

STRUCTURAL SIMULATION

Case description: This Benchmark corresponds to a simple structural verification of a low production forged crankshaft, used in some categories of local motor racing.

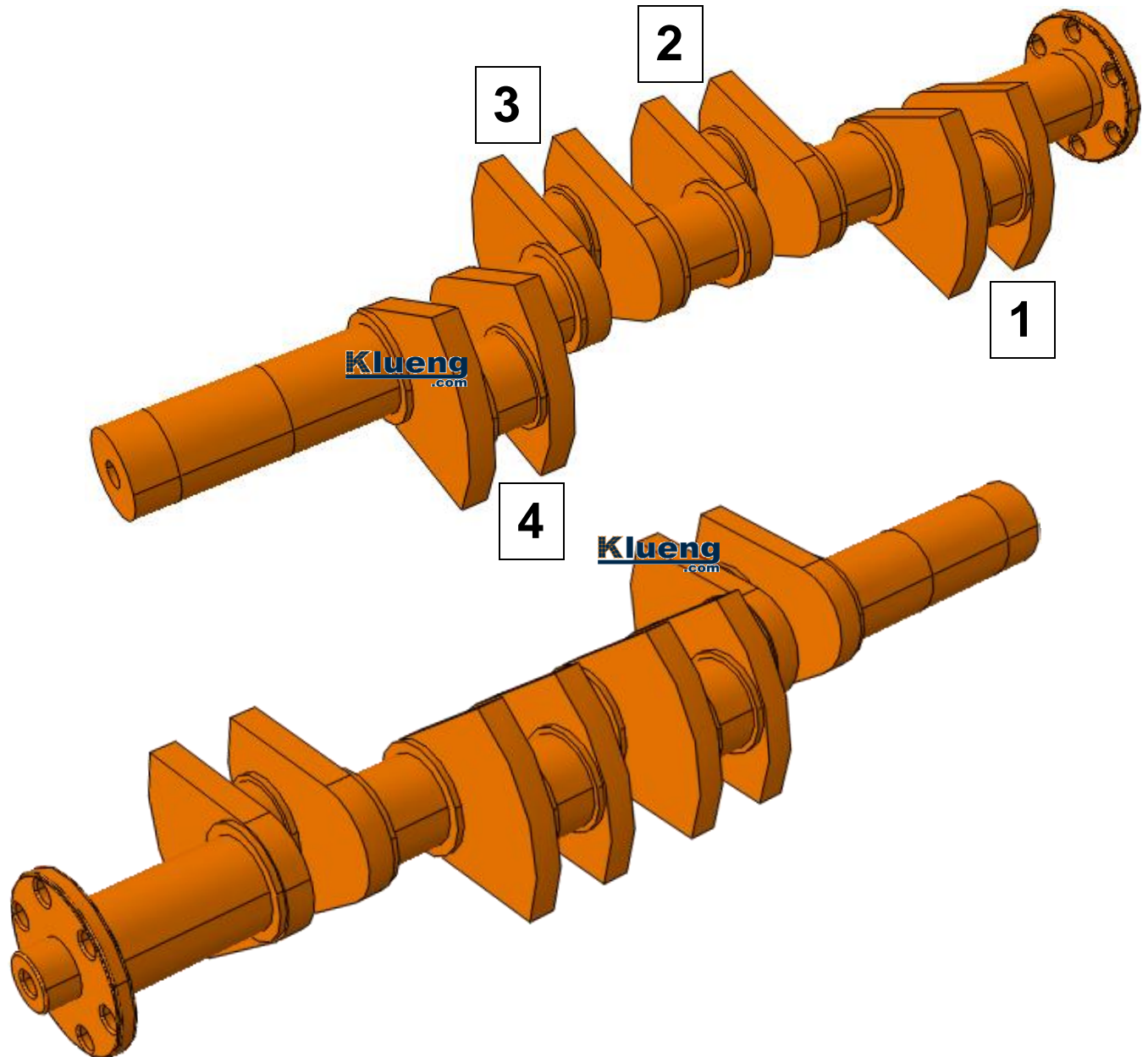


Fig. 1 – Geometry

Development: A finite element model was carried out, as shown below:

