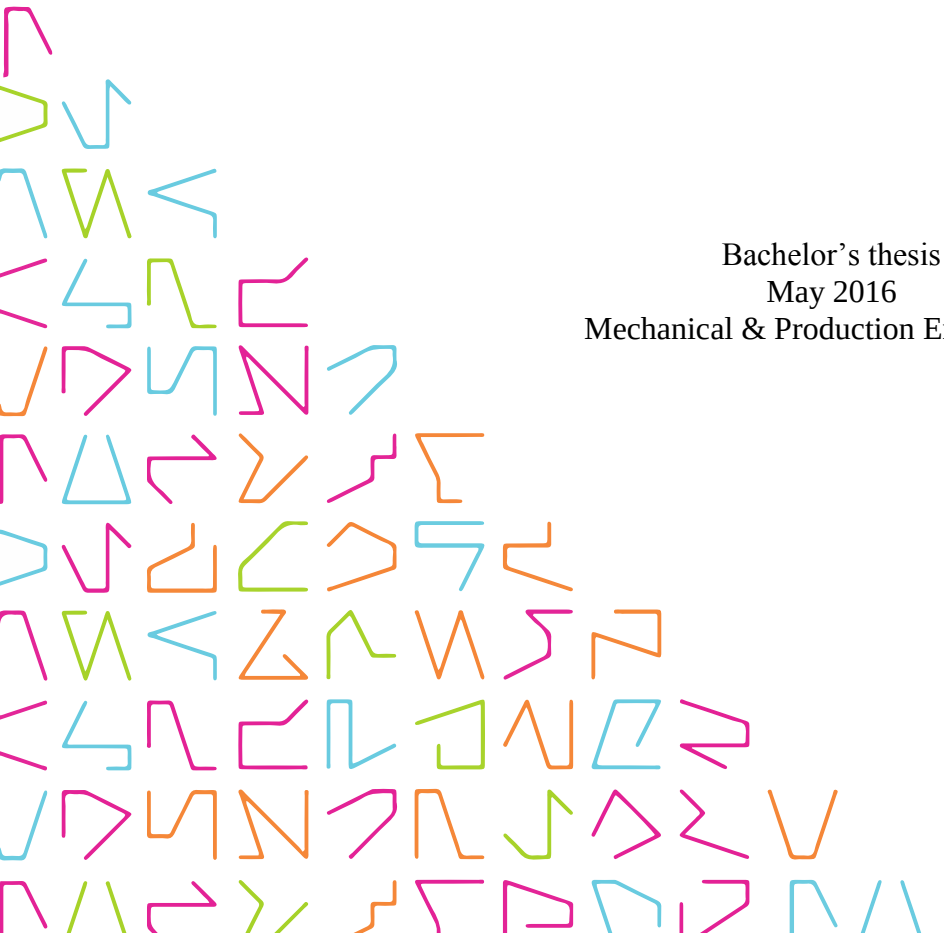
TAMPEREEN
AMMATTIKORKEAKOULU

# IMPROVING THE REQUEST FOR QUOTATION PROCESS

## A Research on Price-related Requests for Quotations

Jarno Inkinen



Bachelor's thesis
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**ABSTRACT**

Tampereen ammattikorkeakoulu
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Improving the Request for Quotation Process
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The objective of this study was to gather information about the current state of a company's request for quotation process. Price-related requests for quotations were analyzed from different perspectives during the study period. The aim of the research was to study the process and reveal sections, which needed improvement. The theory of spare parts pricing and company's request for quotation process were presented also in this thesis to clarify the background of this research.

The data for the research were received requests from the company's information systems from the previous year. The research was done using spreadsheet calculation for handling and sorting the data. Different aspects of the data were compared, and emphasis was put on details, feature by feature. The company's needs and analysis were done accurately by comparing and sorting the data. Restrictions for the data were made concerning requests which were not able to be researched with similar methods.

The research revealed that the items requested were repeated during the researched period. The most common reason for such items was their high purchasing prices and pricing methods which do not maintain list price. Improvement was recommended concerning guidelines for the price list of those items. Only the items that were requested five or more times were researched more closely, but further research is recommended for those items that were requested three or more times.

The results gave useful information on the pricing group distribution of the items. The group of the items without pricing groups was revealed, and several reasons can be attributed to it. The common reasons were invalid item code or replacement of the item.

The requests concerning items with valid prices were an important finding. Almost one fifth of the requested items had a valid price already, so there is a possibility for improvement. Further research is required to clarify the reason why the price was requested even if it was already valid.

This is the summarized public version of the research. The classified report has been submitted to the company.

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Key words: spare parts pricing, process improvement, RFQ

**TIIVISTELMÄ**

Tampereen ammattikorkeakoulu
Kone- ja tuotantotekniikan koulutusohjelma
Modernien tuotantojärjestelmien suuntautumisvaihtoehto

INKINEN, JARNO:
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Tutkimus hintaan liittyvistä kyselyistä

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Opinnäytetyön tarkoituksena oli toimittaa yritykselle raportti selventämään käytössä olevan viestintäprosessin nykytilaa hinnoittelu- ja toimitusaikakyselyiden osalta. Saapuneet hintaan liittyvät kyselyt tutkittiin, jotta kyselyitä voidaan jatkossa tarkastella tarkemmista näkökulmista. Opinnäytetyön päämääränä oli tutkia kyselyiden avulla prosessia ja löytää prosessin osat, jotka saattavat tarvita parannusta. Varaosien hinnoittelun teoria sekä yrityksen käyttämä prosessi on esitetty työssä tutkimuksen lähtökohtien selventämiseksi.

Saapuneet varaosakyselyt käytiin läpi vuoden ajalta. Data oli peräisin yrityksen tietojärjestelmistä. Datan hallitsemisen ja lajittelemisen välineenä käytettiin taulukkolaskentaohjelmaa. Saapuneiden varaosakyselyiden ominaisuuksia vertailtiin keskenään ja osien yksittäisiä ominaisuuksia tarkasteltiin syventymällä niihin vaihe vaiheelta. Selvitystä tehtiin yritykselle hyödyllisistä näkökulmista sen tarpeisiin ja kyselyiden analysointi tehtiin tarkoin menetelmin datan jaottelua apuna käyttäen. Tutkimusalueesta rajattiin kyselyt, joita ei voitu tutkia samanlaisilla menetelmillä.

Selvityksessä paljastui useita varaosanimikkeitä, joihin kohdistui kyselyjä pääosin korkean ostohinnan vuoksi. Listahintaa ei ylläpidetä, jos se kohoaa liian korkeaksi, joten näiden nimikkeiden hinnoittelumenetelmä aiheutti kyselyt. Parannusehdotuksena esitettiin ohjehintalistaa näille nimikkeille, jotta kyselyiden määrä vähenisi. Nimikkeistä tarkasteltiin vain niitä, joita oli kysytty viidesti tai useammin, joten jatkotutkimuksen kohteeksi ehdotettiin niitä varaosanimikkeitä, joista oli tehty kysely kolmesti tai useammin.

Tulokset paljastivat tietoa hinnoitteluryhmien jakautumisesta. Varaosia ilman hinnoitteluryhmää paljastui merkittävä määrä. Tiedon puuttumiseen löytyi monia eri syitä, joista yleisimpinä oli kysely väärällä nimikenumerolla tai kysytyn osan korvaaminen toisella. Selvityksessä paljastui myös, että kyselyitä tehdään nimikkeistä, joilla oli jo voimassa olevat hinnat. Melkein viidesosalla kysellyistä nimikkeistä oli jo hinta voimassa, joten löydös oli merkittävä prosessin parantamisen kannalta. Näiden kyselyiden alkuperä selvisi tässä tutkimuksessa. Kyselyiden perimmäisten syiden selvittämiseen tarvitaan jatkotutkimusta.

Yritykselle kirjoitettiin oma, salassa pidettävää materiaalia sisältävä raportti. Tämä on julkinen tiivistetty versio tutkimuksesta.

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Asiasanat: varaosien hinnoittelu, prosessin parantaminen, RFQ

**CONTENTS**

**GLOSSARY**

| | |
|---|---|
| ERP | Enterprise Resource Planning |
| FLU | Frontline Unit |
| GLP | General List Price |
| GPF | Global Picking Frequency |
| PG | Pricing Group |
| RFP | Request for Proposal |
| RFQ | Request for Quotation |

# 1 INTRODUCTION

This bachelor's thesis was an assignment from a big worldwide company which works in the field of cargo handling solutions. The service department of the company was interested in examining and studying the process behind a normal everyday spare parts pricing task. The spare parts pricing team receives annually a huge amount of RFQs which request price and lead time information. There was interest in examining those requests to clarify the present state of the RFQ process and to find out the possibilities for the development in the process.

The international spare parts business is very hectic by its nature, and requests are exchanged quickly between different departments. The departments fill in the requested information and forward the RFQ form to the next one in the process. The essential object of this thesis was process investigation on the basis of the analyzed price and lead time requests data from the last year. The goal was to investigate the condition of the RFQ process and to make conclusions on how the process can be improved.

The research was made to fulfill the pricing team's needs, so price was emphasized in this thesis. The research was restricted to the price related RFQs received during 2015. The RFQ process was overviewed on the basis of the pricing task, and the process flowchart demonstrates the price-related request process. The research results should point out the sections of the process which may need improvement and explain the conclusions from the results. All graphs and tables of this thesis were based on the researched data and were made by the thesis writer.

The theory of this thesis considers pricing in the spare part business. Pricing has been a growing trend in the field of industry for a while, and its importance increases continuously. The theory presents the basis of spare parts and the pricing of them. The pricing strategies and their problems are presented. After the theory section the focus will be on the overview and research of the RFQ process.

# 2 PRICING IN THE SPARE PARTS BUSINESS

## 2.1 General about spare parts

The after-sales business and its importance seems to be a growing trend over the past years according to Zinoecker (2006). Spare parts create an essential share of the after-sales business, and they have the highest potential to generate profitable revenues in the field of services. It is good to notice that in the whole service business spare parts are the most profitable business area, although service contracts and training periods are tough competitors. (Zinoecker 2006, 14.)

The spare part business contains much more item codes and more complicated price lists than the primary product business. There might be a multiple amount of spare parts compared to primary products, and spare parts item heading data requires continuous maintenance with tremendous capacity. The range of spare parts also varies a lot. Spare parts involve parts bought from the original manufacturer, subcontracted parts and even self-manufactured parts. (Zinoecker 2006, 15.)

Spare parts can be considered as complementary products because of their purpose. The function of the spare parts is to replace broken parts from the machines and to maintain equipment performance in case of a defect. The demand for spare parts is contingent on the amount of defects and breakdowns of machines, so there is a connection between these factors. (Kulmala 2006, 2.)

### 2.1.1 The price of spare parts

The price of a spare part is the value of a bought good for the customer. The price of a product is the value expressed in money, which changes the ownership of the product, if the product is sold. The price is the device between the seller and the buyer, who will determine what each will receive from the trade. So the price can be considered the charged amount of the product. The buyer and the consumer can regard the price as the fulfillment of their needs but also as the final criterion which will affect the purchase

decision, if comparing products. To the seller the price is a way to gain revenue and the most important factor of profit. (Sherlekar & Sharad 2010, 307–308.)

The dictionaries determine price in many ways. The most common way to understand price is "money which needs to be paid when purchasing something" (Collin 2006, 312). The price is a device for the transfer of ownership, and in that way it is a basis of trade transactions. Determination of price in trade consists of what the buyer is willing to pay, what the seller is willing to approve, and how the competition will change it. (Business Dictionary 2016.) Price may mean different things for different people, so it is not unambiguous. Price neither explains the purchase decisions of the customers completely. There are customers who value price more than others. Some customers may consider a high price a guarantee of high quality, and some may regards the cheapest as the best option. (Kulmala 2006, 3.)

### 2.1.2 Spare part groups

Because of the nature of the spare parts business it is impossible to control and handle every part individually. Categorizing parts is crucial to managing them with the smallest possible amount of work. Categorizing spare parts can be done in several ways. Zinoecker (2006) recommends to handle some parts as reference examples or to completely classify the same kind of parts in similar groups. One recommended way for classifying is to use old invoicing data. On the basis of the invoice data it is possible to determine the importance of a spare part by examining revenues and turnovers. Then the same kind of parts can be treated with similar methods as reference parts or even to transfer information from an already handled part to another. (Zinoecker 2006, 16.)

It depends on the situation how the parts should be categorized, but technical specifications of parts are a possible way to define spare parts more precisely. The range of spare parts is usually wide, which means that the range of item specifications can be enormous. Usually technical specifications are also specified in subcategories, which determine the part specifications more precisely. Table 1 shows examples of the technical specifications of spare parts. It is very common that the main categories are divided into subcategories which specify the parts more accurately. For example,

bearing can be divided into slide bearing, rolling bearing and plain bearing, according to table 1.

TABLE 1. Technical specifications of spare parts (RFQ research material, modified)

| | | | |
|---|---|---|---|
| bearing | • slide bearing<br>• rolling bearing<br>• plain bearing | structural part | • assemblies<br>• axles<br>• welded parts |
| electrical part | • cables<br>• connectors<br>• sensors | powertrain part | • engines<br>• gearboxes<br>• clutches |
| hydraulic part | • cylinders<br>• hoses<br>• hydraulic pumps | pneumatic part | • compressors<br>• hoses<br>• valves |

The spare part group classifications are usually on the more common level than technical specifications. The spare part groups are more likely to describe the origin or the use of a part. Classifications are also possible to do on the basis of the competitive situation of the part, part procurement or a way of producing a part. Group classification is also dependent on the situation where the groups are categorized. Classifications should pay attention to features which Zinoecker (2006) pointed out earlier. Features were, for example, the complexity of a part, the exclusivity of a part or exceptionally intensive competition of a part (Zinoecker 2006, 15–16).

Spare part groups can be

- common parts
- parts with competition
- designed parts
- specified parts for certain product
- parts with added value like services or programs.

## 2.2 Pricing strategies

There are many approaches for pricing and a lot of different strategies which you can follow by chasing the best possible result. According to Phillips (2005, 22) it is possible

to end up with the best expected result at pricing by following costs and the customers' willingness to pay and by observing the competition altogether. Kulmala (2006, 5) highlights the possibility that pricing can succeed without any mathematical strategy. He reminds that it is often only good luck and simple mathematical methods cannot be trusted. (Kulmala 2006, 5.)

Pricing strategies vary in different sources but the purpose of them is the same. The aim of a pricing strategy is to specify the actions of the company to determine the optimum price for the products and marketing objectives to gain profits (Business Dictionary 2016). Phillips (2005, 22–23) uses the most common and well-known way to divide the pricing strategies in cost-plus, market-based and value-based strategies. For example Noble & Gruca (1999, 438) use classification into four categories, which are new product, competitive, product line and cost-based strategy. Different pricing strategies are needed because different methods fit in different situations. The selection of a pricing strategy might depend on various factors, but usually the most common reasons are the number of spare parts in a company, possible competition, business goals and the current market situation. (Zinoecker 2006, 14.)

