



MAJOR PERFORMANCE INCREASE OF CRANKSHAFTS FOR ALL ENGINE APPLICATIONS

Double fatigue strength of crankshafts, while keeping the main dimension of the crankshaft and also being economical.

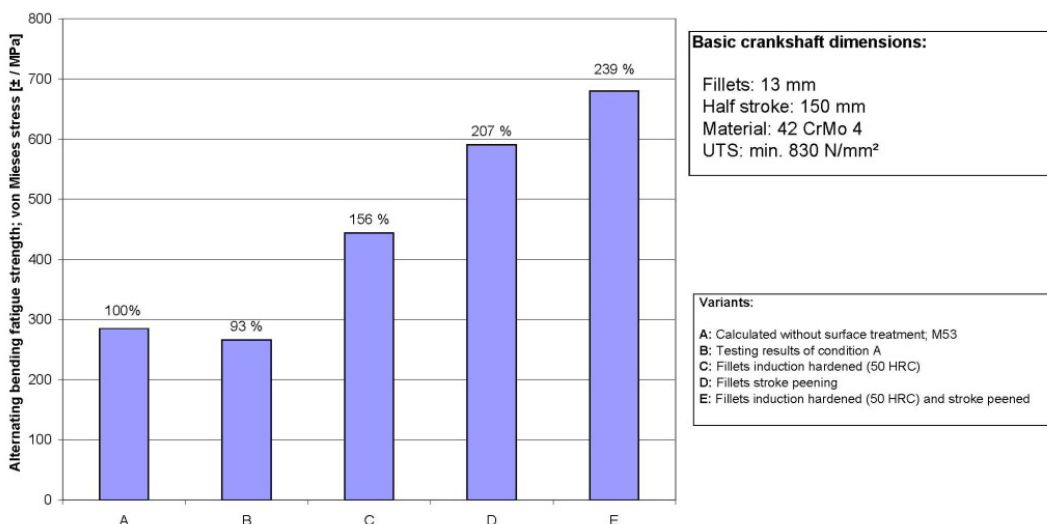
The latest development in this area have enlarged the scope of possibilities to enhance the fatigue strength of crankshafts. Historically the possibility to significantly increase fatigue strength was induction hardening of journals and fillets of the crankshafts.

With the one of a kind patented ALFING stroke peening process we have invented a second possibility to enhance fatigue performance.

The patented ALFING stroke peening process can be applied on quenched and tempered crankshafts and also being combined with the common induction hardening process.

Both processes, induction hardening and the patented ALFING stroke peening process will give significantly higher fatigue strength for crankshafts, independent from the size of crankshaft.

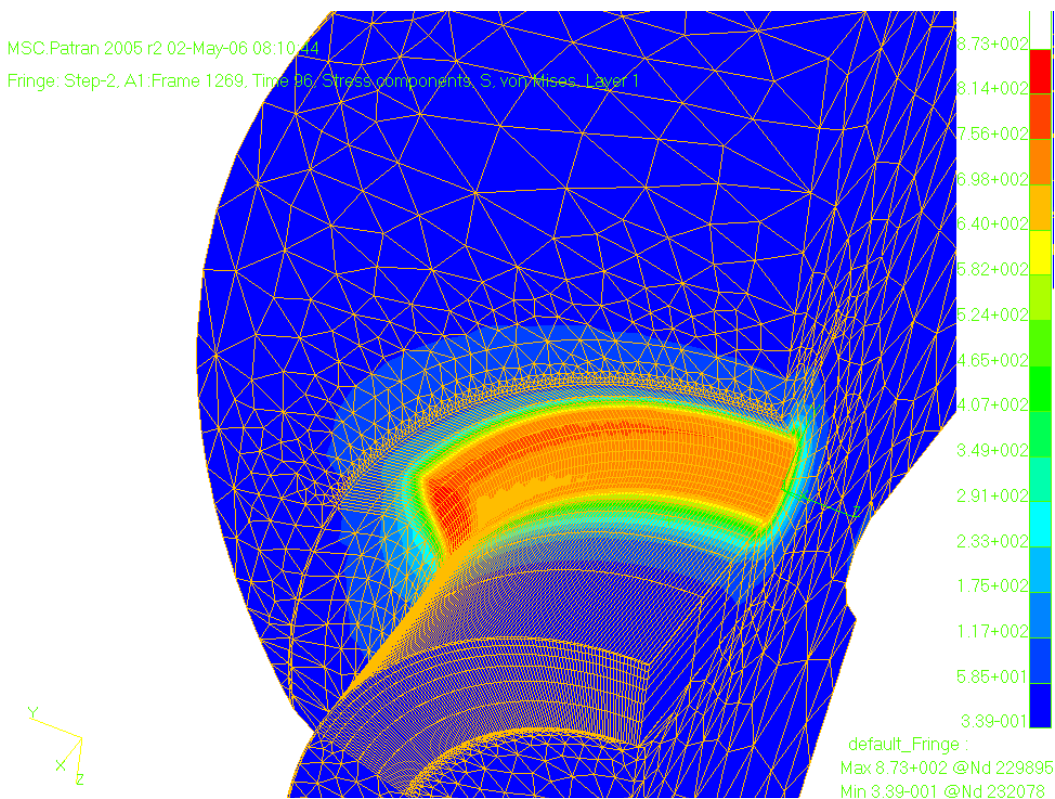
Stroke peening-reached (crack) fatigue strength



A) Basics of the process

A specially designed tool will be pushed with high force into the high loaded crankshaft fillets. As a result of this plastic deformations take place and as a consequence out of this leaving high compressive residual stresses in the crankshaft fillets.

X-Ray measurements on real size crankshafts confirmed compressive residual stresses for more than 10mm in depth into the fillet material. Due to the high depth into the fillet we have a possibility for subsequent processing without reduction of the fatigue levels. It is also possible to repair/rectificate crankshafts including undersize of the fillets.



Due to the flexibility of the patented ALFING stroke peening process we have the possibility to apply the process to all fillet and crankshaft sizes, as well as materials and surface hardnesses.

The patented ALFING stroke peening process is applied on CNC controlled machines and can be adjusted to type specific operational load conditions.



B) Advantages of Stroke peening compared to other cold working surface treatment (i.e. shot peening, roller burnishing, fillet or hammer peening, cold rolling, etc.)

- Compressive residual stresses in a depth of more than 10 mm (on a R13) which could be more than 20mm (on bigger radii)
- Actual fillets from R3 mm up to R40 mm (process parameters are „scaled“ with the crankshaft dimensions)
- In combination with induction hardening
- Recessed axial and radial fillets
- Multi radii fillet (compressive residual stresses are so deep to allow finish machining after stroke peening)
- Can be applied to existing crankshaft design with only minor drawing changes
- Possibility for repair solution including undersize of journals and fillet

C) Approvals of 3rd parties and field experience

All major classification societies have granted approval after excessive real size fatigue testing of crankshafts. Following the excessive testing the classification societies have granted also general K-factors based on IACS UR M53.

Since more than 30 years the crankshafts with the patented ALFING stroke peening process are in use in all engine application all over the world.