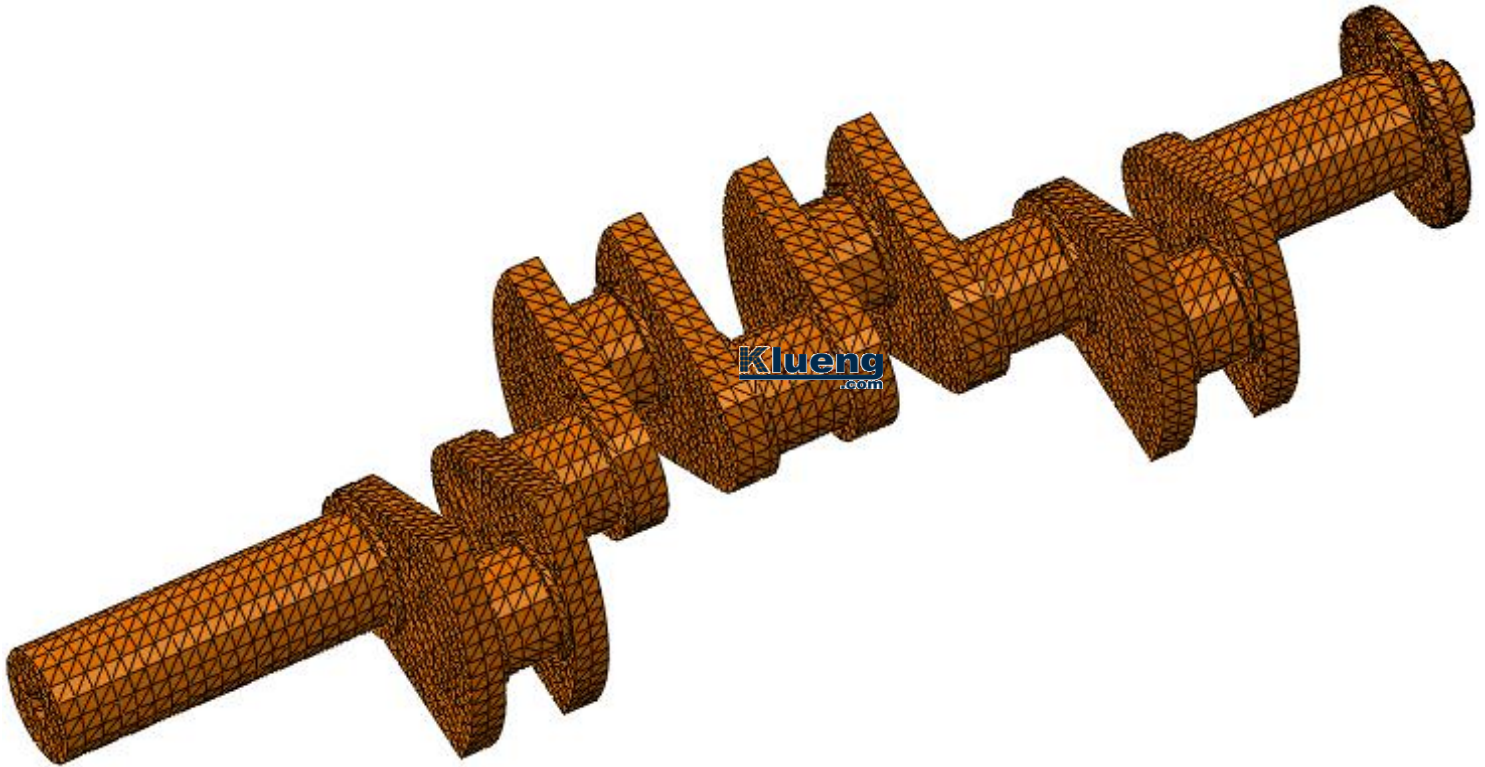


Fig. 2 – Finite element model

Based on maximum solicitation values and application time provided by the customer (dynamic effects were considered) were obtained the stress field on the crank during its operation. In the following pages are shown the obtained results, discriminating each crankshaft position with numbers as detailed in Fig. 1.

