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Line balancing using metaheuristic methods in BMW South Africa

Hart, Richard

2017

https://hdl.handle.net/10539/26033

Hart, Richard Brian (2017) Line balancing using meta heuristic methods at BMW South Africa, University of the Witwatersrand, Johannesburg, <http://hdl.handle.net/10539/26033>

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Abstract

This study documents a project to investigate the possibility of achieving savings in BMW South Africa's Rosslyn assembly plant through the use of metaheuristics to optimise line balancing methods. Through this project, a customised Ant Colony Optimisation algorithm was developed for the optimisation of the frontend assembly line in this plant. This algorithm is one which was designed to take into account many of the constraints which are found in an automotive manufacturing environment such as work areas, shared processes and sequence constraints. Through the use of the algorithm, a solution was developed which shows improvements to the line balancing in the area. These improvements show a 17% reduction in labour costs in the area, an improvement of 13.12% in the area's average work loading and an increase in the average work stability of 17.81%. Additionally, improvements were found which would allow this algorithm to be used in other lines in the assembly plant for further savings and improvements.