

Cross-Industry Study 2017

Total Cost of Ownership

The successful management of C-Parts

Preface

Swiss companies are facing an increasing competition from competitors from other industrial nations and from low-wage countries. Further challenges include an increasing demand for resource-efficient and optimized manufacturing as well as high labor cost in Switzerland. Especially on the shop-floor level companies have still some improvement potentials. Our long history in Operational Excellence shows, that even large and well-known companies can still improve in lean principals and especially nowadays in automatization.

The management of so called C-parts is one of these challenging topics. For example C-Parts cause only 20% of the purchasing volume, but 80% of the procurement costs. With regard to the process costs the purchase price is incredibly high. Thus, not the price itself, but the total costs should be considered when talking about these items. That is the reason why the Institute of Technology Management decided to focus in a research project on the Total Cost of Ownership regarding C-parts. Hereby we reviewed the existing literature and former research. On this basis we developed a TCO calculation tool and we challenged our results and findings with several industrial companies.

This study presents some of our project outcomes. It shows existing barriers and action fields regarding the application of C-parts and TCO. In addition, it provides an extract of the TCO tool and shows six company cases. We see this as a first step on the way to better understanding whole processes and the related costs.

We hope this study helps you better understanding the successful application of C-parts.

Best Regards,



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Acknowledgment

We would like to thank our industry partner Bossard as well as all participating companies for their input and great support...



Bossard is headquartered in Zug (Switzerland) and is among the market leaders in fastening technology in Europe, the Americas and Asia-Pacific. Founded in 1831 as a hardware store by Franz Kaspar Bossard-Kolin, the company expanded its business activity and began to set up an international network of bases. In the course of expansion, the company went public on the stock market in 1987. The recession at the beginning of the 1990s and the associated worsening business trend led Bossard to a review of the entire organization. In doing so the company focused on the core competence of fastening technology and the gradual selling off of all its tools, fittings and handicraft units. Bossard is active in the field of fastening technology in Europe, America and Asia. In November 2012, the Bossard group acquired the KVT Koenig Group's range of fastening technology.

Today, Bossard has a global network of companies with more than 2,100 employees in over 75 locations and carefully selected international partners in all regions of the world. The continuous drive for excellence and innovation has led to steady growth and market success for more than 180 years.

Bossard's core competences are:

- Fastening elements – the full range of fastening products such as screws, nuts, bolts, woodscrews, washers, pins and much more.
- Application Engineering and consulting services to optimize your production and assembly processes
- Customer logistic solutions to free customers from C-parts management

Today, Bossard maintains an international procurement network for screws and fasteners. The company works together with 3,200 manufacturers.

Key Facts

Executive Summary



C-parts and fasteners are responsible for 70-80% of the whole purchasing volume of manufacturing companies. But the value of these parts only amount to 2-5% of the purchasing value.



The strategic procurement departments are usually responsible for C-parts. However, if whole logistic/warehouse systems are going to be changed, the topic becomes more crucial for C-level management.



Total Cost of Ownership is a widely known concept. For many companies it has a significant influence on buying decisions and supports the negotiations from customer and supplier perspective.



Most larger companies are using an semi- or full-automated logistic/warehouse systems. Hereby, the different providers are very integrated in the company's supply chain as they often deliver directly to the working stations.



Overall process costs seem to be more important than product costs. Means, if the multifunctional C-parts saves money in a downstream process, companies are willing to pay more for this fastener, screw or C-part in general.

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IMPORTANT INFORMATION

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I Introduction

"Total Cost of Ownership" (TCO) is a financial estimate and procedure that estimates not only the acquisition costs but all direct and indirect costs associated with an asset or acquisition over its entire life cycle. This method allows the identification of both known cost-drivers and hidden costs prior to making any investment decision. The aim of the presented TCO project at hand is to create a reasonable TCO Tool and to further improve the common understanding of handling C-parts as strategic components.

We, the division of Production Management at the Institute of Technology Management (ITEM-HSG), designed an approach to support the procurement of C-parts in order to optimize the total costs. Hereby, we are working in a close cooperation with the Bossard Group in Switzerland. The project's objective is thereby to develop a TCO Tool that is able to calculate and display the possibilities and advantages of the strategic consideration regarding costs of C-parts to both internal and external stakeholders. Apart from the pure procurement costs of C-parts, we want to show additional beneficial factors (e.g. savings in quality management, assembly or IT), whose inclusion in the decision-making process of the procurement process can lead to a sustainable and significant optimization of the overall costs and processes.

Not only procurement costs but also other types of costs from different functions in the value chain (assembly, production, warehouse, distribution, administration etc.) must be taken into account when calculating the total costs of ownership. In order to gain an in-depth understanding of the different types of costs, their relationships and dependencies, we discussed our approach and ideas with representatives from different companies and departments. This cross-industry approach allows the overall cost problem to be analyzed from different perspectives and to develop sustainable holistic solutions.

In summary, this report shows the main outcomes of the project. In a first step, the basic literature is reviewed. This mainly contains literature regarding TCO (incl. benefits, challenges) and C-parts. Secondly, the designed TCO Tool is introduced shortly and in the last part of the report, six cases from different industries are presented. These cases are based on interviews with diverse departments such as procurement, lean management or supplier analysts.

II Total Cost of Ownership

The first "Total Cost of Ownership" concept was developed and promoted by the consulting company Gartner Group in 1987 to assess and calculate the purchase and maintenance costs of IT-infrastructures. Since then the model experienced a wide approval and attracted a lot of interest which resulted in the development of many different methodologies and software tools to analyze TCO in various operational contexts (Bremen, 2010). Ellram (1993) defines

TCO as "the term total cost of ownership represents both a purchasing tool and a philosophy that aims at understanding [and reproducing] the true costs of buying a particular good or service from a particular supplier".

In this aspect, TCO aims at highlighting not only the purchasing costs but rather all direct and indirect costs associated with an asset or acquisition over its entire life cycle.

OUTLINE OF OPPORTUNITIES AND BENEFITS

TCO itself is highly versatile and can be used in various contexts, offering numerous opportunities that can be divided into tangible and intangible advantages.

Tangible advantages: Making all relevant direct and indirect costs transparent results in a better comparability of different suppliers. By identifying cost-related indicators in a TCO-based supplier evaluation system, the suppliers' performances can be effectively measured and evaluated and their decisions effectively tracked and reproduced (Bhutta & Huq, 2002). This leads to an improved transparency of the cause-and-effect chain enabling the identification of the optimization potential and clearly defining the expectations of the negotiating parties involved. Cost transparency also increases the cost understanding within the company through a change in cost-thinking among employees – fostering a focus on total costs and empowering an overall and long-term view of cost optimization within the company (Ellram, 1993). Another benefit is the possibility to make well-founded make-or-buy decisions. Additionally, the economic order quantity of goods and services can be defined with the help of a TCO calculation.

Intangible advantages: Internal corporate communication is improved as decisions made by employees and other corporate departments can be better understood and traced – based on consistent datasets and clear reasoning. In addition, externally TCO supports the strengthening of the negotiation position with suppliers. TCO can also be used in product development and sales. Regarding product development, a TCO perspective should be taken into account from the point of view of potential customers, this enables the sales department to justify higher sales prices towards customers if the total costs of the overall life-cycle are lower than those of the competitors (Bremen, 2010).

MAIN STRUCTURE OF THE TCO BACKGROUND

In general, the TCO background consists of two levels: (1) Cost categories which are further divided into several (2) cost elements. In the literature, the term "cost driver" is often used at the cost element level to emphasize the origin of the costs, since the process costs are allocated proportionately to specific cost carriers (Bremen, 2010). The choice and number of cost categories, cost elements, and cost drivers, as well as the structuring of these levels, depends on the respective case at hand and the TCO model developed for this purpose. For example, it is possible to structure the levels according to the functional areas of the company, product-related aspects or to structure them according to the product lifecycle or monetary and non-monetary criteria (Degraeve et al., 2005).

