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Clarifying the Documentation Structure to Better Suit Market Demands

Helsinki Metropolia University of Applied Sciences

Bachelor of Engineering

Mechanical Engineering

Bachelor´s Thesis

18 April 2016

Metropolia

Tekijä Otsikko Sivumäärä Aika	Alec Holmström Dokumenttirakenteen selkeyttäminen vastamaan markkinatarpeita 30 sivua + 2 liitettä 18 Huhtikuuta 2016
Tutkinto	Insinööri (AMK)
Koulutusohjelma	Kone- ja tuotantotekniikka
Suuntautumisvaihtoehto	Koneautomaatio
Ohjaajat	Tuotehallintapäällikkö Kimmo Kuusisto Lehtori Pekka Salonen

Tämä insinöörityö tehtiin Konecranes Oyj:n toimeksiantona. Tavoitteena oli selkeyttää yrityksen käyttämää dokumenttirakennetta vastaamaan paremmin markkinoiden tarpeita. Työ rajattiin käsittelemään ainoastaan kevytnostintuotteita. Rakenteen selkeyttämisen lisäksi tavoitteena oli käyttäjäkäsikirjan luettavuuden parantaminen sekä tutustuminen räätälöityihin tuotteisiin ja mallipohjan laatiminen niille.

Tuotedokumentointi on todella tärkeä osa tuotekokonaisuutta. Tämä on ensimmäinen asia, joka asiakas näkee avattuaan lähetyksen. On tärkeää, että käyttäjän käsikirja on toimiva sekä sisällöltään että myös ulkonäöltään.

Aluksi selvitettiin tämänhetkisen rakenteen ongelmat. Niitä oli esimerkiksi luettavuudessa, tulostettavuudessa ja räätälöityjen tuotteiden dokumentoinnissa. Jotta näihin ongelmiin löytyisi ratkaisuja, tarkasteltavaksi valittiin monia eri manuaaleja. Niihin kuului Konecranesin tämänhetkisiä sekä vanhoja manuaaleja, kilpailijoiden manuaaleja, sekä myös nosturi-alan ulkopuolelta valittuja manuaaleja. Kaikkia näitä manuaaleja vertailtiin toisiinsa ja listattiin niiden hyvät ja huonot puolet. Eri dokumenttimäärittelyvaihtoehtoja tutkittiin ja niistä tehtiin SWOT-analyysi, jonka vaihtoehtoihin kuuluivat konfiguroituva, ei-konfiguroituva ja osin-konfiguroituva dokumenttimäärittely.

Tutkimusten ja analyysien perusteella löydettiin monia ratkaisuvaihtoehtoja. Niistä valittiin parhaimmat, joiden perusteella laadittiin uusi rakenne. Uusi dokumenttimäärittely valittiin osin-konfiguroituvaksi. Uusi dokumentointi on selkeämpi ja luettavuudeltaan parempi kuin aikaisemmin käytössä ollut.

Avainsanat	Dokumenttirakenne, käyttäjän käsikirja, nostin, kevytnostolaite, sähköketjunostin, standardi

Author(s) Title Number of Pages Date	Alec Holmström Clarifying the Documentation Structure to Better Suit Market Demands 30 pages + 2 appendices 18 April 2016
Degree	Bachelor of Engineering
Degree Programme	Mechanical Engineering
Specialisation option	Machine Automation
Instructors	Kimmo Kuusisto, Manager, Product Management Pekka Salonen, Senior Lecturer

This Bachelor's thesis was commissioned by Konecranes Plc. The topic of the thesis is clarifying the document structure of the owner's manual to better meet the market requirements. The new document structure concerns the light lifting product line, not the entire range of products produced by Konecranes. The thesis also examines the customized product documentation, based on the findings a template needs to be made for them.

The product documentation is of high importance. It is the first item that the customer sees upon opening the product. Due to the high importance of this documentation, it is essential that the document is satisfactory.

To start with the problems of the current structure were examined. They were for example, the readability of the documents, printing challenges, specialized product documentation etc. In order to find solutions to these problems, several manuals were examined. They consisted of present and old Konecranes manuals, competitor manuals and manuals taken from outside the lifting business. Then all these manuals were compared and the benefits and deficiencies of the documents were listed as well. In addition, different document types were analysed with the help of a SWOT analysis. These document types were configured, non-configured and partly configured documents.

Based on the findings from comparing the manuals and the analysis, several solutions were found. The best solutions were taken into consideration when the new document structure was created. The chosen document type was the partly configured one. Utilizing the new document type and structure, the documentation was improved.

Keywords	Document structure, Owner's manual, Hoist, Light Lifting, Electric Chain Hoist, Standard

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Appendix 1. New Document Structure for LL Products

Appendix 2. Customized Instructions for Options

List of Abbreviations

Directive	A directive is a legal act that the European Union uses to set certain results that they require the member states to achieve. However, the EU does not dictate how they are to achieve these results.
Standard	"*A standard is a document that sets out requirements for a specific item, material, component, system or service, or describes in detail a particular method or procedure. Standards facilitate international trade by ensuring compatibility and interoperability of components, products and services."* (CEN, 2016)
OM	Owner's manual. Mandatory documentation supplied with all products, containing all the necessary information about the product in question.
TG	Technical guide. Internal document that contains all vital technical information about the products.
LL	Light lifting. A specific category of lifting equipment, internally referred to as light lifting but also known as workstation lifting systems.
KC	Konecranes.
ECH	Electric chain hoist. Type of lifting equipment.
ATON	Software program currently used for publishing documents.
Teamcenter	Program used in the near future for publishing documents. Also used for other purposes, e.g. storing drawings and models.
DoC	Declaration of conformity. Technical document that states that the product conforms to the EC directives and standards.

1 Introduction

The owner's manual (*OM*) of a product is a crucial document. It is the first item that the customer sees upon opening the product. The document contains all the vital information needed by the customer. Due to the high importance of this document, it is essential that the document is satisfactory. The information as well as the graphics must be correct and professional looking. The document must be easy to read and understand. The owner's manual must contain all the necessary safety related information and has to be provided as a paper version with all products. (Directive 2006/42/EC, 2006)

At the moment the OM's for the light lifting product line are not perfect. They contain all the necessary information, however, the readability of the documents is not optimal. Currently, Konecranes, or hereafter also referred to as KC, is in the process of implementing a new document structure that is meant to update all KC documents to the same form, in order to have all documentation made in the same way with the same structure. This will make it easier for both customers and personnel to find information in the different documents.

This thesis was commissioned by Konecranes Plc. The topic of the thesis is clarifying the document structure of the owner's manual to better meet the market requirements. The new document structure is only meant for the LL product line, not the entire range of products produced by KC. The thesis also includes research into the customized product documentation and making a template for them.

The goal of the thesis is to clarify the currently used document structure. This is achieved by modifying the newly implemented document structure. As previously mentioned, KC is implementing a new structure made by the documentation department in co-operation with the legal department. The document structure was made with the larger lifting equipment in mind and therefore there is a need for another structure that is suitable for the smaller LL products.

It is important to make sure that the new document structure includes all the necessary and mandatory information related to safety, installation and operation of the equipment

etc. To ensure this, the machinery directive and appropriate standards have to be followed. The improved readability of the documents will be a significant objective when producing the new structure.

The following methods will be employed to complete this thesis. Firstly, different product documentations will be compared, i.e. comparing the structure of the current KC documentation and also competitors' documents. Secondly, looking outside of the lifting business, for example the power tool market is examined. The first two methods will give a wider view of the market needs. Based on these findings, examples of document structures will be formed. Finally, employees from different departments within KC will be interviewed. Currently there is not much information available about the document structure. Therefore, the best way to approach this subject is to interview people, bringing forth their expert opinions and views on the matter.

A customized product documentation template will be made by interviewing the support team at the production facilities in France. The template will be formed, based on the information gathered in the meetings.

