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6th International Quality Conference

08.06.2012. Center for Quality, Faculty of Engineering, University of Kragujevac

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6. International Quality Conference

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Faculty of Engineering, University of Kragujevac

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USING GENETIC ALGORITHAM TO OPTIMISE MACHINE LAYOUT PROBLEM

Abstract: *In this paper, it is presented problem of machine layout optimization. The importance of resolving the problem is large for manufacturers, who whant to save production time and cost. Poor layout gives longer traveling distance from one machine to anather and biger cost in handling the material for production. Time saving and cost reduction are achived by redusing the travel distance of people, especialy material and informations. The papire deals with genethic alghoritm whose objective is to find the appropriate placment of the machines in workspace.*

Keywords: *genethic algoritham, machine layout, travel distance*

1. INTRODUCTION

One of the biggest problems in the design of workspace manufacturers of heavy industry is the layout of machines. Importance of layout machines is manifested through cost of the matreial handle, time and matreial flow. Material handling costs contribute an estimated 15 to 70 % of total operation expenses and can be reduced by approximately 10 to 30% if an efficient layout is emplyed [4]. In that way machine layout affects on manufacturers productivity and efficiency.

How the machines will be placed depends on the type of manufacturing industri. There are meny types of layouts. Extrema layouts are layout by product and layout by function. Layout by product is a layout with high volumes of prodacts, but with low variety of products, on the other hand layout by function is a layout with high variety of products and low volumes of products. Type of layout that stands between these types is celullar layout. For havy industry, whos layout is considerd in this papir it is used layout by product.

A product layout arranges activities in a line according to the sequence of operations for a particular product or service. This would be an assembly line, such as a ship's winch line. This kind of line is eficient, but it has its imperfections. So the finding of optimal path between machines would reduce these imperfections.

Machines layout path is combinatorial optimization problem that attempts to find an optimal path through layout from a finite set of paths. An optimal tour is one which distance is minimized.

A large variety of optimisation solutions for layout are found in literature. Such as heuristic methods like genetic algorithm and ant colony optimisation algorithm (ACO), optimisation could be done by using quadriatic assignemnt problem (QAP) formulation.

An ACO algorithm is an artificial intelligence technique based on the pheromone-laying behavior of ants; it can be used to find solutions to exceedingly complex problems that seek the optimal path through a graph. [2]

QAP formulation is a fundamental combinatorial optimization in the branch of optimization or operation research in mathematics, from the category of the

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