There exist unique costs (acquisition, installation, disposal etc.) and running costs (direct and indirect costs as well as spare part costs). Some cost drivers are universally usable and others only in specific application contexts. According to Ellram and Siferd (1993) there exist six cost categories to calculate the TCO:

- 1) *Quality* contains cost elements that ensure the supplier and product quality
- 2) *Management* consists of procurement costs, leading and planning costs
- 3) *Supply* are costs of the goods received and the consequential costs of delayed and faulty deliveries
- 4) *Service* focuses on installation costs, maintenance costs and further services costs that arise after the sale of a product
- 5) *Communication*: External communication are costs in a supplier relationship while internal communication cost are allocated to the communication category
- 6) *Price* summarizes all costs which are linked to the negotiation of all contractual aspects such as order quantities, delivery prices, and delivery conditions.

All cost drives can be assigned to one of the cost categories mentioned above.

COMMON RESTRICTIONS OF TCO IMPLEMENTATION

Although the TCO concept has gained great importance in scientific research and practice, the degree of dissemination is rather low, especially among small companies. The root-cause can be found in the restriction of its practical implementation due to (Bremen, 2010; Lorenzen, Rudzio, & Blümel, 2006):

- a) Changes in the status quo of intern operating processes that can be in conflict with the existing corporate culture
- b) The complex introduction of TCO in the company and the requirement for education and further training, which creates additional costs
- c) The time- and resource-intensive identification and quantification of all costs (drivers) that represents the biggest hurdle in addition to the lack of data sources and systems to determine the cost elements
- d) Complexity by the situation-dependent character of TCO analyses as costs are dependent on many factors (such as the industry, company size, importance of the procurement object, currency fluctuations, etc.) and are thus different for each company.

Hence, an established, company-specific TCO model cannot be copied directly from another company (Ellram, 1993; Bhutta & Huq, 2002; Bremen, 2010).

In summary, the TCO model creates more transparency in procurement costs by providing comprehensive and accurate coverage of all costs that make an investment worthwhile. As a result, this model improves the procurement process, supports the internal and external communication as well as the decision-making process in general.

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III C-Parts Management

The definition of C-parts (or C-class-items) is not identical in literature. However, usually C-parts include all connecting elements and small parts such as clamps and others. In our study, we mean mainly fasteners and similar elements. To structure C-parts the ABC-Analysis is commonly used which is a method to classify articles in material management. The classification is based on the annual usage per article and thus a company-specific ranking list is created. Articles with the highest annual costs are called A-Parts (high-quality goods) and the lowest are called C-parts (low-value goods). According to the ABC rule the average inventory of a company consists of

- A-parts: 10-20% of the items account for 70-80% of the procurement costs
- B-parts: 15-25% of the items account for 10-20% of the procurement costs
- C-parts: 65-75% of the items account for 5-10% of the procurement costs

This data depends of course on several factors such as operating industry, serial or batch production, etc. Compared to A-parts, C-parts possess low value as well as low supply risk but their substantial number in the inventory (65-75%) causes a disproportionate effort and expenses within the logistics and other departments. Therefore C-parts management aims at efficiently organizing the procurement and management of C-parts.

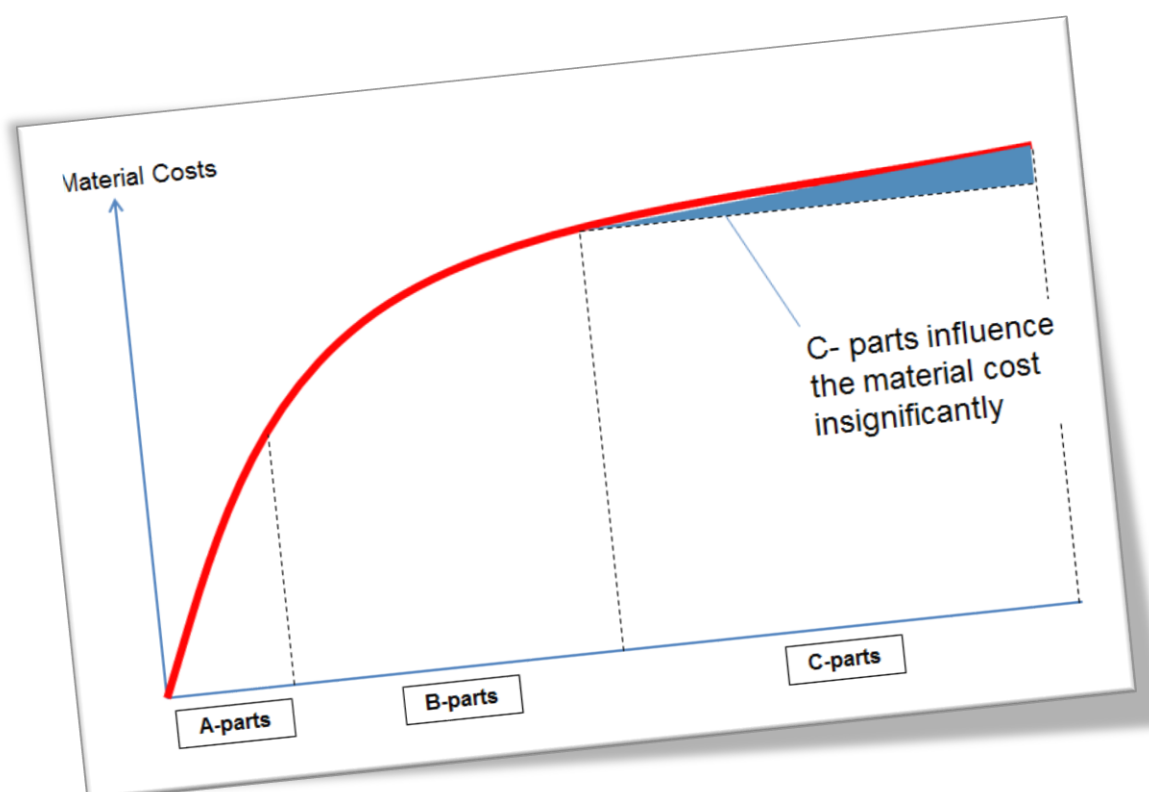


Example Automotive: On average, 50% of all single parts are fastener related

ABC VALENCE-RISK PORTFOLIO

Four core strategies can be derived from the ABC-analysis: *Ensure supply*; *vertical collaboration*; *efficient processing and exploit market potential*. In regard to C-parts the following two strategies are relevant: *Efficient processing* which characterizes a supply strategy that aims at optimizing costs for all procurement processes. A possible solution option from this perspective would be the automatization of order systems with electronic data interchange connection (EDI connection) to the supplier or by means of purchasing cards (special commercial credit cards for employees), with which an essential user is able to acquire the goods himself being constrained by an existing budget. In terms of global sourcing - procurement on international markets, contracts with various purchasing agents within certain procurement regions (e.g. Hong Kong, Singapore etc.) are to be considered. The second strategy *ensures supply* is an alternative warehousing strategy. This strategy needs be considered if a high supply risk exists. This can be the case with essential semi-finished products that are only offered by few businesses, causing in a production stop in case of delivery problems on the supplier's side. Hence it is advisable to storage those kinds of C-parts in order to take appropriate account of the high supply risk. Owing to minimal capital commitment, this makes also sense from an economic perspective (Klaus & Krieger, 2008).

We won't look into the strategies vertical collaboration and exploit market potential as they are primarily related to A-parts.