1

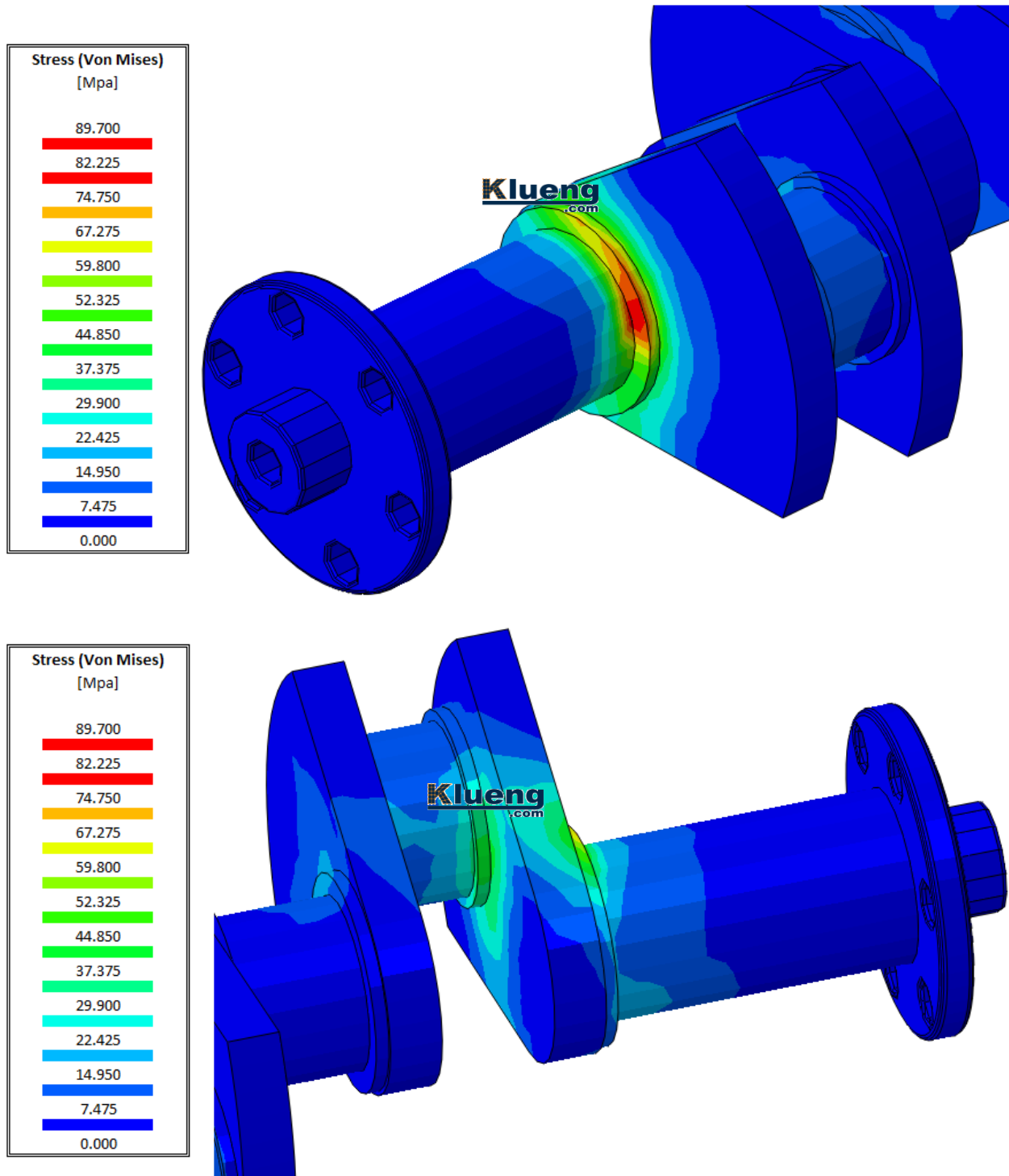


Fig. 3 – Stress field obtained, position 1.

