ORS NEWSLETTER JULY 2002
Issue # :1

BEARINGS

FOR THE FIRST ISSUE...

ORS, established in 1983, has taken technical assistance under the license agreement with STEYR WAELZLAGER. SKF/Austria has purchased STEYR in 1989, then license agreement continued until the Spring of 1991. After the license expired ORS has been exclusively realizing all kinds of engineering, technical improvement, product design, die/tool design, process development and technical investment practices.

The practices that are believed to be interesting to our customers will be prepared and released periodically under the name of "ORS NEWSLETTER".

In our first release we would like to announce a R&D project and its invaluable results to our customers. The project, namely "THE OPTIMIZATION OF FORGING PROCESS AND FORGING DIES OF BEARING RINGS" was assisted/investigated by ***TUBITAK*** (Science and Technological Research Council of TURKEY) and performed under the supervision of ***METU*** (Middle East Technical University).

As a measure of precaution to increasing prices of raw tube material used in production of bearing rings in world market, ORS has decided to invest in the "Forging Technology" and has purchased a hot forging press in 1996.

Instead of cutting rings from raw tube material, rings are now being produced from raw rod material. In the hot forging press, initially, the rod is

heated by induction coils, and through 3-4 stations (steps) formed into raw inner + raw outer ring set (main form). However, cost of the forging dies and their time-taking manufacture, as well as the trial-and-error process for the design and test of new forging dies have indicated a need for an application of a simulation/optimization method.

Instead of the trial-and-error process, a systematic research and development study has been done. In cooperation with Mechanical Eng. Department of ***METU*/Ankara**, and with the support of ***TUBITAK*** a research and development project has been started.

The research and development group, consisting of 7 mechanical engineers, over the period of 3 years systematically studied and analyzed the process, the press itself and as well as the input material. This data has then been transferred to the MSC/Marc AutoForge FEA (finite-element analysis) software.

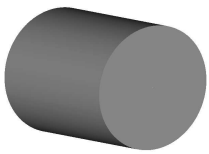
The flowcurves of the materials mentioned above, used in the production of bearings, were determined at the ETH/Zurich, Switzerland material laboratories after a laborious study.

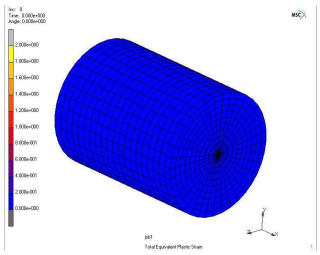
As a result of this project;

- ✓ In order to forge a new material, before starting the design and production of dies/tools, the simulation of the forging is executed using FEM (finite element method) in a complete virtual manner and the displacement of the material, the filling of the dies, the mechanical and thermal forces applied to the die faces and their distribution are investigated and the process is optimized to determine the final design for the forging dies after the interpretation of the results of the simulation.
- ✓ The detailed die designs are performed according to the main designs performed after the utilization of simulations in a fully virtual environment. And the dies are produced in ORS facilities according to the revised die designs.
- ✓ The study for the forging application of a new part: the trial die investment and the time losses are prevented .
- ✓ While it were not always possible to judge the production of parts by forging prior to this study, now we can get an easy and exact answer if the forging is applicable or not.
- ✓ The raw billet material is standardized and the same part variety can be produced from a less number of different diameter raw billet material.

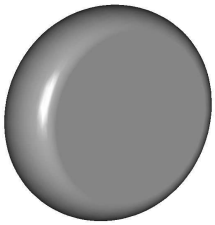
Hot forging technology:

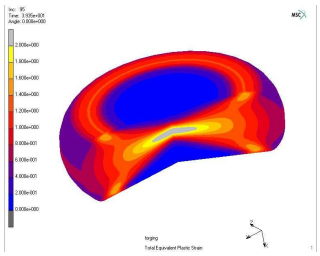
SLUG



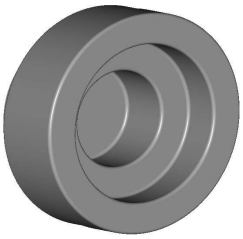


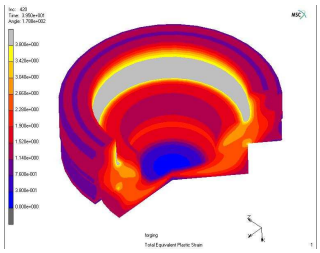
PANCAKE



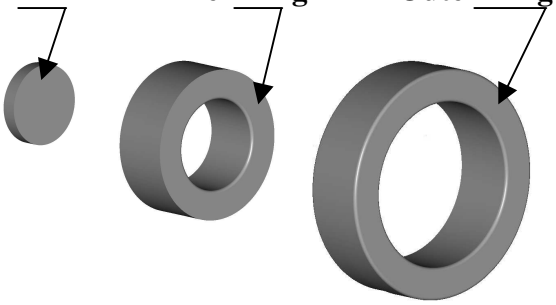


MAIN FORM





Waste Material **Inner Ring** **Outer Ring**



ORS BEARINGS

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