The following strategies - cost-plus, market-based and value-based pricing - highlight one aspect more than the other three. The cost-plus pricing is a strategy which calculates the price by adding margin over it. The market-based pricing follows the prices of a competitor on the market and compares them when setting price. The value-based pricing estimates the value of goods for the customer and sets the price on the basis of that assumption. (Phillips 2005, 22–23.)

### 2.2.1 Cost-plus

The cost-plus pricing is one of the most popular ways of setting prices because it is quite simple to use and easy to understand. When using cost-plus pricing, you need to know the cost of the item being priced. The next step after the cost is known is calculating the price by adding a percentage margin over the cost. That can also be done by the rule of thumb method or by adding some increase, which is used traditionally. (Phillips 2005, 23.)

In theory the cost-plus pricing should work well, and added surcharge is supposed to generate expected revenue to cover the expenses. The situation is not always that clear because the cost-plus pricing does not pay attention to the market. The cost-plus pricing does not consider the willingness of the customers to pay at all, and missing knowledge about the market causes problems also with the price differentiation. When knowledge about the market is missing, one cannot utilize price differentiation so it is not possible to charge different prices from different customers. (Phillips 2005, 23.) Noble and Gruca (1999, 439) also highlight that the problem of the cost-plus method is the lack of information on the competition and the customers.

Noble and Gruca (1999, 439) advice to use the cost-based strategies with caution. According to them the competitive situation where the average costs remain at the same level regardless of the demand is a good and profitable situation for cost-plus pricing. Also different factors in organizational working may support a company for using cost-based pricing strategies. These kind of factors can be an avoidance of risks or a need to internally argue about the given prices. (Noble & Gruca 1999, 439.)

### 2.2.2 Market-based

The market-based pricing is used in the market where there is a lot of competition. Prices are often set to the same level with the market leader or a little bit lower, if the plan is to capture the market from the others. In some cases the competition might set the prices by itself. When using the market-based pricing strategy, one should be able to charge a higher price from the customers who value the product more than the regular customers to take full advantage of this strategy. It is also necessary to monitor the market and the prices of the competitors to achieve an updated view of the competition. (Phillips 2005, 24.) The market-based strategy also takes essentially into consideration the customers' willingness to pay, in addition to competition comparison (Cullbrand 2012, 12).

This pricing strategy requires comparison of the market prices. Comparison is necessary for this strategy in order to be able to set valid prices on the basis of the market levels. This strategy also requires knowledge about the purchasing power of the purchaser and

the criteria of the buying decision so a correct profitable price can be set. Market studies are the key accumulating that knowledge. (Kulmala 2006, 3–4.)

In competitive situations the market leader can also show the way to the others by changing its prices and by forcing the competitors to update theirs. The market-based pricing can also be done by imitating the existing prices of the competitors in the market or by continuously updating new comparable prices. It is possible that some companies compete by lowering the prices and consciously trying to be the cheapest in the market. If the competitors know about conscious price lowering, it may begin a price war. Noble and Gruca (1999, 441) remind that the price lowering strategy and the price imitating strategy work best in the market with a lot of competitor branded products. (Noble & Gruca 1999, 441).

### 2.2.3 Value-based

According to Phillips (2005, 24) the idea of value-based pricing is to find a price which correlates with the customer value of the product. The customer value is of course dependent on the context and the goods. The value-based pricing is challenging in real life, for example when evaluating the value which the customer would pay and which he is actually willing to pay after comparing the market. It is impossible to notice or estimate the value of the product for every single situation for every single customer. Competition almost always forces to lower the prices under the limits that the company will set. (Phillips 2005, 24–25.)

The value of the product is more than the only amount that the customer is willing to pay. The value-based strategy should figure out the real value which the product generates to the customer. (Cullbrand 2012, 13.) Value can be considered as measured value, the amount of value which the product brings to the customer or profitable benefit in currency. When using the value-based pricing method, it is possible that there is not any information available of the reference price levels of similar products or the common price levels are not publicly known. The value-based pricing strategy differs from the market-based in that way. The value-based pricing often requires knowledge about the behavior of the customers or a description of their needs. (Kulmala 2006, 7; 9.)

The value-based pricing should begin by estimating the reference price on the basis of how a customer values the product and which price level a customer considers reasonable. At this point the customers' thoughts about the presented pricing information, if it is available for comparable products, affects the customers' understanding and image about the value of a product. (Nagle & Hogan & Zale 2011, 104–105.) Kulmala (2006) suggests using comparable method for determining a reference price. A comparable method requires estimating the value which the customer receives by buying a product. If comparable information is available, that makes the evaluation easier. When evaluation is done, price is determined by adding or cutting the price, which varies on the basis of how the customer considers the value compared to other products. If there are not any comparable products available, value can be considered through the following aspects: for example the customers' trust for the vendor, guarantee of logistics or simply on the basis of the features of the product for the customers' needs. (Kulmala 2006, 7–9.)

## 2.3 Pricing spare parts

What is the point of pricing? Kulmala (2006, 1) describes pricing from the point of the seller that pricing is action which tries to improve the sales and gain profits. Pricing can be considered simply as searching for the right price, but actually it is much more. There are many practical factors which need to be taken into consideration and a lot of precise theoretical analyses to be done for the pricing to succeed. (Kulmala 2006, 1.)

Pricing may include very complicated decisions for many organizations, and the pricing decisions can change because of many reasons. For example, variance in the market can affect the whole spare part business. Also the type of goods and the amount of customer commitment affects the way how the parts are priced. (Phillips 2005, 18.) Zinoecker (2006) says that many companies do not optimize their spare part pricing process, which would be crucial for increasing profitability. When spare part pricing is done without precision and an exact plan, the result will be poor. When using a pricing procedure which is nearly correct or only directional, untapped potential for the accumulation of the profits will be left over in the spare parts business. The pricing methods aim at increasing the profitability of spare parts, and also at the same time taking into consideration the customer value. The customer value is important to notice

when pricing is done, because then the amount of customer complaints should be minimized and customers should be more satisfied. (Zinoecker 2006, 14.)

Kulmala (2006) mentions that pricing considered as a marketing tool or a competitive weapon is really effective. When pricing is done right, it is possible to have an influence on the sales or even competitors actions. If the pricing affects the sales increasingly, then business is most likely profitable. It is also good to notice that pricing can be dangerous for business. Wrong pricing actions may be a disadvantage for business and even cause damage. (Kulmala 2006, 3.)

### 2.3.1 Spare part groups in pricing

Many companies have categorized their spare parts in groups and use that as an advantage to ease their pricing process. As it was earlier demonstrated, there are many varieties to divide the parts into different groups. I interviewed the Manager in Parts Pricing concerning spare part groups in pricing. Names of the interviews have been hidden to avoid identification of a person or a company. According to him the most important aspects of classifying spare parts into groups when pricing them is competitiveness versus the captivity of parts in markets. This means that the very competitive parts should be treated differently from the parts which have a stabilized situation and sales guaranteed for them. Another important aspect is how the customer perceived the value of parts. It describes the value of the part or how useful and important the part is for the customer. (Manager, Parts Pricing 2016.)

When spare parts are categorized, it is possible to select the pricing method on the basis of the priority of the parts. For the spare parts with the highest priority it is right to use very complex pricing methods, but the parts with low priority can be priced with simple pricing methods. As a result it might be good to examine the high priority parts with very specific market research studies and to analyze the customers' willingness to pay before pricing is done. One should also take into account the customers' value and the importance of the part groups, when the part groups with high priority are priced. A couple of part groups which are priced with care might realize an important share of the profit potential available, and the part groups with low priority can be left with less attention. (Zinoecker 2006, 16.) The Manager in Parts Pricing confirmed that

categorization of parts into groups allows to manage the pricing effectively, and pricing actions can be tailored. He also tells that categorization makes analyses and forecasting more accurate. After that it is possible to examine and analyze one specific group of parts more closely. (Manager, Parts Pricing 2016.)

Risks of spare part classification appears when the parts are priced. If competitive spare parts are overpriced, it can affect negatively on how a customer sees all prices of the company. If a customer considers all spare part prices high, it can damage the company's price image. It can be really harmful for competitive business. There is also a risk with captive parts, because not even the most captive parts are free from competition. If those parts are priced too high, the competitors' options may attract the customer and cause a lack of willingness to pay more. (Manager, Parts Pricing 2016.)

### 2.3.2 Discounts

Discounting can be used to support pricing and pricing strategies as an endeavor to affect the customers' buying behavior. It is quite common in different field of industries. Discounting includes its own risks, and it cannot be done if you are not aware of them. Many companies consider the discount policy decisions challenging. According to them it is especially difficult to determine the common rules for managing decisions and give the decision-making responsibility to someone. (Cullbrand 2012, 7–9.)

How to give discounts in practice and what should be considered? I interviewed the Manager in Parts Pricing also about discounts, and according to him discounting should be used for controlling the company's own price levels. The prices in the price lists are given forward in the distribution network, and discounts are the way to control the listed prices. He also reminded that if the distribution network is the company's own and fully controlled, discounts may not be needed and the price lists determine the exact sales price. (Manager, Parts Pricing 2016.) Concerning how discounts are given, Cullbrand (2012) points out to pay attention to who is giving the discount. According to him there is a possibility that a person in a different position may give different discounts for the item the price of which is listed. Behind this there is an idea that there is a need to increase the sales volume or revenue income. A solution to this problem is to limit the decision-making rights. Limiting the right to give discounts of a certain percentage is

another option, or limiting the right on the basis of the amount of earned profits after the discount. (Cullbrand 2012, 8–9.)

Discounts can also be used to increase the sales amounts and to affect the buying behavior of the customers, as was mentioned earlier. This is really effective when different discount is given on the basis of the purchase revenue size of the customer. More discounts should be given to the customers who buy a huge amount of products than to customers who buy only couple of products. This discounting method will increase the customer's willingness to purchase larger volumes. (Cullbrand 2012, 8–9.) Discounts also can be a key to succeed in some business areas which are very discount-oriented. The culture or nature of the regional market may increase the importance of discount, and the amount of discount can affect the customer's purchasing decision directly. (Manager, Parts Pricing 2016.)

Over-discounting can be really damaging, and it is the most significant risk in giving discounts. There is a possibility that over-discounting will lead to permanent damage called price erosion. Price erosion means the situation where the price is lowered so often or so low that increasing the price back to the normal level is not possible any more. If the prices have been decreased too much, it is difficult to increase them again, and the customers may not react to that kind of news very well. To avoid this situation, discounts should be given through structured and well-controlled framework which is meaningful and simple to utilize in practice. (Manager, Parts Pricing 2016.)

### 2.3.3 Spare part kits in pricing

If a group of spare parts is defined as a kit, then the way of pricing it is to count the sum of all included products and to add a small discount in the accumulated price. According to Cullbrand's (2012) studies that is a typical method for the pricing kits of industries. Discount is there because it will make buying a kit profitable for the customer. The amount of the discount of the kit should be sufficient to attract the customer to buy the kits but small enough to keep the business profitable. Pricing kits may cause trouble if the price of one item increases significantly. The customer’s reaction should be taken care of, and it could be useful to check if discount can be used to even the price change. (Cullbrand 2012, 97–98.)

Using kits can be considered as a tool for increasing the sales. If a kit is created wisely, it contains really competed parts and something to tempt the customer to make the purchase decision. If a kit is sold, it is more profitable than selling a single part because a kit contains many parts which have all been priced profitably, and small discount won't turn it unprofitable. Also it is of great benefit for the customer to receive all parts at same time by purchasing only one item. (Cullbrand 2012, 97–98.)

The benefit of kitting parts is that kits make price comparison more difficult. It aims to distract the customers' focus away from the price of one item and to bring the benefits up from the customers' point of view. When the customer is not focused on only one certain item price, it will lower the customer's price sensitivity and increase the chance of a purchase decision. (Cullbrand 2012, 97–98.)

## 2.4 Problems with spare parts pricing strategies

Every pricing strategy has its own special features and problems. This chapter takes a closer look about the problems which the cost-plus method, the market-based method and the value-based method may cause. These strategies have a lot in common, so same features can cause problems for different strategies. Competition is repeatedly mentioned in all strategies and also the customers' willingness to pay, because those are essential features in the spare parts business. It is important to be aware of the possible problems when a strategy is used.

**Problems with the cost-plus strategy**

Usually companies make a mistake and price their spare parts with simple methods, which are often really similar. A common mistake is to aim at predefined target margin using a purposely created mark-up, which is found based on cost. (Zinoecker 2006, 15.) There is a risk that a mark-up is lower than the market would allow, and then the company do not earn all the profits which are available (Kulmala 2006, 4). According to Zinoecker (2006) the companies which are using pricing methods with a mark-up factor are usually facing several problems. If pricing is done with the same uniform mark-up for different kind of categorized parts, then other parts are priced wrong, and that may cause customer complaints. In the worst case this may damage the company's price image and the customers imagine all parts expensive. Sometimes it can also be the

opposite and a mark-up could be higher and the customers would still be willing to pay for the product. (Zinoecker 2006, 15.)

Competition may also be a reason for the cost-based pricing strategy problems. Different competition for different kind of parts is not taken into account in this pricing method. Self-manufactured and directly copied parts can also be the cause of competition. Pricing parts which are highly competed for won't succeed with this mark-up method which does not pay attention to the competitive situation. (Zinoecker 2006, 15.)

**Problems with the market-based strategy**

A problem with the market-based strategy usually appears when the price is determined and a buying customer represents his own evaluation of the price level. Usually the buyers try to express their discontent for a price because they are not willing to pay that much. The price is probably at the correct level, but the buyers may try to cut the price more. Another problem is concerning the true value of the parts. A healthy way to improve the market-based strategy is to endeavor to get the customer to pay the correct value of the product. (Cullbrand 2012, 12.)

The price competition may lead to continuous price-lowering, which is not always the best option. One way to increase the sales without price cuts is to focus on product differentiation, advertising and improving distribution, Cullbrand (2012) summarizes. He explains this as a long-term improvement which will benefit the business more and longer than continuous price-lowering. (Cullbrand 2012, 12.)

**Problems with the value-based strategy**

Phillips (2005) summarizes that the value-based strategy is good in some situations, but it needs a couple of characteristic which commonly won't actualize in real circumstances. He says that monopoly or arbitrage situation where profits can be made without a risk would be ideal for using the value-based strategy. Then it would be possible to decide the real values of the products for the customer and most certainly to make profit. That will cause worries for possible regulations to business, because trade should be fair and maximizing profits with false methods is illegal. Phillips rejects that kind of an idea and states that kind of a situation impossible. It will be challenging to detect a certain customer value of the product in the point of sales. Charging different

prices for different products might also cause trouble, if the products are similar. (Phillips 2005, 25.)

# 3 RFQ PROCESS OVERVIEW

## 3.1 RFQ generally

Generally RFQ is understood as a request for quotation in the bidding process of standard business actions. RFQ in the bidding process is a message or a note which is used to inquire offers from possible suppliers. A request for quotation can include many aspects, and it can be used to determine very specific features of requested goods. Strictly restricted quotation eases up the comparison of possible vendors but too restricted may cause lack of alternatives. (Logistiikan maailma, 2016.)