2

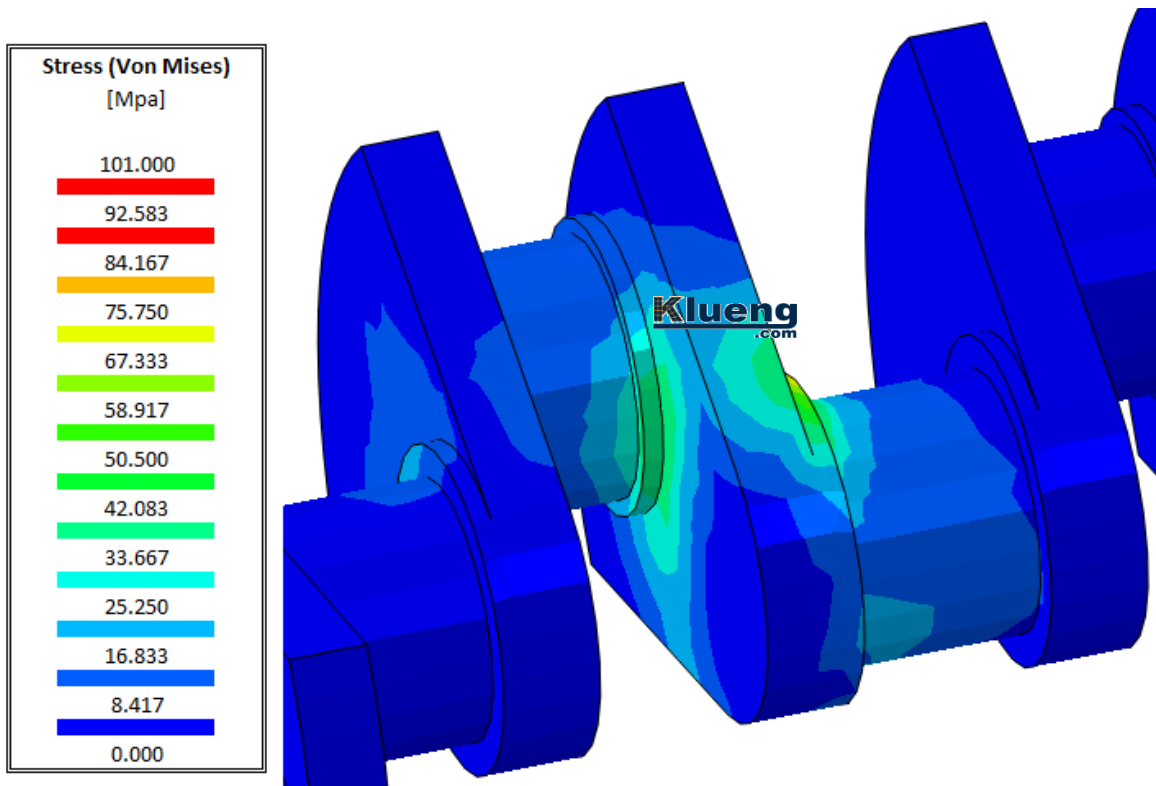
