IMPROVING PIM WITH THE USE OF DATA-MINING

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Data mining technologies slowly find their way into different industrial application areas where large data sets are generated exhibiting complex relationships among processes and variables. Finding patterns, trends, and anomalies in these datasets, and summarizing them with simple quantitative models, is one of the grand challenges of the information age. PIM and related technologies are no exception. The process started approximately two decades ago by first attempts to introduce artificial neural networks to model and to predict some processes within different PIM phases.

With this work we tried to analyse some phases of low-pressure injection moulding process of ceramic parts. Thus we employed artificial neural network to investigate the relationships among the technological parameters of injection moulding (time, pressure, tool temperature, suspension temperature, pipe temperature) and feedstock data (moisture, binder's share, viscosity), green part data (density, geometry, bending hardiness, Weibull modul) and the quality of molten parts graded by visual inspection.

We further analysed the impact of the binding system to the quality of the green parts. The viscosity of several feedstocks containing various combinations of 6 different binders was measured in the shear rate range from 0 to 100 s^{-1} at 5 different temperatures (60°C – 80°C). The impact of binders and temperature to flow curves was carefully studied and then prototyped by artificial neural networks. The trained network was then used to interpolate and predict viscosity for different combinations of binders as well as different temperatures in the given interval. The results were evaluated against the measurements leading to some interesting observations.