Round Table Discussion: What is the Impact of Uncertainty and Lack of Information on Spare Parts Logistics?
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1 INTRODUCTION

This document summarizes the discussion about the impact of uncertainty and lack of information on spare parts logistics which took place at the Marcus Ewans conference “Optimizing the International Spare Parts Management in the Machinery Industry” in Berlin, 24-25.1.2013. The round table was moderated by Ralf Gitzel and the participants were:

- Christina Backman (Director Global Aftermarket Logistics at Volvo Penta)
- Olaf Leijdekker (General Manager Aftersales Service at Yakasawa Europe)
- Thomas Hering (Project Manager Logistics Aftersales at MAN Diesel Turbo SE)
- Bart Loozen (SC Director Parts and Logistics at Pon Equipment and Pon Power)
- Dr. Thomas Milke (Managing Director Metroplan Process Management)
- Kay Schölermann (Project Manager of Supply Chain Development at DeLaval Services)
- Dr. Rainer Kleber (Postdoctoral Researcher at Otto-von-Guericke University Magdeburg)
- Jürgen Schulz (Managing Director at LOCOM Software)
- Dr. Ralf Gitzel (ABB Corporate Research)

The first part of this report summarizes the problems identified in the context of uncertainty and lack of information. Second, best practices known to the participants are described. The intention of this summary is to give researchers and inexperienced professionals an idea about the challenges and to give readers of all backgrounds some ideas about how to address these issues. The document should be read with the caveat that this is a cross-industry discussion with no information about whether and to what extent a problem applies to a particular business. Also there is no detailed discussion about the details of the solutions regarding effectiveness and ease of implementation.

2 CHALLENGES OF UNCERTAINTY AND MISSING INFORMATION

Vendors face a series of problems regarding information about the past and present as well as predictions about the future. In this analysis the problems are divided into two tiers. First, there are the causes which are responsible for the lack of information and the uncertainty. Second, there are concrete problems resulting from these circumstances.

2.1 Causes of Uncertainty and Missing Information

Lack of End Customer Contact: For many industries represented at this round table, there is a distinct lack of contact with the end user. In some cases, the products offered by the companies are sold to OEMs which incorporate them into systems which are sold to the end customer. In other cases, the products are not modified further but are still sold through dealers who are not part of the company. Either way there is a lack of information regarding the end customer and his buying and usage behavior, which is crucial for reducing the uncertainty about future customer demand. In the
worst case, products which were sold in one part of the world end up in another one without any knowledge of the supplier.

**Lack of Installed Base Information:** In some ways a side effect of low customer contact but also a result of neglect in the past is the lack of installed base information. For many industries, there is only a partial picture of which products are used by which customer for which purpose and under which environmental constraints. The information becomes even sparser when looking at (legacy) systems sold a long time ago before there was a focus on after sales business. The issue of lacking installed base information was shared by most (but not all) participants of the round table.

**Diversity of Parts and Lack of Master Data:** The number of different spare parts a vendor has to provide easily reaches multiple tens of thousands. The relationship between these parts and the products sold is not always obvious. As a result, there are often mistakes or gaps in the master data.

**Lack of Quantity:** Some industries are faced with the problem that they have an installed base too small to run serious statistical analysis. This problem can be further amplified by products which are highly customized or even made to order. All of this results in a high level of uncertainty regarding forecasts of demand.

**Size matters:** As a rough rule of thumb it can be said that those industries which sell expensive and complex products have better information about their parts. Either they have more contact with the customer during sales (who needs to specify modifications) or due to service contracts and requests by the customers. On the other hand, they often suffer from a lack of quantity as described above. At the other end of the scale are products which are mass produced (thus having the necessary quantity) but are hard to track down and observe in the field.

### 2.2 Effects of Missing Information and Uncertainty

The causes mentioned above result in a series of issues which can roughly be grouped into the categories listed below.

**Being Caught Wrong-Footed with the Customer:** Some tasks require access to detailed information in order to solve them properly. One major cause of this situation are OEMs and vendors which re-sell equipment into other parts of the world without informing the original vendor. In the service business, this is a major issue because the service team might lack information about a particular item’s unique properties. Also, lack of information sometimes makes it difficult to identify parts, especially if there are master data issues.

**Inability to Plan for Changing Business:** A warehouse is designed for certain types and amounts of products. However, markets change and this can lead to different types of products being needed. For example, liquids might have to be stored where there were only boxes before, part sizes may change significantly etc. If one is unaware of changing customer needs these changes can come as quite a surprise.

