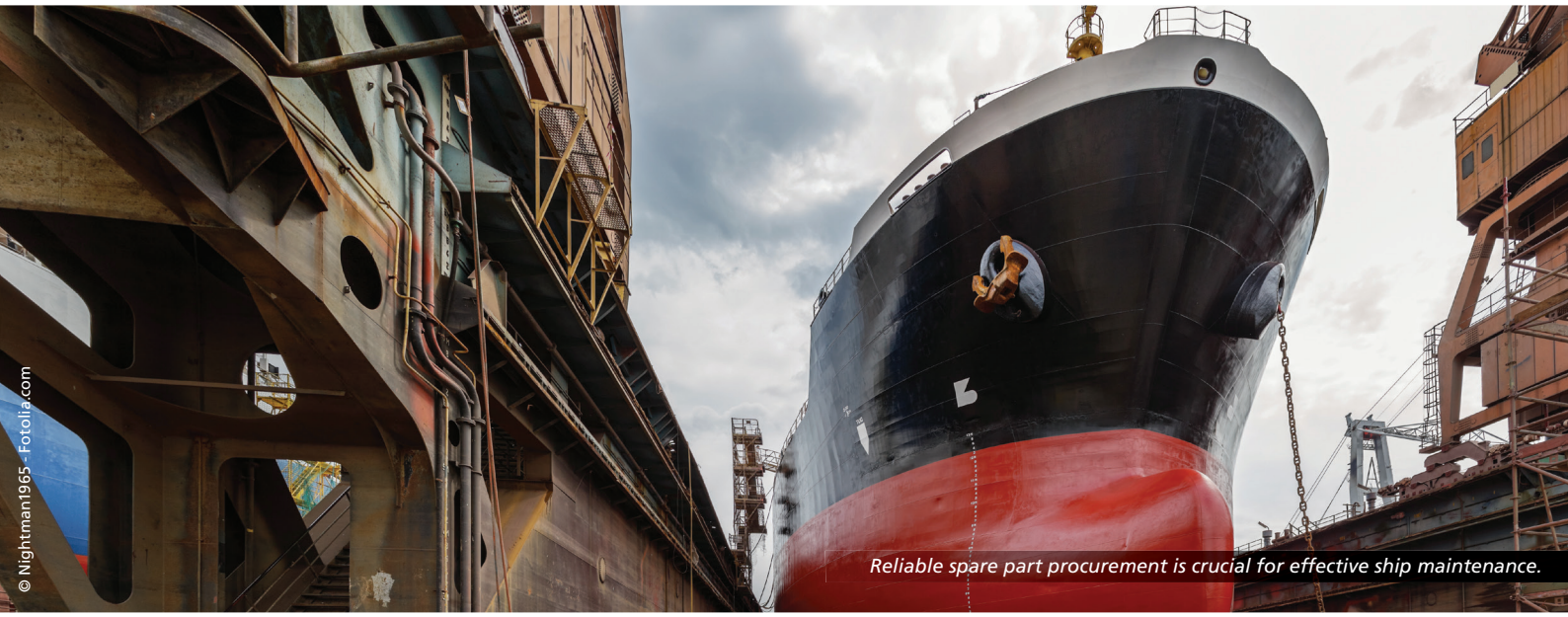
Fraunhofer CML

SOLUTIONS

FRAUNHOFER CENTER FOR MARITIME LOGISTICS AND SERVICES CML



Reliable spare part procurement is crucial for effective ship maintenance.

COST-EFFICIENT PROCUREMENT WITH SUPPLY CHAIN OPTIMIZATION (SCO)

Current challenges

Causing about ten percent of ship operating costs the procurement of spares make up an essential share of ship owner's expenses and is seen as one of the biggest challenges of ship management in mid-term future.

Best practice procurement

According to CML's Best Practice Ship Management study 2013 successful procurement is based on three crucial factors:

- Proactive decision-making:
A long-term and strategic view on procurement is important to enable stable supplier relationships and benefit from discounts.

- Fleet-wide planning:
To achieve maximum cost synergies procurement decisions should be taken from a fleet-wide perspective instead of focussing on single ships.

- Supply Chain perspective:
A successful procurement management should take the costs of the whole supply chain into account.

Procurement-related services at CML

CML's procurement-related services can help to take maritime spare part procurement up to the next level.

