

FINAL YEAR PROJECT REPORT  
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DETERMINATION OF THE EFFECT OF FORCE  
RATE IN DUCTILE POLYMER

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## **ACKNOWLEDGEMENT**

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In the name of ALLAH, who is Most Gracious, Most Merciful and HIM alone is worthy of all praise.

We wish to express our gratitude and appreciation to our project advisor En. Yaacob Md. Taib, Puan Anizah Kalam and our project co-ordinator, Prof Madya Dr. Ahmad Suhaimi who have given us a guidance and support throughout this project.

Also we would like to convey appreciation to all staff members of Mechanical Engineering Department especially to En. Abu Kassim who has given us a best co-operation with some useful knowledge. Without them this project cannot be completed successfully. Also we wish to thank all our friends who have helped us directly or indirectly in completing this project work.

Above all our greatest thanks to ALLAH s.w.t in giving us good health and the trait of patience, both of which were instrumental in accomplishing this final year project.

## **PRE - INTRODUCTION**

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This report takes a look of the impact resistance of polymers. There are some approaches are discussed and examined with particular reference to fracture mechanics analysis of impact data. It shown that fracture mechanics gives a satisfactory theoretical assessment of the whole problem and many of the important parameters of the materials can now be determined by impact testing.

The experiment in this report is based on BS 6729 for metals and has led to a testing protocol which takes account of the major difficulties imposed by polymers.

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## **1.0 INTRODUCTION**

### **1.1 Properties of Engineering Materials**

The purpose of this experiment is to obtain the common properties of actual engineering materials. In the engineering design of structures, components and machines, the 'elastic' properties of the materials used must be accurately known. Elasticity and plasticity are the microscopic properties of large section or parts as opposed to the microscopic properties that are studied in solid-state physics.

'Failure' is the ultimate condition to be avoid in any structural part. The nature of structural failure can be studied experimentally, but only by "destructive testing". A part may fail in tension, compression, torsion, bending, fatigue, etc. and a corresponding number of test isolate or emphasize each kind of failure. Such test are satisfactory if a "sample" of the material can be used, but if the ultimate structure, machine or part is to be checked for defect or for conformity with specifications, some kind of non-destructive test (NDT) must be employed.

Impact tests are an extreme case of dynamic loading and impact failures are closely related to stress concentrations since a notched bar is used in the most common impact-test machine. The charpy and the izod impact-testing machines both use a pendulum hammer striking a notched specimen. Impact test can hardly be said to produce basic data and can be quantitatively applied in design. The tests are widely use for comparisons of "toughness" of steels or plastics. The work expended in an impact test correlates rather closely with that shown by the stress-strain diagram for a standard tension test, but since the fracture are quite different it is worth nothing that for many materials, e.g. glass, the result