CHARACTERISTICS OF C-PARTS IN THE CONTEXT OF TCO

Even though the purchase price of C-parts represents only a small part of the total costs, one problem is that most costs – besides the purchasing price – remain hidden. The purchase price represents the visible cost whereas the invisible costs include costs that occur during the ordering process, the delivery and storage of goods as well as during the unpacking and assembly. The practice shows that in the areas of logistics and engineering, around 50% and in the case of order processing, up to 30% of cost savings can be achieved by analyzing and reducing the invisible costs (estimation from former projects). Hence, it is worth identifying the cost structure and the cost elements as well as reducing the process costs with suitable solutions based on a TCO approach.

To minimize the process costs during procurement different optimization steps can be applied. Reducing the suppliers, limiting order frequency and increasing the average order value are significant steps to reduce costs and resources. Furthermore, the procurement processes can be enhanced by bundling orders to one IT-Tool to control, simplify and speed-up the ordering process. Finally, a long-term collaboration with suppliers to align and adapt each other's processes and properties and to support joint product development are usually very beneficial. This allows companies to focus their resources primarily on their own core competencies.

But besides the procurement, other departments such as R&D, production, assembly, quality management, service, administration and IT need to be considered when looking at the overall cost. Most companies do not reflect these processes, which offer a lots of hidden saving potential. For example, by implementing only one single drive (e.g. Torx®) reduces the number of tools, fasteners and storage which are necessary in the production, assembly and service departments. Moreover, costs can be reduced as the Torx® properties limits the tribological effect and allows an easy automation of the process. Another example are thread-forming screws. One can imagine that such screws reduces the overall cost enormously as there is only to prepare a hole –, tap drills are redundant and training of employees to perform such a process is shortened. This list is of course not conclusive and further company-specific opportunities can be added to reduce the total costs.

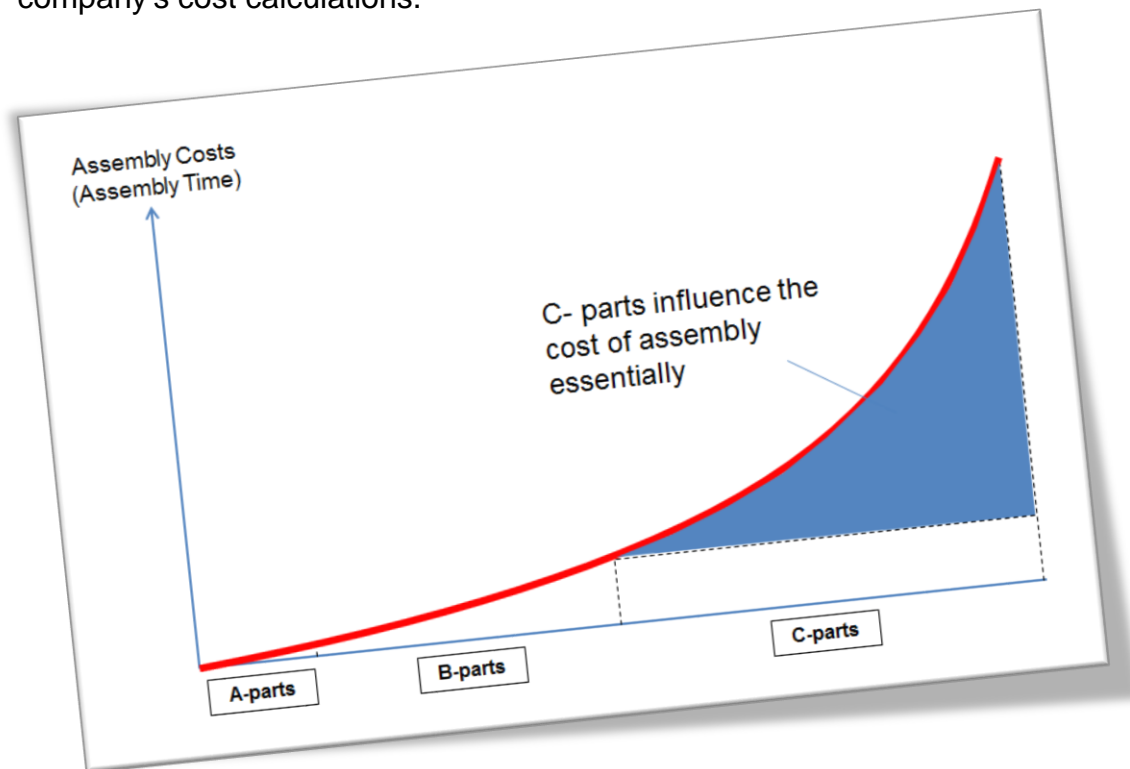
Therefore large cost savings due to eliminating process steps and creating transparency are possible – even besides the well-known procurement and logistics processes. However, the other are only partially addressed in theory and praxis and therefore justifies the development of an overall TCO calculation.

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IV TCO Model & Tool

The Bossard group has developed an own ABC approach related to the overall assembly cost. Based on several projects with external companies, the following graph was developed. This shows that besides having a look on the material costs, the total cost of ownership approach should have a large impact on company's cost calculations.



Based on the TCO idea, the following TCO Tool was developed by the Institute of Technology Management at the University of St.Gallen. It can be used to make TCO calculations and also to evaluate the Bossard TCO approach. The TCO Tool is the outcome of several workshops, interviews with industry experts and a comprehensive literature review. The basic elements are *eleven processes (incl. cost driver)* and *specific C-parts* of the Bossard product portfolio as examples for the calculation. The processes and the product examples are described on the next pages.

The processes are split into main subcategories. For instance, the assembly process has the subcategories training of employees, workplace preparation, assembly, work control and cost drivers named tooling costs, tool tribology and equipment consumption. In addition, these subcategories can be split again into even smaller process steps. Cleaning the workstation, preparing the lubrication, checking the drilling, etc. are possible process steps which are recognized on a detailed level of the TCO Model and Tool. All these process steps have an impact on the total cost of ownership of C-parts.

An outline of the TCO Tool is presented the following pages. For further details and information, please contact the Institute of Technology Management at the University of St.Gallen or the Bossard Group.

P1 R&D	Prozesskosten	1.1 Definition der Anforderungen (Pflichtenheft) 1.2 Konstruktion & Entwicklung 1.3 Lösungsverifikation 1.4 Lösungsvalidation 1.5 Datenpflege (Stückliste, CAD-Zeichnung) 1.6 Erstellen von Montageanweisungen
	Kostentreiber	
P2 Lieferantenmarkt	Prozesskosten	2.1 Lieferantenauswahl 2.2 Lieferantenaufforderung 2.3 Vertragsmanagement 2.4 Lieferantenentwicklung
	Kostentreiber	
P3 Operative Produktion	Prozesskosten	3.1 Bedarfsermittlung 3.2 Lieferantenanfrage 3.3 Ware im System erfassen 3.4 Bestellungsaufgeben 3.5 Rechnungsabgleich
	Kostentreiber	C3.1 Frachtkosten C3.2 Steuer und Zölle
P4 Materialmanagement	Prozesskosten	4.1 Wareneingang-Check 4.2 Wareneingang-Inspektion 4.3 Warensorgen 4.4 Lagerbestandsführung & -kontrolle
	Kostentreiber	C4.1 Lagerplatzkosten
P5 Erfassung	Prozesskosten	5.1 Bedarfüberwachung am Ort des Verbrauchs 5.2 Ware auslagern 5.3 Kommissionierung der Artikel 5.4 Zuführung der Waren zum Arbeitsplatz
	Kostentreiber	C5.1 Stückkosten C5.2 Lagerplatz am Ort des Verbrauchs
P6 Montage	Prozesskosten	6.1 Schulung Fertigungsmitarbeiter 6.2 Arbeitsplatzvorbereitung 6.3 Fertigungsrichtigkeit 6.4 Arbeitskontrolle
	Kostentreiber	C6.1 Werkzeugkosten Montage C6.2 Werkzeuginventar C6.3 Betriebsmittelverbrauch
P7 Montage	Prozesskosten	7.1 Schulung Montagearbeiter 7.2 Arbeitsplatzvorbereitung 7.3 Montagefähigkeit 7.4 Arbeitskontrolle
	Kostentreiber	C7.1 Werkzeugkosten Montage C7.2 Werkzeuginventar C7.3 Betriebsmittelverbrauch
P8 Service	Prozesskosten	8.1 Schulung Service-Mitarbeiter 8.2 Ersatzmanagement 8.3 Servicefähigkeit 8.4 Vereinfachte Demontage
	Kostentreiber	C8.1 Werkzeugkosten Service C8.2 Service-Intervall C8.3 Betriebsmittelverbrauch
P9 Qualitätsmanagement	Prozesskosten	9.1 Prüfstellen 9.2 Qualitätsprüfungen 9.3 Produktüberwachung 9.4 Abg. Maßnahmen Fehlervermeidung
	Kostentreiber	C9.1 Fehlerkosten
P10 Finanzwirtschaft & Administration	Prozesskosten	10.1 Rechnungskontrolle 10.2 Zahlungsanweisung
	Kostentreiber	C10.1 Kapitalkosten C10.2 Abschreibungen
P11 IT	Prozesskosten	
	Kostentreiber	C11.1 ERP-Integration C11.2 ERP-Stammdatenkosten