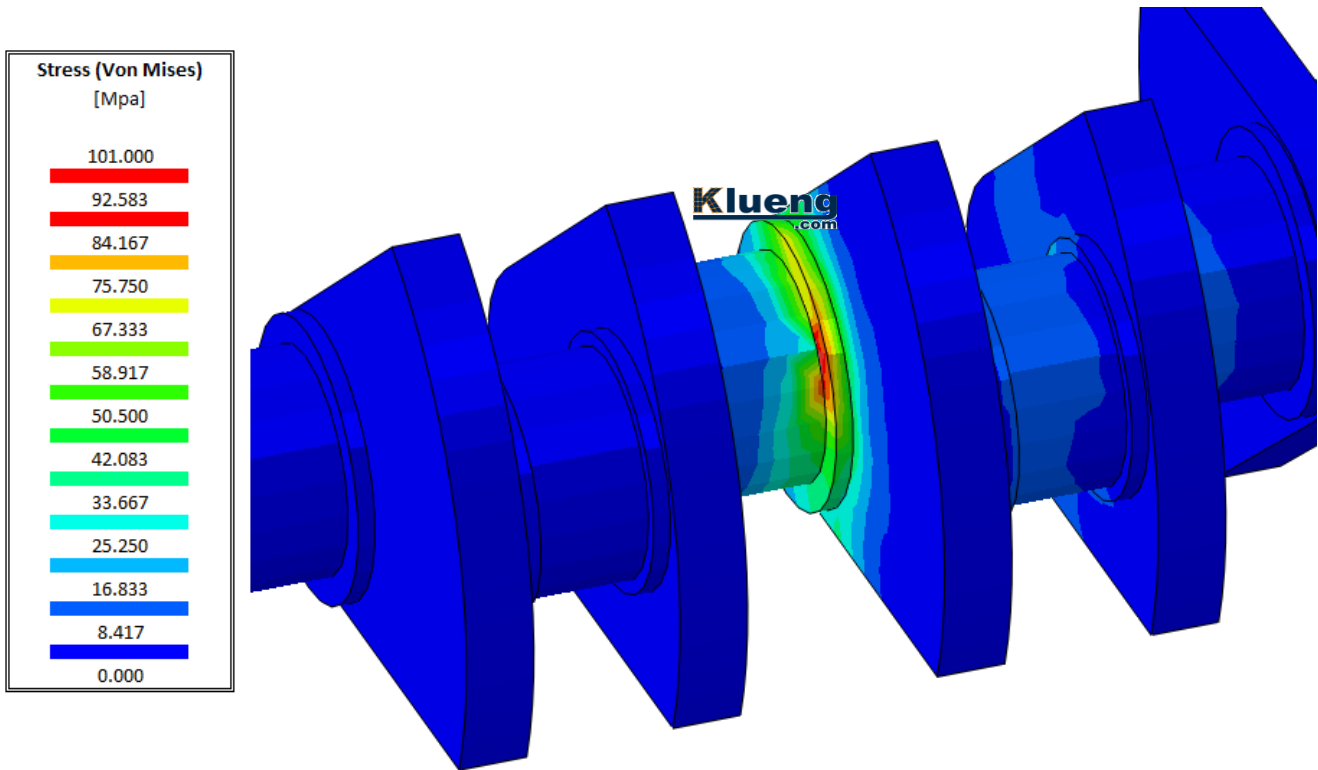


