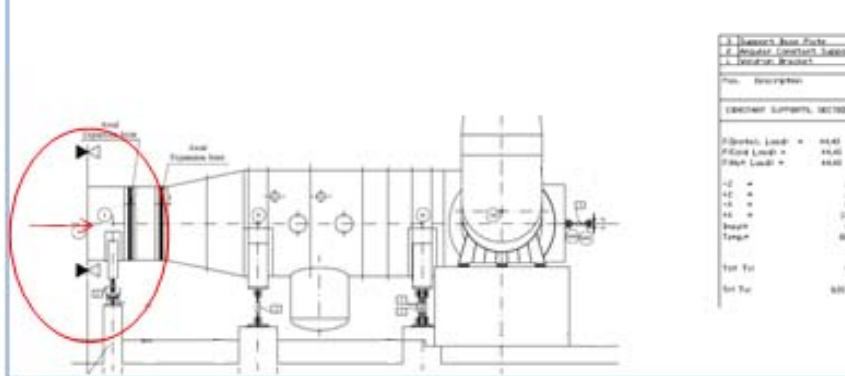
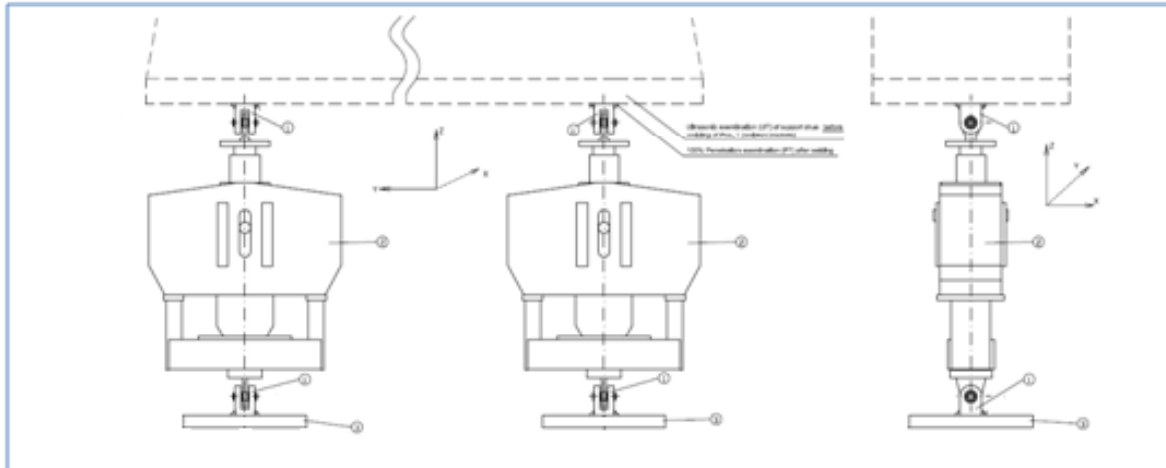
Develop such concept that will completely cancel the influence of friction.

- The Solution was created
- It was very expensive (so-called “hanging concept”)
- A modified solution was proposed that removed friction only from the zone of influence on the turbine.

