TKI DINALOG
Dutch Institute for Advanced Logistics

COLLABORATION BY CONDITION BASED MAINTENANCE

IMPROVING THE SERVICE CONTROL TOWER WITH PROACTIVE DECISION MAKING

A Two-Staged Alert and Intervention Generating Model for Proactive Lateral Transshipments in the ASML Supply Chain

ASML is a manufacturer of semi-conductor equipment, operating on a global scale. Like other capital goods manufacturers, ASML offers service contracts to its customers to ensure the availability of its equipment. Inventory of spare parts is located in numerous warehouses across the world to deliver the spare parts quickly to the customer. A Supply Chain Control Tower is used to monitor this network of Warehouses and to act on detected exceptions. Ite Jan Muller, MSc student at University of Twente, developed an alert and intervention generating model for the Control Tower of ASML, to enable a proactive response to exceptions in the Supply Chain.

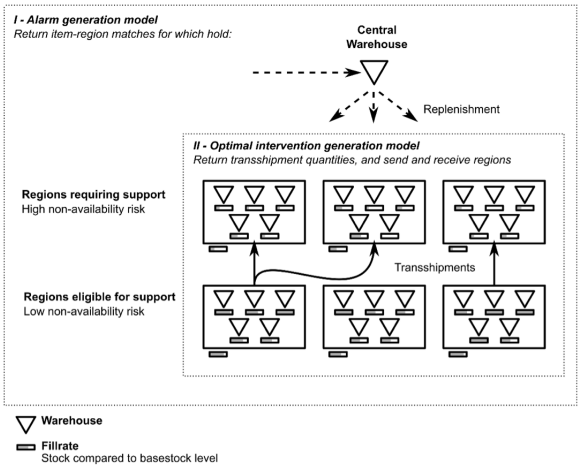
AN ALERT AND INTERVENTION GENERATING MODEL

Consider a supply network with a Central Warehouse and several Local Warehouses. A group of Local Warehouses located near each other are called a *region*. Within a region, stock is shared reactively when one of the warehouses faces a non-availability (a situation when the warehouse is out-of-stock but faces a spare parts request). We have developed a model that detects imbalanced inventory levels across the network. The mathematical model that we have developed will generate an intervention proposal for these imbalanced networks by using *proactive lateral transshipments*. That is, scarce parts are shipped between regions in order to reduce the overall non-availability risk. The mathematical model will minimize the maximum non-availability risk per region, on a part level.

To run the mathematical model for the inventory levels of tens of thousands of parts takes too much computation time, and it is also not necessary. Therefore, an alert generating model preselects the parts that have an imbalanced network. The conditions that trigger an alert are:

1) At least one region that requires support;
2) At least one region that is able to support;
3) A proactive lateral transshipment would significantly reduce the time required for normal replenishment from the Central Warehouse.

Thresholds for the non-availability risk have been tested for the decision to give and to receive. The proposed parameters in these decision rules have been chosen and validated, such that alerts are only generated when an intervention with reasonable impact can be found.



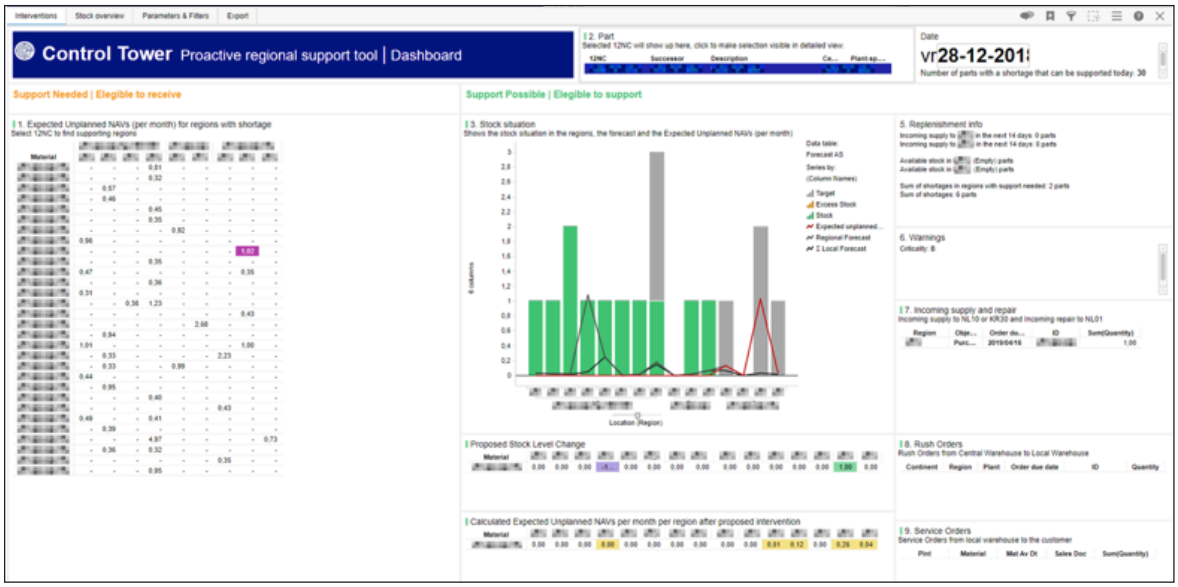
RESULTS

We have used the two-staged decision making model on weekly data from a period of four months. The proactive lateral transshipments will decrease the maximum regional expected unplanned non-availabilities with 84% on average. Furthermore, the proposed proactive lateral transshipments have significant contribution to reducing the number of required reactive emergency shipments. When looking at the transportation costs, the proactive lateral transshipments are almost similar to the costs of the avoided emergency shipments. However, when other costs involved in a non-availability are included in this trade-off, executing proactive lateral transshipments is beneficial for ASML and its customers.

The described two-staged model is implemented in a Business Intelligence dashboard where planners can easily approve or adjust intervention proposals. The worldwide stock levels are visualized on a spare part level and drilldowns can be made on storage locations, scheduled receipts and service orders. With an intervention generating tool, the Control Tower analyst can see the impact of moving parts between regions to support the decision or compare possibilities.

NEXT STEPS

The developed alert and intervention generating model is currently implemented within ASML. The analysts and planners within ASML have already made some adjustments to the parameters to include more alerts. The frequency in which the alerts and interventions are generated is increased from once to twice a week. Further research is executed on further automation of the operational interventions and performing lateral transshipments to minimize downtime and maximizing contract performance.



Topsector Logistiek

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