The following services are provided:

ANALYSIS OF PROCUREMENT DATA

DEMAND FORECASTING

SUPPLY CHAIN OPTIMIZATION

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IMPRESSUM

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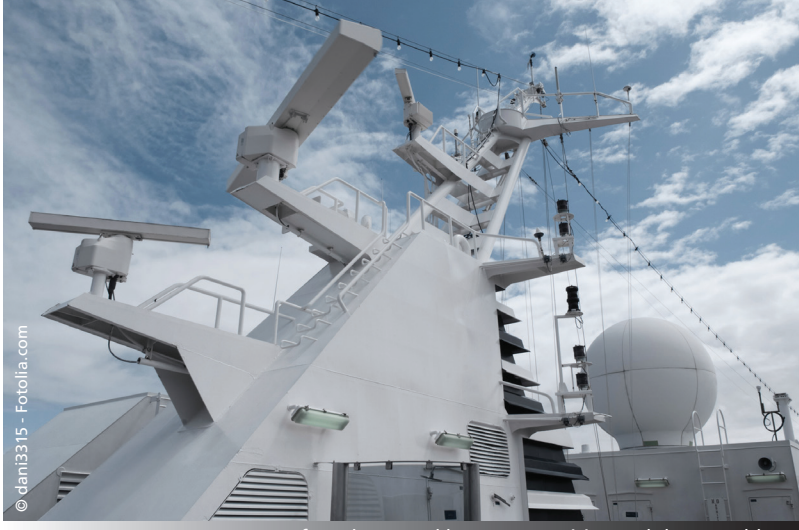
Spare parts have completely different logistical needs...



...from large and heavy to sensitive and damageable.

Analysis of procurement data

To enhance transparency of customer's current procurement and evaluate the potential for improvements, CML provides an extensive set of statistical services, including:

- Data preparation using proper mathematical data cleansing algorithms
- Analysis of order frequencies and regularities for different items and cost centers
- Cost driver identification
- Identification of crucial influence factors determining spare part demand
- Item classification and prioritisation using different classification methods

Demand forecasting

The demand of spare parts often is characterized by sporadic and irregular courses. In this case, demand forecasting is challenging.

To enable a proactive procurement planning CML developes mathematical forecasting algorithms and heuristics which are specially suitable to forecast demands of maritime spare parts.

Thereby forecast can be either based on historical demands, or on additional explanatory variables. In the long-term a usage of condition data of technical systems derived from condition monitoring is aspired.

Knowing the demands for spares in future, ship managers are able to benefit more from available discounts and as a result can reduce their purchasing costs.

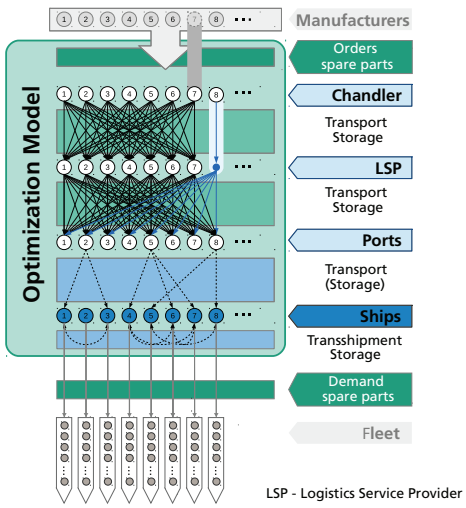
Supply Chain Optimization

In order to provide fleet-wide procurement decisions we developed a generic linear programming model. The model takes into account all procurement-related costs and can be customized to an individual ship manager.

Based on the expected need from demand forecast for different spares, the model calculates the optimal order, transport and storage quantities within the modeled network by minimizing procurement costs.

The model considers all crucial elements of customer's spare part supply chain, including multiple chandlers with different prices and discounts as well as a network of logistics service providers to model the processes of transportation, storing and transshipment. As one main influencing factor of ship operation the voyage plan is incorporated.

Optimization model framework



LSP - Logistics Service Provider

Main features of the Supply Chain Optimization model

- Modeling of customer's individual supply chain, consisting of different chandlers, logistics service providers and ports
- Different cost types, including procurement, storage, transportation, shortage and capital commitment costs
- Modeling of individual fleet and corresponding voyage plans
- Different types of discounts, e.g. quantity and sales discounts
- Different means of transport,e.g. express shipping versus standard shipping
- Consideration of transshipments between vessels as additional functionality