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Development of a manufacturing cost estimating model for sand casted components using the design mass, for preliminary quote purposes at a Transnet foundry.

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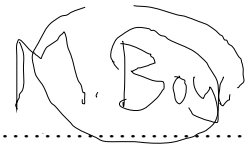
Supervisors: Professor R Siriram

A Research Project submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Masters of Science in Engineering.

04 September 2020

Declaration

I declare that this research report is my own unaided work. It is being submitted to the Degree of Master of Science to the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination to any other University.



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Mhlangabezi Boyce

11 ……..day of ……September 2020……

Abstract

The purpose of this study was to develop a manufacturing cost estimating model, that uses design mass of the component as input, for a steel and sand casting foundry. A relationship between design mass, mould mass, mass with risers and manufacturing cost of the component was to be established. Then, standard costing principles were to be used to develop a parametric relationship linking design mass to manufacturing cost. Lastly, foundry experts were to be consulted for validation of the developed model.

A Pearson correlation of 0.764 was found to exist between the model's intended input (design mass) and the intended output (manufacturing cost). The developed model was found to have a Mean Average Percentage Error (MAPE) of 9.23%. Statistically, it was found that the mean of the manufacturing cost as predicted by the developed model is the same as the mean of the manufacturing cost as predicted by Transnet Engineering Koedoespoort's current foundry model. Experts that were surveyed, using a questionnaire, found the developed model to be easy to use, flexible, consistent, accurate enough and of appropriate scope.

Key words: sand casting; standard costing; cost estimating.