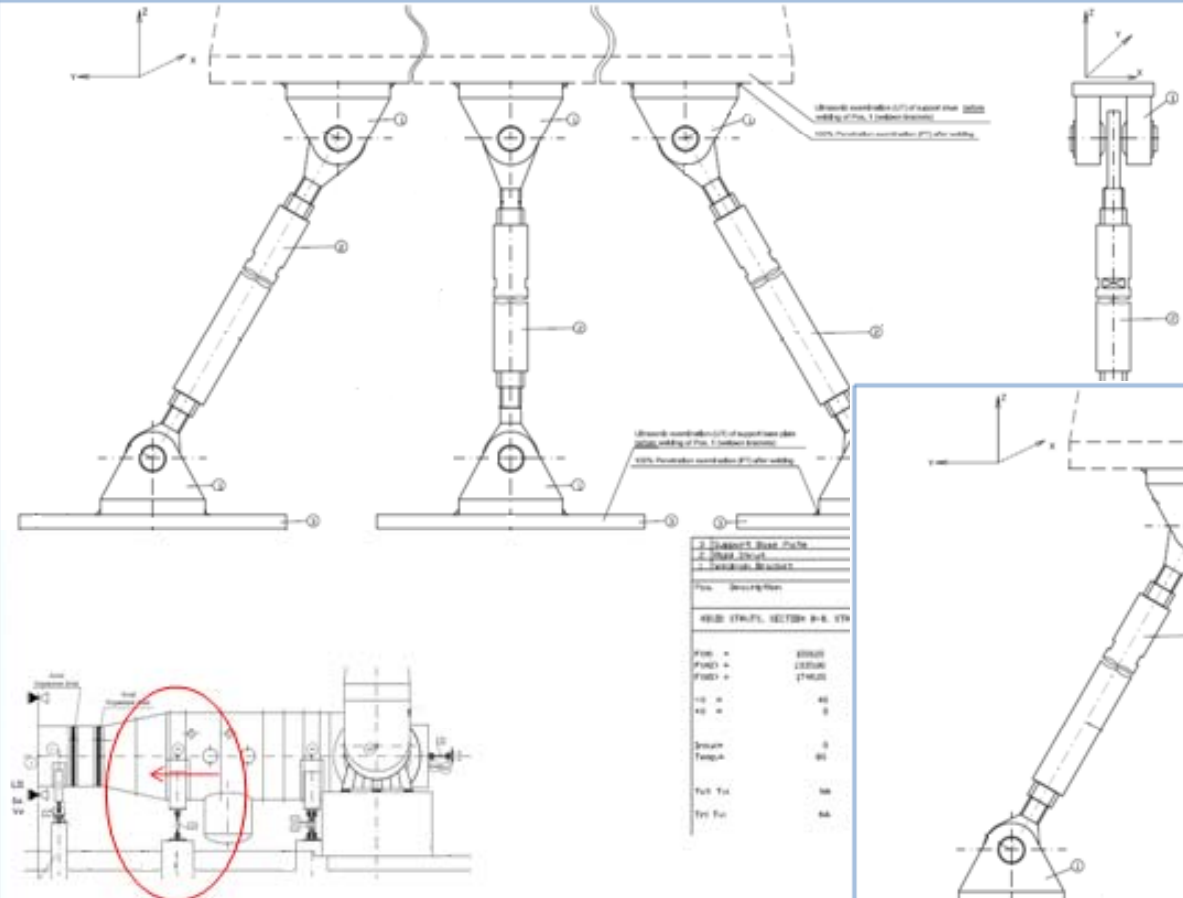
Modified Solution Concept



Concept display, continued

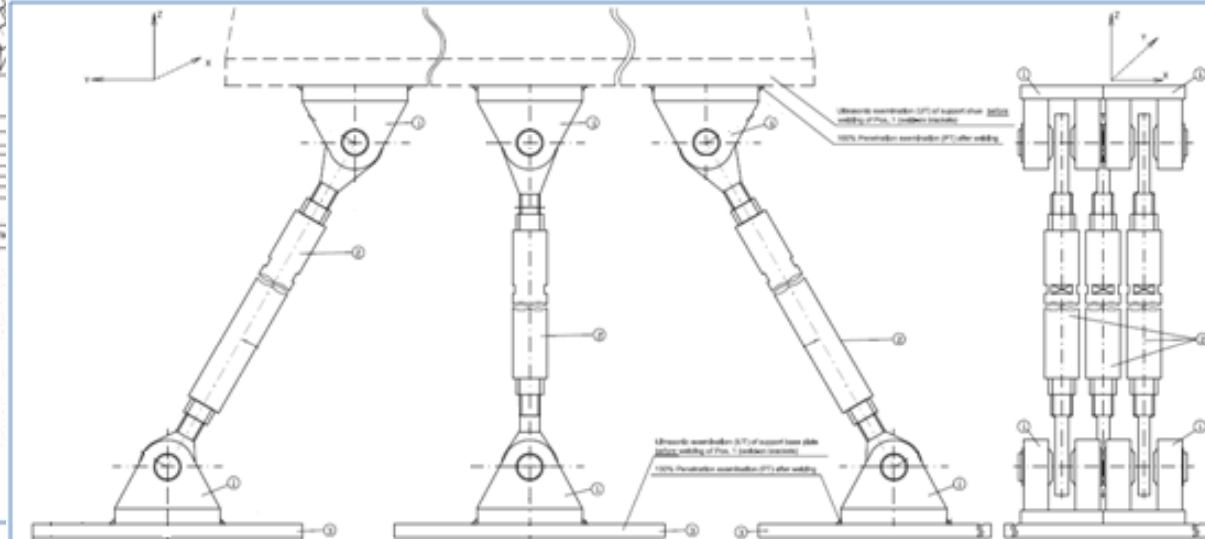


Concept display, continued



