Optimization of Overmolding Process of Metal-Plastic Part

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Metal-plastic parts with steel inserts prepared by overmolding technique showed several cracks. Cracks marked as no 1 and 2 were noticed immediately after overmoulding process. Cracks no 3 and 4 were propagated only several days after overmolding, during post crystallization of plastic. The superposition of both high residual stresses at the metal-plastic interface and creation of cold joints in overmolding plastic were the reasons of cracks initiations. Residual stresses at the metal-plastic interface exceeding the yield strength of plastic were confirmed by simulation in Moldflow software. The differences in the melt front temperature above 20 °C were simulated in the critical areas where the cold joints created in the real metal-plastic parts. Cracks no 1, 2 and 3 were eliminated by increasing of plastic thickness in the critical areas. Cracks no 4 were eliminated by decreasing of packing pressure, what also contributed to the elimination of cracks no 3.

Keywords: metal-plastic part, overmolding, crack, cold joint, residual stress

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