According to Logistiikan maailma (2016) a request for quotation should contain information about

- the description of the product
- technical specifications
- commercial specifications
- the amount of requested units
- delivery information
- terms of trade.

## 3.2 RFQ process in research

RFQs are received if some information is missing or more information on something is required. In an ideal situation the spare part business is working behind this process, except in the cases where some information is missing. Then the RFQ process offers a structured way to provide missing information, such as sales price or lead time. RFQs in this process can in general be considered as a distraction caused by lack of information or data not maintained. I interviewed the Manager in Technical Information who has worked with the initialization of the RFQ process at the implementation phase. The aim of the interview was to clarify the difference between the traditional RFQ and the company's RFQ process. He summarized the RFQ process as a tool which keeps track and provides a structured way for solutions to questions between the beginning and the end point of a process. The RFQ Tool was created to help handling and working with

internal and external queries in the spare part business, and it offers a solid and systematic way to handle the part queries. (Manager, Technical Information 2016.)

The process has been developed to clarify the operations, and the current tool has been developed from the older version, which was found limited in functionality from the purchaser point of view. As the old version did not meet the expectations and there was a need to develop a more structured way for handling queries, the company developed the way of working, and also organizational changes set need for new processes. When the business expanded and more communication was needed, the process was adjusted to allow more users to utilize the tool. Also the way of handling the cases was changed and all cases were pointed directly to responsible persons. This development lead to a more flexible process and clarified each person's responsibilities. The last updates allowed the process to be more structured and made communication between the central organization and the interest groups even better. The current process offers functions such as automated e-mail status change alerts. (Manager, Technical Information 2016.)

The process is used to make inquiries in different aspects relating to the spare part business. The tool allows to inquire price, lead time, both price and lead time, delivery follow-up, item management or other details. According to the Manager in Technical Information (2016) users are able to select which kind of information they request and choose the type of query on the basis of the need.

## 3.3 RFQ options in the company's process

This chapter presents the RFQ options which are possible to choose in the company's RFQ process. Research was made of the price and lead time requests. Therefore those requests are explained more in detail, and the RFQ process overview will concentrate on them.

**Price & lead time requests**

RFQs can be created to inquire both price and lead time or each of them separately. Requests are made by the front line units or business support persons who are responsible for external customers. Also the requests initiated by front lines will be handled by the business support managers. The main reason for these requests is the

lack of found information or recently created items lacking updated sales prices or lead times.

The followed process is dependent on whether the requested spare part does exist in the company's enterprise resource planning system or not. If a new item number needs to be created, the business support forwards the received inquiry in the form of an RFQ to the purchasing department. The purchasing department updates the purchasing information of the items in the system. That can be, for example, the lead time of the items, the default vendor and cost information. Once the necessary details are in place, the purchasing department forwards the RFQ to the pricing department, where the GLP is defined and set. The pricing department sends the RFQ back to the business support, and they will comment the original query. If the item is not correctly available in the ERP, the RFQ needs to be sent through the item management before the purchasing department. The item management will take care of opening a new item and maintaining item data.

RFQs can also be created if just price or lead time information is needed. The process procedure if the item is opened or not in the ERP is similar as with the price and lead time queries. The business support can forward the RFQ straight to the pricing department, if the purchasing information is valid in the ERP.

The price and lead time request process is represented in the form of a process flowchart. The chart is included in the appendices, and it was made by the thesis writer to specify just the price-related RFQ process. Appendix 1 (RFQ process flowchart for price and lead time requests) was created to help to understand the process on the basis of the price-related request type which was researched in this thesis.

**Delivery follow-up, item management and other requests**

The RFQ tool allows to inquire the delivery follow-up for the ordered spare part. It needs identification information about the already done order, so the form differs a bit from other forms. The item management requests are often about the items which have a spare part number but are not available in the system. Usually the item management queries are returned to the inquirer immediately after the item management processing. Other types of requests are quite rare, but they can be related to the commodities required in the service business.

# 4 RFQ RESEARCH

## 4.1 Research background

This research was done to investigate the possibilities to improve the RFQ process from the viewpoint of the spare part pricing team. The spare part pricing team receives annually a lot of RFQs requesting price information and also cases where a valid price exists. There was interest to examine all the received price-related requests during the researched year 2015 and to analyze the present state of the RFQ process. The need was to analyze the requests from different viewpoints to build a better understanding of the current situation. This kind of a research has not been done before, and clarification of the results will give information about the content of the requested data. The results of this research should point out the points of improvement and give information about possible development needs.

The company had true interest and need for this research as well for the findings. The results were conclusions and summaries from the researched data. Actions will be done based on prioritization and need of further analysis. The whole research was based on the company's data of the received the price-related RFQs during 2015, and it was analyzed by the thesis writer. Also all the text, tables and graphs in this research chapter were made by the thesis writer and based on the analyzed data.

The data for this research was extracted from the ERP and RFQ tool. All needed information was not available in one source, so the first step was combining data into the one Excel file. Collecting the necessary data required combining information, and the data amounts were large. Unique item numbers exceeded 10 000.

The research data was limited to the received price and lead time requests from the studied year. The research data needed to be limited also by the following aspects. Cases were excluded when lacking a recognizable item code for further examination. The RFQs including several items were excluded, as the research concentrates on the amount of RFQs and specific part numbers. Excluded were also the requests which did not concern an item recognizable by the company ERP. There were requests by the vendor item codes or item description, and that data is not valid for getting more

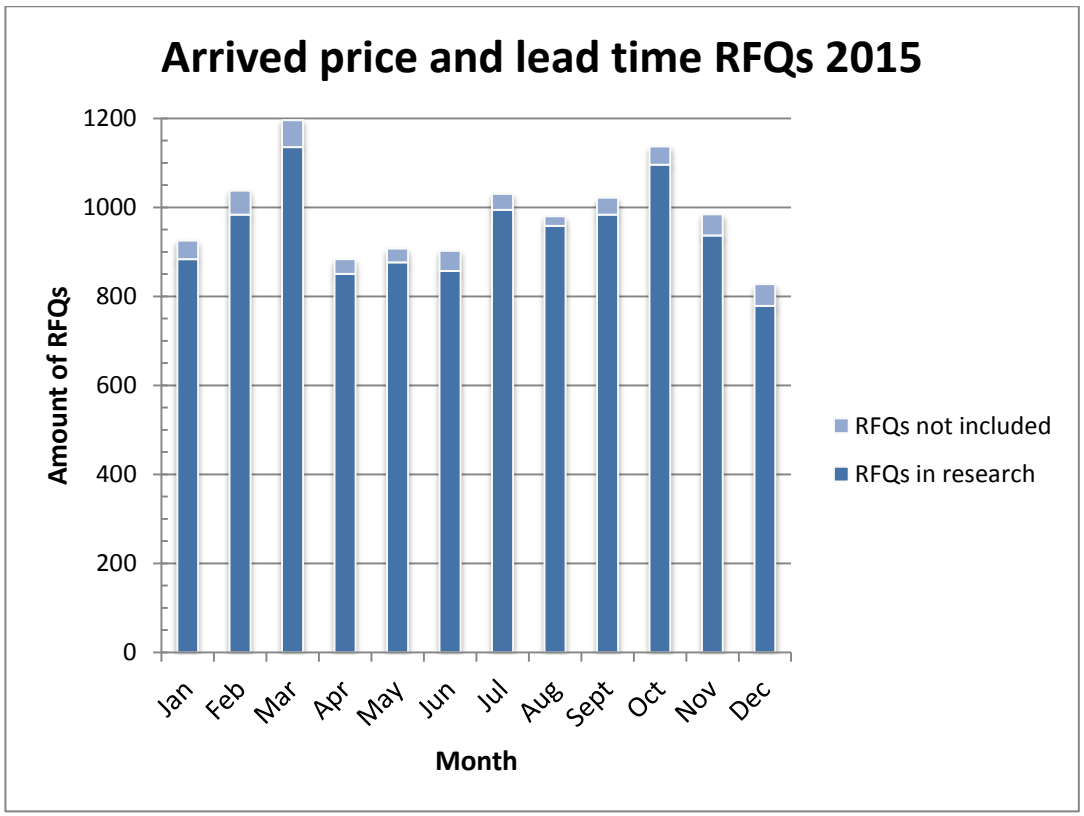
information on the requests, which this process really handles. Those exceptions were excluded from the research.

This research summarizes the findings from the data. The company had some assumptions for the development needs in the process, and this research was the first of its kind to analyze the current situation in detail. The analyzed data revealed development possibilities, which are presented in this report. The requests were studied from different points of view to allow a detailed enough analysis for corrective actions. Ideas for improvement are introduced in the discussion chapter.

### 4.1.1 Received RFQ requests

Statistics of the received price and lead time RFQs in 2015 were built up after the research data was collected and combined. The restrictions of the research data decreased the total amount of RFQs in the research. The restrictions caused those exclusions, which were discussed in the research background topic. The research has a comprehensive view of the studied price and lead time inquiries. In the beginning the data included the RFQs requesting information for multiple item codes. The requested multiple item codes were possible to separate to single items manually and research like other valid item codes. This changed the focus to study the received spare part requests instead of the received RFQs. The items were in the center of interest, and the items provided the specific information about the requests. The amount of the received RFQs were presented in this chapter, and the next chapter considers the received requests as items.

Graph 1 illustrates the received RFQs split per each month. The RFQs excluded from the research have been sorted out from the researched data and studied separately from the valid requests. The graph shows the received RFQs, and it differs a bit from the amount of the requested items.




GRAPH 1. Arrived price and lead time RFQs 2015

The table 2 shows the precise amounts of the received RFQs in the study, the amount of RFQs not in the study and the exact amounts of the requested items in the study. There were more requested items than RFQs in the research, because some RFQs were inquiring information for more than one item at the same time. The multiple item requests were split in data concerning only one specific item, as it was explained earlier. The amount of the requested items not valid in the study cannot be defined, because the requests were not specified for a designated item. Those requests were concerning lists, item groups or "see below" information which was not able to be reached in the data.

TABLE 2. Statistics of the research data

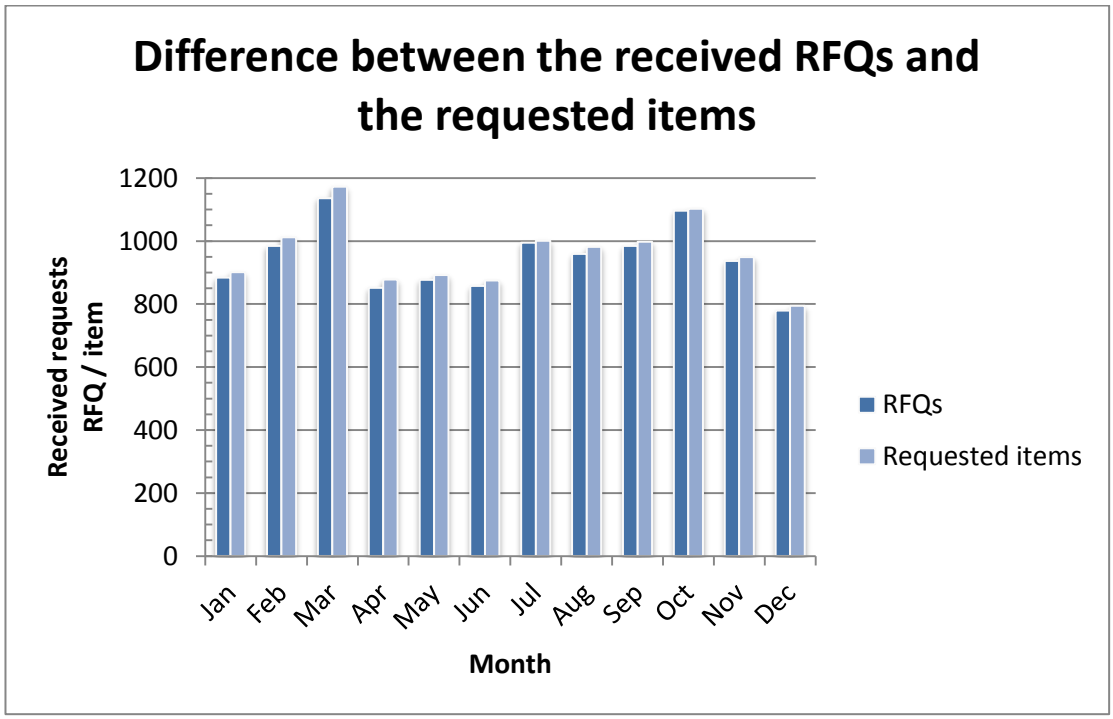
| | **Total** | **Jan** | **Feb** | **Mar** | **Apr** | **May** | **Jun** | **Jul** | **Aug** | **Sep** | **Oct** | **Nov** | **Dec** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **RFQs in research** | 11339 | 884 | 984 | 1136 | 851 | 877 | 857 | 995 | 959 | 984 | 1096 | 937 | 779 |
| **RFQs not in research** | 499 | 42 | 54 | 60 | 33 | 31 | 46 | 36 | 21 | 38 | 41 | 48 | 49 |
| **Amount of requested items** ***(In research)*** | 11555 | 901 | 1012 | 1172 | 878 | 892 | 875 | 1001 | 981 | 998 | 1102 | 949 | 794 |

*The amount of the items not in the research cannot be defined because the attached item lists from requests were not researched.

### 4.1.2 Difference between the amounts of received RFQs and requested items

For the results it was more important to focus on studying the received item requests than RFQs. The amounts of the received price and lead time requests told about the volumes per year and per each month. The RFQ volumes indicate the work load, but it was of interest to figure out the real reasons for why certain items were requested and what caused the big amount of the received requests. By focusing on the items and on how the company manages and categorizes them will give necessary information on how to find out the process development needs.

Graph 2 shows the difference between the amounts of the received RFQs and the requested items. The total difference was 216 items during the researched year. The differences between the months were not so big, but it was relevant to study the requested items individually, and 216 items cannot be left without attention.

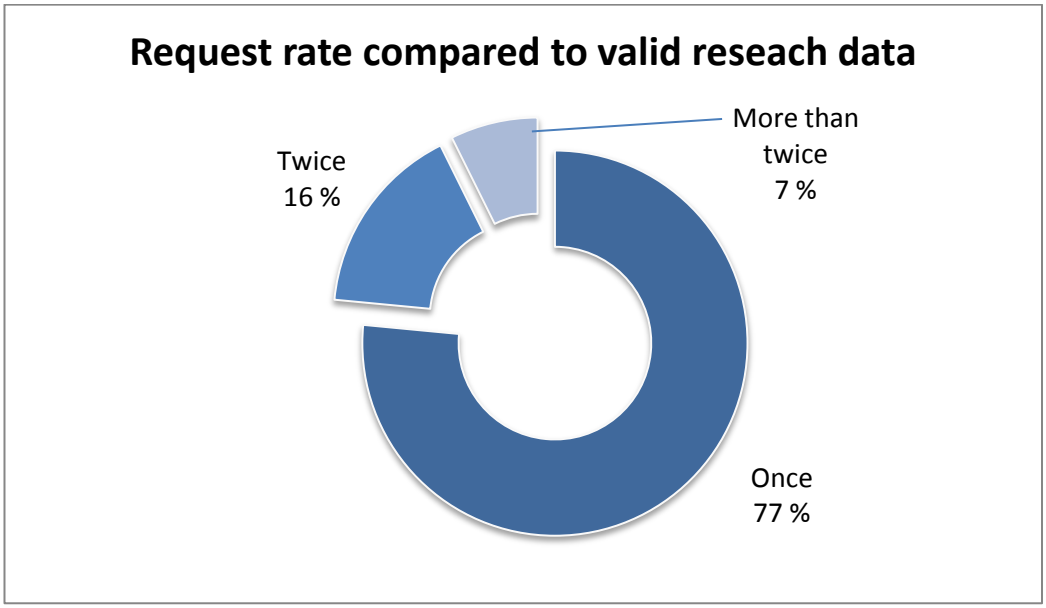



GRAPH 2. Difference between the received RFQs and the requested items

The total amount of the requested items was 11555, and this was the data on which this study was based. If the requested items from 2015 and some details were mentioned, it was then compared to the total amount of the items.