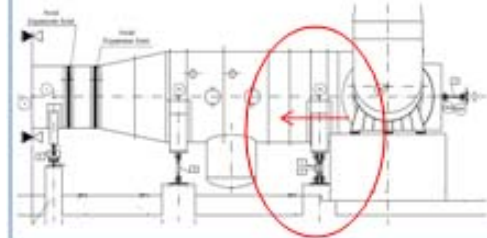
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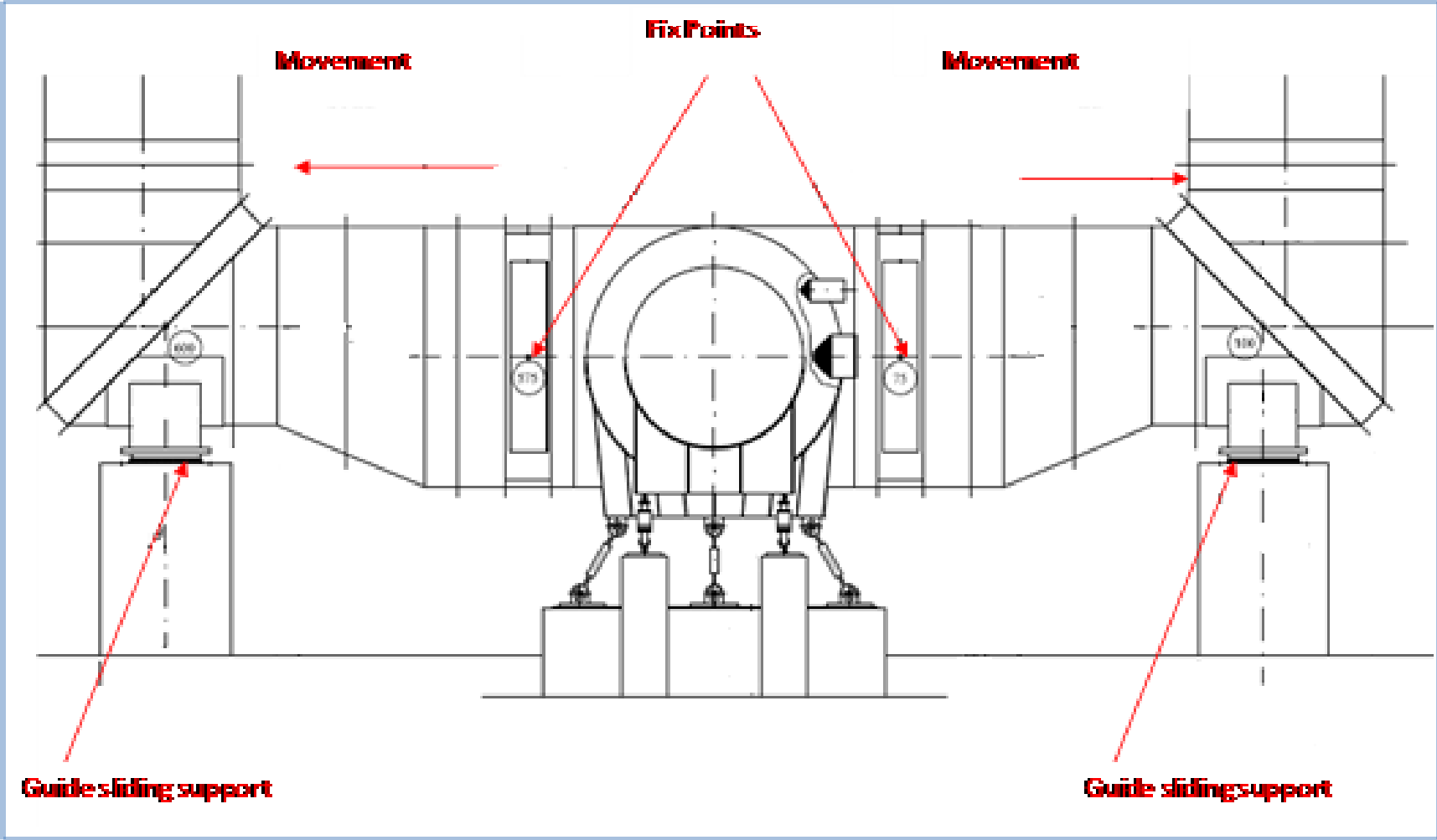
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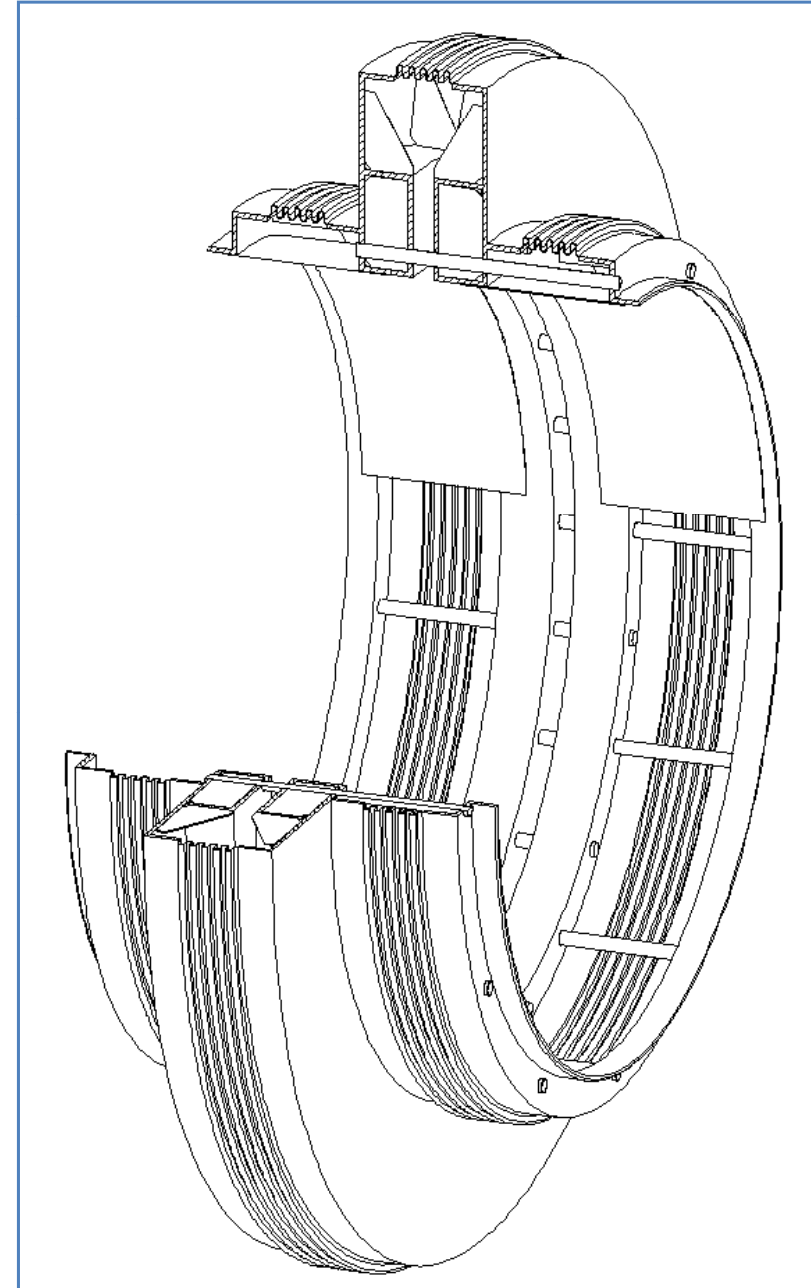