P3 Operative Purchasing	Process costs	3.1 Assessment of demand 3.2 Supplier inquiry 3.3 Register goods in system 3.4 Release order 3.5 Invoice control
	Cost driver	C3.1 Freight charge C3.2 Tax and Tariffs

P7 Assembly	Process costs	7.1 Training assembly employee 7.2 Workplace preparation 7.3 Assembly 7.4 Work control
	Cost driver	C7.1 Tooling costs C7.2 Tool tribology C7.3 Equipment consumption

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Product Examples of TCO Tool

The following products give an overview of different Bossard products, which serve as examples for the calculations in the TCO tool. Each of these products has at least one special characteristic. For instance, the ecosyn®-lubric screw is pre-coated with a dry lubrication. This saves time and costs by eliminating the lubricant in the assembly, increases quality due to a constant thin-layer film and reduces purchasing of items such as brushes, lubricant and much more.

Pan or hex washer head screw (ecosyn®-fix)

Shake-proof and vibration-proof – thanks to these properties the pan or hex washer head screw is widely used for connections in electrical equipment, household appliances and in the manufacture of technical equipment. pan or hex washer head screw is a cost saving opportunity in procurement and inventory management. The washer integrated into the screw head minimizes the loss of pre-load. On a properly tightened screw, the large friction radius under the head increases the loosening torque. The large diameter of the integrated washer compensates as well large tolerances of covering elongated holes. This all saves costs and makes assembly much faster.



Tribological dry coating (ecosyn®-lubric)

Tribological dry coating is a solution system for mechanically-loaded fasteners and components (screws, nuts, washers). The coating is a non-electrolytically applied thin-layer film with integrated lubrication properties and an additional corrosion protection. It guarantees constant friction coefficients and contributes to simple and clean assembly processes.



Wedge lock washers (Nord-Lock®)

Wedge lock washers are used in numerous industries such as: energy, transportation, offshore, mining and quarrying, construction and bridge building, manufacturing and processing, ship building, and military. Over the operational life cycle, wedge lock washers give increased operational reliability and lower maintenance costs while significantly reducing the risks of production stops, accidents and warranty claims.



Thread forming screws (DIN7500)

Thread forming screws are connecting elements which form their mating thread themselves in a pre-drilled or cast core hole – without any cutting by means of special thread geometry. Thus, thread forming screws act as a positive-locking retainer. DIN 7500 is the oldest and most widely used design and defines the thread and the technical delivery conditions. Nevertheless, screws such as Taptite or Taptite 2000 are also currently very common.





Thread locking coating (Precote®)

A thread locking coating is a varnish-like pre-coating system on base of microencapsulated acrylates for locking and sealing of threaded parts. Its characteristics as a sealing and locking element become effective only on assembly, when the capsules are ruptured by shear and/or pressure stress and the adhesive is allowed to cure. Advantages are the additional sealing in the thread, a dry/tack-free and physiologically harmless film. It avoids corrosion in the threaded connection and has a good chemical resistance e.g. to fuels, hydraulic fluids, liquid coolants etc.



Ribbed flange locking screw (VERBUS RIPP®)

The hexagon head ribbed flange locking screw is combining several great functions in one small object. The principle behind is that during tightening the surface of the clamped plate will be compressed by the ribs of the flange. Then the ribs carve to the clamped plate to a form-closed connection. When loosening it results in a shallow corrugation and after loosening maintains a slightly corrugated surface. Hence, the screw maintains up to 80% of the original preload force. Furthermore it prevents the fastening from setting due to a reduction of contact pressure.



Hexalobular drive (TORX®)

The hexalobular drive offers technical advantages as well as economical benefits. The torque transfer is higher because the driving forces are transferred through surfaces rather than edges. This results in less wear and tear tools and no damage on the surface treatment – the corrosion protection is preserved. In addition, the optimal torque transmission extends the working life of screw driving tools. This leads to considerable cost savings, above all when working with small screws or socket set screws. There is no "cam-out" effect typical with cross recess drive screws. Besides the screw head requires less space. The wide range of use and large potential of rationalization are in some cases even more beneficial. One type of drive can be used for many different types of screw. This particularly applies to the size range up to M8. The product range used can be reduced. The logical result is less outlay on assembly tools, reduced storage and logistic costs. Hexalobular drive gained worldwide acceptance such as the automotive industry, telecommunications, appliance technologies and many other industry segments.

V Industry Cases

Overview



Cleanroom Company



Technical Solutions Corporation



Machining & Tooling Ltd.



Coffee Machine Company



Farming Enterprise



Transformer Corporation



Cleanroom Company

INTRODUCTION

The examined company in this case is one of the pioneer companies in the field of cleanroom equipment and isolator design. Innovative products, customer-specific solutions and an efficient service organization have led the company to become a global market leader and important partner for industry and research laboratories. Its core competency is creating workable and validatable designs, systems and products for the different applications of cleanroom technology. This process involves system engineering, design qualification, system qualification at the customer's site and includes GMP certified documentation. A powerful research and development department forms the scientific basis for the acceptance of the regulatory authorities and the validatability of processes and products.

Groups of Customers are mainly the pharmaceutical industry, the cosmetic and food industry, the watch industry, research laboratories and universities. Additionally, the company provides extensive international services.

STRATEGIC PERSPECTIVE OF C-PARTS

Due to the rather time-consuming manual handling of C-parts/spare parts the Cleanroom Company looked out for applicable and time reducing lean management methods. They decided to cooperate with a full-solution-provider on a half-automated technology with included Kanban-aspects. Nowadays, the technology has advanced so far that the worker simply needs to press a button to activate a commission. Other C-parts which are from a different supplier follow the same manual inventory procedure, but are ordered separately. In the future, it focuses on merging these parallel in-house inventory solutions by directing them to only one supplier. C-parts however account in this case for only merger of the costs in regard to the whole volume, which is all managed by the purchasing department.

SUPPLIER MANAGEMENT

The Cleanroom Company works annually with around 100 to 200 suppliers who regularly supply as well as one-time suppliers, which are both strongly driven by R&D. Those suppliers do not only deliver C-parts. When it comes to the selection process of suppliers of C-parts it focuses on suppliers who can meet the technical requirements on a high quality level and who allow combined orders of several different products. Additionally the supplier's capabilities; flexibility and deliver punctuality are also taken into account alongside the cost evaluation to achieve the best possible price. Existing supplier relations are evaluated on an annual basis.

Besides, global service points are chosen geographically and cultural-wise to respond to the demands and requests of the procurement markets in regard to the available suppliers and customer requirements.