### 4.1.3 Items requested repeatedly

Altogether 2714 requested items from the valid research data of 11555 items was requested twice or more. This was 23 % of all the requested items during the researched year. The number of the more than twice requested items was 223, which was 7 % of the requested items. The repeatedly requested items increase work in the process, and this study aims to clarify the reasons why the items have been requested often. Graph 3 shows how many items have been requested once, twice or more than twice during the research period. The rate of the repeatedly requested items is meaningful when making conclusions that the process development needs.




GRAPH 3. Request rate compared to valid research data

This section is limited to only the most repeatedly requested items. The research contained 34 items, which were requested five or more times during 2015. The most requested item was requested 19 times, which actually was explained with quotation-based pricing. The quotation-based pricing is used for the most expensive parts.

Altogether 20 out of 34 repeatedly requested items fit to quotation-based pricing. 9 items were requested repeatedly even if they had valid and maintained GLPs, so there might be more to be analyzed regarding the price levels. 5 items did not have valid or maintained GLPs and were still requested repeatedly. Those above mentioned parts were researched more closely by analyzing the information available in the RFQ tool.

The items which were requested repeatedly and had GLPs were examined individually by studying the RFQ forms. Table 3 describes those items and lists information about the amount of requests during the study, item and item description, vendor of the item, global picking frequency GPF and where the request was from. Later in this research the meaning of the vendors, global picking frequency and business areas where the requests came from will be determined more precisely.

TABLE 3. Items requested repeatedly with maintained GLP

| Requests | Description | Item code | Vendor | GPF | Requests from |
|---|---|---|---|---|---|
| 18 | ACCUMULATOR | 1231 | Vendor XA | High | All around the world |
| 6 | ELECTRIC MOTOR | 1232 | Vendor XB | Medium B | Central / APAC |
| 5 | SEAL KIT | 1233 | Vendor XC | Low | All around the world |
| 5 | FORK | 1234 | Vendor XD | Low | USA |
| 5 | HOUSING | 1235 | Vendor XE | Medium A | EMEA |
| 5 | VALVE,BRAKE SYSTEM | 1236 | Vendor XF | Low | EMEA |
| 5 | VALVE,VALVE PLATE | 1237 | Vendor XG | High | EMEA |
| 5 | OIL SEAL | 1238 | Vendor XH | Low | EMEA |
| 5 | INSTRUCTION MANUAL | 1239 | Vendor XI | Medium B | EMEA |

For those items the RFQ request research individually revealed the following conclusions, which are summarized in table 4. It seems that the item replacements among the fast moving items cause confusion and repeating requests. Also many answers in the RFQs referred to the reference RFQ, which was already processed. It could indicate that a request could be avoided, because the data should be maintained already.

TABLE 4. Conclusions about why items are requested repeatedly

| Requests | Description | Item code | Why requested |
|---|---|---|---|
| 18 | ACCUMULATOR | 1231 | Replacement caused several requests |
| 6 | ELECTRIC MOTOR | 1232 | Possible vendor was searched |
| 5 | SEAL KIT | 1233 | Replacement caused several requests |
| 5 | FORK | 1234 | Price requests although price was listed |
| 5 | HOUSING | 1235 | Replacement and conversion to kit |
| 5 | VALVE,BRAKE SYSTEM | 1236 | Price requests although price was in reference RFQ |
| 5 | VALVE,VALVE PLATE | 1237 | Price requests although price was listed |
| 5 | OIL SEAL | 1238 | Confusion with request and price was in reference RFQ |
| 5 | INSTRUCTION MANUAL | 1239 | Confusion with item location |

The items without a maintained GLP revealed different results. Table 5 shows similar information for the items without a GLP as the earlier table 3 for the items with a GLP.

TABLE 5. Items requested repeatedly without a maintained GLP

| Requests | Description | Item code | Vendor | GPF | Requests from |
|---|---|---|---|---|---|
| 9 | SPREADER | 2231 | - | Low | All around the world |
| 6 | LOCKING PLATE | 2232 | - | Low | EMEA |
| 5 | WHEEL HUB | 2233 | - | Low | EMEA |
| 5 | CHAIN | 2234 | - | Low | All around the world |
| 5 | ENGINE | 2235 | Vendor XJ | Low | All around the world |

Studied item prices should not be maintained but study revealed quotation based pricing and even one item with maintained price. Table 6 presents detailed conclusions why these items were requested repeatedly.

TABLE 6. Conclusions about why items are requested repeatedly

| Requests | Description | Item code | Why requested |
|---|---|---|---|
| 9 | SPREADER | 2231 | Quotation based |
| 6 | LOCKING PLATE | 2232 | Item not available to global market |
| 5 | WHEEL HUB | 2233 | Not sure if item fits in specific case |
| 5 | CHAIN | 2234 | Price requests although price was listed |
| 5 | ENGINE | 2235 | Replacement and conversion to kit |

The reasons were quite case-by-case, and a common trend between the items cannot be defined. The first item in the list used quotation-based pricing, which causes a lot of requests. The second item was not available for the global sales due to item features. The third item needed a lot of verification for its suitability. The fourth item request was made because the item was product-specific and the price of the item needed the update for a specific machine. The fifth item caused confusion because the engine requests considered many engines in the same request.

## 4.2 Analysis on the basis of the classification and technical features of the items

In this chapter the research on the basis of the classification and technical features of the items is presented. The global movement of the items from the central warehouse were also examined based on the actualized sales transactions. The purpose of this research was to specify the features of the requested items and the segment items based on the above-mentioned features.

The research was done in relation to the company's pricing groups, technical segmentation, combination of them and the global picking frequency of the item. The pricing groups were further on abbreviated as PG and global picking frequency as GPF. The pricing groups refer to the company's pricing structures and segments following a specific pricing strategy. This study highlights that some technical segmentation codes maintained by the company may require updates to be more specific. The global picking frequency describes the number of the sales transactions from the central warehouse.

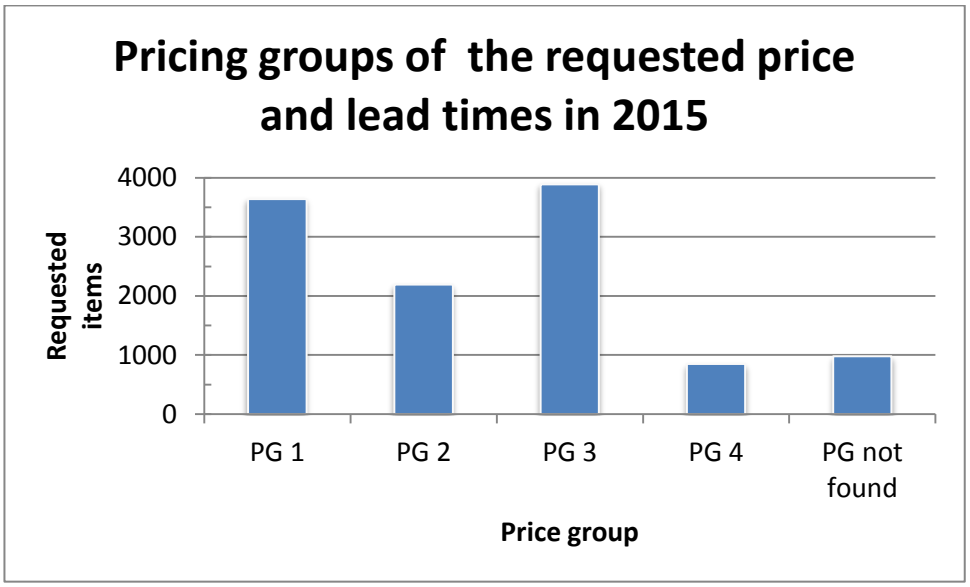
### 4.2.1 Pricing groups

The company utilizes four main segments for part pricing. Each segment has its specific pricing rules. In this study the segments are referred as 01, 02, 03 and 04. The company is maintaining price group information only for the parts that have a valid price, and therefore an additional group (N/A) has been used in this study.

The pricing group analysis was the first step to represent the received price and lead time requests. Pricing groups were a relevant way for categorizing the received RFQs items, because same group items have something in common. Segmentation of the items into pricing groups was also important for later studies.

The received requests contain also items which did not have a defined price group. This kind of items comprised actually a remarkable amount of the requests included in this study. In the research these parts were marked as price group not found, and for those the group called PG not found was created. This group needed to be created, because price group information is only maintained for the parts that have a valid price. The PG not found group included those items which did not have a valid GLP during the research or the company ERP did not recognize the item codes. Altogether 979 items did not have information about the price group. If an invalid item code or vendor code is requested, the first goal of the RFQ process is to find the company's correct item code for the received request. The process can offer a completely different item to replace the requested, if there were suitable replacements possible. Later in the process the correct pricing group will be determined and the item can end up priced.

The requested items in 2015 were examined through the pricing groups. The pricing group 01 includes typically items categorized on the basis of the market and availability. The PG 02 can be described through the example items which were hoses and bearings. The PG 03 was the group for spare parts related to product structures, and the PG 04 contained typically large structural spare parts. Graph 4 shows that the major part of the requested items was in the price groups 01 (32 %) and 03 (34 %). The third biggest was the price group 02 (19 %), and the undefined group (8 %) was bigger than the group 04 (7 %). The percentages were calculated from the complete amount of the requested items in 2015.



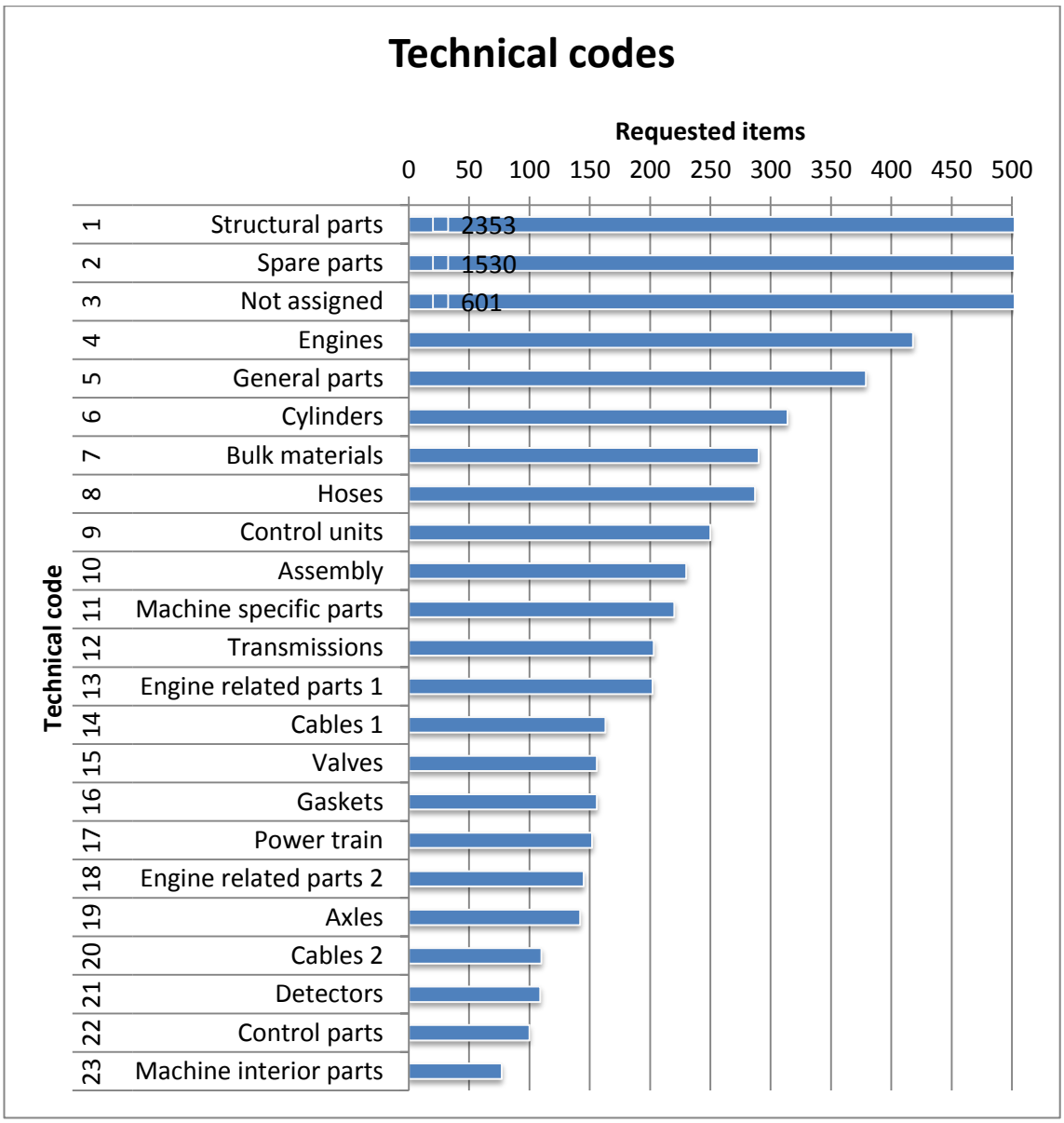

GRAPH 4. Pricing groups of the items requested in the study

### 4.2.2 Technical features

The technical features of the item can be researched through the master data. The technical feature describes the technical aspects and category of the items. There are 23 main categories, which have altogether 223 different subcategories. The main objective of the technical feature study was to reveal significant item segments. The most requested technical feature codes of the item contain relevant information about the request frequency of the items, and there was a desire to find out the volume of the requested item type. The study focuses on the items with most requested technical feature groups, leaving the few times requested items without observation due to

prioritization. The findings regarding the technical code can be considered useful, but there is a need to remember a possible deficiency in the classification.

The research data included 601 items without the specification of the technical code. That was 5 % of the requested items in the research. It was also the third biggest technical code group of the study and a significant section of the study area. The second biggest technical group of the study was spare parts with 13 % of the items which was a general group. The biggest technical group was structural parts with 20 % of the requested items. Graph 5 represents the technical groups of the items in the study, including the not assigned general group and items without specification. The graph shows the distribution of the technical codes with a significant number of items. Because there were so many technical codes, it was impossible to picture every single code in the graph.