**Being reactive instead of proactive:** When information about the installed base is missing, it is hard to reach the customers proactively. Instead one is forced to quickly react to requests and changes, which often happens at higher expense than in the proactive scenario, e.g. due to low stock. This is especially problematic in the case of legacy parts. Furthermore, it is not possible to directly influence customer-level sales if there is no access to this level of the supply chain. Again,
customers with legacy parts would be important targets – they might sit on ticking time bombs and a careful evolution plan would help them to avoid potential issues in the future.

**Inability to Draw Conclusions:** Without information, it is difficult to learn from mistakes and to draw conclusions which could help the business. Why are some dealers ordering (and presumably also selling) more of a particular part than others? Why do incentives not have the intended effect, e.g. leveling-out demand? Does a customer really buy all his parts from me and if not why? What did he buy in total? What is the impact of non-original parts on the reliability of the product?

**Inaccurate General Statistical Forecasting:** While it is true that forecasting is always difficult, especially when concerning the future, a lack of information makes certain predictions even harder. Especially statistical approaches suffer if there is not enough data or there is a strong bias in the sample. The bias is likely to occur if the accessible data is not representative of the whole installed base. For example, if only warranty data is considered, one uses only those products for the prediction which failed early and ignores those which failed later or never. The opinion was voiced that only the aviation industry has complete failure data due to the numerous laws and regulations surrounding air carrier business. Also, the forecasts are often demand-based and not failure-based, so it is unclear whether a part was ordered for a repair or as a spare at the customers. As a side note, it should be mentioned that using the MTBF as the basis for a forecast is problematic because it represents the average case and thus is too low in 50% of the cases.

**No Ability to Forecast Special Cases:** While there is probably a high level of inaccuracy in the general forecasts, some cases are even more difficult. It is extremely difficult to use historical data for strongly growing markets or for niche products which have a very small installed base but possible peaks on the demand side. In the case of new products, there is a complete lack of historical information about their spare part demand.

### 3 CURRENT BEST PRACTICES

The challenges described above are not easy to solve but some current best practices were identified at the round table.

**Master Data Management:** Master data management is a major tool to understand the data from the field and thus special care should be taken to keep master data up to date.

**Service Contracts:** Service contracts offer a good way to get direct access to the customer and thus better information about the installed base. The increased awareness results in more proactive action and less situations of wrong-footedness. Also at this level, it is easier to draw conclusions and with a large part of the installed base covered, predictions about demand become easier.

**Demand Forecasting for New Products:** The current practice for forecasting the demand of new products is to ask the product manager what he/she expects based on past experience. However, this number is often quite inaccurate. It was suggested to implement a KPI which tracks this inaccuracy to learn from past mistakes. Furthermore, it was suggested not to rely on data from the initial phase for a forecast as that data consists primarily of units in the burn-in phase which additionally are from early production batches and thus probably more likely to fail. (This depends of course on the general failure behavior of the product type.)
Conservative Stock Keeping: With the risk of inaccurate forecasts, one suggestion was to keep critical parts in stock at all service locations to avoid damage to the company reputation.

Sales Inquiries: Sales to an OEM/vendor can be followed up by a manual inquiry as to who the equipment was sold to. While many vendors will probably want to keep this information secret to protect their own service business this does not apply to all industries and markets. Also, there seems to be a different OEM mentality in different countries. However, manual enquiries are quite time consuming and cannot be kept up for every deal.

Provide Incentives for Installed Base Information: It was suggested to grant warranty only to those OEMs who provide installed base information. Since this is not possible in many countries, other incentives such as extended warranty or part buy-back can be used. If part buy-back is already an option for the OEM, the incentive could be improved conditions for the transaction. The same incentives can also be used for information required for forecasting, e.g. operating hours and failure data.

Dealer Inventory Management: A joint planning system of stocks that encompasses dealers/OEMs as well as the original vendor is an excellent way to get access to the end customer. This increases the level of information dramatically and allows more accurate planning. Installed base information is easier to update and the improved planning is an additional win-win situation for both sides.

“Risk Item” Forecasting: Items for which demand rarely occurs should not be tackled by traditional forecasting methods but rather with the tools of insurance companies (e.g. actuarial mathematics). This way, stocks can be justified financially even without detailed data. A similar approach would be to sell spare parts to the customer with the same arguments enriched by the prospect of downtime.

4 CONCLUSIONS

When looking at the results of the round table discussion, there are several interesting insights. First of all, there seems to be a strong interest in data and forecasting issues in the spare parts community. Second, while the problems identified do not apply to all industries, there was a strong consensus as to the nature and causes of the problems. The discussion of the solutions showed that there are some good practices for some of the issues but there is still work to do. The discussion ended with two visions of the future – one was a suggestion to track the installed base with sensors connected to the mobile internet. The other was the concept of the servitization where product maintenance is covered by a flat rate. With either idea, the picture of missing data and uncertainty would change drastically and offer the opportunity for new solutions to the identified problems.
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