OPERATIVE PERSPECTIVE OF C-PARTS

The Cleanroom Company uses a half-automated order system (fixed and variable stations). At the moment, it is tried to expand it onto other product categories as for example cables. On a monthly basis, it receives and checks their invoices as well as the indicated prices. Fully automated order systems, e.g. weighing systems, were too expensive at the beginning but they would envisage it. Of course, a certain level of trust towards the supplier should already be established and check-ups should not be neglected. The order database from their main supplier allows to conduct a structured reassessment of our C-parts which took place in the year of its implementation and most recently two years ago. The highest cost driver are certainly labor costs which are assigned to the order processing and logistics in general.

TOTAL COST OF OWNERSHIP APPROACH

On the basis of the Cleanroom Company's flat hierarchies and open company culture, process cost are recognized and improvements are easily put into practice due to the transparent processes. It doesn't follow yet a stringent TCO approach but it regards cost transparency as a highly important topic and states that TCO will probably follow in the future. For example, in case of a product maintenance requiring C-parts which have not been used for a long time, a TCO tool would help to lower process costs while searching for an alternative. In the end, the overall picture must be coherent. In this sense, a more detailed TCO analysis would be a reasonable idea. It may also help to decrease labor or process costs. But on the shop floor level, it's facilities are very individualistic and thus the measurement of regular activities is challenging, which is required to fill a TCO tool.

TOTAL COST OF OWNERSHIP TOOL

Generally speaking, lean management is always present, thus a TCO tool can be advantageous. However, a certain amount of trust towards the supplier should already be established. The enterprise would also verify the calculated numbers themselves to better understand where it comes from. The time spent for C-parts would be much more restraint compared to A-parts. As long as there is a significant economization, this is acceptable. At the moment, the Cleanroom Company sees no need to dive into the details due to the small prices per unit. Especially the C-level management is only involved when whole (logistic) systems will be changed. Finally, such a TCO tool might be helpful but on a much lower detail level as savings in C-parts seems not to justify this effort.





Technical Solutions Corporation

INTRODUCTION

The Technical Solutions Corporation is a leading supplier of innovative industrial automation solutions as well as software, equipment and complete applications. It is located in more than 50 countries and has installed more than 250'000 technical solutions worldwide – supported by a broad service network. The wide range of technical solutions can be used to perform tasks such as assembly, welding, handling, painting, picking, palletizing and machine tending. These functionalities allow the Technical Solutions Corporation to operate in a variety of key markets, which include automotive, raw material fabrication, foundry, electronics, machine tools, pharmaceutical and food as well as beverage industries. A strong solutions focus helps customers to improve productivity, quality and overall worker safety.

STRATEGIC PERSPECTIVE OF C-PARTS

The Technical Solutions Corporation has strategic alliances with several C-part suppliers to avoid dependencies and price dictatorship. They follow a “second source” approach which also includes invitation of tenders to better compare prices. This is usually managed by the business units themselves. The purchasing department is responsible for the orders of C-parts. However, the R&D department can influence the product selection (incl. C-parts) as well and if the assembly sees potential for improvement, they will report it to the purchasing department, which will discuss further enquiries with the suppliers.

The purchasing volume of C-parts is roughly about 70 – 80 % and concerns all products which cost less than 20 CHF per product (value of around 5 %). Moreover, as several components are not produced in-house, well-functioning R&D partnerships were established with different suppliers within the course of time.

SUPPLIER MANAGEMENT

Within the international Technical Solutions Corporation 80.000 suppliers are used which are strictly measured on quality, savings, on-time delivery (OTD) and inventory turnover on a regular basis. Since the company faces tough competition and cost pressure, supplier relationship management is important but not crucial. For one of the plants the Technical Solutions Corporation works with approximately 700 suppliers, 50% of those are delivering C-parts which are classified according to the ABC-approach. Every product category is assigned to a strategic purchaser who is motivated by a “Total Savings” philosophy. This philosophy takes into account the entire costs of a product – so it is TCO conform. Additionally, individual bonuses are distributed cross-departmental. Regarding the purchasing volume, today each plant orders separately whereas the company tries to combine orders from different plants, business units or divisions to achieve additional savings.

OPERATIVE PERSPECTIVE OF C-PARTS

A preferred assortment for C-parts was defined which serves as an orientation guideline for the R&D department. The flow of goods is monitored by an integrated SAP system. Furthermore, the Technical Solutions Corporation uses automated order systems, e.g. SmartBins, and thus entirely integrate the suppliers who manage the entire delivery process. So far, the internal supply management of the Technical Solutions Corporation was not able to define all C-parts related process costs, as mainly the intra-logistics were neglected which offers enormous cost-saving potential. But in the course of a Kanban-system installation for all remaining C-parts, a quantification of the process costs is envisaged.

TOTAL COST OF OWNERSHIP APPROACH

The Technical Solutions Corporation's philosophy considers process costs as much more important than the sole purchasing prices. As a consequence, a company-owned TCO tool was designed which receives annual updates. Hence, TCO is a widely implemented approach in the company and is so far implicated in decisions regarding especially A- and B-parts. A TCO tool for C-part parameters has not yet been designed due to the little savings in prospect relative to the expenditure of time and resources. The Technical Solutions Corporation would only consider them in the course of a comprehensive warehousing and delivery system re-organization.

TOTAL COST OF OWNERSHIP TOOL

A TCO tool should serve different business units and departments which leads to various levels of responsibilities and interests. Nonetheless, the strategic purchasing should be mainly advised in this matter. But if a re-organization on a larger scale should be realized, e.g. SmartBin integration or introduction of interrelated systems, the upper management level would be involved.

Such a tool only provides additional value, such as transparency of internal processes, if real numbers are used. Hence, the data is confidential. At least one exemplary cost calculation with conservative numbers and explained formulas should be provided which would be crucial to build-up trust between supplier and customer. If the outcome appears realistic, further random samples should be calculated eventually, but not on the lowest TCO input level. For daily business, the formulas should include adjustable default values.

The granularity should thus be divided into two main stages. On the one hand, the upper management and the stakeholders would be addressed by a simple, abstract overview of the possible savings. On the other hand, strategic purchasing, R&D, assembly and other business units are in need of detailed cost calculations down to the lowest level (e.g. safety gloves consumption). Nevertheless, plausible formulas and numbers are the key for success of a TCO tool.





Machining & Tooling Ltd.

INTRODUCTION

The Machining & Tooling Ltd. is a world leading provider of machines, automation solutions and services to the tool and mold making industry and to manufacturers of precision components. Products range from EDM machines and high-speed milling to 3D laser surface texturing machines, services, spare and expendable parts, consumables, and automation solutions.

The most important customer segments are the aerospace and automotive sector. Based in Switzerland and maintaining a presence on 50 sites worldwide, the company has more than 2,800 employees.

STRATEGIC PERSPECTIVE OF C-PARTS

Since 1993 the Machining & Tooling Ltd. has cooperated with a C-parts provider on half-automated solutions for all their European plants. On plant level, the worker pushes a button every time a box runs out of parts or alternatively when a minimum quantity is reached an order is triggered automatically. On management level, the strategic purchasing department is responsible for price negotiations, benchmarking of existing products and quality issues. Sometimes the operative purchasing department orders directly, but always notifies and reports the strategic department. “Advanced Purchase Engineers“ (APE) act as a link between the purchasing department and R&D to find an optimal solution for production and logistics.

The C-part definition includes all fasteners, nuts, O-rings or similar items. A threshold of +/- 10 CHF was abandoned as it turned out to be inapplicable.