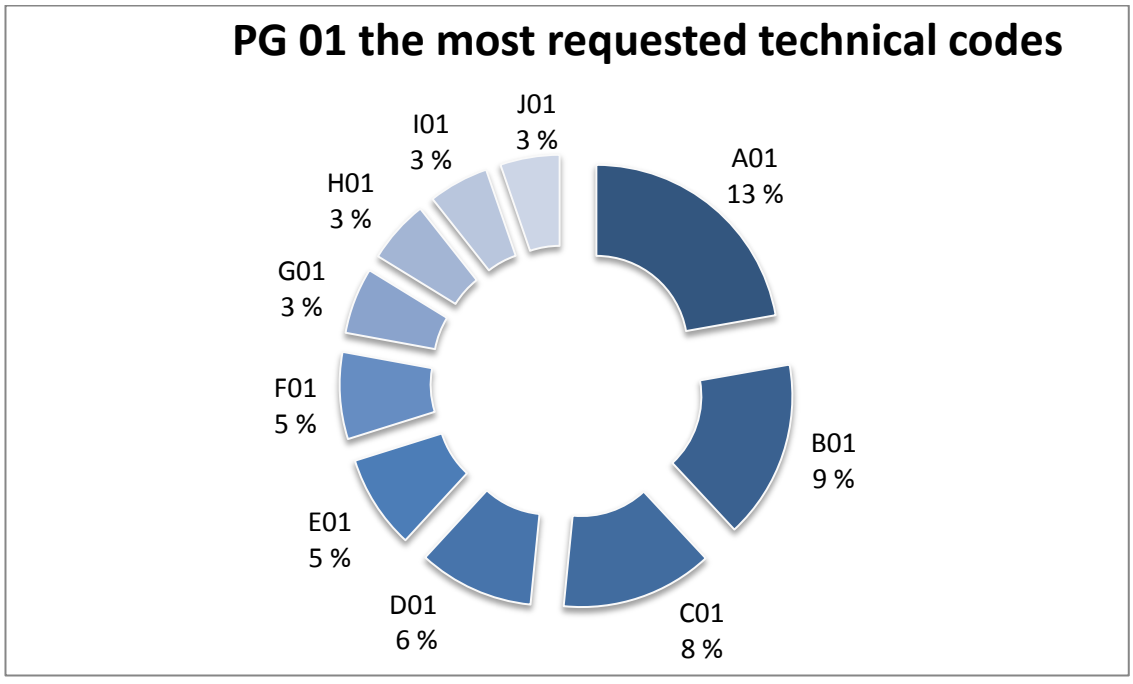

GRAPH 5. The biggest technical groups of the items requested in the study

The rest of the technical codes which were not pictured in the graph comprised 27 % of the requested items. That percentage contains 178 different technical codes, and the number of the requested items varies between 1 - 77 items.

### 4.2.3 Pricing groups categorized in technical codes

Is there a repeating trend in the technical aspects of the requested parts inside the pricing groups? How many of them have been requested? The pricing groups were studied more closely on the basis of those questions. The goal of this study was to prove that certain pricing groups include the same kind of parts on the basis on their technical specifications. The data was separated again as pricing groups, and the most counts of the same technical codes were examined.

The pricing group 01 categorization on the basis of the market and availability led to studying this group from the viewpoint of the technical groups and vendors. Graph 6 shows the most requested technical groups by the pricing group 01. The distribution of the technical groups was quite constant after the three biggest groups, which indicate illogical technical divisions in the pricing group 01.



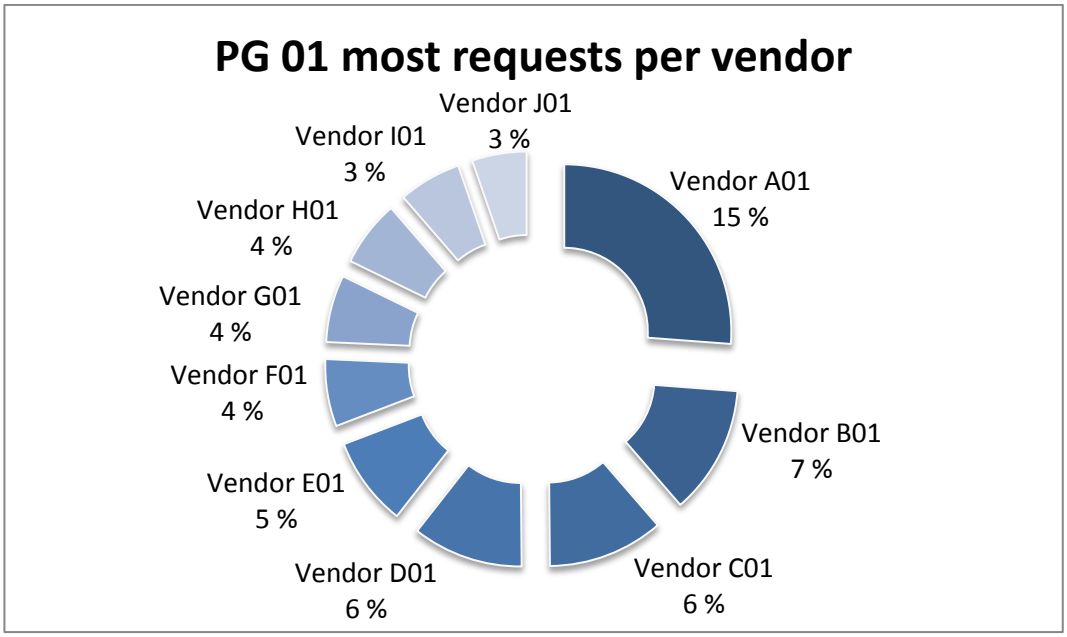

GRAPH 6. The most requested technical groups by the pricing group 01

Table 7 contains descriptions of the technical codes in an informative form. Because of the amount of the existing technical codes it was easier to show the definitions only for those codes which are related to the studied group.

TABLE 7. The definitions of the technical codes in the pricing group 01

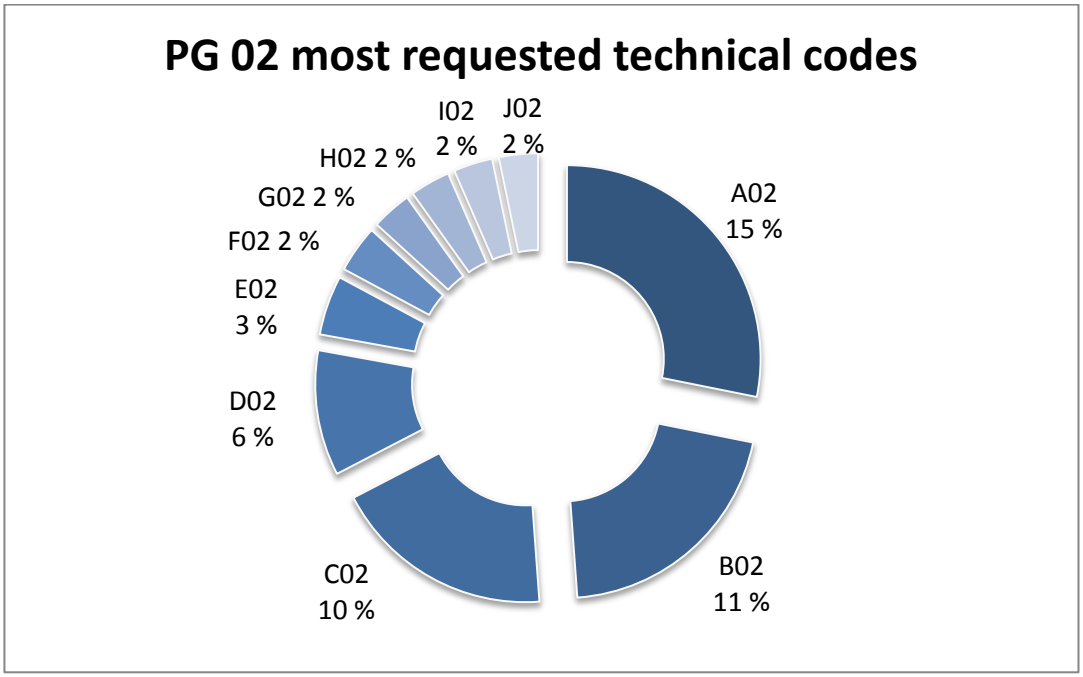
| Technical code | Description | Technical code | Description |
|---|---|---|---|
| A01 | Spare parts | F01 | Transmissions |
| B01 | Engines | G01 | Engine related parts 2 |
| C01 | Structural parts | H01 | Power train |
| D01 | General parts | I01 | Bulk materials |
| E01 | Engine related parts 1 | J01 | Axles |

Graph 7 shows the vendors who had the most of the received requests. All vendors presented in the graph received over 100 requested items. The amount of the received items were soon halved after these clearly biggest vendors in the pricing group 01. It was obviously wise to study the PG 01 through the vendors. The vendor study will continue later more precisely in its own chapter.




GRAPH 7. The vendors whose items were requested the most in the pricing group 01

The typical items in the PG 02 were hoses, bearings and that kind of universal spare parts. This group also includes parts with a certain purpose of use. Graph 8 shows the most requested technical groups of the PG 02. The technical groups were divided in the pricing group 02 as expected. As the table 8 defines, the following technical codes in the PG 02 represent the typical items for the group 02.



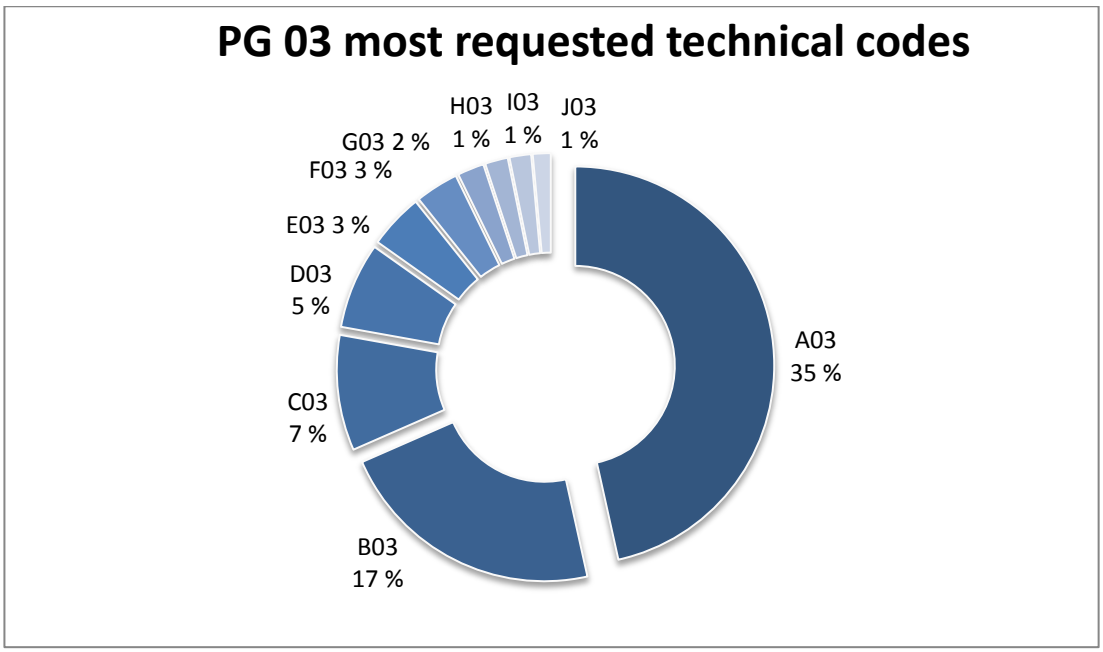

GRAPH 8. Most requested technical groups by pricing group 02

Table 8 contains the descriptions of the technical codes in a more informative form. As was mentioned earlier, the technical code descriptions seem to be reasonable and as expected for the PG 02. The study proved that a trend continues along the pricing group 02 results.

TABLE 8. The definitions of the technical codes of the pricing group 02

| Technical code | Description | Technical code | Description |
|---|---|---|---|
| A02 | Structural parts | F02 | Air filter |
| B02 | Hoses | G02 | Fuel filter |
| C02 | Spare parts | H02 | Switches |
| D02 | Bulk materials | I02 | Line components |
| E02 | General parts | J02 | Connector parts |

The PG 03 included typically items on the basis of the structure of a product. Graph 9 shows that A03 was the biggest technical code in the pricing group 03. C03 and D03 were the often requested technical codes, and they were typical items also in the PG 03.



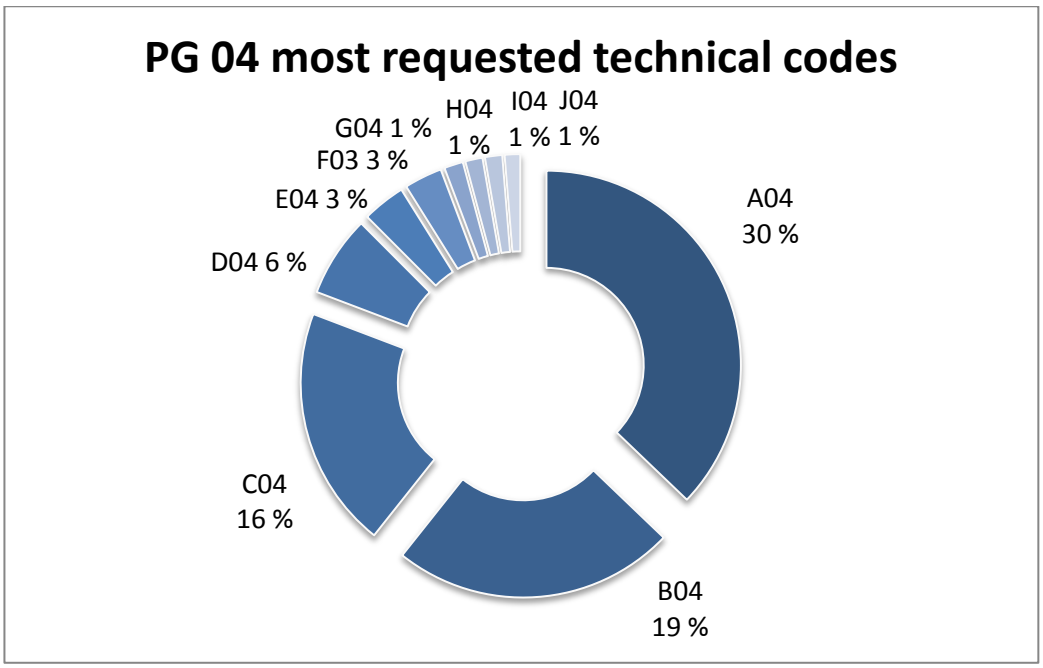

GRAPH 9. The most requested technical groups of the pricing group 03

Table 9 summarizes again the description information from graph 9. The descriptions of the following technical codes seemed to be typical for the PG 03. The distribution of the technical aspects in this group seemed reasonable.

