

## **Multiaxial forging of low carbon – low alloy ferritic steel**

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Multiaxial forging of low carbon – low alloy steel was performed in five forging steps during rapid cooling of the steel from austenitic state. As a result, fine grained structure was obtained with average grain size of  $\sim 1\mu\text{m}$ . The first two deformation (*i.e.* the first two forging steps) were done in the austenitic state of the steel. The third forging step was made on the austenite-ferrite transformation temperature. The fourth step fell into the heterogeneous austenitic-ferritic region, while the last step happened in fully ferritic state.

Due to the severe plastic deformation in austenitic state the dislocation density of the austenite saturated, and the stored elastic strain energy caused the starting temperature of the allotropic transformation to increase, thus the extent of the undercooling became larger. This caused that smaller ferritic cores were formed during the transformation, which led to finer grain structure.

After five step multiaxial forging the steel showed (111)[11-2] texture, which is typical for cold rolled BCC metals. The  $\alpha$ -fiber in the texture was hardly detected, but more parts of the  $\gamma$ -fiber (the F1 and F2 components, as well as C component) were found during texture investigations by electron back scattering diffraction.

*Keywords: multiaxial forging, severe plastic deformation, grain refinement, texture*