2 Konecranes

2.1 Konecranes as a company

KC explains itself in the following way, "*Konecranes is a world-leading group of Lifting Businesses™, serving a broad range of customers, including manufacturing and process industries, shipyards, ports and terminals. Konecranes provides productivity-enhancing lifting solutions as well as services for lifting equipment and machine tools of all makes.*" (Konecranes a, 2016). KC is the world's largest supplier of industrial cranes and a clear market leader in crane service, which not only services their own hoists but other manufacturers' lifting equipment as well. Currently KC is in the process of merging with Terex Corporation. This will result in the new company Konecranes Terex Plc. (Konecranes a, 2015)

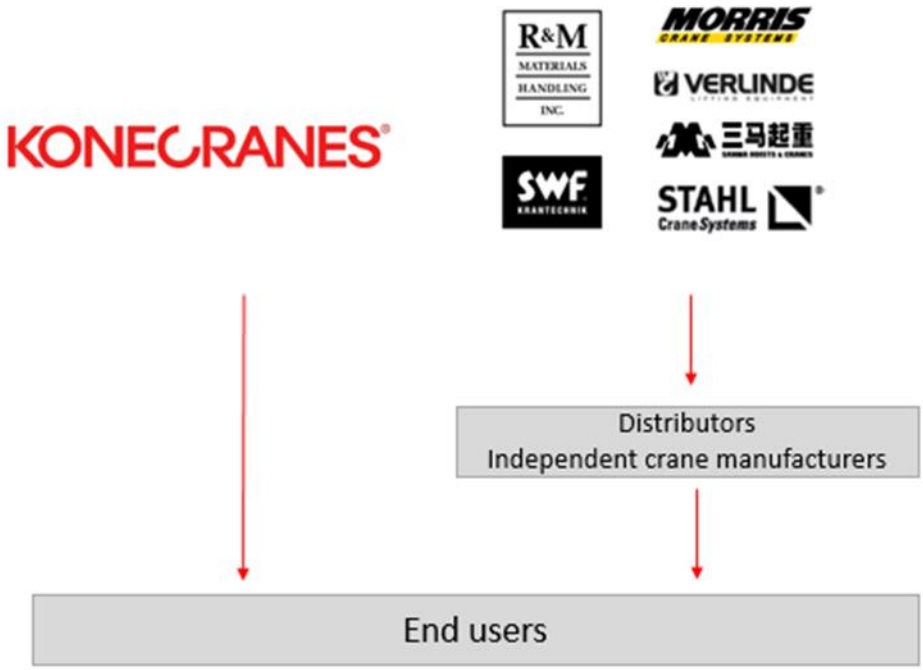
2.2 Products

KC produces various kinds of lifting equipment and provides the world's most extensive service network. 42% of their business comes from service, while 58% is made up of equipment sales. They make lifting equipment that can lift anything from tens of kilograms to thousands of tons. (Konecranes b, 2016)

2.2.1 LL products/ Workstation lifting systems

Picture 1. ECH sold by different power brands.

Equipment under the name workstation lifting systems, are internally referred to as light lifting (*LL*) products. These systems are made for lifting lighter loads, usually between 250 kg and 5 000 kg. The largest hoists can lift up to 20 000kg. These systems include the following equipment categories: manual products, vertical lifters, air balancers, jib cranes, workstation cranes and electric chain hoists (*ECH*). From all these systems the ECH is the most commonly used and KC's most sold equipment in the LL category. The branded ECH can be seen in picture 1 above. (Konecranes c, 2016).



Picture 2. An illustration showing how the products are sold.

As illustrated in picture 2 above, Konecranes group has 6 power brands that sell the LL products to distributors and other crane manufacturers. These brands are R&M, STAHL CraneSystems, SWF Krantechnik, Verlinde, Morris Crane Systems and Sanma Hoists & Cranes. KC branded products are the only ones sold directly to the end user. (Konecranes b, 2015)

3 Problems and challenges with the current structure

The document structure has gone through several developments over the years. In the past there was no clear directive on how to structure the OM and there were only guide-lines on what the documents must contain. It was up to the person writing the manuals to decide what the document contained, aside from all the mandatory information. A new structure was implemented by the documentation department in order to have a unified design for all KC documents. (Mantere, et al., 2015)

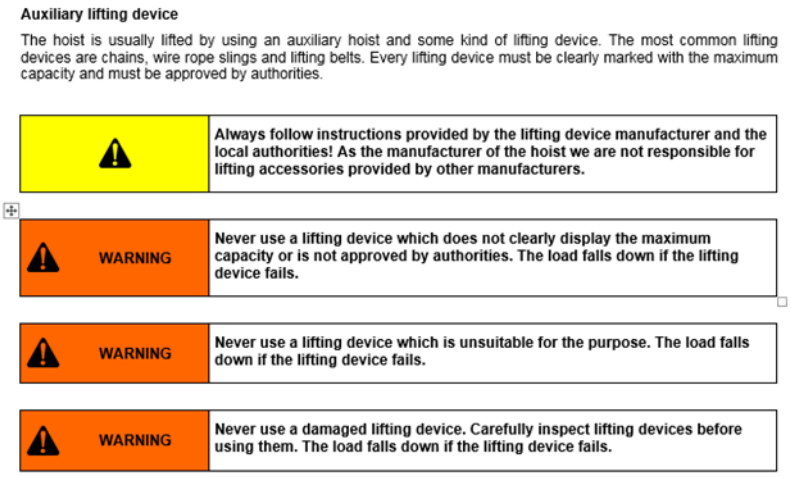
A generic challenge is that all the brands have their own identity and demands for the products and the documentation. Platform side has to fulfil these requirements and demands form all brands and this is no small challenge to manage. This may be achieved best by using non-configured documents as it would allow the documents to contain more brand tailored content.

Here some examples of other problems and challenges concerning the document structure:

- The readability of the documents, unclear structure
- Printing challenges, if problems with feature codes
- Shipping the documents in advance or storing them by the clients
- The visual quality of the documentation when printing on demand at the end of the manufacturing process
- Specialised product documentation

3.1 Readability of the documents

The problem with the current document structure is that it is not clear enough i.e. the structure has a great deal of similar information spread out in the manual, instead of combining the information in one place. There have been comments from customers and brands that the new documents are not as good as the old ones. This might be due to the fact that some of the OM's were completely renewed, with a different look and content. The readability of the documents has decreased. However, the old manuals where not perfect either.



Auxiliary lifting device

The hoist is usually lifted by using an auxiliary hoist and some kind of lifting device. The most common lifting devices are chains, wire rope slings and lifting belts. Every lifting device must be clearly marked with the maximum capacity and must be approved by authorities.

⚠	**Always follow instructions provided by the lifting device manufacturer and the local authorities! As the manufacturer of the hoist we are not responsible for lifting accessories provided by other manufacturers.**
⚠ WARNING	**Never use a lifting device which does not clearly display the maximum capacity or is not approved by authorities. The load falls down if the lifting device fails.**
⚠ WARNING	**Never use a lifting device which is unsuitable for the purpose. The load falls down if the lifting device fails.**
⚠ WARNING	**Never use a damaged lifting device. Carefully inspect lifting devices before using them. The load falls down if the lifting device fails.**

Picture 3. KC ECH manual showing the amount of warning signs.

The following problems do not have so much to do with the actual structure as with the implementation of the current structure. This is due to the way of providing warning texts, which changed with the implementation of the current structure. There are now a great deal of hazard symbols and warning boxes spread out in the manuals, as can be seen in picture 3 above. When there is so much warning information spread out in the entire manual, you run the risk of losing the importance of a single warning. It gets lost in a sea of warnings. In a way it is similar to the tale of the child who cried wolf too many times. Attempts have been made to try and rectify the problem, using different hazard signs like Danger, Warning, Caution and Notice. This has not quite solved the problem. Previously the majority of the warnings were in “do” and “do not” lists, they were clear and easy to read. This was changed when KC chose to follow three safety standards, ISO 3864:2004, ISO 7010:2010 and ANSI 2535.4:2007. It is voluntary to follow these standards in the EU, however, KC is operating globally.

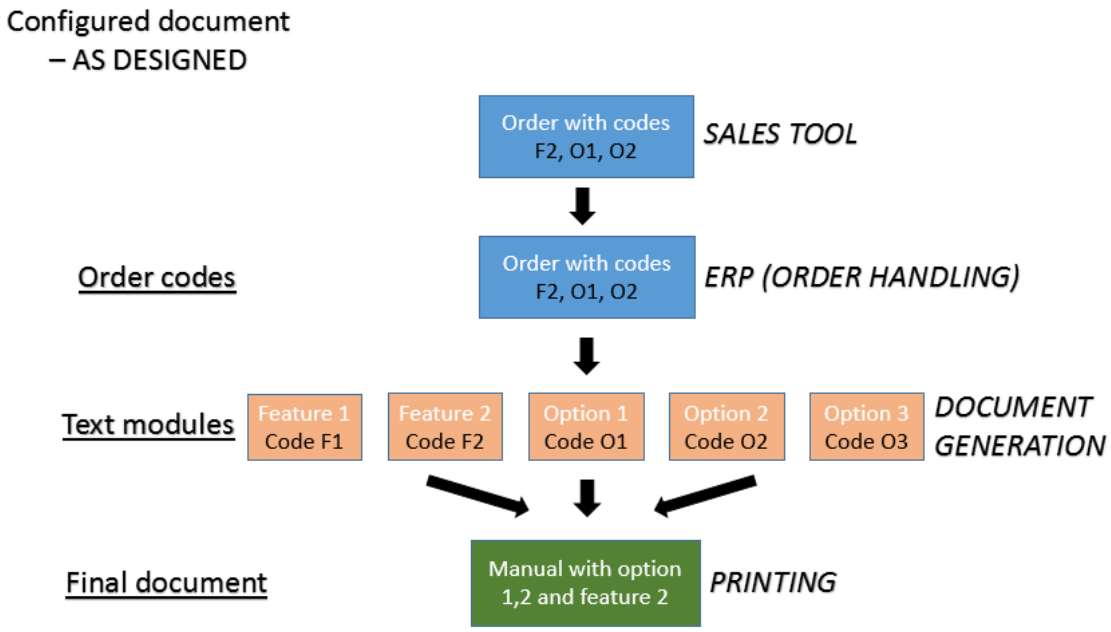
4	**Maintain operating and safety requirements** Owners SHALL ensure that the equipment meets the applicable (local and global) safety and operating requirements.	