TABLE 9. The definitions of the technical codes of the pricing group 03

| Technical code | Description | Technical code | Description |
|---|---|---|---|
| A03 | Structural parts | F03 | Cables 1 |
| B03 | Spare parts | G03 | General parts |
| C03 | Cylinders | H03 | Cables 2 |
| D03 | Machine specific parts | I03 | Fixing parts |
| E03 | Assembly | J03 | Valves |

The PG 04 typically contained large structural spare parts. According to graph 10 it seems that the technical code distribution in the pricing group 04 varies a lot. The company has segmented less parts into the PG 04 compared with the other groups. Exceptions in the technical code distribution might occur because of the size of the PG 04.




GRAPH 10. The most requested technical groups of the pricing group 04

Table 10 contains information on the technical code definitions of the pricing group 04. As it was mentioned earlier, there are deflections in the technical codes distribution of the PG 04, so the group 04 study should be considered more directional than the other groups.

TABLE 10. The definitions of the technical codes in the pricing group 04

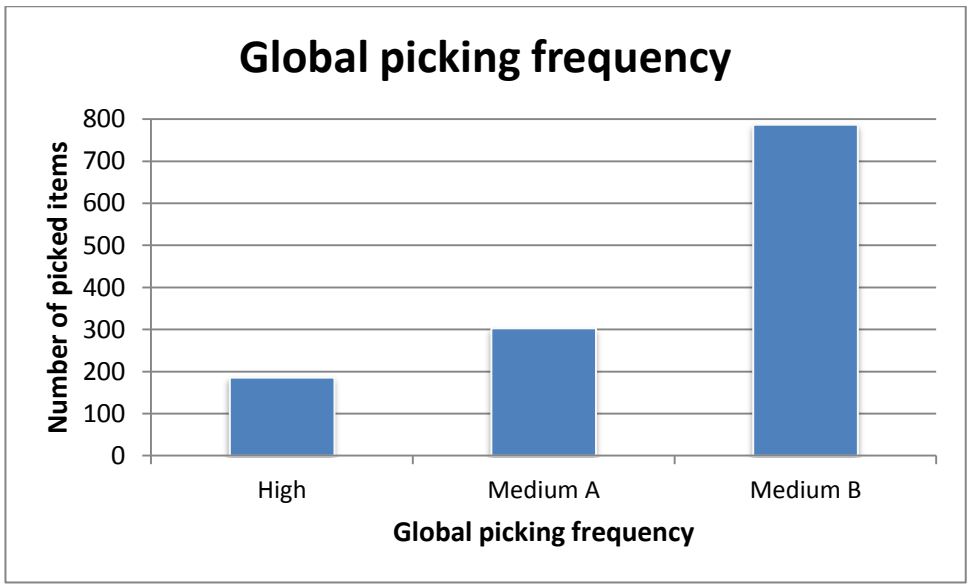
| Technical code | Description | Technical code | Description |
|---|---|---|---|
| A04 | Structural parts | F04 | General parts |
| B04 | Control units | G04 | Axles |
| C04 | Spare parts | H04 | Big structures |
| D04 | Assembly | I04 | Electical parts |
| E04 | Engines | J04 | Machine specific parts |

### 4.2.4 Global picking frequency

The global warehousing information offers knowledge on how often the items have been picked from the central warehouse during the last 15 months. The measurement for global picking frequency was the sales transactions during the last 15 months. This was the best available information for the research to describe the sales activity of the items. According to the research the high global picking frequency for an item can indicate problems in the RFQ process, if the items in the highest mobility groups have been requested often during the researched year. There can be a high risk that affects the whole process negatively if it happens.

There were different classes to describe the frequency of the sales transactions. The categories were between zero picks and fifty or more picks. The research also contains the items which did not have the global picking frequency information in the ERP so those items were considered in the research as their own group. There was also a group of items which did not have any valid information because of the incorrect item number or validity in the company's system.

Graph 11 shows three of the most picked groups and the amounts of the items included in the groups. The most picked group was presented as high movers, and it contained 186 items from the study. It comprises 2 % of all the items included in the study. The second group was presented as medium movers A and medium movers B. The medium movers A contained 303 items, which is 3 % of all the items in the study. The third biggest group was medium movers B, which contained 787 items, and it is 7 % of all the items in the study.




GRAPH 11. The number of the items in the three most picked groups.

In the low mover group there were 9565 items altogether, which was huge 83 % of all the items in the research. It seemed it was that percentage of the requested items during the research which have not led to continuous sales.

There were 121 items without the GPF information. Most of those items had a valid pricing group or technical code, but the picking information was missing. They might have been new and recently activated items, which did not yet have this information available. This group without any information made up 5 % of all the requested items.

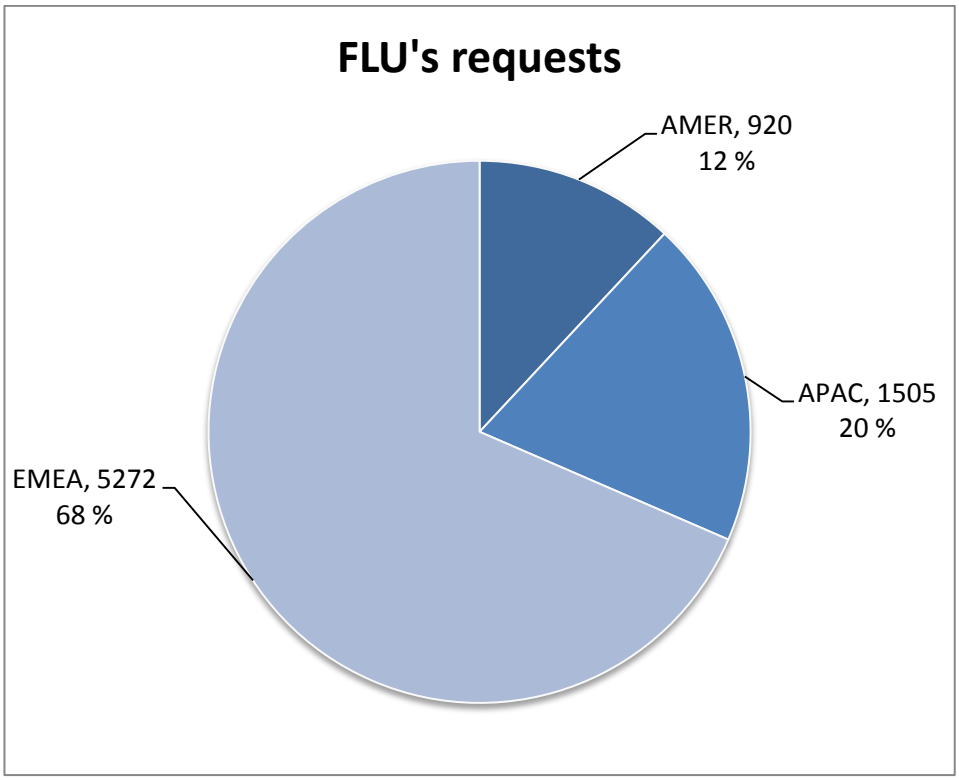
The high mover group included two items that were requested 5 or more times during the researched year. They were requested 5 and 18 times. This is why these requests were examined in the chapter about the repeatedly requested items. The second biggest group, medium mover A, included one item which was requested 5 times during the researched year. That item was also examined in the chapter about the repeatedly requested items.

### 4.3 Analysis on the basis of the origin of the requests and the vendor of the items

This chapter presents the research on the basis of the origin of the received request. The research clarifies the origin of the requests geographically and organizationally. In this chapter vendor information on the basis of the requested items is also presented.

### 4.3.1 Frontline units requests

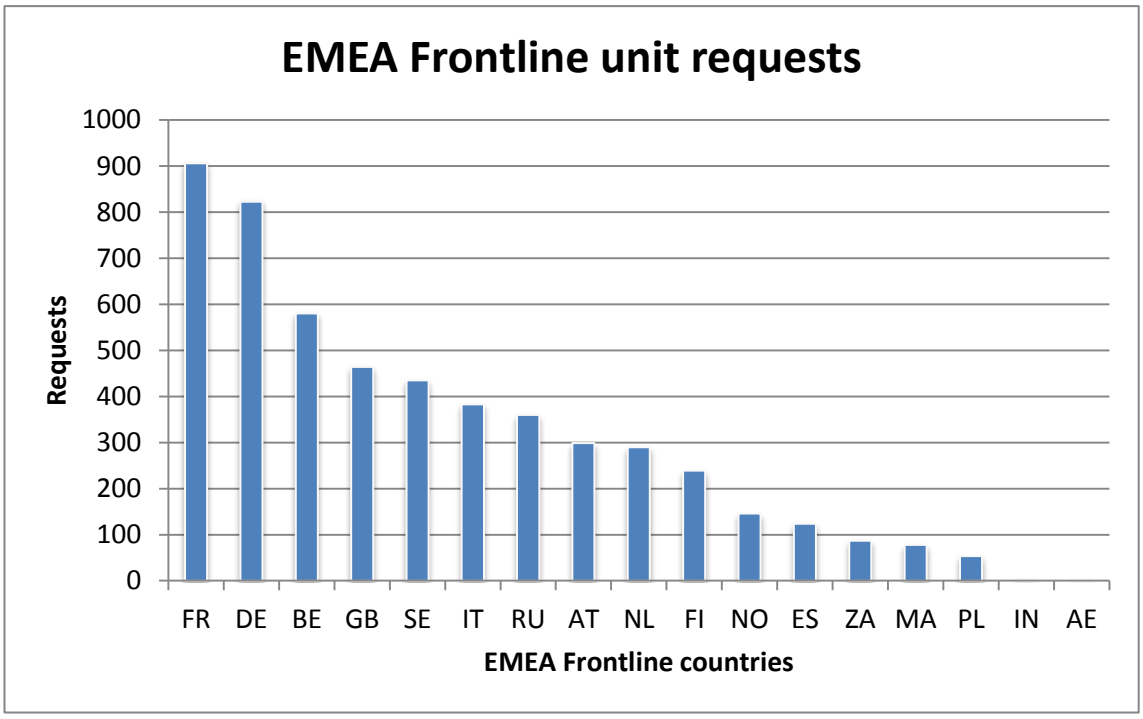
The geographical distribution of the requested price and lead times were a relevant part of this study. The origins of the requests were necessary to be unraveled to be able to compare the received requests globally. The requesters were divided into central operations and frontline units to determine from which areas the requests of the frontline were. When the frontline unit requests were examined, the RFQs of the central operations were filtered away. The frontline units requested the price and lead time for 7697 items valid in the research. It was 67 % of all the received requests in the study. Graph 12 demonstrates how the frontline unit requests were divided between the business areas EMEA, APAC and AMER.




GRAPH 12. The distribution of the frontline unit requests

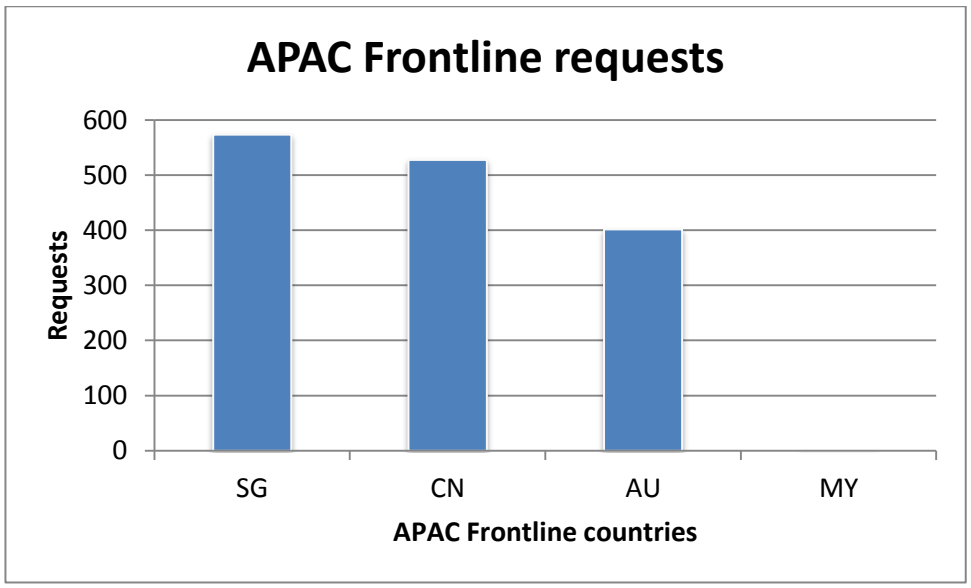
EMEA was clearly the largest business area according to graph 12, and it contained most of the countries, so it needed to be examined more closely. The price and lead time requests from the EMEA countries were studied per country, and the results were summarized in graph 13. According to graph 13 France, Germany and Belgium made most of the EMEA requests. France requested 906 times (17 % of the EMEA requests), Germany 823 times (16 %) and Belgium 580 times (11 %). The other geographically exceptional countries which belong to EMEA were Russia, which requested 360 times

(7 %), and South Africa which requested 87 times (2 %). India and The Arab Emirates which were also considered to belong to EMEA, requested only a few times, so their requests are not visible in graph 13.




GRAPH 13. EMEA Frontline unit requests separated per countries

APAC was the second biggest area according to graph 12 percentages. Graph 14 shows that the APAC requests came from Singapore, China, Australia and Malaysia. Most of the requests were sent from Singapore, which requested 574 times (38 % of the APAC requests). China requested 528 times (35 %), Australia 402 times (27 %) and Malaysia requested directly only one RFQ.




GRAPH 14. APAC Frontline unit requests separated per countries

AMER was the last area to be studied, and its requests were from the USA and Brazil. The USA requested 919 times, and almost all requests came from this area. Brazil requested directly only one RFQ.

### 4.3.2 Central operations requesters

The central operations requested the price and lead time for 3858 items valid in the research. It was 33 % of all the requested items. The received requests from the central operations included requests from the external customers. This research considered those requests to belong to the central operations section.

Graph 15 presents the top 10 requests of the central operations per requester. The business support A requested 445 price and lead times during the researched year, which comprised 12 % of the requests of the central operations. The area sales B requested 294 price and lead times, which makes ups 8 %. The business support C requested 211 times, which makes up 5 %.

