Mold Surface Analysis after Injection Molding of Highly Filled Polymeric Compounds

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This work deals with an impact of abrasive particles used in powder injection molding (PIM) on a surface roughness of the tool. For this purpose, the surface of new mold cavity was compared with the same mold cavity after 2 000 injection molding cycles. Processed PIM compounds contained polymeric binder with around 60 vol. % of metal or ceramic particles (0.1 up to 20 μm). Surface analysis was performed on cavity impressions prepared from a special silicone imprinting substance in two directions by a 3D surface scanner. Investigated parameters were surface roughness (Ra) and roughness depth (Rz) which have an influence on flow instabilities of highly filled compounds such as wall slip affecting the final product quality. Obtained results showed a significant wear of the mold cavity which was statistically confirmed by t-test and F-test parametric methods. A greater part of the mold cavity was smoothed during injection of PIM compounds, while the surface roughness increased near the point gate (runner system) probably due to a high injection pressure in this part of the mold.

Keywords: PIM, Cavity, Surface, Roughness, Wear

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