Picture 4. Example of an unnecessary illustration.

The last problem concerns the tables and illustrations in the manuals. A great amount of explaining in the current structure, is done with tables and illustrations. Picture 4 above is an example of an unnecessary illustration. The tables have many illustrations that take space. The information in the tables is important and cannot be removed. However, if

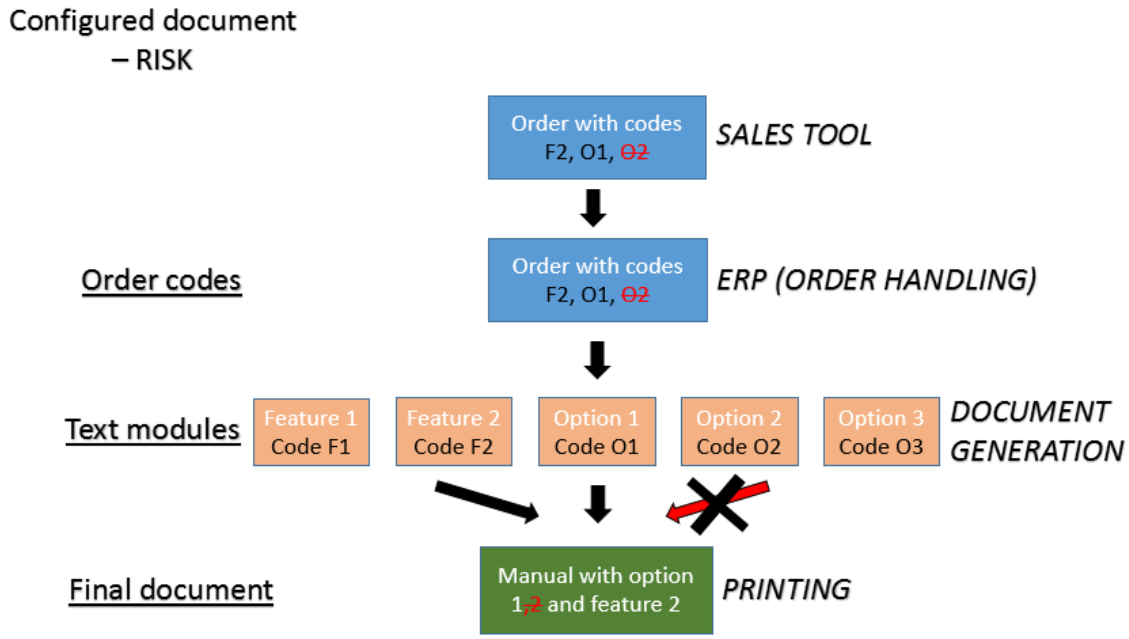
the information in these tables were written without the tables, i.e. normal continuous text, it would save a great deal of space. The following is mentioned in the ISO 12100 standard "w*henever helpful to the understanding, text should be supported by illustrations.*" (ISO 12100, 2010, p. 101) If the illustrations are deemed as not helpful, the number on illustrations could be reduced.

3.2 Printing challenges



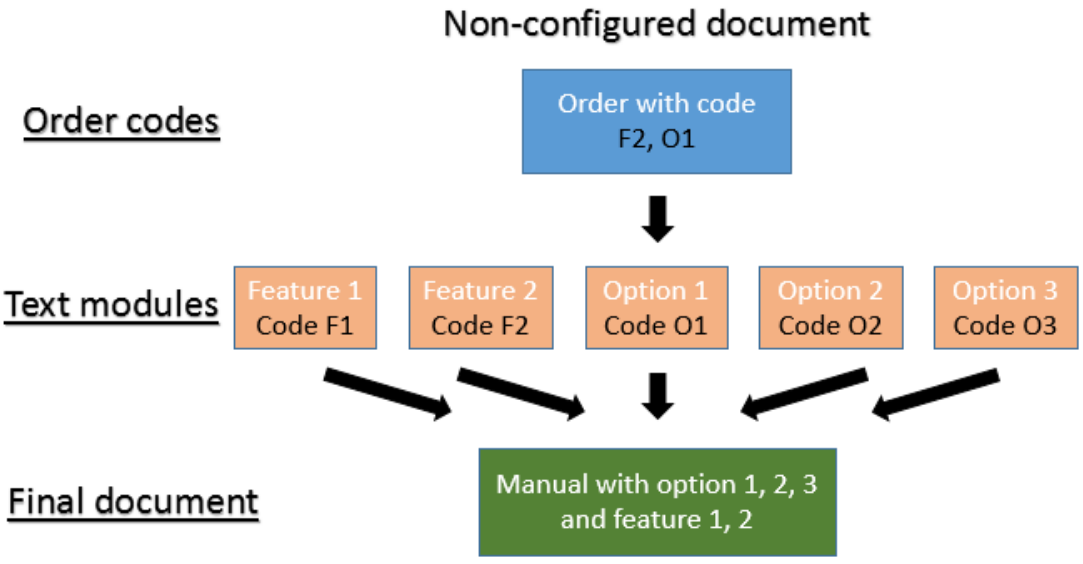
Picture 5. How the configured documents are built

The OM's that KC uses at the moment are configured. This means that when an order is placed by the customer for a specific product the software that processes the order also generates feature codes, depending on what features the product has. These codes are transferred to the next program, ATON, where the OM's are created. The feature codes determine what is included in the document, e.g. language, product type etc. The entire OM is built from several smaller parts, this can be seen in picture 5 above.



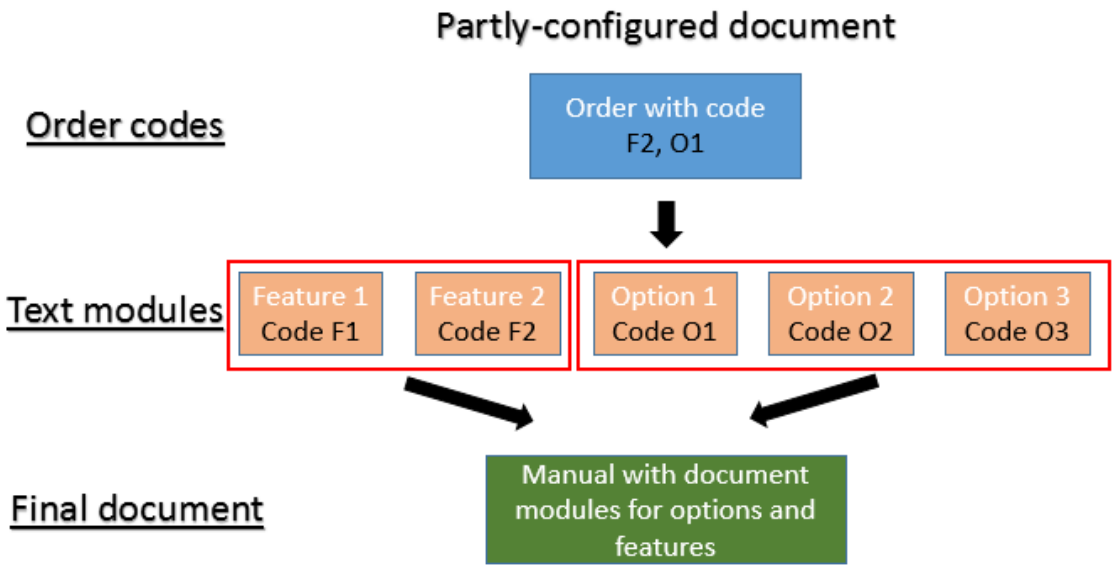
Picture 6. Illustrating the risk with configured documents

These feature codes may cause problems with the manuals, e.g. some features are missing from the printed document or a missing code causes a problem so that the document cannot be printed, this can be seen in picture 6 above.



Picture 7. The non-configured manual gets all options and features

The non-configured document differs from the configured document in a few ways. When a non-configured document is created all the information is included in the same document, i.e. all features and options, as seen in picture 7. This differs from the configured documents, where only the features and options specific to the order is included. The document is always “ready” to be printed or sent, where the configured document needs to be pieced together.



