UNIVERSITI TEKNOLOGI MARA
SHAH ALAM
SELANGOR DARUL EHSAN

FINAL YEAR PROJECT REPORT

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

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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 200μm), 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_o. 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.