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| Master of Science Thesis TRITA-ITM-EX 2019:XXX  KTH Industrial Engineering and Management  Machine Design  SE-100 44 STOCKHOLM |

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***Sammanfattning***

Examensarbetet skrivs på svenska eller engelska och har alltid både en svensk och en engelsk sammanfattningssida. Ett arbete om skrivs på svenska har ett svenskt *Omslag* och en svensk *Titelsida*. Denna skrivmall, som inte har “bookmarks” eller några avancerade “features”, definierar layouten för ett examensarbete i maskinkonstruktion (MF206X) men är även tillämpbar för andra examensarbeten på institutionen för maskinkonstruktion. Den kapitelstruktur, som presenteras här, är inte obligatorisk utan skall enbart ses som ett exempel på en sådan.

I detta kapitel sammanfattas examensarbetet. Sammanfattningens omfattning är högst en sida. Typsnittet är Times New Roman 12 pt, med 6 pt före med raka vänster- och högerkanter. Sammanfattningen åtföljs av en blank sida. Den föregående titelsidan, som lämpligen också innehåller en illustrativ bild, följs också av en blank sida. Alla kapitel börjar längst upp på en högersida, dvs på ett udda sidonummer.

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***Abstract***

The thesis is written in Swedish or English and it has both a Swedish and an English *Abstract* page. An English thesis has English *Cover* and *Title* pages. A Swedish thesis has Swedish *Cover* and *Title* pages. This template, which has no bookmarks or other automation features, defines the layout of a masters thesis in machine design (MF206X), but it also applies to other masters theses at the department of machine design. The chapter structure that is presented here is not mandatory, it is just an example.

The abstract is maximum one page long and it is written in Times New Roman 12 pt, with 6 pt before, justified alignment. The abstract page is followed by a blank page. The preceding title page, which preferably contains an illustrative picture, is also followed by a blank page. All chapters start at the top of a right hand page, i.e. a page with an odd number.

FOREWORD

*Use 12 pt Times New Roman, Italic and 6 pt before and 12 pt after, to describe the content of this chapter in two or three justified rows.*

Here is the right place to acknowledge help, assistance, cooperation and inspiration important for the presented project provided by others. This section, which is optional, should be written in Times New Roman, 12 pt and 6 pt before, with justified alignment. Please, leave two empty rows before the body text.

The foreword chapter should be ended with the two rows Name(s), and Place and month written in Times New Roman 12 pt, and right adjusted. *Name(s)* should be 36 pt before and *Place, month and year* should be 12 pt before.

Name(s)

Place, month and year

NOMENCLATURE

*Use 12 pt Times New Roman, Italic and 6 pt before and 12 pt after, to describe the content of this chapter in two or three justified rows, e.g. Here are the Notations and Abbreviations that are used in this Master thesis. (Only include the lists that are applicable). The lists are written in 12 pt Times New Roman, 6 pt before.*

***Notations***

***Symbol Description***

*E* Young´s modulus (Pa)

*r* Radius (m)

*t* Thickness (m)

….. …….

***Abbreviations***

*CAD* Computer Aided Design

*CAE* Computer Aided Engineering

*PLM* Product Lifecycle Management

… …

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# **1 INTRODUCTION**

*Use 12 pt Times New Roman, Italic and 6 pt before and 12 pt after, to describe the content of this chapter in two or three justified rows, e.g. this chapter describes the background, the purpose, the limitations and the method(s) used in the presented project.*

## **1.1 Background**

The main heading is numbered and typed Right aligned in Bold Arial. The main heading font size is 18 pt, with 12 pt before and 12 pt after. Second level headings, e.g. “*1.1 Background*” are left aligned and typed in 16 pt Bold Italic Arial, with 24 pt before and 6 pt after.

The body text is typed in Times New Roman, 12 pt, 6 pt before, and justified.

## **1.2 Purpose**

Figures in the thesis should be centered on the page with 12 pt space before. The figure legends should be in 10 pt regular Times New Roman, centered with a 12 pt space before and 6 pt after. The figures should be numbered Figure 1, Figure 2, etc.



Figure 1. The ITM logo, from ITM (2011).