Picture 8. Partly configured document

The partly configured document is also pieced together by modules, this is illustrated in picture 8 above. However, these are larger modules then the ones used in configured and non-configured documents. Where in the other document types a module might be a sentence or chapter, here for example, the entire selection of options is one module. This means that when there is not a feature code for any option, then the whole option module is left out of the documentation. This reduces the extra information that does not concern the customer’s product.

3.3 Shipping challenges

There are times when the customer wants or requires that the product documentation is sent to him before the ordered product arrives. This happens when the customer needs to make certain modifications to the support structure before the product can be installed.

Or then the customer wants to familiarize himself with the product in advance. The most common case is when it involves a government project or when a consult agency is involved. They require the documentation already in the planning phase. In any case, this is a challenge at the moment in some cases. Due to the fact that the documents are configured to be specific to the order, they are usually not made until the product is nearly finished. This means that the document cannot be sent to the customer before that stage without someone manually building up the document and sending it. If the documents would be non-configured, the product documentation could be sent at any time to the customer. These same problems also occur when the customer has lost or damaged the original documentation and would like to get another one sent to them. If the order cannot be located in the system, the specific details of the order need to be set into the system and then generate new documents.

The same challenges are faced by customers that store products themselves and make their own packages that they sell to the next party. Because the products have been sent to them without the documentation ready, these customers need to print their own documents ones they have gotten an order specifying for example, all the equipment involved in the order and the language of the documentation.

3.4 Quality challenges

When the documents are printed at the end of the manufacturing process the time between printing and packaging is limited. This means that the visual quality of the documentation may suffer. A solution to this is presented later in the SWOT analysis.

3.5 Customised product documentation

There are times when a customer wants a product that requires certain extra features or parts, this can be anything from a special colour to a specific extra part. All these orders are handled case by case and the documentation for this is also done the same way. In most cases the necessary information, drawings, diagrams and descriptions are added to the end of the documentation. This again causes challenges when the configured documents are used. Because some of the features mentioned in the standard document

might be wrong and only corrected at the end of the document. This might confuse the customer.

4 How to improve the structure

The structure of the OM's needs to be improved and clarified. One of the first procedures to be done, is to compare the structure of different manuals. Then find the differences and see which parts work and which do not. The comparison manuals can be either current KC manuals or old manuals that are no longer used. In order to get the best understanding of what the structure looks like, it would be valuable to get manuals from across the KC product range. This gives an excellent picture of how the currently implemented structure varies depending on the product. The manual's structure can be compared to the currently used master structure, this will give an idea of how the current master structure has been implemented.

In order to obtain a better understanding of what the new structure should be like, it would be valuable to look at competitors' manuals and compare how they have structured their manuals. Looking at manuals outside the entire lifting business would also give valuable input for a new structure. For example, manuals from the power tool market, as they are technical and describe how to operate complex machines. These manuals are made for the consumer market, whereas the crane manuals are usually aimed more at the business market. The product end user might be a business or a normal consumer. The style of writing differs slightly in the different markets, so by comparing manuals from different products and markets you get a bigger picture of what the market demands from the documentation. The aim is that the documentation would be the best on the market. However, the main objective is to satisfy the customers and brands.

Furthermore, there must be teamwork when improving the structure. All concerned departments need to be involved and their thoughts and concerns need to be taken into consideration for any changes made to the existing structure.

Due to the fact that the current documents are configured, the owner's manual varies from one order to the next, depending on what features are mentioned in the document. One way of improving the documentation is to change from configured documents to non-configured or partially-configured documents. This way the documents would be

more alike and there would be fewer mistakes in the documents, i.e. the manuals would contain the correct information.

5 Mandatory information

In order to sell the product in Europe it has to conform to the European Machinery Directive 2006/42/EC. There are several instructions mentioned in the machinery directive that the manufacturer has to comply with and inform the customer of. The objective of the directive is to state the essential health and safety requirements in relation to design and manufacturing (Directive 2006/42/EC, 2006, p. 26). There are certain things that have to be included in the instructions that accompany the product. If these details are missing from the documentation the product does not conform to the directive and therefore it cannot obtain the required CE marking that all products sold in Europe must have (Directive 2006/42/EC, 2006). The directive also specifies other markings that have to be on the machinery, besides the CE marking, e.g. the name of the company, the year of construction, serial number etc. (Directive 2006/42/EC, 2006, p. 47)

The instructions must be written in the official community language or language of the member state in which it is placed on the market. The instructions that accompany the machinery must be either “original instructions” or if there are no “original instructions” in the language that the product is meant to be used in, then there must be a “translation of the instructions”. The instructions must contain all the possible uses of the product and the foreseeable misuse (Directive 2006/42/EC, 2006, p. 47). The manufacturer must take into consideration that a non-professional may use the product (Directive 2006/42/EC, 2006, p. 2) and therefore the instructions must be written using simple language (Directive 2006/42/EC, 2006, p. 47).

The instructions must contain all the following information:

- Name and address of the manufacturer or its representative.
- Designation of the machinery as it is marked on the machine.
- EC declaration of conformity (DoC).
- It must contain a general description of the machinery.
- Drawings, descriptions, diagrams and explanations necessary for repair, maintenance and use and for checking the machine’s correct functioning.

- It must include a description of the intended use of the machinery in question.
- Warnings regarding ways in which the machinery may not be used, that experience has shown might occur.
- Instructions concerning assembly, installation and connection, including drawings and diagrams and how the machinery is to be mounted.
- Instructions on how to reduce noise or vibration and information about noise emissions.
- Instructions on taking the machine into use, using the machine and how to train operators.
- Information about possible risks that might still exist after all possible safeguards have been taken.
- Information about using protective equipment.
- Information about the characteristics of tools which may be fitted to the machinery.
- Instructions how to transport, handle and store the machinery.
- Instructions on what to do when an accident or breakdown occurs.
- Instructions about maintenance and adjustment intervals and who should perform these. Also how to perform these safely using the correct protective equipment.
- Information about available spare parts for the machinery.
  (Directive 2006/42/EC, 2006, p. 48)

These are some of the more important details mentioned in the European Machinery Directive 2006/42/EC. Based on the directive 2006/42/EC, there are general standards for machinery and specific standards for hoists, e.g. ISO 12100:2010 for machine safety, EN 14492-2:2006+A1:2009 for power driven hoists and EN 13157:2004+A1:2009 for hand powered cranes, to name a few. There are different standards that are for different hoists and cranes depending on how they are powered and what their intended use is.

6 Research

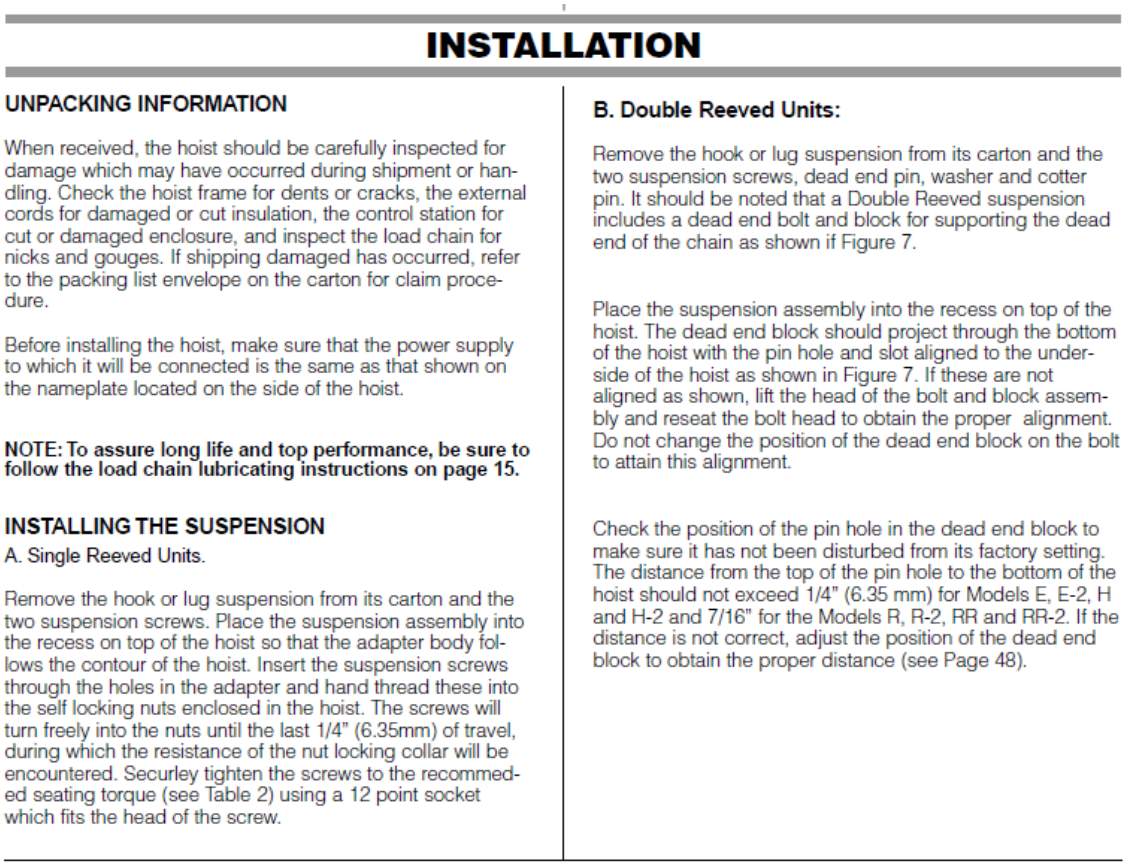
It is important to investigate and compare competitors' manuals and manuals outside the lifting business. Features from the manuals might be usable in the new improved structure. Depending on the style of document used for the manuals, the document structure also changes. In order to decide what kind of document style would be good to use and

