Statistical evaluation of metal plated polymer surfaces

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The surface quality of metallized polymer parts plays a crucial role in the functional and aesthetic properties of the final product, especially in the automotive industry and consumer electronics. This study focuses on non-contact measurement of the surface structure of ABS polymer parts, metallized using vacuum technology with the application of copper, nickel and chromium layers. The measurement was performed on the Talysurf CLI 500 device and evaluated according to the current standards ČSN EN ISO 21920-1 and 21920-2, which define the profile roughness parameters and the methodology for their assessment. The measured data were subsequently analyzed using descriptive statistics and multivariate statistical methods including analysis of variance (ANOVA), which allowed to reveal differences between samples manufactured in different time periods and in different plating conditions. The results confirm that the metal coating significantly affects the values of key surface structure parameters (Ra, Rz), and indicate the need for consistent control of process stability. The study also confirms the benefits of statistical tools for quality assessment and supports their wider use in technological practice.

This work and the project were realized with financial support from the internal grant of TBU in Zlin No. IGA/FT/2025/004, funded by the resources of specific university research.