

## The effect of operating loading on stress-strain state of power plant superheater collector

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**Abstract:** The stress-strain state analyses were performed in critical locations of power plant superheater collector (thick-walled cylinder with radial holes, 12Cr1MoV steel) using finite element methodology. This unit operates under internal pressure 14 MPa and temperature 540 °C difference in tube wall on thickness.

The segment of collector was modeled according symmetry conditions. Physical and mechanical properties of heat-resistant low-alloy steel 12Cr1MoV were used for the three-dimensional model. Stretching load applied to cylinder edges, that is equivalent internal steam pressure on collector caps.

We change the temperature of the inner and outer walls of the collector model. Stated that cylinder stress-strain state affects the difference between the external and internal temperature regardless of its maximum value from 500 °C up to 600 °C.

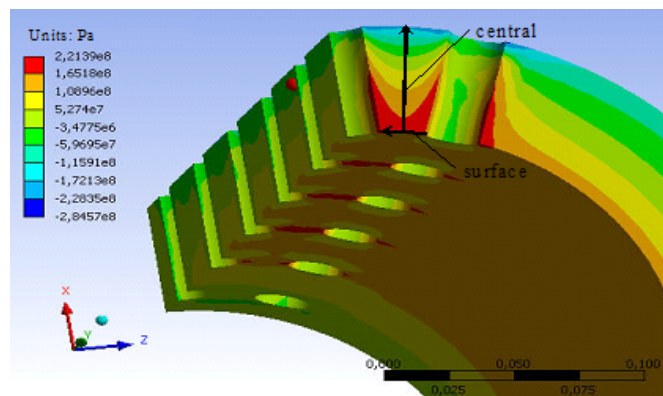


Fig.1. The distribution of axial stresses  $\sigma_y$  in the model with internal pressure 14 MPa and temperature 530 °C on the inside and the outside of 600 °C.

The maximum tension along the lines of "central" and "surface" appears in the case when the temperature of the inner surface of the cylinder is lower than the temperature of the outer surface. The bridges between the radial holes is critical collector plots "central" (refer with: Fig. 1) [1].

### References:

1. O. Kwon, M. Myers, A.D. Karstensen, and D. Knowles. 2006. The effect of the steam temperature fluctuations during steady state operation on the remnant life of the superheater header. International Journal of Pressure Vessels and Piping 83, 349–358.