Project 1
Modelling of components made of rolled and annealed aluminum sheets with particular properties fir the automotive industry

Motivation:

Aluminum alloys are widely used in automotive industry due to an increasing environmental demand to reduce the total weight of a vehicle and thus, fuel consumption and CO_2 emission. The production of Aluminum components contains a large number of thermomechanical processing steps where each step has a significant impact on the properties of the final product. Further improvement of the processing route and alloy development involves a better understanding of the relationship between process and microstructure. This can be achieved by building up a physically based through process model.

Goal:

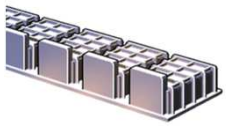
The aim of this project is to model the microstructure evolution along the whole processing chain and to predict the mechanical properties of the final product. Moreover, the surface properties of the Aluminum sheet will be optimized to improve the forming process and flexible rolling will be used to produce tailored structural components.

Interest of research and development:

- to build up a through process model which covers the complete processing chain
- to develop a physically based model which describes the strengthening behavior caused by precipitates developed during annealing after storage and forming of the sheet
- to investigate the influence of processing parameters on structured surfaces in order to improve formability and surface quality
- to apply flexible rolling for the construction of stress optimized structures and further weight reduction

Process:

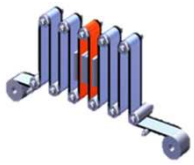
Homogenization



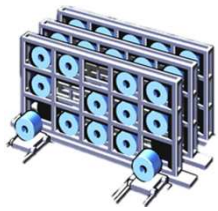
Hot Rolling

Cold Rolling, incl.:
- Skin Pass Rolling
- Flexible Rolling

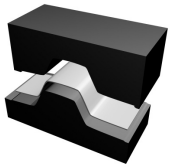
Solution Heat Treatment



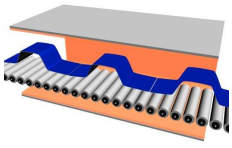
Transport / Storage



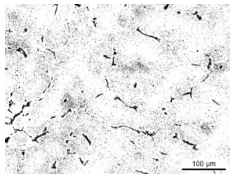
Forming

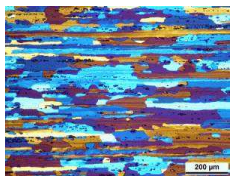


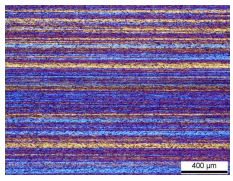
Paint Baking

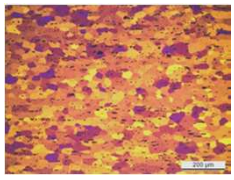


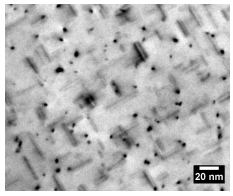
Microstructure:











Consortium:

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engineering for mobility

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