thereby also what kind of document structure to have, it is useful to make a small analysis of the different types. A SWOT (Strength, Weakness, Opportunity, Threat) analysis with some problems and conclusions concerning configured, non-configured, pre-printed or printed on demand documents was done and can be found later in this chapter.

6.1 Comparing competitor and Konecranes manuals

There are several competitors in the lifting business. The competitor manuals that were compared were limited to a few brands and a specific product category. The chosen manuals were the OM of electric chain hoists from two companies. The brands where CM (Columbus McKinnon), Yale and Demag. CM and Yale are part of Columbus McKinnon Corporation and Demag is a Terex Corporation brand. The manuals were chosen because the products are similar to the electric chain hoist that KC produces. The reason for choosing the CM and Yale manuals were to see how the documents differ between the brands within the same company.

The chosen manuals also reflect the different world markets these products are intended for. The CM and Yale manuals are for the North American market and Demag and KC more for the European market. The CM and Yale manuals are written by Americans, whereas the Demag manual by Germans.



INSTALLATION

UNPACKING INFORMATION

When received, the hoist should be carefully inspected for damage which may have occurred during shipment or handling. Check the hoist frame for dents or cracks, the external cords for damaged or cut insulation, the control station for cut or damaged enclosure, and inspect the load chain for nicks and gouges. If shipping damaged has occurred, refer to the packing list envelope on the carton for claim procedure.

Before installing the hoist, make sure that the power supply to which it will be connected is the same as that shown on the nameplate located on the side of the hoist.

NOTE: To assure long life and top performance, be sure to follow the load chain lubricating instructions on page 15.

INSTALLING THE SUSPENSION

A. Single Reeved Units.

Remove the hook or lug suspension from its carton and the two suspension screws. Place the suspension assembly into the recess on top of the hoist so that the adapter body follows the contour of the hoist. Insert the suspension screws through the holes in the adapter and hand thread these into the self locking nuts enclosed in the hoist. The screws will turn freely into the nuts until the last 1/4" (6.35mm) of travel, during which the resistance of the nut locking collar will be encountered. Securley tighten the screws to the recommended seating torque (see Table 2) using a 12 point socket which fits the head of the screw.

B. Double Reeved Units:

Remove the hook or lug suspension from its carton and the two suspension screws, dead end pin, washer and cotter pin. It should be noted that a Double Reeved suspension includes a dead end bolt and block for supporting the dead end of the chain as shown if Figure 7.

Place the suspension assembly into the recess on top of the hoist. The dead end block should project through the bottom of the hoist with the pin hole and slot aligned to the underside of the hoist as shown in Figure 7. If these are not aligned as shown, lift the head of the bolt and block assembly and reseat the bolt head to obtain the proper alignment. Do not change the position of the dead end block on the bolt to attain this alignment.

Check the position of the pin hole in the dead end block to make sure it has not been disturbed from its factory setting. The distance from the top of the pin hole to the bottom of the hoist should not exceed 1/4" (6.35 mm) for Models E, E-2, H and H-2 and 7/16" for the Models R, R-2, RR and RR-2. If the distance is not correct, adjust the position of the dead end block to obtain the proper distance (see Page 48).

Picture 9. CM manual showing two column structure (Yale Hoist b, 2013)

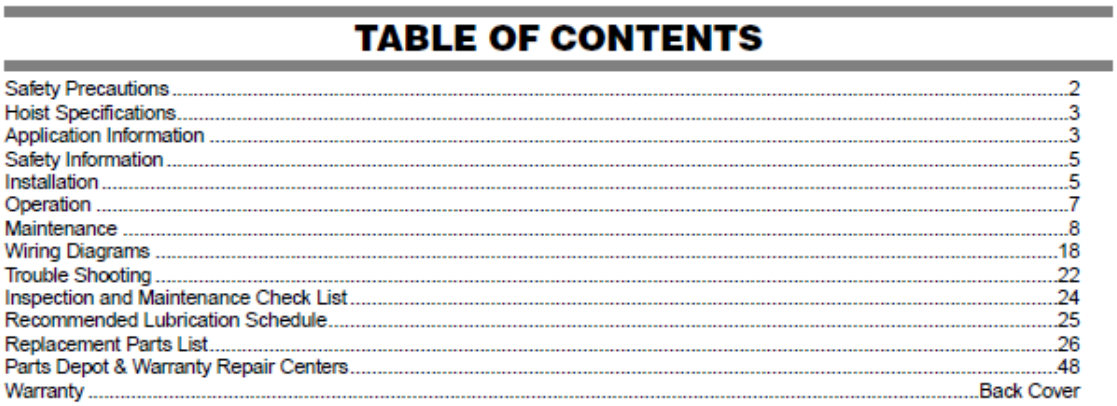
From the very first glance it is clear that all four manuals are different, even the Yale and CM manuals have big differences. The first fact that can be noticed about the Yale and CM manuals is that the text is divided into two columns, as seen in picture 9 above. Whereas the other, Demag and KC, manuals have just one column. This seems to work quite well. The illustrations in the Yale and CM manuals are good and clear. However, the safety illustrations in the CM manual are perhaps not quite as professional looking as in the others. The pictures are more like cartoon drawings. They are similar to the ones that KC used in some older manuals.

Another difference between the manuals that can be easily found is the number of pages in the different manuals. Demag, CM and KC documents all have in excess of 90 pages, whereas the Yale manual only has slightly over 50 pages. At this point it is worth mentioning that these four manuals are not manuals that have been delivered with the product. They have been taken from electronic sources. The Yale manual only has the necessary information and not much else, i.e. more text and fewer illustrations. The same

applies to the CM manual, however, there are about 25 pages of electrical diagrams and this is why there are more pages in the CM manual.

The Demag and KC manuals explain certain aspects of the hoists more thoroughly, compared to the CM and Yale manuals. However, in order to explain in detail how to install or change parts on the hoist, illustrations are needed and illustrations require space. A compromise needs to be found between the essential information that needs to be explained and the less important facts. This is one area where the KC documents can improve significantly.

One aspect that makes the other manuals easier to read and understand than the KC manuals, is the fact that the KC manual has too many tables and small illustrations that are unnecessary. By splitting up the text into short textboxes, the reading is made slower. It also makes the manual poor looking. For example, the safety information in the other manuals is explained in a shorter and better way. The KC manual is more thorough, however, it is much harder to grasp all the safety information. Yale and CM both start with clear “do and do not” lists, whereas the information is spread out throughout the manual in the KC version.