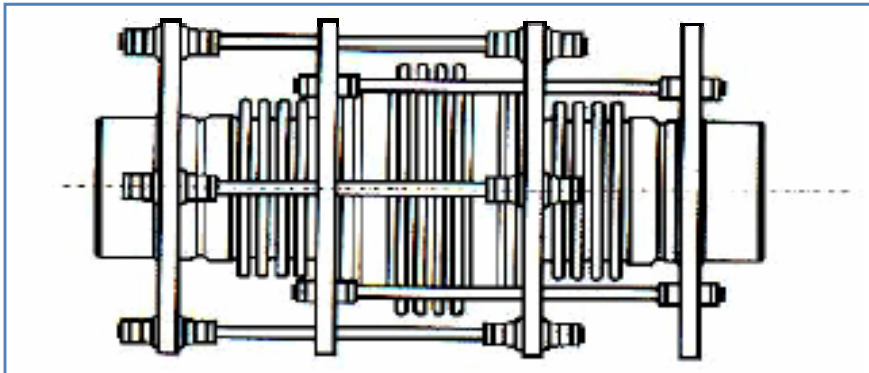
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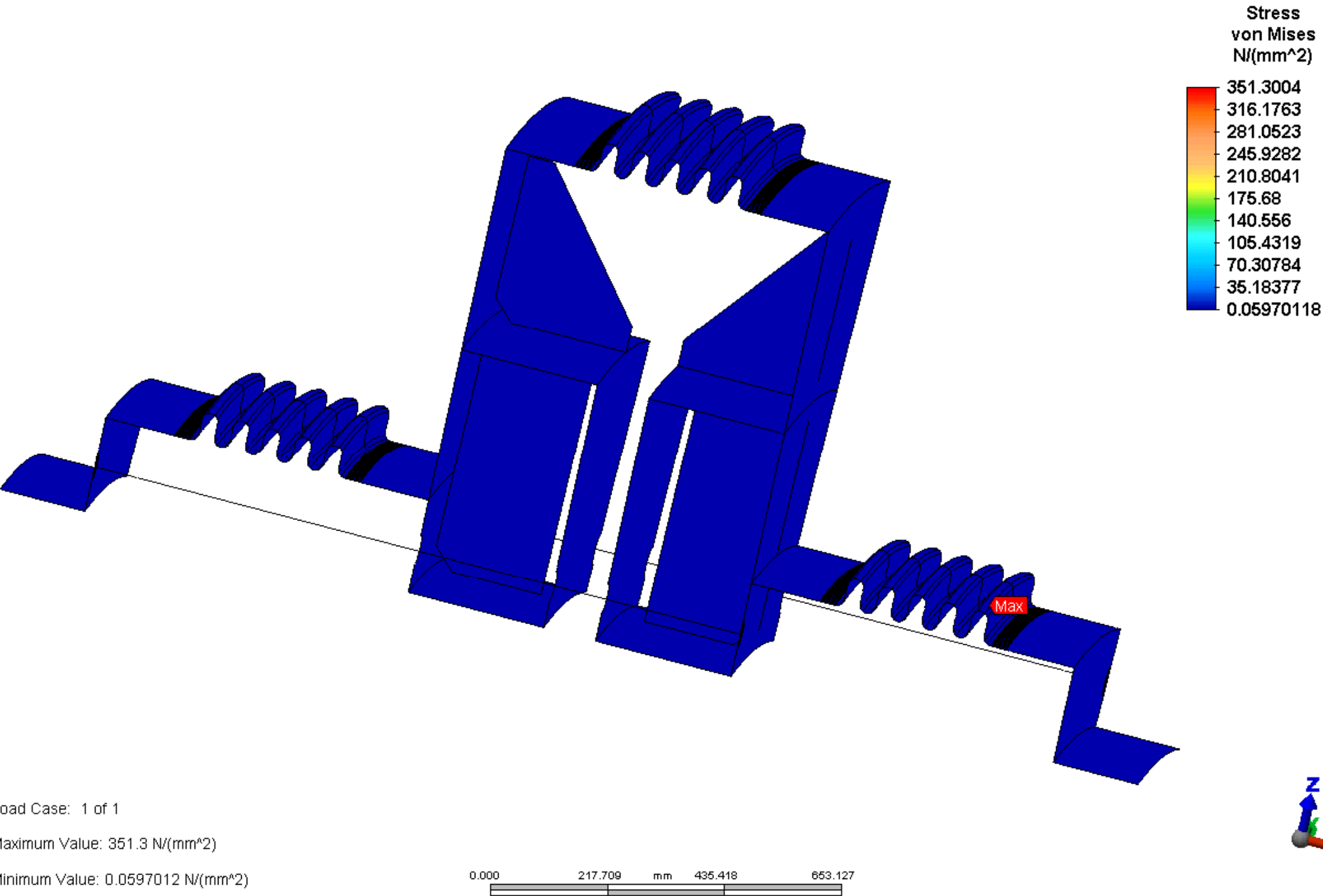


In-line pressure balanced expansion joint

What is different from others:

- Dimension, central portion of ca. 6 meters
- Stiffening beams placed inside compensator, without disrupting flow





**THANK YOU
FOR YOUR
ATTENTION!**