SUPPLIER MANAGEMENT

The Machining & Tooling Ltd. deals with a high number of Suppliers, due to the fact that they have a huge part variety. In regard of C-parts several suppliers (incl. sub-contractors) provide fasteners, etc. to all plants worldwide. This has mainly historical reasons as many plants are the result of different mergers and acquisitions. However, Machining & Tooling Ltd. seeks for a consolidation of their supplier base. Regular ABC-analysis and benchmarkings are used to classify products and to compare suppliers. For the selection of adequate suppliers, Machining & Tooling Ltd. focuses on quality and price – where quality is an order qualifier. Due to the ongoing evaluation and benchmarking process. Machining & Tooling Ltd. uses an eRFO (Request for Offers) tool that allows current and potential suppliers to reply on requests and to bundle all relevant information automatically.

OPERATIVE PERSPECTIVE OF C-PARTS

The Machining & Tooling Ltd. manages a standardized assortment which is revised from time to time. If the R&D demands a special item, first a standardization project is conducted. If the demand cannot be covered by a (existing) norm object, special orders are placed.

The existing C-part solution is half-automated. The material is brought directly to the assembly area by the providing company. The greatest saving potential will be overall labor costs which occur during the administrative process of order processing and logistics in general. Machining & Tooling Ltd. sees the entire logistics process as the largest cost driver for C-parts. Introduction of an active C-part management led to cost-savings of about 20% of the process associated costs.

TOTAL COST OF OWNERSHIP APPROACH

The TCO approach is well-known within the Machining & Tooling Ltd. business units and they are aware of the importance to review total costs of purchases. However, a TCO approach to calculate total costs of purchased items is not implemented today, knowing that process associated costs might over-compensate cost-savings on product prices. Therefore, the company is willing to buy complete modules or sets, also the product price might be higher. Machining & Tooling Ltd. would be interested in using a TCO tool also for C-parts, as long as it uses an holistic approach. However, today the company does not even conduct TCO calculations for A- or B-parts.

TOTAL COST OF OWNERSHIP TOOL

The Machining & Tool Ltd. sees the strategic purchasing department as main user of a TCO Tool for C-parts. The company believes that a TCO tool that gives a quick overview on all relevant process costs, could influence the purchasing decision significantly. The Machining & Tooling Ltd. would introduce the TCO tool in a joint workshops with the supplier. The company suggests to include also “soft factors” such as workplace security or ergonomic advantages or the company’s Code of Conduct. A two-stages approach would firstly allow employees from other departments (R&D, APE, Quality, etc.) to test the TCO tool and all the underlying formulas/variables whereas secondly a user-friendly interface would quickly present the outcome after inserting the most important index numbers. Whereas, for departments like R&D and APE the single process costs and cost drivers might be of relevance, the purchasing department would rather work with total cost blocks such as assembly, intra-logistics, IT, without going into more detail.





Coffee Machine Company

INTRODUCTION

The Coffee Machine Company is partner of many well-known brand-suppliers worldwide. They see themselves as a competent partner in the development and manufacture of machines and devices associated in the coffee machine industry. The company has five different production sites, three in Switzerland, one in Portugal and one in China, where the company develops and manufactures innovative devices using the most modern production methods with a high level of quality.

30-years of expert-knowledge enables the Coffee Machine Company to realize market- and customer orientated solutions. From small components such as milling machinery to whole coffee machines – the company serves many markets and customers around the world.

STRATEGIC PERSPECTIVE OF C-PARTS

The producer of Coffee Machines has been working with its preferred of C-parts for several years. Initially, the innovative warehouse logistics solution with focus on C-parts was the reason to form a cooperation with a special provider. At this time, only a few supplier were able to offer such a service. Each site of the Coffee Machine Company employs a central purchasing manager who bundles the orders. The R&D department has the biggest influence onto the orders which are conducted by the purchasing department. Pre-defined product specifications by their customers hardly concern C-parts, thus the Coffee Machine Company mainly uses standard products. Numbers regarding the percentage of C-parts in relation the purchase volume are roughly believed to be around 70 – 80 %. The percentage of C-parts in relation to the purchase value is not present.

SUPPLIER MANAGEMENT

The Coffee Machine Company mainly works with two C-part suppliers (except for China). These co-operations work well and thus no further supplier are requested. A great relationship with the suppliers in Switzerland may ensures that price is of secondary importance if service, quality and delivery reliability are given. The Coffee Machine Company also uses classifications, which are similar to the ABC-approach, to rank their suppliers. Unfortunately these are inconsistently applied throughout the company.

Procurement markets are explored on a reactive basis. But since the status-quo and the price negotiations work well, new suppliers are only inquired if quality problems occur or if they undergo strong price pressure by their customers. The R&D department is the main driver for new suppliers whose advises are taken into close consideration.

OPERATIVE PERSPECTIVE OF C-PARTS

The standard assortment is very volatile and new parts are regularly included. Hence, the R&D department is advised to render parts multi-applicable. As a fully automated logistic system for C-parts is in use, the orders are registered automatically and the supplier fills the shelves on a weekly basis. However, the Coffee Machine Company has not yet managed to calculate its savings due this automatization activities, but believes this part to be the biggest cost driver in C-parts management. Still, crucial are processes in logistics, its administration and the non-automated assembly which are not yet taken into satisfactory consideration yet. These different processes are most important when talking about total cost of ownership.

TOTAL COST OF OWNERSHIP APPROACH

Apart from costs, reliability, quality and on-time delivery (OTD) are the factors mostly taken into consideration when selection suppliers. An interesting aspect is the possibility to add third party products to the existing supplier system. The so-called “grey costs” have been put into focus – the TCO approach is known but rather neglected. Administrative tasks of employees were tracked, associated to a cost pool and then put into a formula. The high process costs in relation to the low price per C-part is striking. In the end, the Coffee Machine Company figured it is much cheaper to buy entire assembled components as it smoothens the administrative process costs per single item. Finally, process costs are important as they can be much higher on the long run than the purchase price. A TCO model is not in use so far, but the philosophy of cumulative costs is introduced in the organization.

TOTAL COST OF OWNERSHIP TOOL

The Coffee Machine Company believes that the comparison and evaluation of C-parts should be conducted by the R&D department. It could be too late to compare the products in the purchasing department which then needs to get back to the R&D unit and create unnecessary loops. From a lean perspective an appropriate TCO tool could increase transparency and reveals waste in processes. This would also influence the purchasing strategy in long-term. The greatest cost driver are conduct management, order management, invoices, commissioning and conveyance. The lean or R&D management would take enough time to fill in the appropriate numbers into a TCO tool since it would disclose cost drivers. As soon as the interactions and the separate units are composed, a single “super-category” should be sufficient to calculate the entire formula. Soft factors such as safety issues are not relevant for the Coffee Machine Company, but other companies would certainly profit from these variables. Therefore, individual changes such as a friendly user-interface should definitely be included.





Farming Enterprise

INTRODUCTION

The Farming Enterprise is a global leader in the development, manufacturing, and distribution of agricultural equipment, delivering agricultural solutions to farmers all over the world by offering a big product portfolio from tractors, grain storage, combined harvesters, hay and forage equipment, seeding and tillage implements, protein production systems as well as service parts. The company is project oriented, customizing every product based on the specific customer needs.

Known for their reliable, innovative products the Farming Enterprise works on a global level with over 3.000 independent dealers and distributors in more than 150 countries.

STRATEGIC PERSPECTIVE OF C-PARTS

The Farming Enterprise has several strategic alliances with C-part suppliers, which have grown historically due to different subsidiaries. The company follows a “second source” approach to avoid dependencies while seeking the best price offering. In the different subsidiaries, the (strategic) purchasing departments are individually responsible for the orders and processing of C-parts. Nevertheless, the production and R&D department can influence the product selection a lot as they are considered to be the internal technical experts, possessing the relevant knowledge of the different product properties. Depending on the subsidiary and site, the influence varies so that local differences are quite common within the Farming Enterprise. The purchasing cost of C-parts is roughly about 10-20%, whereby there is no common definition of C-parts. For example, by an internal definition of the German sites, suppliers with an revenue lower than 500.000 EUR are recognized as C-parts suppliers. This also includes bearings and other catalog parts. Nonetheless, some fasteners are so expensive that they even do not count as C-parts.