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Picture 10. Table of contents from the Yale manual used in the comparison (Yale Hoist a, 2013)

As for the document structure itself. All manuals start with a few words about the manual and product, the length of the introduction varies from a few sentences to a few pages. The introduction is followed by a safety section. The CM and Yale manuals start with “do and do not” lists and the KC and Demag manuals start with more detailed safety instructions. After these two segments the content starts to differ even more, but the structure is still similar in all manuals. KC continues with identifying the parts and functions of the

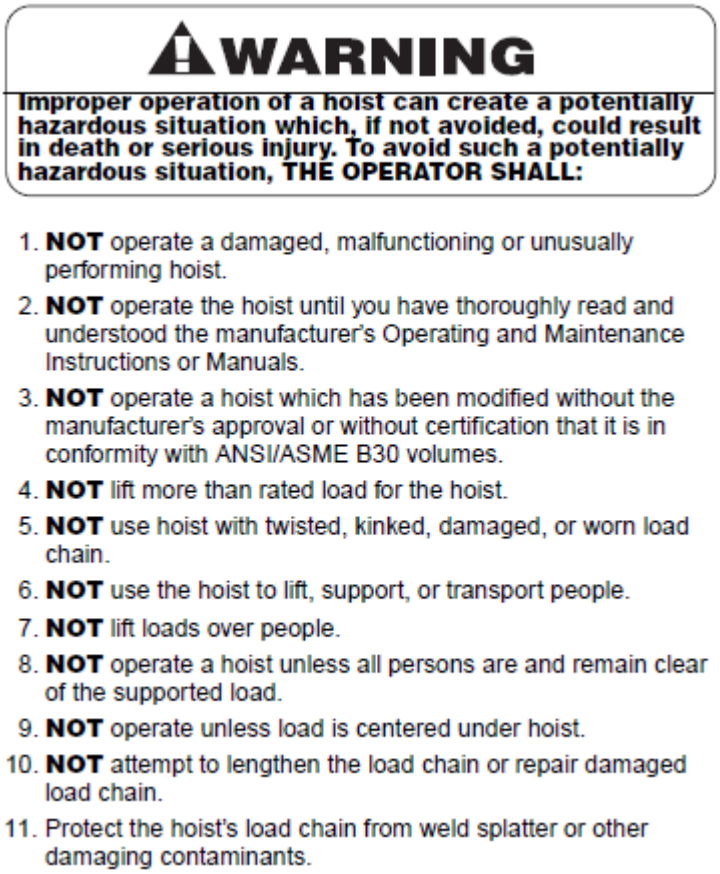
hoist, then how to install the hoist. Demag continues with more technical aspects and technical values of the hoist, however, also identifying the parts and functions of the hoist before the installation instructions. CM and Yale continue the same way as the others, however in a more concise manner. After the installation part come the instructions on operating the hoist followed by maintenance instructions. At the end of the manuals all brands have trouble shooting instructions and spare parts lists. The structure can be better visualised in picture 10.

At the end of the manuals there are segments that differ from each other. For example CM and Yale have wiring diagrams at the end, where Demag has them in the assembly section. Yale and CM have the warranty on the last page, the other manuals have the warranty in the introduction segment. Demag has information about accessories at the end, this is missing from the other manuals.

6.1.1 Aspects to take to the new structure

There are some aspects of the other manuals that would be valuable to include in the new structure. Firstly, the number of tables and illustrations needs to be reduced. This way the readability of the document is improved. Improving the readability is one of the goals of this thesis.

Secondly, the safety information needs to be centralized to one place. The other competitor manuals have achieved this to some degree. All safety information cannot be located in one place, because in some situations the information is better to have with for example installation instructions. However, the safety notification could be a short warning sign with a short explanation about the hazard in question.



WARNING

Improper operation of a hoist can create a potentially hazardous situation which, if not avoided, could result in death or serious injury. To avoid such a potentially hazardous situation, THE OPERATOR SHALL:

1. **NOT** operate a damaged, malfunctioning or unusually performing hoist.
2. **NOT** operate the hoist until you have thoroughly read and understood the manufacturer's Operating and Maintenance Instructions or Manuals.
3. **NOT** operate a hoist which has been modified without the manufacturer's approval or without certification that it is in conformity with ANSI/ASME B30 volumes.
4. **NOT** lift more than rated load for the hoist.
5. **NOT** use hoist with twisted, kinked, damaged, or worn load chain.
6. **NOT** use the hoist to lift, support, or transport people.
7. **NOT** lift loads over people.
8. **NOT** operate a hoist unless all persons are and remain clear of the supported load.
9. **NOT** operate unless load is centered under hoist.
10. **NOT** attempt to lengthen the load chain or repair damaged load chain.
11. Protect the hoist's load chain from weld splatter or other damaging contaminants.

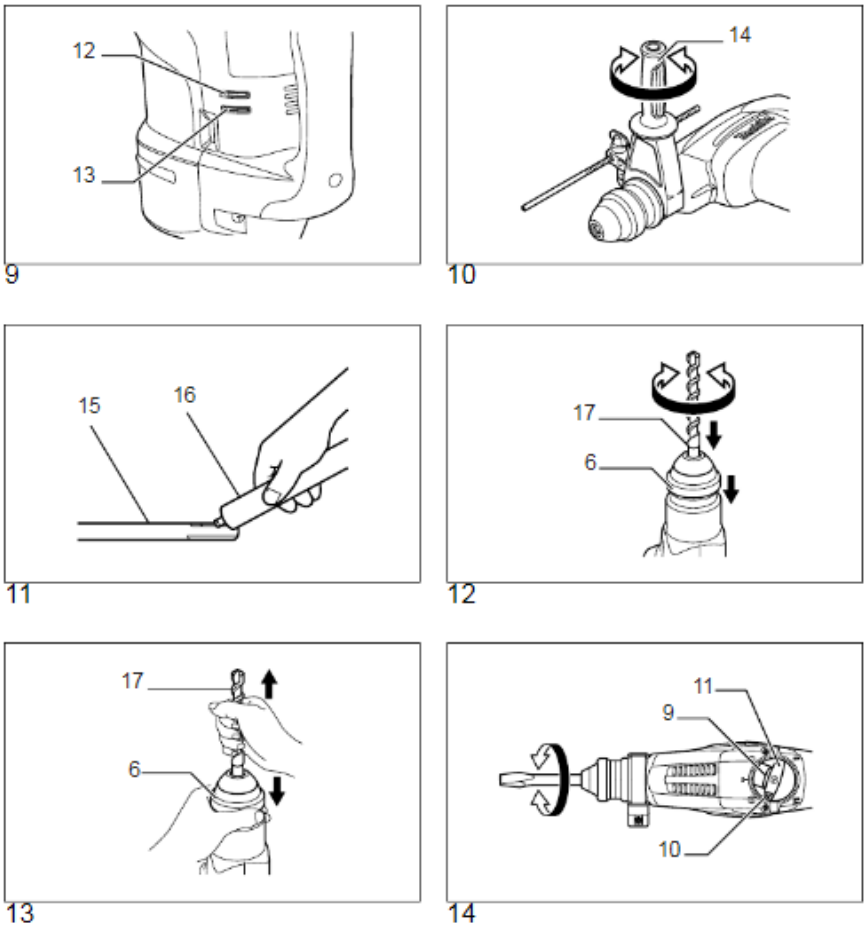
Picture 11. A "do and do not" list that is used in the Yale manual (Yale Hoist a, 2013)

In conclusion, there are benefits of using a “do and do not” list. Competitors and old KC manuals use these lists. The list is an excellent way of providing short and clear instructions concerning safety, as can be seen in picture 11 above. Instead of providing unnecessary tables and illustrations that take valuable space.

6.2 Manuals outside the lifting business

In order to acquire a wider perspective of the market needs, manuals outside the lifting business were looked at. There are several markets that have manuals which are technical enough for this purpose. The best suited manuals for this are from the power tool market. The tools are electrical and in some cases require intricate instructions. The manuals of power drills were chosen. Bosch, Black & Decker and Makita manuals were compared.

The first aspect that was noticeable in the manuals was that they all contained instructions in several languages. For this reason the manuals have more pages, however it means that the same manual can be printed for several countries. This means that you save on the amount of variations you need to print.



Picture 12. The Makita manual starts with illustrations (Makita, 2016)

The next noticeable aspect was that the manuals started with illustrations. The illustrations were all just numbered or named for future reference, this can be seen in picture 12 above. The illustrations described parts of the drill or how to operate the equipment. In the written instructions that followed the text referred to the correct illustration. This enables the manual to use just one set of illustrations i.e. the same illustrations do not need to be added separately in all language segments, this saves space. The instructions were divided into two columns, similar to the Yale and CM manuals.

The structure of the manuals was significantly more similar than anticipated. The manuals start with safety related information followed by functionality and operating instructions etc. The structure itself did not help so much with the structure update. The way of using illustrations and languages was the more interesting part.

6.2.1 Features to take to the new structure

The two aspects that are the most interesting to try and implement into the new structure are the way of illustrating product features and using multiple languages. It might not be plausible or make sense to locate the majority of the illustrations into the beginning of the instructions. This would only help if we would add several languages to the manuals.

6.3 SWOT analysis

Table 1 SWOT table

The SWOT analysis is used when the strengths, weaknesses, opportunities and threats of a project need to be identified. In table 1 the aspects to consider are visible. There are

internal factors, such as strength and weakness, and then external factors, opportunity and threat.

