

UNIVERSITI TEKNOLOGI MARA
SHAH ALAM
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FINAL YEAR PROJECT REPORT

'THE STUDY OF CRACK INITIATION IN SINTERED
STEEL AND MILD STEEL UNDER FATIGUE'

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CONTENTS

	PAGE
CHAPTER 1: HISTORICAL AND OVERVIEW	
1.1 Introduction	1
1.2 Why do part breaks (fail)?	2
1.3 Historical Perspective	3
1.3.1 Early Fatigue-cracks Initiation Research	4
CHAPTER 2: THE MATERIALS	
2.1 Steels	5
2.2 Sintered Steel	6
2.2.1 Powder characteristization	7
2.2.2 Sintered Steel Processing	8
CHAPTER 3: FAILURE ANALYSIS (THEORY)	
3.1 Introduction	12
3.2 Fatigue	14
3.2.1 Fatigue life	18
3.2.2 Factors affecting fatigue life	19
3.3 Fatigue crack initiation	21
3.3.1 Crack-initiation Mechanism	21
3.3.2 Viscoplasticity	23

3.3.3	Cavitation	23
3.3.4	Oxidation and corrosion	25
3.4	Slip Mechanism	29
3.5	Fatigue crack propagation	31
3.6	Yield Strength	33
3.7	Development of microstructure and alteration of Mechanical Properties	35
3.7.1	Martensite	35
3.7.2	The Martensite transformation	36
3.7.3	Tempered Martensite	37
3.8	Equipment is used to observed the fatigue	38
3.8.1	Scanning Electron Microscope (SEM)	39
3.9	The value of Electron Microscope	40

CHAPTER 4: JIGS DESIGN

4.1	Precedure to make Upper part	41
4.2	Heat treatment of steel (JIGS)	43
4.3	Steel heat treatment	44
4.3.1	The basic heat treatment process	47
4.3.2	Factors influencing heat treatment of steels	49

CHAPTER 5: SPECIMEN PREPARATION

5.1	Introduction	56
5.2	Determination of the specimen thickness (circular plate bending)	58

CHAPTER 1: HISTORICAL AND OVERVIEW

1.1 Introduction

During the process of a fatigue failure, microcracks initially form and then coalesce or grow to macrocracks, which propagate until the fracture toughness of the material is exceeded and final fracture occurs. For the present purposes, in which we are generally considering metals in the usual range of grain size (2 to 200 μm), a microcrack may be defined as smaller than a few grain diameters; a macrocrack may be taken as larger than this. This presentation will be concerned with the phenomenology of formation of microcracks, growth of microcracks to macrocracks (usually a slow step), and the subsequent slow growth of macrocracks at low values of the alternating stress intensity near threshold, ΔK_0 . Comparison of the growth of microcracks at high cyclic stress and the growth of macrocracks at low cyclic stress where ΔK is approximately the same will also be made.

It should be recognized that in the almost all fatigue failures most of the lifetime is spent in the initiation and slow-growth stages, yet these have received less attention in the recent literature than macrocrack propagation at higher growth rates.