SUPPLIER MANAGEMENT

There are more than 6.000 qualified suppliers worldwide across all subsidiaries. Approximately 1.000 of them, based on the in-house definition, represent C-part suppliers. In comparison, the top 500 A-parts suppliers make around 80% revenue. This gives an idea of the big challenge for the Farming Enterprise to organize and manage all parts (A,B,C) and their suppliers. Factors which are strictly measured are quality, costs and delivery performance. Special internal “Supplier Cost Analysis Manager” are responsible for analyzing the real product costs by looking at the supplier's procurement, production and logistic processes. Each product category or commodity is then assigned to one Cost Analysis Manager who follows a “Total Savings” philosophy. This philosophy is TCO conform and takes the entire costs of a product into account – making it more difficult for the supplier to deviate from the real pricing.

OPERATIVE PERSPECTIVE OF C-PARTS

A standard range of C-parts is defined within the Farming Enterprise, whereas the management of C-parts is completely outsourced. In addition, the company has dedicated employees who are in daily contact with the C-parts supplier to optimize the proceedings and processes. The overall evaluation responsibility of cost savings lies with the logistic department. From the Farming Enterprise's point of view, logistic, warehousing, refill, underlying IT-systems and the administration of the latter represent the main cost blocks which are not sufficiently taken into account regarding C-parts. The biggest cost-impact on the overall costs have thereby the administration costs.

TOTAL COST OF OWNERSHIP APPROACH

Apart from supplier costs, further important factors that play an essential role in the TCO calculation are R&D and production. They are a big support when it comes to the identification and application of possible techniques and products to substitute C-parts. For example, in workshops the use of glue-techniques to replace screws are tested and discussed.

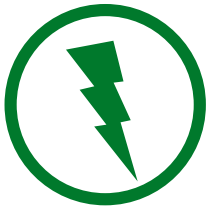
The TCO approach is well known and applied by the Farming Enterprise. They have long experiences in the management of transport and validations cost methods and realized that C-parts are too costly and time consuming to be performed in-house.

As a result in-house TCO models for the selection of potential suppliers are essential for the Farming Enterprise. It therefore employs 18 Supplier Cost Analysis Manager who are responsible for the detailed cost calculations as process costs are considered more relevant than purchasing prices. In addition, around 40 Cost Analysis Manager work in the R&D and more than 50 Cost Analysis Manager in the logistics department. This high number of TCO related employees guarantees a best-price procurement and processing. However, the TCO approach is only applied for A- and B-parts as the management of C-parts is perceived to be too expensive and therefore the Farming Enterprise outsourced this part.

TOTAL COST OF OWNERSHIP TOOL

From the Farming Enterprise's perspective, the target group that should be approached by the TCO tool is the purchasing department. Working with a TCO tool would influence the purchasing decision insofar as it supports the potential cost calculations and helps to identify best-practice cases. The main question whether a TCO tool should be implemented is not a time or data availability question, but rather if it is profitable or not. Thus, detailed numbers are not relevant as all cost analyst would judge them differently. A material-flow overview or heat map would be more advisable to see, which departments and processes are affected (especially for C-parts). Some supporting use cases as well as a sample calculation could support the decision making positively.





Transformer Corporation

INTRODUCTION

Throughout the long history of the Transformer Corporation, research, design and manufacture of custom built transformers and reactors have always been the solid ground of the company. More than 45 years of experience in manufacture of transformers and reactors has made the company an international industry leader and a primary company in the industrial. The use of insulation and protection systems such as cast resin and vacuum pressure impregnation, as well as the various technologies used in the cooling of components, have enabled the Transformer Corporation to master application fields such as energy distribution, civil and military marine, offshore, fixed and mobile rail traction as well as in the mining and renewable energy sectors.

STRATEGIC PERSPECTIVE OF C-PARTS

The Transformer Corporation works primarily with one supplier using an elaborated and well established Kanban system for the order processing of C-parts. Core business items from the supplier's catalog are purchased via this system as well as specially customized items. They also had a cooperation with a second supplier but reduced it to only one. This allowed improvements and simplifications of the order processing and the establishment of a good supplier relationship. The implemented Kanban-list is reviewed on a regular basis and adaptations are made if needed. Shared responsibilities and low restrictions within the order processing of C-parts allow thereby a great flexibility for the company especially when it comes to the purchase of new items who are not yet cataloged but required from the responsible design engineers.

Even though the volume of C-parts is around 50% the overall value is less than 1%.

SUPPLIER MANAGEMENT

Suppliers are mainly evaluated based on the ABC classification. Thus the supplier acquisition process is composed of the following steps: First, the different required products are categorized into different product families. In a second step, according to the identified product families suppliers who meet the technological requirements are assessed and validated based on their product quality, price offerings, and on-time-delivery capabilities. Nevertheless, the existing supplier partnership is not subject to regular examinations. Supplier reviews are rather taking place in an ad-hoc manner if certain situations demand it.

OPERATIVE PERSPECTIVE OF C-PARTS

The Transformer Corporation draws mainly on a standardized assortment of C-parts within an automated replenished Kanban system based on RFID technology. The product orders are directly delivered to the company's warehouse where the internal logistic takes over and brings the products to the different assembly lines.

The automated reorder system helps to save costs and allows on time deliveries e.g. manual handling costs are minimized as everyone is in the position to initiate an order; manual order mistakes due to wrong or left out order placements are overcome and therefore production stops prevented; handling costs are additionally saved as there is no need to issue any formal POs from the SAP system. As a result, the automatized reordering process minimizes operative handling costs of purchasing C-parts and prevents costs that might arise due to eventual production stops.

TOTAL COST OF OWNERSHIP APPROACH

When assessing a new potential supplier or an existing one, its product quality, its price and their on-time delivery capability are evaluated in exactly this ranking order. The Transformer Corporation is familiar with the TCO concepts but does not really apply it when selecting a new supplier, except if there is an important make-or-buy situation at hand or a potential supplier's site is within a far distance and specific cost calculations are needed.

Up to this point the responsibility of calculating TCO costs lies with the supply chain management department and not yet with R&D. But the Transformer Corporation introduced a new project called "Design for Assembly" where engineers from R&D started out to incorporate total cost calculations for their developed items as well as their associated lifecycle.

TOTAL COST OF OWNERSHIP TOOL

From the Transformer Corporation's perspective TCO calculations made by the supplier can have a positive effect on the decision-making process apart from the product quality, its price and the delivery time, if the calculations are able to show a significant benefit in form of the product's overall cost reduction e.g. its shelf-life costs, assembly costs and maintaining costs. With respect to the levels of detail of the presented TCO calculations from the supplier's side, the Transformer Corporation prefers them to be on a rather broad level focusing on the total costs per function. Showing the cost benefits at this level will trigger the right discussions by establishing a common understanding regarding the different needs and expectations of the parties involved as well as diminishing the risk of circling around and losing time on minor details while missing out on the important issues.



VI Summary

The following discussion summarizes the six case studies regarding the application of the Total Cost of Ownership approach and strategic C-parts management within industrial firms in Switzerland. Our sample includes companies from different industries, as well as companies of different size. Despite different firm characteristics, the participating companies showed similar challenges with regard to the management of their C-parts portfolio:

As discussed in the first section of our study, C-parts represent about 70-80% of the purchasing volume of industrial companies, while representing only 2-5% of the purchasing value. Hence, in the past many companies neglected the cost saving potential of an active C-parts management. The discussion with the participating companies showed, that all companies have taken measures to optimize the C-parts management with regard to the order processing and associated purchasing process. Center of those activities are the introduction of electronic Kanban systems for automatic and half-automatic reordering of C-parts. In addition, some companies have taken measures to optimize their assortment of fasteners to reduce the number of articles and managed suppliers. Nevertheless, the cost saving potential of an active C-part management besides order processing and purchasing is not systematically reviewed.