Fig. 4 - Stress field obtained, position 2.

3

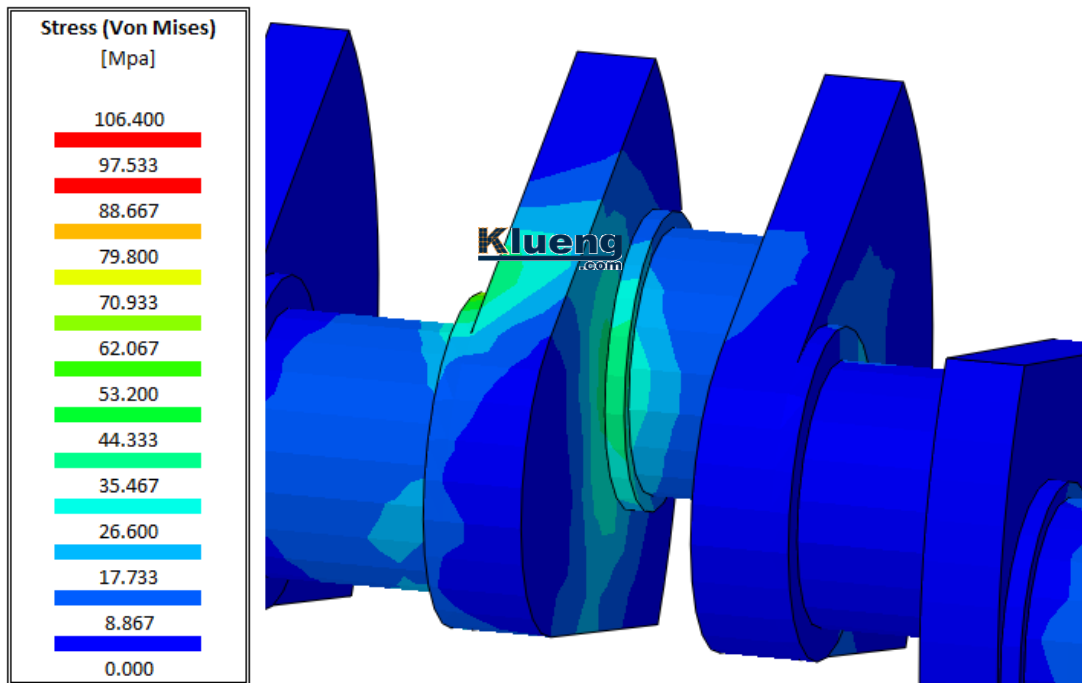
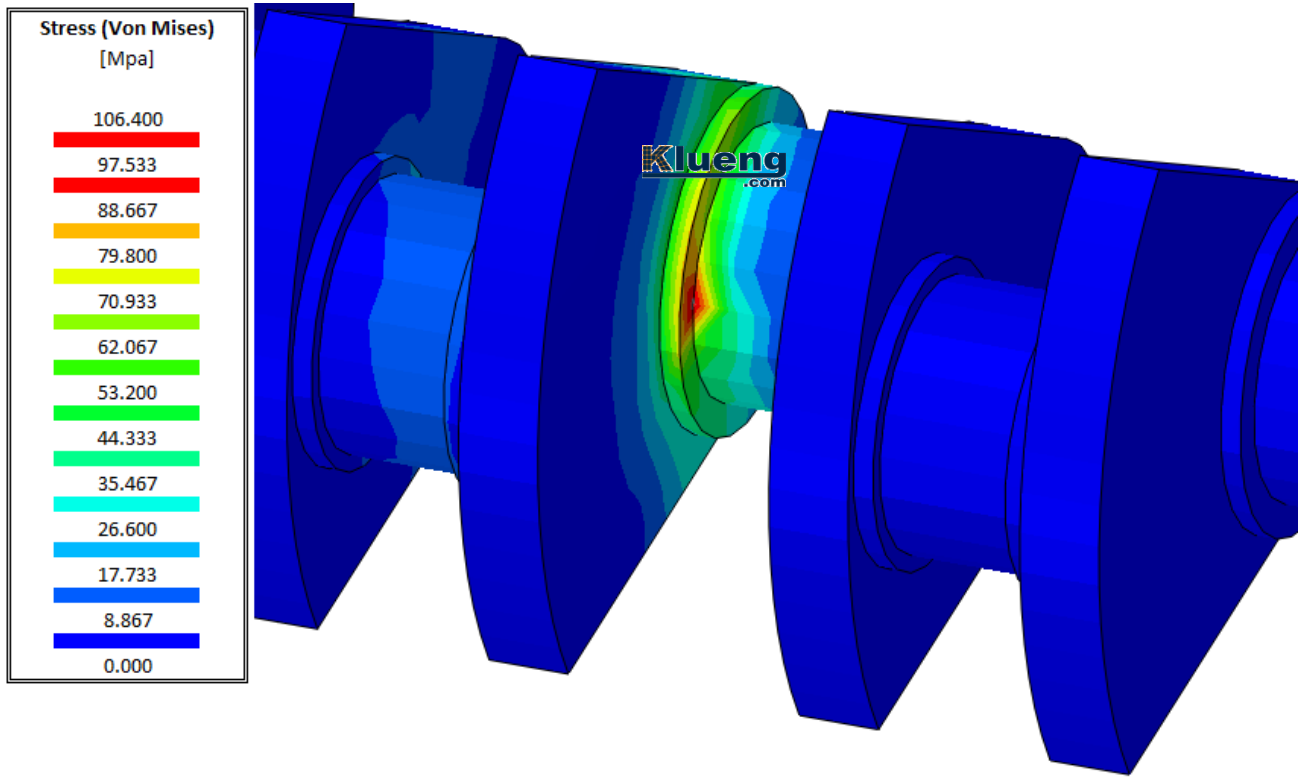


