

Lubrication of Aluminium Sheet Metal within the Automotive Industry

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Abstract. The production of automotive body parts and panels is a very complex process, starting with the raw materials and ending in the paint shop. Due to the fact that aluminium sheet metal has to be lubricated before forming, all of the following processes have to be considered. Lubricants, such as oils, dry-film lubricants or recently introduced hotmelts have to protect the material's surface, reduce friction whilst drawing the panels and should not compromise further treatments [1].

Different types of lubricants show different characteristics. This difference is especially noticeable when comparing liquid and dry-film lubricants. As dry-film lubricants do not run off the blanks' surface and are distributed homogeneously, they show different tribological properties compared to conventional liquid lubricants. The effect on friction of aluminium sheet metal is shown through several basic experiments [2, 3].

In addition, the paper shows the effect of further operations within the production chain. The advantages and disadvantages not only for drawing, but also for assembly lines and the painting process are described in this paper. Assembly issues are carried out on stability testings of riveted and clinched assemblies. These trials show how the assembly process is affected by different proceedings. The fact that every car body has to be completely free of grease before painting, signifies the necessity to get lubrication off the car body's surface before painting. The interactions between lubrication and paint shop are shown on typical process parameters.

Most typical characteristics considering bonding and riveting were tested out on a hood assembly of the current BMW 7-series. In addition to that, experiences made in the press shop at BMW's Dingolfing plant were figured out and carried over to a long-term strategy of pre-lubrication of aluminium sheet metal. This includes adhesive compatibility as well as the above mentioned assembly process.