The underlying study shows that most companies obtain the majority of their standard fasteners from one or two major suppliers. The companies have built a long-lasting relationship with their suppliers and due to the high number of purchased articles the switching costs are quite high. In addition, cost savings on single articles are overcompensated by the costs of managing an additional supplier. Furthermore, the introduction of supplier specific electronic Kanban systems has tightened the reliance on the C-part supplier. Outside the standard assortment of fasteners our interviews showed that for non-standard C-parts the supplier selection is mainly driven by technical requirements and the R&D departments. This was especially dominant in companies with a rather project-based businesses (engineer-to-order processes).

As mentioned above, all participating companies are using electronic Kanban systems for the management of their standard assortment of C-parts. The type of deployed system varies from fully-automated to half-automated systems. In case of the later one, the user actively reorders the item, whereas automated systems reorder based on an ex-ante defined reorder point. To reduce costs related to the intra-logistics of C-parts, some of the participating companies use additional services of their C-parts supplier, where the refilling of the Kanban boxes at a central point (the supermarket) of the production site is done by the supplier.

However, none of the participants makes use of a direct supply to the assembly line. With regard to a deployed standard assortment of C-parts, we found that all companies have recognized the cost saving potential of a reduced number of items and managed suppliers. Nonetheless, the compliance within the R&D departments is rather weak and for purchasing managers difficult to assess. This is especially the case within project-based businesses.

The concept of TCO is known within the case companies. Despite one company, none of the participants uses the TCO approach for supplier selection. Although the companies are aware of the process-associated costs, a systematic assessment of those costs is not implemented. For example, the Technical Solutions Corporation, which has implemented a TCO tool applies the tool for purchasing decisions of A- and B-parts, but not for C-parts. In their perception, the costs for gathering the required data overcompensate the cost-savings. For the implementation of a TCO approach, the participating companies see the responsibility within the purchasing departments.

Finally, due to the introduction of electronic Kanban systems, the participating companies were able to realize cost saving in order processing and logistic processes. Moreover, the active C-parts management besides order processing, logistics and standard assortments is rather underdeveloped. The companies have recognized the cost saving potentials of an active C-parts management besides purchasing. However, most of them are not able to realize savings as the major cost drivers of C-parts within production, assembly, quality management and service are not systematically reviewed during the supplier selection. C-parts management and methods like Total Cost of Ownership are seen as topics of the purchasing departments. However, our study showed that the selection of suppliers is often driven by R&D departments. Therefore, the topic of TCO should be already addressed during the development of the product. Here, designs and products that have a high impact on production and assembly processes can be identified and adequate products can be selected.

VII Recommendations

1. INCREASE COMPLIANCE WITH STANDARD ASSORTMENT

1. Our study showed that the compliance of R&D departments with defined standard assortments of C-parts is rather low. The main issue of an extension of the C-parts portfolio is the disproportionate increase of costs. For example, by just adding one new type of fasteners, this has an effect on the procurement processes, inter- and intra-logistic, storage, tooling and briefing of the employees. It is easy to understand, that the related overall cost are much higher compared to the usage of a standard assortment of C-parts. Thus, some companies (e.g. Machining & Tooling Ltd.) have implemented a distinct process for the introduction of new C-parts. This process increases the burden to use C-parts outside the standard assortment and at the same time increases the compliance with the standard assortment. Therefore, we recommend to implement a standardized processes for the introduction of new C-parts that evaluates if existing C-parts of the standard assortment are able to fulfil the specifications.

2. OPTIMIZE INTRA-LOGISTICS OF C-PARTS

2. As described in the summary, all participating companies have introduced electronic Kanban systems for the management of their C-parts. Focus is mainly on cost savings in purchasing and order processing. However, our study showed that intra-logistics are a major cost-driver of C-parts management. Therefore, we recommend to evaluate the cost saving potential of optimized intra-logistics with direct supply of C-parts to a “supermarket” or to the point-of-use autonomously by the supplier. Often these costs are underestimated as the effort and costs of the worker, who are responsible for the refill, are not easy to determine. As all cases show, a (semi-) automated logistic solution should be standard for most companies if the consumption of C-parts is at a certain level.

3. IMPROVE DESIGN FOR ASSEMBLY

3. Assembly activities in western Europe are under pressure. Many companies relocate those activities to low-cost countries. However, also in Asia and Eastern Europe labor costs are rising. Our study confirms that major cost savings can be realized by a improved design for assembly. Therefore an adequate selection of C-parts that increase automatization and reduce manual handling (costs) is crucial. For example, a pre-coated screw with thin-layer lubricant eliminates the preparation and lubrication process in the assembly, reduces quality checks and decreases the effort in the procurement and logistics. Hence, R&D departments already need to assess the impact of a selected C-part on production and assembly early in their development activities. Companies should therefore always evaluate and discuss a cooperation in an early stage of their product development – the right supplier can provide a lot of know-how and might saves cost even before they emerge.

4.

REVIEW PRODUCTION AND ASSEMBLY ACTIVITIES

Today's C-parts management mainly focuses on improved order processing and logistics processes. However, major cost saving can be realized by reviewing production and assembly activities with regard to adequate C-part selection. Latest technical developments such as pre-coated or thread-forming fasteners reduce handling costs and allow fully-automated assembly. For example, the thread-forming fasteners have impact from the beginning of the value stream. Starting in the procurement, there is no need for tap drills anymore. In the production, it is not required to prepare a drilled hole, which makes the process cleaner and faster with a lower accidental operation rate. Finally the quality level is constant and training of employees to perform such a process is shortened.

In addition, optimizing the assortment with regard to unified type of drive and fastener allows reduction of required tools at the point-of-use and has a positive impact on services. In line with design for assembly, we recommend to focus more on process-associated costs in production and assembly. Therefore, the own internal processes and activities need to be challenged on a regular basis and new opportunities and technical solutions should be considered.

5.

ADOPT TCO APPROACH

In general, we recommend industrial companies in high-wage countries and their management to focus more on process associated cost in the entire value-chain of their C-parts. Although the effort in the procurement process is well-known, other internal processes such as R&D, production, assembly, quality management, service, administration and IT must be also considered consequently. Thus, companies and managers have to rethink about their management of C-parts and the consequences. Unfortunately, our study shows that companies still rather underestimate the cost-saving potential. However, due to the high volume of handled C-parts even minor process optimizations sum up to considerable cost savings. From an economical perspective, C-parts should not be neglected and be treated as other products and raw materials. The internal philosophy should change as also such small, cheap and "minor" parts can influence the total costs of each company significantly.

"C-part Management requires money, lots of time and other resources. But in the end, it is worth it."

Chief Purchasing Officer
Anonym

We would like to cordially thank everyone who participated in our industry study! Together we made a big step towards a deeper understanding of the Total Cost of Ownership approach.

ABOUT US

The Institute of Technology Management at the University of St.Gallen (Switzerland) was founded in 1988. We maintain close links to industry through intense collaboration with Swiss, European and American organisations by means of major research and consulting projects.

Our Division Production Management offers industrial organizations both industry and functional expertise, advisory and benchmarking competencies, and academic research. An experienced team of 60 researchers supports you in order to increase your future competitive advantages, from identifying the greatest improvement opportunities to their implementation.

The Institute of Technology Management is one of the leading European benchmarking institutes with 100 international studies over the past 15 years. With this experience as well as our systematic and efficient bench-marking approach we can guarantee high quality and scientific validity of results.

NOTES

The image displays a series of 25 horizontal bars stacked vertically. Each bar is a uniform width and height, creating a structured space for notes. The bars alternate in color, starting with a light green bar at the top, followed by a dark green bar, and continuing this pattern throughout the set. This layout is typical of a notebook page or a form designed for organized note-taking.



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