TKI DINALOG
Dutch Institute for Advanced Logistics

RATIONALIZING OBSOLESCENCE MANAGEMENT

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Gut feeling becomes obsolete in End of Life decisions

The Royal Netherlands Navy's (RNLN) fleet is deployed worldwide and its main task is to ensure security at sea and from the sea. In order to conduct its operations, their fleet has to be available and in excellent condition. Despite the efforts of the maintenance department, this goal is not always reached and one of the reasons is obsolescence. Whenever this phenomenon occurs, decisions regarding obsolescence management are made by engineers based on experience and gut feeling. Laurens Hellegers conducted a master thesis project that focused on rationalising obsolescence decisions by developing a decisions support tool.

WHAT IS OBSOLESCENCE?

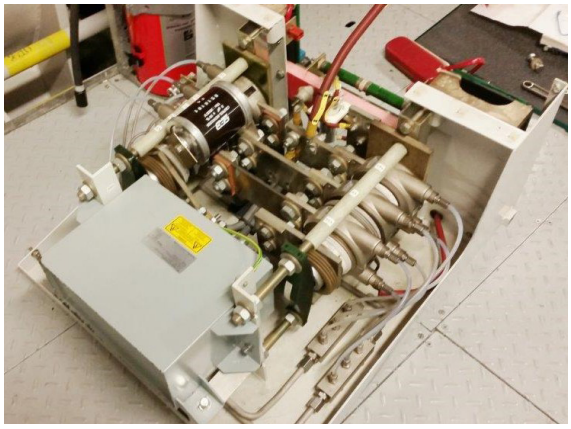
Obsolescence is the phenomenon where the budgeted lifespan of the whole system exceeds the lifespan of a particular component. There are several underlying reasons leading to obsolescence. Manufacturing sources can for instance, triggered by rapid progress in technology, diminish. Or the useful life of capital assets is just far beyond the useful life of its embedded components. On the other hand, manufacturers can plan obsolescence in order to force consumers to replace their systems. Defense systems such as aircraft and battleships are often subject to the first two reasons.

OBSOLESCENCE STRATEGIES

In this master thesis project a comparison of all possible combinations between the Last Time Buy (LTB) and modification strategy is made. In the LTB strategy, the original equipment manufacturer allows the asset owner or service provider to place a final order before discontinuing the production of a specific component. By purchasing a sufficient LTB quantity, the asset can be maintained the rest of its useful life. The modification strategy, on the other hand, replaces the obsolete component immediately by a new, more sophisticated, technology. Besides solving the obsolescence issue, the new implemented technology is often superior to the obsolete component in terms of e.g. failure rate, energy consumption or functionalities. By varying the timing of modification and keeping track of the corresponding cost, the optimal combination between both strategies can be found. However, note that it can occur that the old technology is too outdated at some point in time. A modification is then inevitable and has to be executed. Therefore, the maximum timing of modification is restricted.

CASE STUDY

The developed model is applied in a case study in order to demonstrate the practical applicability of the tool. The brake chopper is chosen as main subject which is a critical part of the propulsion system of the Zr. Ms. Rotterdam. It is characterized as a slow mover and has large downtime cost. Every possible modification timing is evaluated by the performance indicators: fill rate and total relevant cost. The optimal solution for this component is to delay modification as long as possible. In comparison with modifying immediately, which is the current strategy of the RNLN, a cost reduction of more than 5 percent can be achieved. However, note that this cost reduction strongly dependents on the maximum length for which the LTB strategy is allowed. The user of the tool should quantify this variable by estimating the degradation of the old technology.



CONCLUSIONS

In the applied case study, the optimal timing of modification is classified as an extreme: delay modification as long as possible. In general this statement holds, what means that the optimal timing is either to modify immediately or to delay modification as long as possible. In the rare case where the optimal timing is in between the two extremes, the obtained benefits are negligible. In addition, the performed sensitivity analysis showed that certain input variables have a strong influence on the optimal strategy. High demand rates, long planning horizons, and high back ordering cost favor for instance the modification strategy. Whereas high initial investment cost and high repair rates favor the LTB strategy. Altogether, this master thesis project suggests that a way exists to rationalize obsolescence decisions. Assumptions were made in order to develop this model and there is still a lot of work to do, especially in predicting obsolescence, but when the RNLN is forced to make a reactive decision regarding obsolescence, they are ready to rationalize it.

Topsector Logistiek

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MaSelMa project – Powered by:

Gordian Logistic Experts

TU/e Technische Universiteit Eindhoven University of Technology

UNIVERSITEIT TWENTE.

Erasmus Universiteit Rotterdam

This activity was co-financed by the Supplement for Private-Public Cooperation Research and Innovation of the Ministry of Economic Affairs and Climate Policy.

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