



COATING OF ALUMINIUM ALLOYS

Motivation

Development of new aluminium coating for purposes of automotive in order to improve surface properties of metals mold for tires pressure. These molds are usually made from aluminium alloys and they are being exposed to temperatures around 170 - 190 °C. The state-of-art manufacturing usually deals with the thin layers. Depositions of thin layers are one of the most used modifications of raw materials in order to improve their quality and to preserve their original properties. Thin layers can be based on polymers, another metals or their mix

Technology

The coating process consists of degreasing the mold at pH 11.0 - 12.2, pickling by temperature at 50 - 70 °C, rinsing by demineralized water at room temperature, immersion bath, rinsing, drying, followed by the deposition of final thin layer.

Hard materials with high melting point are suited for aluminium alloys exposed to high manufacturing temperatures. Adding one or more transition metals into PTFE coating can change surface properties and thermal stability of aluminium mold.

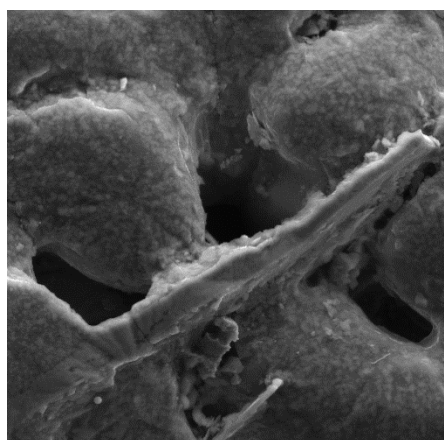


Figure 1: Material research of metal mold for tire pressure by using SEM

Applied research

Quality of final product is evaluated by surface tests (such as microhardness, abrasion resistance, and roughness test). Chemical composition and particle size distribution are evaluated by Scanning Electron Microscope. This analysis is usually extended by EDX analysis of chemical elements. All of these tests are conducted with respect to process temperature, which the final specimen is exposed to. Analysis is focusing on persisting the chemical composition, particle size distribution and surface properties at 170 - 190 °C.

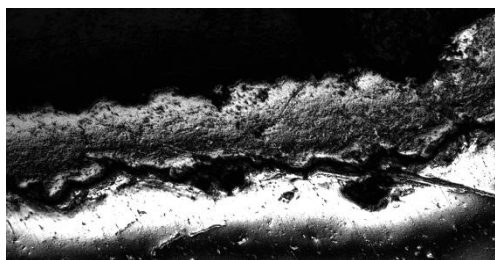


Figure 2: Results of coating deposition upon the aluminium mold via confocal microscope

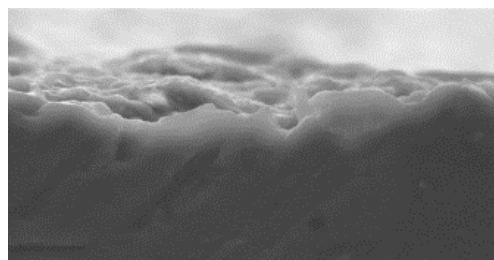


Figure 3: Results of coating deposition upon the aluminium mold via SEM