Influence of tempering on the mechanical properties of a molybdenum-alloyed medium-manganese forging steel for automotive application.

In the this study the influence of different tempering temperatures on the mechanical properties and the microstructure was investigated. The thesis was focused on a medium-manganese steel with 0.2 wt-% molybdenum.

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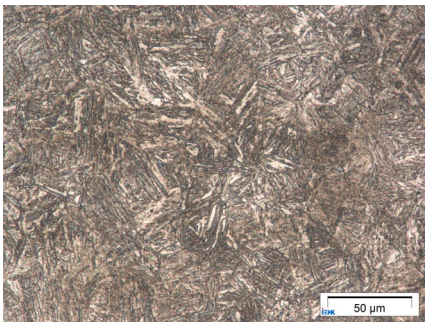

ABSTRACT:

Classic tempering steels like 42CrMo4 are widely chosen as a material for forged safety components with different cross sections. In the past, it has been shown that the fatigue life of these components can be increased, while reducing the development and manufacturing costs, if new material concepts are used.

With microalloyed medium-Mn steels the above mentioned goals can be fulfilled. However, compared to the classic tempering steels these materials have decrease toughness values. In order to optimize the mechanical properties tempering treatments have been applied to a laboratory melt which was additionally alloyed with aluminium (LHD-10).

The microstructure and elemental distribution was characterized by LOM (light optical microscopy), SEM (scanning electron microscopy and EDX (energy dispersive X-ray spectroscopy). The mechanical behavior of the different materials was tested by tensile and notch impact tests.

As already known for other LHD-Steels alloyed with Boron and Titanium, The impact toughness shows a significant growth after a tempering at 650 °C for 1 h, probably triggered by the formation of a second phase on the grain boundaries. The results of this thesis show, that all the both alloying concepts are showing the same schematic change during annealing-treatment.