The table headers should be in 10 pt regular Times New Roman, centred with a 12 pt space before and a 12 pt space after. The tables should be numbered Table 1, Table 2, etc. Text in tables should be in 12 pt regular Times New Roman,centred, 0 pt before and after. An example of a table with a heading is shown below.

Table 1. Table header

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| Row 2, column 1 | Row 2, column 2 |
| ….. | …. |
| Row n, column 1 | Row n, column 2 |

* Unnumbered lists should preferably use a dot as a bullet, and should be in 12 pt Times New New Roman, justified, 6 pt before, with 1 cm hanging indent and 1 cm tabs.
  1. Numbered lists should be numbered 1,2,3 etc., and should be in 12 pt Times New Roman, justified, 6 pt before, with 1 cm hanging indent and 1 cm tabs.

Equations should be centered, 12 pt before. Each equation should be numbered consecutively throughout the paper using Arabic numbers in parenthesis: (1), (2), etc. The equation number should be right shifted and enclosed within parenthesis.

*U* = *R* ⋅ *I* (1)

References to published work should be done using Name and year. For example, Angell and Straub (1999) states that …, or non-linear finite element analysis requires extensive skill (Crisfield, 1997). Please, observe the small distinction between references to Journals (van Wezel and Jorna, 2001) and (Angell and Straub, 1999), a published book (Crisfield, 1997) and a conference proceeding (Eppinger and Salminen, 2001). Standish Group (1994) is an example of a reference from the Internet. The reference heading is a regular chapter heading. Each reference item should be in 12 pt Times New Roman, justified with 6 pt space before.

## **1.3 Delimitations**

It is good practice to define and describe limitations of the project/task in the introductory chapter.

## **1.4 Method**

The method(s) used to address the problem defined above may either be defined in the introductory chapter or elaborated on more in detail in a following chapter.

**2 FRAME OF REFERENCE**

*The reference frame is a summary of the existing knowledge and former performed research on the subject. This chapter presents the theoretical reference frame that is necessary for the performed research, design or product development.*

**3 Implementation**

*In this chapter the working process is described. A structured process is often called a method and its purpose is to help the researcher/developer/designer to reach the goals for the project. The actual title of this chapter depends on the scope and context of the specific project, that is it may be “3 Concept development” with subparagraphs such as “3.1 Requirements specification”, “3.2 Concept generation”, etc. for a project with that scope or it may be “3 Method” for a more traditional research study.*

**4 RESULTS**

*In the results chapter the results that are obtained with the process/methods described in the previous chapter are compiled, and analyzed and compared with the existing knowledge and/or theory presented in the frame of reference chapter.*

5 DISCUSSION AND CONCLUSIONS

*A discussion of the results and the conclusions that the authors have drawn during the Master of Science thesis are presented in this chapter. The conclusions are based from the analysis with the intention to answer the formulation of questions that is presented in Chapter 1.*

## **5.1 Discussion**

The main heading is numbered and typed Right aligned in Bold Arial. The main heading font size is 18 pt, with 12 pt before and 6 pt after. Second level headings, e.g. “*5.1 Discussion*” are left aligned and typed in 16 pt Arial Bold Italic, with 24 pt before and 6 pt after.

The body text is typed in Times New Roman, 12 pt, 6 pt before, and justified.

## **5.2 Conclusions**

The second level headings *5.2 Conclusions* is left aligned and typed in 16 pt Bold Italic, with 24 pt before and 6 pt after.

The body text is typed in Times New Roman, 12 pt, 6 pt before, and justified.

**6 RECOMMENDATIONS AND FUTURE WORK**

*In this chapter, recommendations on more detailed solutions and/or future work in this field are presented.*

## **6.1 Recommendations**

The main heading is numbered and typed Right aligned in Bold Arial. The main heading font size is 18 pt, with 12 pt before and 6 pt after. Second level headings, e.g. “*6.1 Recommendations*” are left aligned and typed in 16 pt Bold Italic, with 24 pt before and 6 pt after.

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## **6.2 Future work**

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The body text is typed in Times New Roman, 12 pt, 6 pt before, and justified.

# **7 REFERENCES**

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APPENDIX A: SupplemEntary INFORMATION

*The appendix or appendices is the natural place for detailed or supplementary information that would make the thesis less easy to read if they were given in the previous chapter. Please, give each appendix a suitable title.*