Fig. 5 - Stress field obtained, position 3.

4

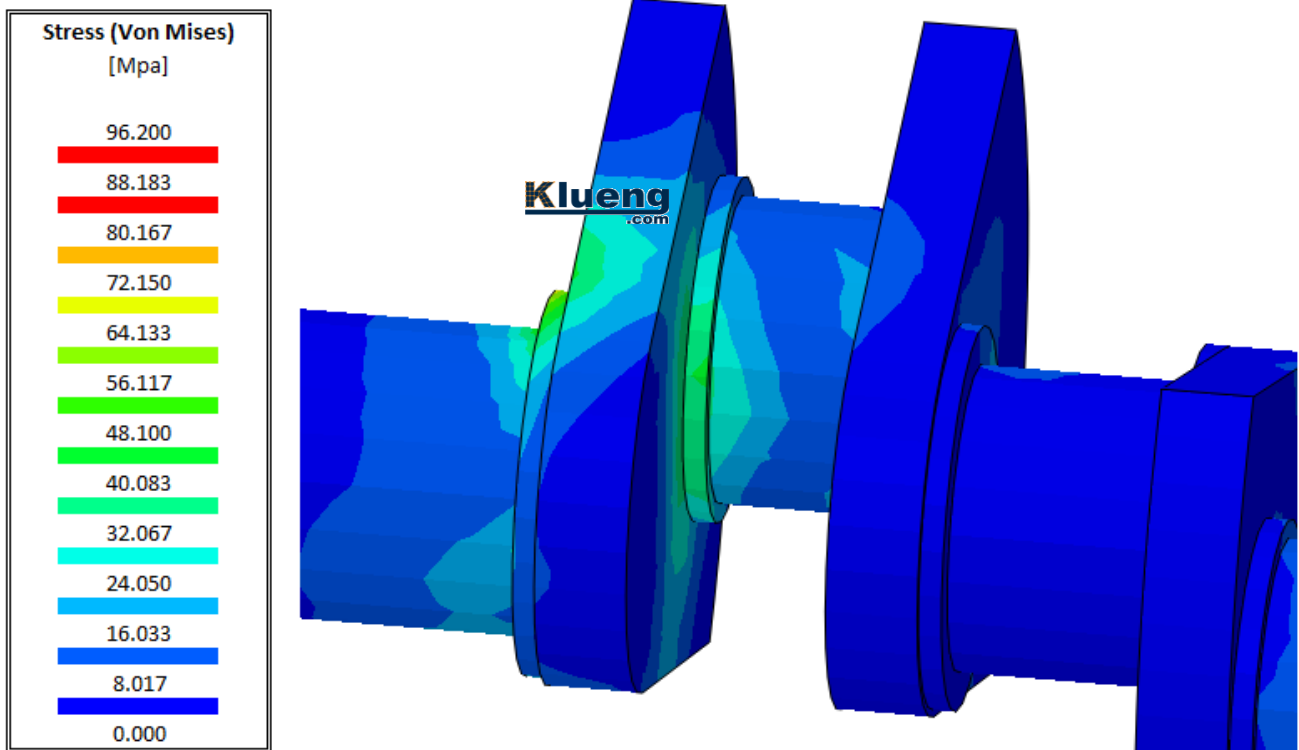
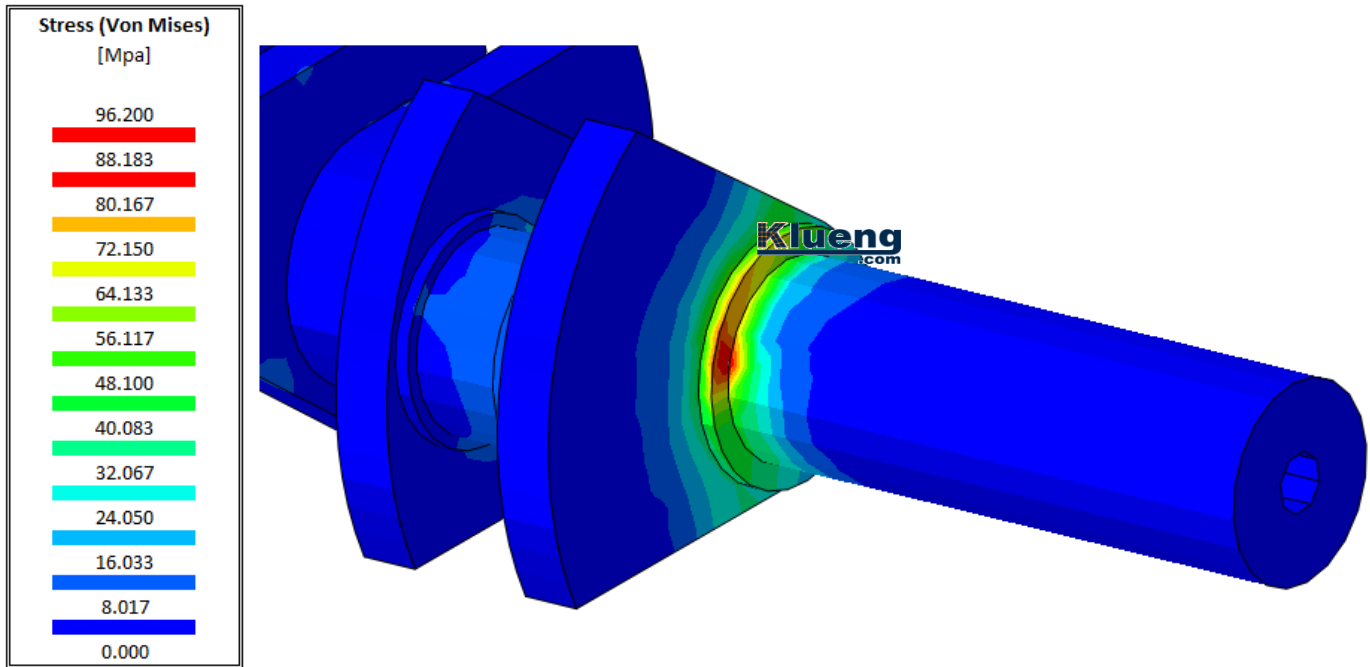


Fig. 6 - Stress field obtained, position 4.

Conclusions: Using numerical simulation tools was possible verify the stress distribution obtained during operation of the analyzed piece. Based on the results, the customer does not require any structural optimization of the piece.

In this typical case of verification could be obtained the stress state of the piece during operation before its manufacture. The application of numerical simulation technologies is useful in this kind of cases because the instrumentation (with strain gauges for example) is extremely difficult, another thing to consider is the cost of the tooling to make parts of this type (forged). Using FEM tools these extra-costs were avoided, reducing manufacturing time and the final cost of the piece.