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SPARE PART MANAGEMENT IN A TESTING WORKSHOP

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ABSTRACT

Spare part management is essential to many organizations, since excess inventory leads to high holding costs and stock outs can greatly impact operations performance, but it is a major problem in the testing work shop in Robert Bosch China Diesel (RBCD) Wuxi. The workshop is used to test the functionality of the injectors, such as those statistics for pressure, electro conductivity, etc. After implementing the automated tower storage in the work shop, the workshop supervisor applied monthly order policy to purchase spare parts, which means at the end of each month, he/she will check the consumption of last month's spare parts and make orders according to that data. However, in order to control the inventory of spare parts and achieve minimum total inventory cost of those parts, the (Q, r) model was suggested to make the monthly order, realizing the goal of maximizing the net profit of injectors.

1 INTRODUCTION

This paper is mainly talking about how to improve the spare part management in RBCD testing work shop using simulation – a new advanced visualized technology. In order to give a clear description of the problem in the following part, we have to introduce the RBCD testing workshop first. As RBCD's name can tell us, the top 500 company BOSCH has a sub-plant in Wuxi China. Its main products are injectors, at the meantime it also produces other products like tail gas treating units for automobiles. Fig 1(a) represents the layout of the whole plant, which includes the main plant for CRIN/CRI, plant for Nozzle/Rail/ZP5, R&D center, warehouse and other supporting facilities.

Our focus area is the CRIN/CRI building, which is used for fabricating injectors. Our testing work shop is located at the up-right corner of this building and the layout of the testing work shop is shown in Fig 1(b) below, we acknowledged that there are four testing lines for injectors, and previous work shop is the body assemble shop; also within this workshop we have an automated tower storage which is located in the left-down corner of the shop. Four doors are used for workers, planners and other personnel to walk through. An office desk is for the supervisor and staff who are responsible for the whole shop. Every day there are three shifts working 24 hours to inspect the injectors. Noting that some machines will break down at some time and sometimes if the problem associated with the machine breakdown is a major technical problem, we have to ask the technician from Function Department to fix the problem, and it may take a long time to process everything. However, most of the time when machines are down, it is because some parts of the machines have to be replaced, which are stored in an automated tower storage located in the workshop. Team leaders of each testing line is responsible to make sure that every machine

can work properly. However, the existing situation for the automated tower storage is that sometimes some spare parts in the automated tower storage is not enough for production while others remains with a big amount. Therefore, we turn our interest to see whether the testing workshop can have a better practice of the spare part management.

2 LITERATURE REVIEW

Based on previous review, it is possible and valuable to use simulation method instead of mathematical method to determine the re-order policy for managing the spare parts in RBCD testing workshop.

3 PROBLEM DEFINITION

The whole process of producing injectors in this plant includes machining, polishing, cleaning, body assemble and testing process. while the injector testing process in the testing work shop consists of 7 sub-testing processes as pressure testing, oil leak leakage testing, resistor testing, laser coding, copper ring assembling, cap assembling, and packaging.

4 MONTHLY CONTROL POLICY

In order to visualize our improvement strategy, we use AnyLogic, which is one kind of modeling and simulation software to do the visualization and measurement. Through building performance measures in simulation, we get some basic results regarding the stock level of spare parts, including Work In Process (WIP), Length Of Stay (LOS) in the first three processes, the gross profit, inventory cost and net profit.

5 (Q, R) CONTROL POLICY

We did around 500 simulation runs to get the optimal solution with the net profit approximately 35,726$, and the decision variables Q = 4, r = 6 for nozzle, Q = 4, r = 4 for filter, and Q = 5, r = 4 for electric pin. We conclude that using (Q, r) control policy to manage spare parts might, to some extent, increase the net profit while reducing the inventory cost.

6 DISCUSSIONS AND CONCLUSIONS

We can see from the data analysis between two control policies that the Total time in system in TL3 with (Q, r) order policy is greater than with monthly order policy. Future project needs more emphasis on data collection and analysis, which will be a great benefit to the overall success of the project and in order to make the system more robust and stable.

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