DESIGN OF A MINI FATIGUE TENSILE MACHINE

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DESIGN OF A MINI FATIGUE TENSILE MACHINE

by

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APPROVAL AND DECLARATION SHEET

This project report titled Design of a Mini Fatigue Tensile Machine was prepared and submitted by KhairolNaim Bin Shafeei(Matrix Number: 121050574) and has been found satisfactory in terms of scope, quality and presentation as partial fulfillment of the requirement for the Bachelor of Engineering (Manufacturing Engineering) in Universiti Malaysia Perlis (UniMAP).

Checked and Approved by

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REKA BENTUK SEBUAH MESIN KETEGANGAN KELESUAN MINI

ABSTRAK

Projekiniadalahdi jalankanbagimerekabentuksebuahmesin mini denganmenggunakankos yang rendahbagitujuanuntukpenggunaanpelajar. Projekinibertujuanuntukmengkajitentangkelesuan yang berlakuterhadapspesimensemasa proses penarikan. Rekabentukakandihasilkanmelalui proses lukisandenganperisian UGNX. Mesininiakanmelakukan proses pengulanganuntukmendapatkan proses kelesuanterhadapspesimen. Spesimeniniakanditarikdenganmenggunakanpemegangmesinmelalui motor yang menggunakandayapusingan yang tinggi. Olehitu, motor merupakanbahagian yang pentinguntuk proses penarikanterhadapspesimen. Selepasrekabentuktelahdibuat, mesininiperludikajiuntukmendapatkanmotor yang mempunyaidayapusingan yang tinggisemasa proses penarikan. Perisian yang akandigunakanuntukmengkajiialahanalisisunsurterhingga. Tambahan pula, analisistelahdilakukanolehduabahagiandaripadarekabentukiaitubesi rod danengkol.Kedua-duainiakanmenghasilkankawasankritikal yang telahdikenakandaya. Secarateorinyapengiraanakandikirauntukgrafkitaranberdasarkandayaanalisis.Melaluirekabentuk yang dihasilkan, mesininimemberikefahamantentangkelesuan yang berlakupada specimen.

DESIGN OF A MINI FATIGUE TENSILE MACHINE

ABSTRACT

This project is about the design of mini fatigue tensile machine by designing a low cost for the use of students. The project aims to study the tensile that occurs to the specimen during the tensile process. The design of this machine will use UGNX 6.0 as the software machine design. This machine will make the process of repetition to get the fatigue tensile of the specimen. These specimens will be pulled through the machine using the gripperby high torque of motor. Thus, the motor is an important part of the process of tensileto the specimen. After the design has been made, the machine must be studied to obtain high torque of motor that suitable for machinewhiletensile process. Software that will used to makeanalyze is Finite Element Analysis.Moreover, analysis had been done by two part of design which is slot and crank. Both of this will be resulted the critical area that had been apply force on it. Theoretically calculation will be calculated to form the graph based on force analysis.Through the design produced, this machine provides an understanding of the fatigue that occur on specimen.

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LIST OF ABBREVIATIONS AND NOMENCLATURE

σ_m	=	Mean stress (N/mm^2)
σ_r	=	Stress range (N/mm^2)
σ_a	=	Stress Amplitude(N/mm^2)
R	=	Stress Ratio
N_f	=	Fatigue Life
N_i	=	Initial Cycle To Crack
N_p	=	Crack Start To Spread
SAE	=	Standard Organization Alloy
kHz	=	kiloHertz
C	=	Carbon
Mn	=	Manganese
Si	=	Silicon
Cr	=	Chromium
Ni	=	Nickel
Mo	=	Molybdenum
Cu	=	Copper
As	=	Arsenic
L	=	length
EBSD	=	Electron Backscattered Diffraction
P-MR	=	Palmgren-Miner rule
kN	=	kiloNewton
NEMA	=	National Electrical Manufactures Association
M	=	Motor
UGNX 6.0	=	Unigraphics
FEA	=	Finite Element Analysis
CATIA	=	Computer Aided Three Dimensional Interactive Application