

HIGHER TECHNICAL INSTITUTE

MECHANICAL ENGINEERING DEPARTMENT

DIPLOMA PROJECT

COMPUTER AIDED DESIGN OF BOLTED JOINTS

By

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OF BOLTED JOINTS

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Project Report

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DEDICATION

I would like to dedicate the following project, to my fiancée for her moral support.

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1. INTRODUCTION

1.1 BOLTED DESIGN

The several machine elements required in order to form a working machine frequently has to be connected together. In other cases it is advantageous to form a complicated machine element out of more than one component which have to be connected together to give the final element. Some reasons have been presented previously, such as producibility, components made out of dissimilar materials, serviceability with parts that have high wear rate. In most cases' joints has the purpose of carrying loads.

Since joint elements are used in a variety of cases they have been standardized to a very great extend.

A joint element, such as a bolt for example, can be used in a variety of tasks. The same bolt can be used in an automobile, in an aircraft engine or in a paper mill. On all occasions its purpose is to carry a certain load in a certain mode. It is fact that an automobile sometimes consists of more than 10,000 parts, a machine tool might have up to 20,000 parts, a rolling mill might reach 1,000,000 parts.

Joints may be permanent or removable. The selection is based on the purpose and on the economy of the joint. Permanent connections cost less in general but they have the disadvantage that to disconnect the parts, the joints have to be destroyed and they cannot used again. On the other hand, permanent joints are safer especially in parts which sustain dynamic loads. Therefore, for permanent joints the main consideration is the strength. For separable joints permitting assembly and disassembly, additional security from accidental separation is necessary.

Permanent joints are held together either by forces of molecular cohesion, such as the welded joints, or by mechanical means as riveted and bolted joints.