Table 2 Configured document

Strengths:	**Weaknesses:**
- The document will have the same options that the product the customer has bought. Better readability. - The document should be easier and quicker to modify. - The document has fewer pages.	- The document has to be printed at the end of the production process, and takes a lot of time. - Are prone to have faults in publishing or order handling systems. - Maintaining the documents requires significant amount of work. - Limitations of the publishing program (ATON). Case by case, not possible to print without order.
Opportunities:	**Threats:**
- The document might be more to the customers liking, less information about features that the customers do not have on the product. - Fewer pages for us to print, meaning less expensive. - Protection of the technology, protection against corporate espionage. All options are not listed in one document.	- Errors in the order process or configuration rules. - If there are any faults with getting the documents from ATON it takes significant amount of time to find and print the right documents. The more time it takes the more expensive the product becomes. - Kit concept for external customers.

Some issues when using non-configured pre-printed documents are for example when the customer chooses the most basic model with no additional options and features, then the customer would have a lot of extra information about features that are not present in the product in question. This might confuse the customers, especially if they do not know exactly what features they have on their hoist.

When using configured documents, you do not list all the possible options that the product has, which is good if you consider protection against corporate espionage. However, this is not favourable from a marketing point of view.

The inevitable need for changes in the documents is complicated as well. The configured documents that are printed on demand are easier to modify, whereas to the pre-printed documents it would require a substantially longer time to implement changes. This is due to the fact that the existing stockpile would first need to be used up before the new documents can be given out. If there were a critical change, then the existing documents would be thrown away, making the implementation quick but costly. This can be diverted by having non-configured documents printed on demand. The document would always be the right one and in case of changes they would take effect immediately.

Table 3 Non-configured documents

Strengths: - Less prone to mistakes during production. - Pre-printing the documents saves time during production. - Allows more time to assure that the printing quality is good. Document quality check.	**Weaknesses:** - A great deal of extra information about features that are not included in the customer's product. - Because KC has several different brands, languages, models and options, there are a great deal of different versions of the document when pre-printing (23 languages, 5 brands etc.).
Opportunities: - The documents could be pre-printed at another location, meaning a "nicer" look. - Save time on the production line. - Gives the customer information about all available options (marketing). - For aftersales purposes it is good to include all options.	**Threats:** - If there are modifications done to the pre-printed documents. You either have to use the old documents first or throw them away, i.e. either a slow modification time or a costly one. - The possibility of adding the wrong documents (wrong brand, model etc.).

The non-configured documents could be pre-printed outside the company which would give the possibility of improving the exterior appearance of them. This might be more expensive than the current solution of printing at the end of the production line on normal black and white A4 paper. However, the time saved by not having to print the documents in the factory might pay for the pre-printed documents.

One problem with pre-printed documents is how to deal with the number of variations of the documents (language, brand etc.). When dealing with configured documents there is no need for storage of all the versions. One solution would be to have several languages pre-printed in the same document package, i.e. you would have e.g. German, French and English in the same package and this would reduce the number of variables.

Based on the number of received orders in the year 2014 and 2015, conclusions can be made about the possibility of “language packs”. German, French and English make up about 56% of all the orders. The major brands have a higher percentage, of more than 60%. (Konecranes c, 2015) The problem with this solution is that the number of pages grows and the readability of the manuals might suffer. If we look at other manufacturers outside of the lifting business, they have several languages bundled together. But the overall number of pages is fewer than we currently have for one language.

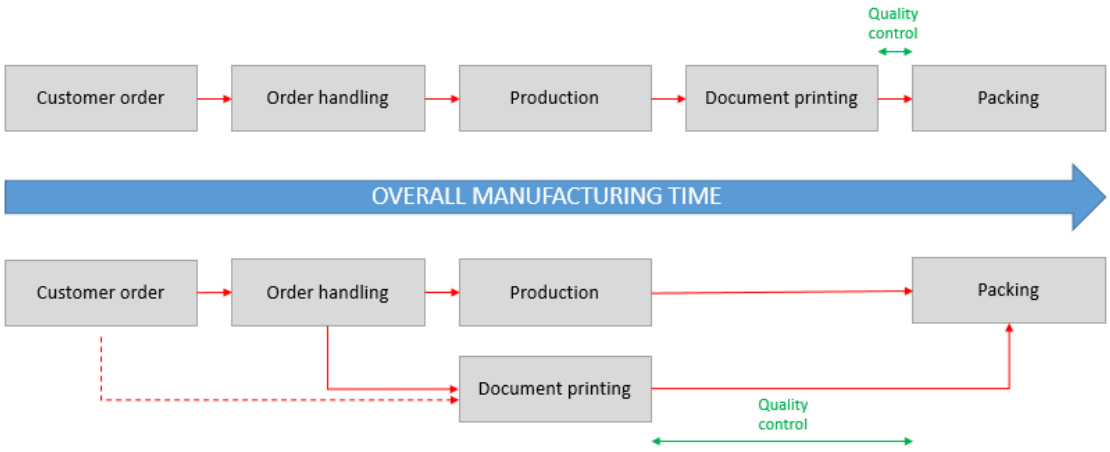
In order not to have all possible variations printed, it would be good to have the majority of the used variations printed, e.g. 80%. By not printing the variations that are least used, the loss in case of critical updates is minimized and the required storage space is reduced. The variations that are outside the 80% covered could be printed on demand at the end of the production process. There would still be an overall time saving and by that also a reduction in expenses. Some pages would still need to be printed during the production process, e.g. test reports. But the time to print the 1-10 pages would be significantly less than previously. This will then result in a small aesthetic issue. If you were to pre-print on nice paper and have ready binders, how would it then look to have a few pages that are different? Then appearance versus practicality has to be considered.

One solution is to have partly configured modular documentation. The documentation would consist of a safety part, installation part and an options part as well. The first two

parts would be pre-printed with generic safety and installation information. Then the specifics related to the options would be found in the last part. All the required information about the options on that specific product would be there.

When having non-configured documents that are pre-printed one has the risk of sending the wrong document with the product, whereas using configured documents printed on demand the document mix-up is less likely. The same also applies to non-configured documents printed on demand.

In non-configured documents all options in the documentation would be included and the customer would know what kind of options he could have. The customer can then possibly order this option afterwards. We would not need to send new documentation with the standard optional parts, since they are already mentioned in the original documentation. The non-configured documents have good aftersales aspects. In case of problems it does not matter if the document is configured or not when getting the documents from the publishing program. By using non-configured documents, the quantity of possible faults and mistakes in the order processing and publishing programs is cut down.



Picture 13. Illustration of the manufacturing process.

One possibility would also be to print the documents on demand at the production plant on a proper printing machine. The printing process could be started at the same time or before the product assembly starts. The printing process could be centralized in the factory. All products produced at the factory would have their documentation printed here. This is only a feasible solution when producing in high quantities. Then all the pages

would be printed at the same time in a better format and the possibility of producing document binders. This would, however, require an investment by the factory. There would also be a need to have a team that looks after the documents and printing process. As seen in picture 13, this would allow for more time to do quality control on the documentation then there is currently.

6.3.1 Results of SWOT analysis

Based on the findings above, the most logical way is to combine some of the options. This means that in the future there would be partly configured documents that are printed on demand.

By printing on demand there is no need for storing all versions. There is a significantly lower chance that the wrong document is shipped with the product. When a document is modified, the change can be implemented quickly and the old versions of the documents are not left to be used up first or thrown away. By using non–configured documents some of the faults that the publishing program causes are reduced.

