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ZAMAK3 Die Cast Optimization in Gravity Mold through Statistical Techniques and Soft Computing

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Abstract: Selecting the optimal conditions in a die-cast process, and the important effects between the variables which compose this study are useful in quality assurance, costs reductions and productivity increase. It follows that, using this statistical techniques and optimization will determine suitable conditions for the process, meaning, where the defects are minimized. In this work the modeling and optimization are shown for a ZAMAK (Zn, Al, Mg and Cu) die-casting process through the Surface Response method, performing an initial exploration with the factorial design then increased with central points. Since the complete quadratic model didn't fit properly therefore Radial Basis Function Networks were used for prediction. In addition, considering the adjusted models, desirability function (optimal D) and genetic algorithms were used respectively to achieve optimization considering the adjusted models. Finally, the obtained parameters were validated in the actual process achieving a considerable reduction in porosity related defects.

Keywords: ZAMAK, Optimization, Casting, Factorial Design, Neural Network, Surface Response, Genetic Algorithm.