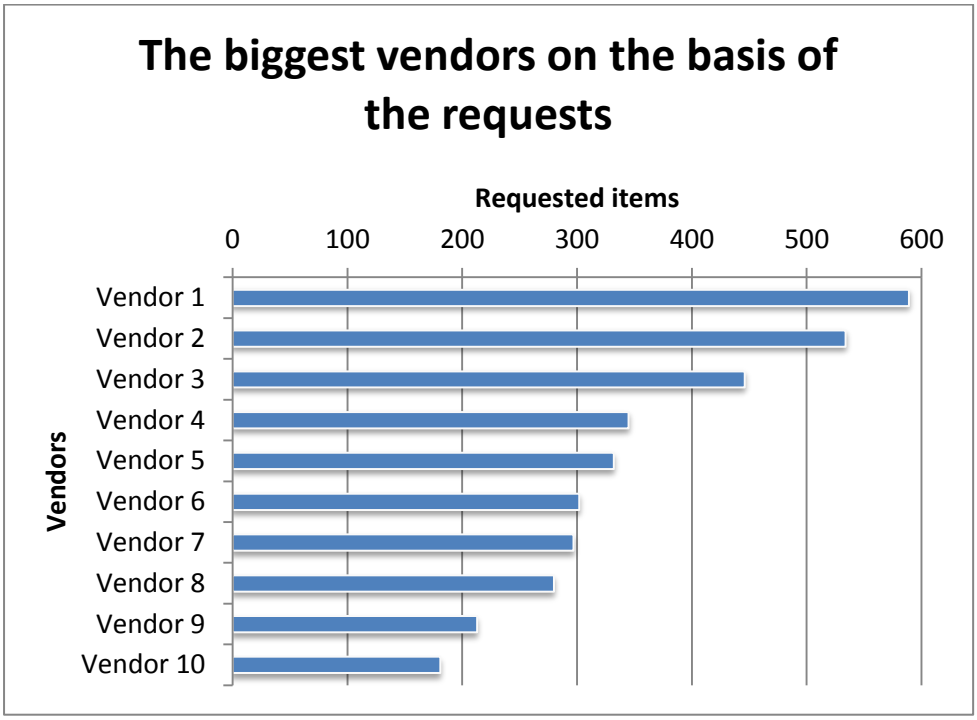

GRAPH 15. Most price and lead time requests from the central operations

### 4.3.3 Vendors

There was interest in examining the origins of the items more closely after the requesters of the price and lead time were found out. A rational way to study the origins of the requested items was to use the pricing groups as a determination section for the vendors. The pricing group classification makes the vendor study results more specific, providing more useful data for drawing conclusions.

The vendors were researched to determine the most requested suppliers and to figure out where the requested spare parts in the year 2015 came from. The research data included 360 spare part kits which did not have any vendor information. The kits consisted of different parts from different vendors. That is why the kits were not valid in this study, and 11195 requested items were examined considering vendors. The data contained 505 determined vendors altogether, and in addition items without any information. It is possible that a same vendor appears again in different pricing groups, because vendors might provide various parts and parts can be classified into different groups.

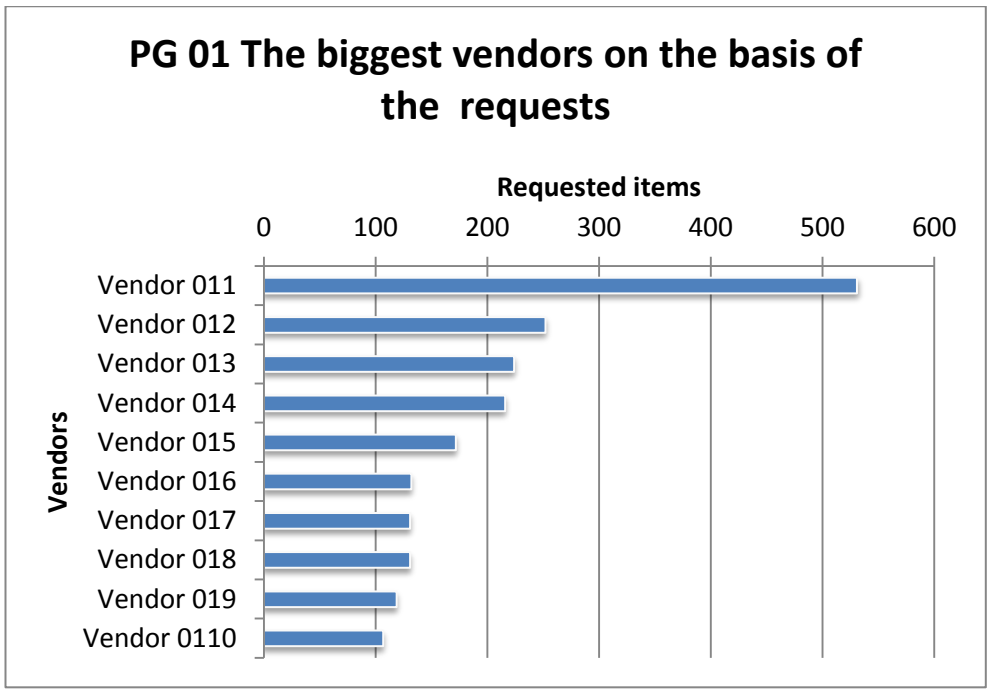
Graph 16 represents the top 10 vendors of the researched 11195 items. The 10 biggest vendors received 30 % of all the item requests in this vendor study. 1094 items altogether did not have any vendor information on them. It was the biggest count of the items, but the research did not regard the items without the vendor data as a vendor group.




GRAPH 16. The biggest vendors on the basis of the requests

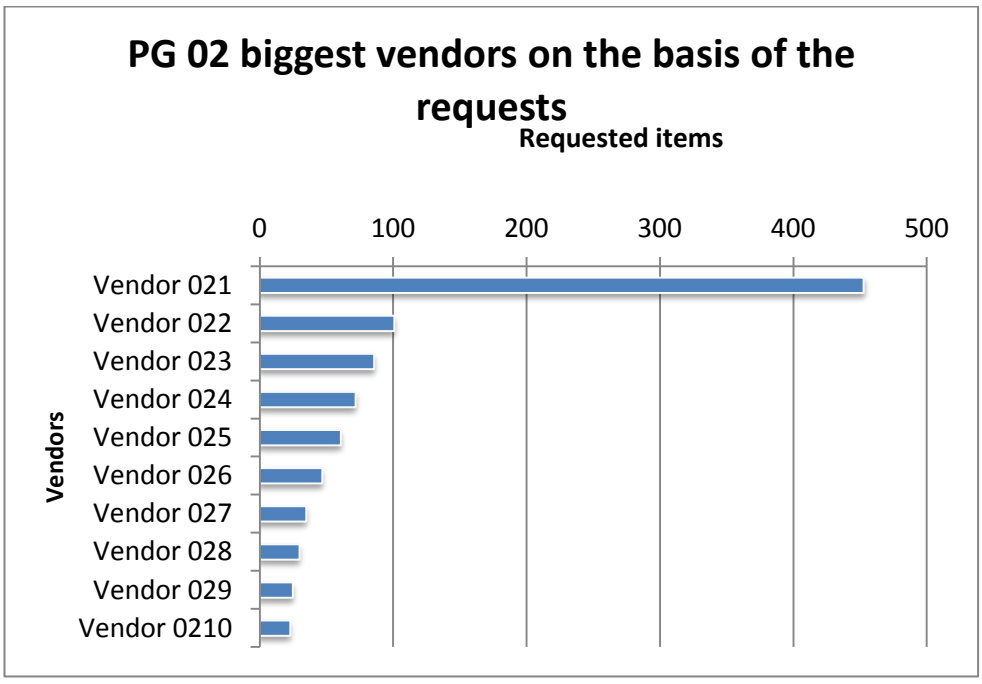
The items without a vendor were not included in the further vendor research. The kit items and other item codes without a vendor were restricted. The items without a vendor were partly the same group of items which was already revealed in the pricing group research. The pricing group creates a connection for the items without a vendor, because if there is not a pricing group, the item cannot end up priced and the vendor information is not needed. It was also common that the requested item which was faulty or replaced with another item might have caused the lack of vendor information.

The pricing group 01 included 3581 requested items. The requests specified for the PG 01 items concerned 242 vendors, including the group of the items without any information. The pricing group 01 contained 75 items without the vendor information, which was the 12$^{th}$ biggest group of items. It was left out of the following comparison because of the data restrictions. Graph 17 presents the biggest vendors of the pricing group 01 on the basis of the received requests.



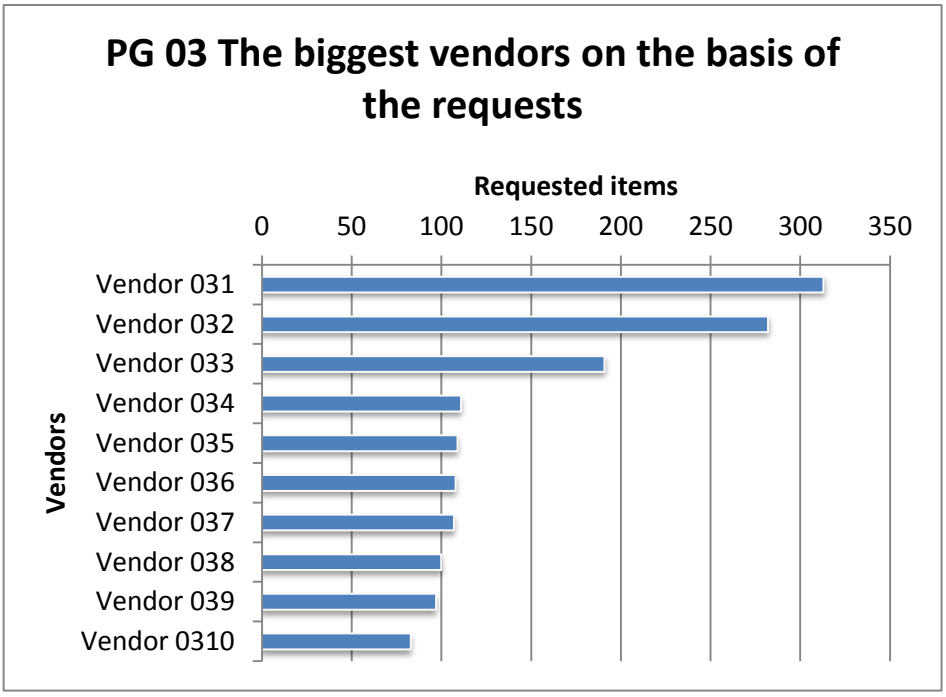

GRAPH 17. The biggest vendors of the pricing group 01 on the basis of the requests

The pricing group 02 included 2097 requested items. In the PG 02 there were 289 vendors, including the group without any information. The pricing group 02 contained 27 items without the vendor information, which was the ninth biggest group of items. It was left out of the following comparison. Graph 18 presents the biggest vendors of the pricing group 02 on the basis of the received requests.



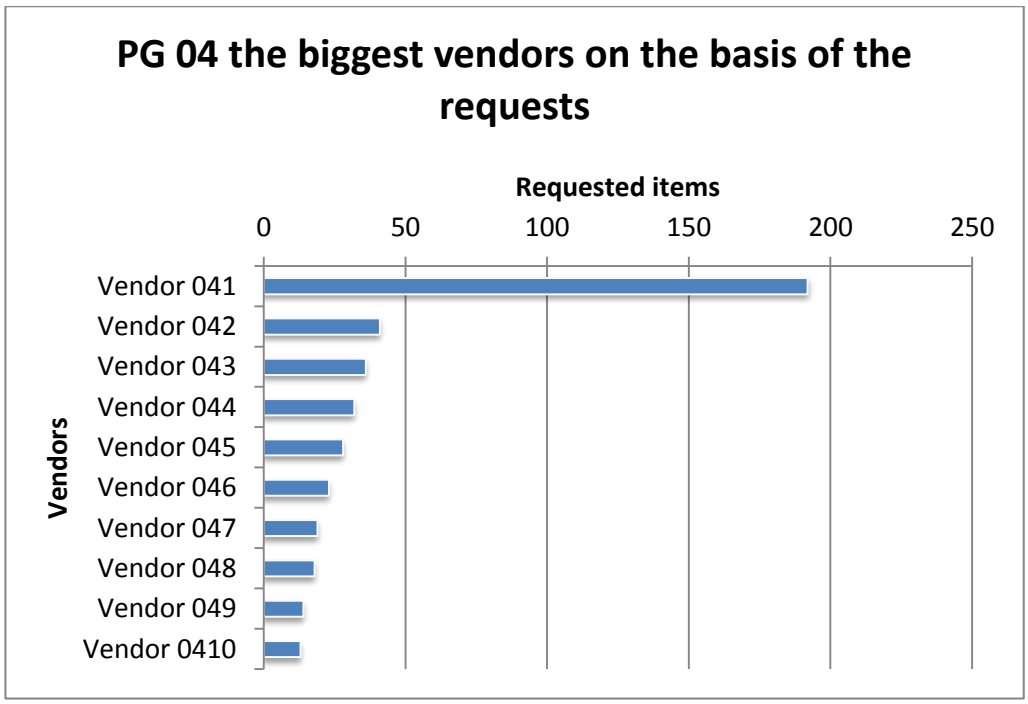

GRAPH 18. The biggest vendors of the pricing group 02 on the basis of the requests

The pricing group 03 included 3709 requested items. The requests specified for the PG 03 items concerned 298 vendors, including the group of the items without any information. This group includes most vendors of the pricing group categories. The pricing group 03 contained 197 items without the vendor information, which was the third biggest group of items considering the vendors, but it was left out of the following comparison. Graph 19 presents the biggest vendors of the pricing group 03 on the basis of the received requests.




GRAPH 19. The biggest vendors of the pricing group 03 on the basis of the requests

The pricing group 04 included only 831 requested items. In the pricing group 04 there were 113 vendors, including the group without any information. The PG 04 contained 148 items without the vendor information, which was the second biggest group of items considering the vendors. The amount of the items without a vendor is enormous compared to the requested items in the PG 04. They were left out of the following comparison. Graph 20 presents the biggest vendors of the pricing group 04 on the basis of the received requests.




GRAPH 20. The biggest vendors of the pricing group 04 on the basis of the requests

## 4.4 Valid prices in 2015

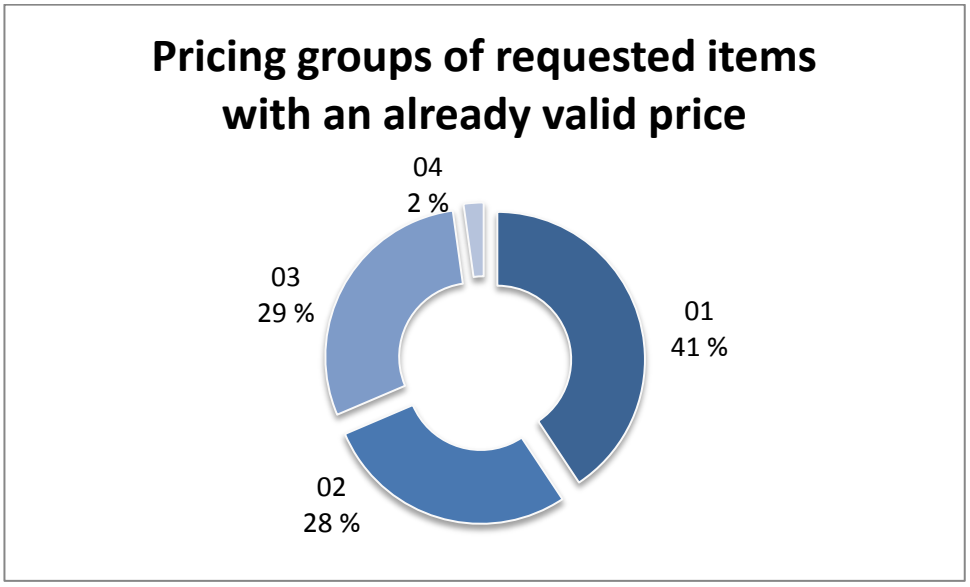
The prices listed during the year 2015 were examined to understand how many RFQs end up to be priced and how many of the requested items have already been maintained in the price list before the requests. The price comparison was directional, because the valid price lists were compared from 01.01.2015 and 31.12.2015, which showed the validities only of those certain dates. Hundreds of new prices were maintained monthly through the received requests, but the amounts per month were not examined in this research. The object of the price comparison was to demonstrate the amounts of valid prices compared to the requested items.