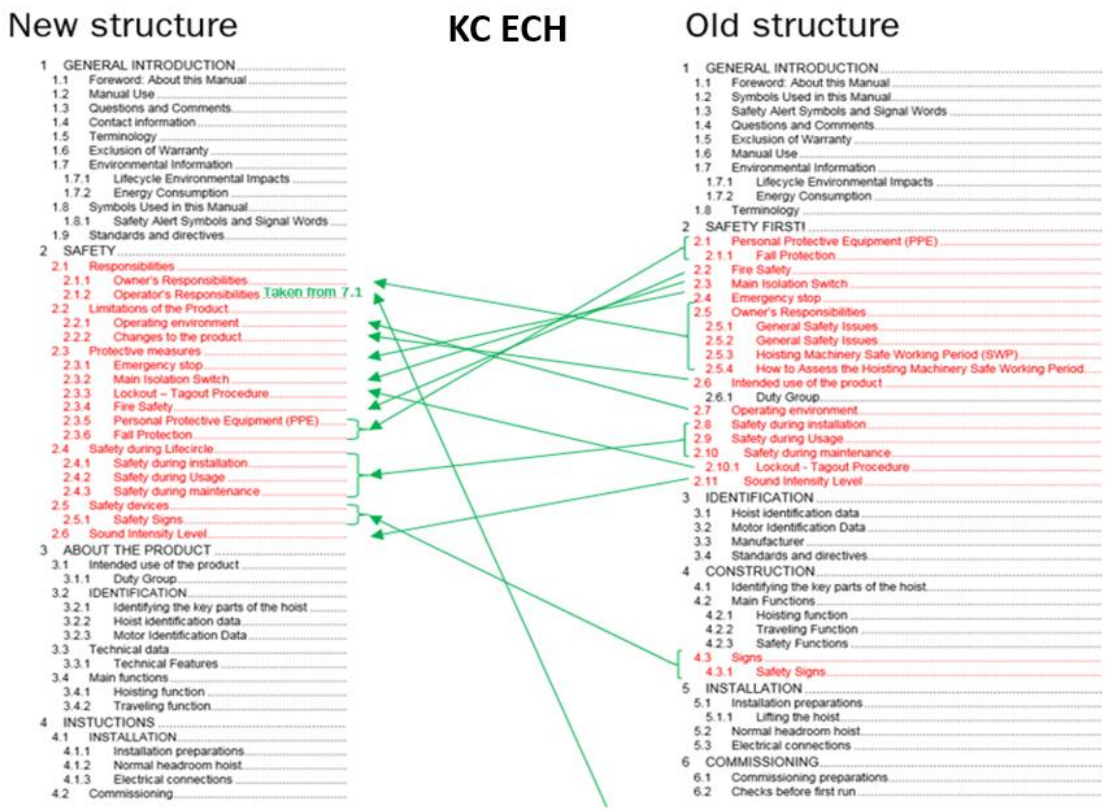
7 Process of changing the structure

7.1 Modification process

The master structure that is used for KC products, including LL products, was in an Excel table. The whole structure was laid out in one continuous table and it was in this Excel file where the structure was worked on. The structure was examined, looking for parts of the structure that did not fit in, by comparing the way the structure was implemented in the different KC products. Although the documents should have been made according to the master structure, there were a few minor alterations in the published documents. These small changes were taken note of for future comparisons. After the structure of the existing documents had been compared, the competitor manuals were looked at and the differences were taken into consideration when rearranging the pieces of the structure in the Excel file.

After considering both the existing document changes as well as the differences in competitor's structures significant changes were made to the structure. After the modifications to the structure were made to the Excel table, an example manual's structure was modified to correspond to the changed structure. The example manual used was the OM for the ECH. The example manual was created in order to acquire a better understanding of how the changes worked. The changes were better identified and a decision regarding whether the change made sense or if the readability was made worse could be made. This was a time consuming process, however, a great way to see the progress of the changes and also a way to show the changes to others. Meetings were held with members of the documentation department and platform side. Suggestions for improvements where expressed and implemented.

A SWOT analysis was made to better evaluate the future structure and type of documentation to be used. The analysis helped to find the different possibilities for the structure as well as the documentation type to be used. The documentation type used greatly affects the document structure. If the manuals were non-configured, the structure always had to be the same for all types of products and the manuals must contain all the information about the product. During the analysis, several key aspects of the documentation types were identified. These aspects were then examined further together with the platform side and documentation department. The structure and example manuals were updated during the analysis.



Picture 14. Example of changes to the structure of a KC ECH OM

One goal was to gather as much of the same type of information together as possible. As seen in picture 8 above, one of the changes made to the structure was that as much of the safety related information as possible was gathered into one place. Other parts of the structure were also moved in order to get a better flow to the structure. These changes greatly improved the readability of the documents.

The finalized structure was made at the end of 2015. In the beginning of January 2016, the structure with all the suggested improvements was presented to all persons involved in the decision making process. This was the final chapter for the thesis. The improvement of the documentation and structure is still in progress but will not be included into this thesis.

7.2 Creation process for the customized product documentation

Meetings were held with the sales support team at the French productions facilities. The process of how the products are created was examined and the goals of the documentation was laid out. The team wanted a template that the designer fills in during the design process. This template, when ready, is included as an appendix in the OM.

The template itself is a very simple document for the designer to explain in more detail how the product differs from the normal. This template can be seen in appendix 2. The template was only a small part of the thesis and therefore the template will not be analysed in more detail.

7.3 Aspects that were considered

When trying to improve the readability of the documents, the idea of taking back the “do and do not” lists was considered, however it was decided that it is not possible. This was because if these lists were to be taken to the LL product documentation, then the documents would differ too much from the other KC documents and the idea is still to have documents within KC as unified as possible.

This is also one of the reasons why the documents are not divided into two columns, which would require all KC manuals to be updated to the new two column system in order for all KC documents style to remain unified. Another reason is that the two column way of writing is more of an American style, and KC has been using and will in the future use, a more European way of styling the documents.

To improve the readability of the documents, KC has been looking into the possibility of narrowing the text in its documents by increasing the margins. However, an unfortunate side-effect is that this would increase the number of pages in the documents. This can be compensated for by reducing the amount of unnecessary illustrations.

Finally, the possibility of using illustrations in the beginning in combination with using multi-language manuals was considered. It was discovered that this is not possible due to the fact that the number of pages would be enormous and the amount of different manuals would be too large. The manuals need to be translated into 23 languages and

for 5 brands, this means 115 different variations for every model. If this is then multiplied by 10 models, the number of variations are over 1100. Storing these as pre-printed manuals is not possible. Even if the languages would be combined to enormous multi-language manuals, the number of variations would still be too many.

7.4 What has been changed in the structure

The contents in the structure are still the same, however some aspects of the structure were taken out, only because they did not concern the light lifting products. The structure segments have been rearranged into new places. The new structure can be found in appendix 1.

The first two chapters, introduction and safety, were structured so that there is no actual information specific to one product. These two chapters could always be the same for all LL products. The following chapter, product description, describes the basics of the specific product. Previously parts of this chapter were in chapter 1 and 2. All the instructions have been located into chapter 4, but previously they were all in different chapters. Chapters 5 and 6 remain the same, however the appendices have been changed slightly. All topics that do not relate to LL products have been removed from the structure. Chapter 7 is new and it contains all the information that concerns the product that has been ordered with specific options. This chapter is only to be used if the structure will remain configured.

8 Conclusion

After considering the SWOT- analysis, comparing manuals and discussions with members of the platform and documentation side, the results are as follows.

One of the major reasons why there is a desire to have the structure non-configured is to reduce the possibility of configuration and printing mistakes. Using a partly configured structure would also reduce these errors.

The best solution would be to have partly configured documents. These documents would always be specific to the type of lifting equipment. The OM would be sent as one

complete manual, regardless of how many products are combined. The information in the manuals would be more clearly structured. All the safety information would be in one place, not spread throughout the whole manual.

The possibility of using two separate manuals consisting of a general safety part which would be the same for the whole LL product line and an instruction part that would be type specific, seems to be possible. This is being further examined at the moment. A challenge is to make the safety part generic enough to be used from manual products to light crane systems. This can be made by having three safety parts, one for the electrically powered, one for the air powered and one for the manually powered equipment.

The possibility of changing the printing process needs to be checked. There are benefits to changing the process, for example more time for quality control, visually better looking manuals, the manual as a binder and possibility of pre-printing some of the modules. However, there are also disadvantages that need to be evaluated, investments in new equipment and personnel and documentation flow.

The safety texts that are now used in the manuals are based on the worst case scenarios. KC has chosen to follow three safety standards. This limits how the safety information is presented and what is included. However, it is possible to cut down on them slightly. That way the amount of pages are reduced as well. One advantage with partly configured documents might be that the manuals could be made more compact, i.e. that there would be more text squeezed onto one page and less air around the illustrations and tables.

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Picture 1. ECH sold by different power brands.
Internal document, Intranet (4.4.2016)
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Picture 11. A "do and do not" list that is used in the Yale manual
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Internal document, Intranet (4.4.2016)

Appendix 1. New Document Structure for LL Products

1KC Num-bering	New document structure					
1	**1**	**Introduction**				
1.1		**1.1**	**About this manual**			
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Appendix 2. Customized Instructions for Options

Customized options on the supplied product

Here should be mentioned all the customized options that are on the product. Short explanation what they are, what they do. If there are any illustrations they should be placed below with the corresponding explanation placed here.
Filled in by the designer when the design is final.

Place holder for any illustrations / drawings

Instructions for the customized options

Here there should be a detailed instruction on setting up and operating the customized option. These instructions are also for the installation in the factory.
Filled in by the designer when the design is final.

Place holder for any illustrations / drawings

Maintenance of the customized option

If the option requires special maintenance, that should be explained here. If there are any checks to be performed annually/ monthly/ daily they should be mention here in a table.
Filled in by the designer when the design is final.

Place holder for any illustrations / drawings

Spare parts

Spare parts for the customized options are not listed in the spare parts catalogue. For correct spare parts contact your dealer directly. Mention the product id-number when contacting the dealer concerning spare parts.

Electrical diagrams and other technical documents

If there are electrical diagrams and drawings they should be mentioned here.
Filled in by the designer when the design is final.

Place holder for any illustrations / drawings