### 4.4.1 Already valid prices

2237 of the 11555 requested items had a valid price at the beginning of the year 2015. It was almost 20 % of all the requested items in this study. The reasons for requesting this kind of items were really interesting from the viewpoint of the process improvement. There must be various reasons for this, because almost every request is individual. The only exception was the earlier described division between the multiple items requests

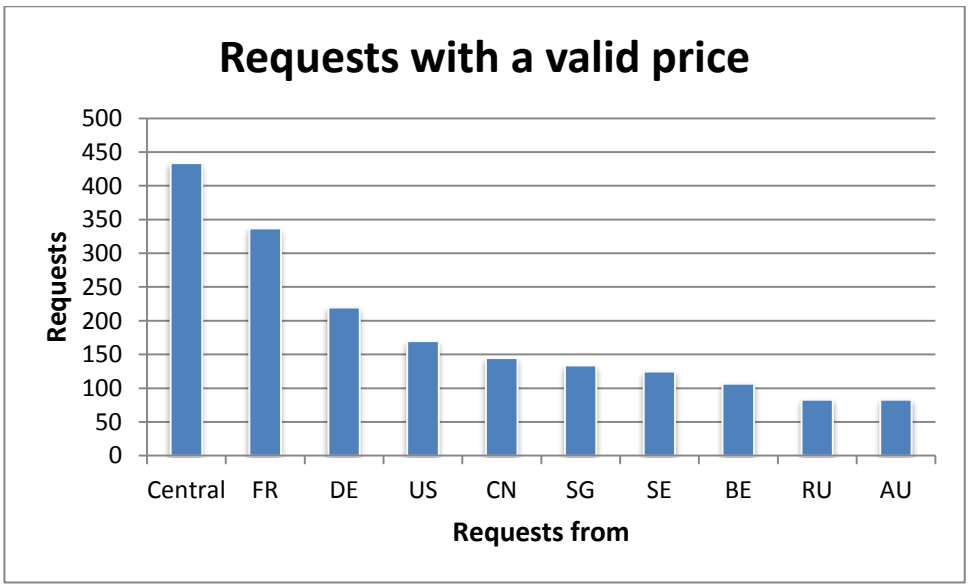
and single item requests. The reason for requesting might be the same when received with one RFQ form.

This study examined more closely what the requested items with a valid price really were and where those requests came from. The goal was to find some similarity between the items behind these requests with an already valid list price. Graph 21 shows the pricing group distribution of the requested items with a list price. The biggest group is 01, and it made up 41 % of all 2237 items with an already existing price. The pricing group 03 was the second biggest with 29 %, and after that came the PG 02 with 28 %. The smallest was the pricing group 04 with only 2 %.




GRAPH 21. Pricing groups of requested items with an already valid price

The requests concerning the items with a valid price were from the central operations and the frontline units. Graph 22 describes the top 10 requesting locations for the items with an already valid GLP. The reasons for the high request rate of the centrals should be studied more. Graph 22 gives alarming information about France's frontline unit, which made many more requests about the items with an already valid price was than the other frontlines.




GRAPH 22. The top 10 requesters for the items with a valid price

The study focused more closely to those top 10 request locations which were responsible for the requests for the already priced items. The central operation was clearly making most of the requests, but the central can be considered as a location of its own. The percentage of the central was 19 % from 2237 received requests. It was found out that the French frontline unit requested the most, altogether 15 % of 2237 requested items. The third biggest was the German frontline, which requested 10 %.

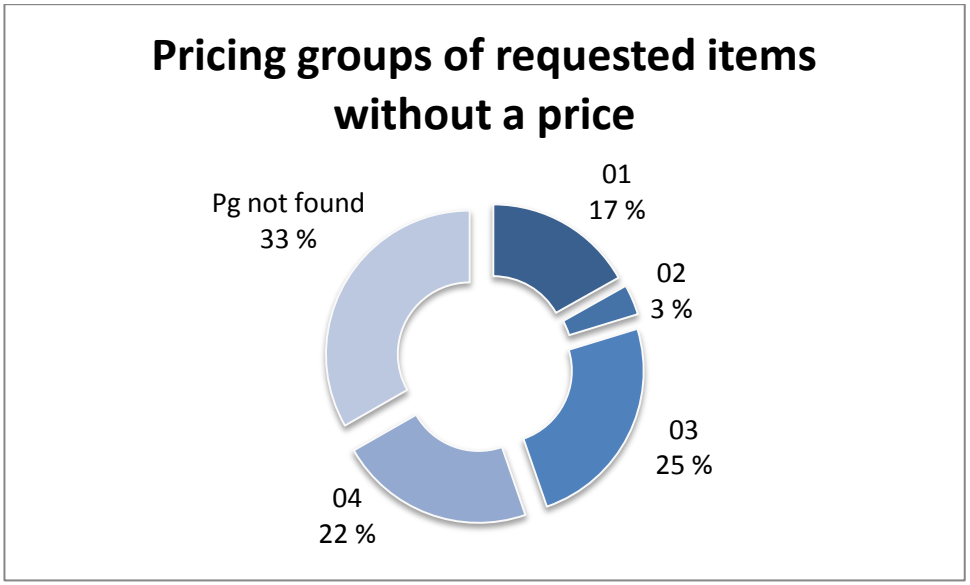
After the clearly biggest frontline requesters the differences started to become even. The fourth biggest requester was the USA frontline unit with 8 %. The fifth biggest requesting FLU was China with 6 % of requests. After that the percentages remained quite similar. Both Singapore and Sweden FLU requested 6 %.

### 4.4.2 Valid prices at the end of the year

Altogether 8636 of 11555 requested items had a valid price at the end of the researched year. They made up 75 % of all the requested items during the research. This study tried to find something in common with the rest 25 % of the items which did not end up priced even though the request was received.

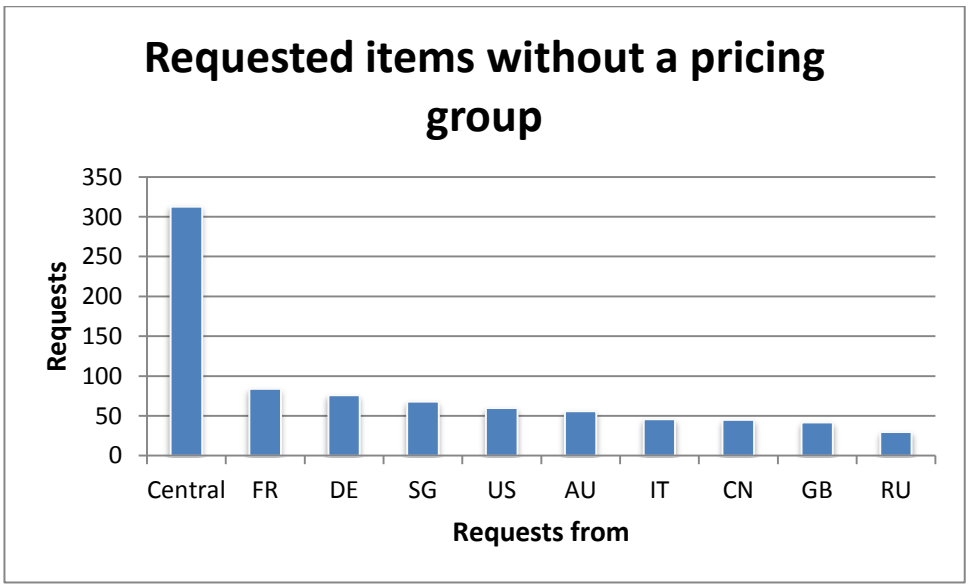
At the end of the year prices were missing from 2919 items requested during the researched year. Graph 23 shows that the biggest pricing group without the list prices

was PG 03 with 25 %, the second biggest was PG 04 with 22 % and the third biggest was PG 01 with 17 %. The PG 02 had only 2 % of non-priced items. The most interesting was the group PG not found with 33 % and 971 items altogether. That was the third of the whole amount of the items which were not priced. If the items do not have a pricing group, they cannot end up priced before it is determined. That group should be studied more closely. One explanation that was described earlier was a possibility that the requests were replaced with another item and the requested material was left alone without further actions.




GRAPH 23. Pricing groups of requested items without a price

In further research the focus of the study was on the group PG not found. The requests of the items which did not end up priced and were left without a PG seemed to be from both the central operations and frontline units. Graph 24 shows the distribution of the top 10 requesters of these items.




GRAPH 24. The top 10 requesters for the non-priced items without a PG

The whole range of these requests was examined more closely, and it was found out that the central operations made the major part of these requests, 34 %. The second biggest requester was the French frontline unit with 9 % of the requests. The third biggest requester was the German frontline unit with 8 %. The percentages started to become even after that, and both Singapore and the USA FLUs requested 7 %. After them came Australia FLU with 6 % of these received requests.

# 5 THE RESEARCH RESULTS

## 5.1 Results from the research background

The data was collected and combined successfully, and the differences between the classification of the RFQs and items were solved. The volumes per month during the year 2015 of the received price and lead time RFQs were presented informatively in the graphs, and the amount varies roughly between 800 and 1200 requests per month. After that the received RFQs and requested items were presented in the same graph which determined research to concern items requests.

The research of the items which were requested repeatedly led to the conclusion that some kind of a list should be maintained of the quotation-based priced items to assist pricing. The research included 34 items which were requested five or more times during 2015. Altogether 20 items of them were clearly quotation-based priced. I suggest that a guideline price should be maintained for most of the requested items to prevent continuous requests considering them. It might also be wise to do an expanded follow-up research to concern all the items which were requested three or more times. There were 223 items that were requested three or more times, which include the already researched 34 most requested items.

The suggested quotation-based guideline price lists can be maintained in a way that it will recognize the customer and offer the optimized price. The price can be optimized on the basis of the customers' commitment for the company or by using the sales amount per a certain customer. The business area varieties should also be taken into the account, if a guideline price list was created.

## 5.2 Results from the analysis of the features of the items

The study began from the pricing group analysis, which revealed items without any pricing group information. Because a pricing group was required for an item so it can be priced, the PG not found group indicates a few possible scenarios. First were new items which were not maintained earlier. The second option was that instead of the requested

item a replacement was offered. The third option was a request concerning the assembly, and the RFQ offered only a certain broken part of it.

The technical code study revealed interesting information for the company. Even though the technical codes were not maintained perfectly and the study was only directional, still a few groups drew attention. Couple of groups were requested unexpectedly often during the year 2015. For those groups I recommend to do a follow-up research and to determine the reason for such an unexpected high amount of the requests. The big amount of the items which did not have a technical code or the big groups of the items which have some really inaccurate technical codes provided important information. Information confirmed that the technical code data in the ERP was not maintained as perfectly as expected.

The pricing groups presented through technical codes confirmed that the categorization of the parts was as it should be. Because this kind of study had not been done before, the results for what the groups really include were interesting to categorize. These results were easy to compare to the company's planned structure of pricing groups. Some exceptions were caused by the inaccuracy described earlier.

The global picking frequency study points at the group which did not have any sales transactions during the last 15 months. It seemed that a big section of the requested items was considered as low movers. Because the GPF describes the history of the moving rate of the items, it did not completely tell about the situation during the research. It would be interesting to perform a comparing research and to examine how many of these requested items have led to sales afterwards.

### 5.3 Results from the analysis of the origin of the items

The research combined information about the origin and geographical location of the requests. They were researched separately from the frontline units and the central operations to describe the origin in the most accurate way. The frontline units were also separated into business areas where the specific information of the country was studied. The requests from the central operations were also important, and a lot of outside customers' requests came through the business support persons of the centrals. The

results gave a good point of view about the origin of the price and lead time requests in 2015. The requested items at the specific level of a certain country were not researched, but a follow-up research might reveal interesting information from the requests of the frontline units in each country.

The vendor research was useful for the company to determine the top 10 vendors of the requested items and the amount of items without a vendor. The items without a vendor were a bigger group than the biggest vendor itself, which was unexpected. Restrictions for the kit items were necessary, because the kits did not have one certain vendor and a certain vendor was not available. The vendors were researched through the pricing groups to describe the origin of the items more closely. The restrictions for the items without vendors in the pricing group study were useful to keep the focus on the vendors. The company was interested in the volumes per the biggest vendors inside the pricing groups which this research confirmed. The vendor names were hidden from this public version of the research.

### 5.4 Results from the valid price research

The research compared the price validity of the requested items to the price lists at the beginning and the end of the study. Because many prices were updated monthly, the comparison of the beginning and end point won't tell the absolute truth of the price validity. This method was accurate enough to describe the already valid prices before the study and to compare the price validities after the study.

At the beginning of the research almost 20 % of the requested items had a valid price. These items were examined more closely through the pricing groups, which did not explain the situation in accordance with the company's wishes. The biggest pricing group was the PG 01, and the next biggest were the PG 03 and the PG 02. The PG 04 was clearly the smallest. The research about the origin of the requests revealed important information. The central was the biggest requester for the items with a valid price before the study. The frontline in France was the second biggest requester, and after that differences started to become even. In this research there was not enough time to study those requests individually and to analyze why the certain items had been

requested. The research pointed out possible points of improvement, and further research is recommended for clarifying the real reasons for the requests.

A valid price was set for 75 % of the requested items at the end of the year 2015. The research tried to determine closely the requested items which had been left without a price at the end of this study. The pricing group categorization revealed that the group PG not found was the biggest for the items which had been left without a price. It comprised a third of these non-priced items, and the study focused on the group PG not found. These requests were mostly requested by the centrals, and different frontline unit amounts were quite equal. Further research is also recommended for clarifying the reasons behind the central's requests.

# 6 DISCUSSION

The aim of this thesis was to research the present state of the RFQ process and to point out the possibilities to the development process. The conclusions of the research results were analyzed and presented in the earlier chapter, which also presents the points about the development process and ideas for further research.

The research succeeded well and achieved its goals. The requested items were researched from many points of view, and the current state of the RFQ process was examined through many aspects. Because the received requests were examined so extensively, almost each study revealed something for further specific research. The researched data was very large, so the research restrictions and subjects were selected wisely to keep the research uniform.

The valid trustable data was researched with methods which were compared, and different aspects were sorted out. All the results were based on this data, and the conclusions were made on the basis of the revealed results. The conclusions presented are valid and arguable on the basis of the research results.

The company took the research results into account already during the research. The results will be examined more closely, and further researches will be done during the summer. The research results from the classified version of this thesis will be summarized and presented to the senior management of the company.

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**APPENDICES**

Appendix 1. RFQ process flowchart for price and lead time requests