

Visvesvaraya Technological University
Belagavi-590018
2019 –2020



A

**“A PROJECT PHASE II REPORT
(15MEP85)**

On

**“EVALUATION AND VALIDATION OF TENSILE PROPERTY OF AI 7075
ALLOY WITH RE-AGENING CONDITION USING TAGUCHI AND ML
ALGORITHM”**

**In partial fulfillment for the award of the degree of
Bachelor Of Engineering**

In

Mechanical Engineering

By

ADNAN S.M (1GV16ME001)

MADHU M (1GV16ME015)

SHIVAKUMAR K.G (1GV16ME038)

VINAY G (1GV16ME047)

Under the Guidance of

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Asst., PROFESSOR

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Dr. T THIMMAIAH INSTITUTE OF TECHNOLOGY.

(Formerly Golden Valley Institute of Technology)

Department of Mechanical Engineering

Kolar Gold Field – 563 120.

Dr T THIMMAIAH INSTITUTE OF TECHNOLOGY
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DEPARTMENT OF MECHANICAL ENGINEERING



CERTIFICATE

This is to certify that the Project Entitled **EVALUATION AND VALIDATION OF TENSILE PROPERTY OF AI 7075 ALLOY WITH RE-AGENING CONDITION USING TAGUCHI AND ML ALGORITHM** has carried out by

ADNAN S.M	(IGVI6ME001)
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The students of **Dr. T THIMMAIAH INSTITUTE OF TECHNOLOGY** in partial fulfillment for the award of **BACHELORE OF ENGINEERING** in **MECHANICAL ENGINEERING** of the **VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM** during the year 2019-2020. It is certified that all correction/suggestion indicated for internal assessment have been incorporated in the report deposited in the department library.

Guide

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ABSTRACT

In recent years, aluminum and its alloys are becoming more and more popular in the manufacture of automobiles and its body parts. This is due to its excellent strength, low density, thermal stability, good toughness, admirable machinability, ease of casting, better corrosion resistance and accessibility with respect to other materials. One of the most commonly used aluminum alloy for structural applications is Al 7075 alloy which has attractive comprehensive properties such as low density, high strength, ductility, toughness and resistance to fatigue. It has been extensively utilized in aircraft structural parts and other highly stressed structural applications. The present study focuses on the tensile properties of this aluminum-zinc alloy by varying the percentage of alloying elements. Taguchi method is used to optimize the number of specimens with specific composition. Experimental values are evaluated and analyzed. The results obtained in taguchi method and validated using machine learning algorithm.

Keywords: al7075, tensile property and machine learning algorithms

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
Jnana Sangama, Belgaum – 590014



**Evaluation of mechanical property of Al 7075 alloy with
Re- ageing condition.**

A PROJECT REPORT
(15MEP78)

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In Partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

in

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Under the Guidance of

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**VISVESVARAYA TECHNOLOGICAL UNIVERSITY
JNANASANGAMA, BELAGAVI – 590014
2019-2020**



“A PROJECT PHASE II REPORT”

(15MEP85)

On

**“EMPIRICAL EVALUATION OF FRP BASED
COMPOSITES”**

In Partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

In

MECHANICAL ENGINEERING

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Abstract

In today's scenario, composite like Fiber Reinforced Polymer is a standout amongst the most alluring and profitable material among all the designing materials. The reason for using these composites is their superior properties and their influential application in aerospace industries, aircraft structural components, etc. The present learning about machining of Glass – Kevlar FRP composites is in a moving stage for its ideal usage in different fields of uses in the monetary perspective. Hence, the hypothetical mechanics have ended up over whelming in this field to attain to completely mechanized substantial scale assembling cycles. Composites fluctuate in their machining direct as a consequence of their mechanical and physical properties that basically depend on upon the kind of fiber, content of fiber, alignment of fiber, and inconsistency in the matrix material.

To join components by rivets and joints the basic requirements is good quality holes, for which drilling operation is performed. Drilling of Glass – Kevlar FRP by the conventional methods is a complicated machining process, to achieve good quality hole, as glass fibers are used in the material. Likewise, composite overlays are viewed as difficult to machine materials. Drilling process is highly depended on the cutting parameters (i.e. Feed, Speed, and Drill material), tool geometry, instrument and work piece material, delamination along with torque and thrust force. Optimization is done to get the nominal measures for all parameters.

The drilling parameters like spindle speed and feed rate are improved by considering various performance qualities, such as surface roughness of the work piece, delamination occurred while drill along with thrust force. Understanding the machining behavior of the work-piece results in Least waste and defects. To evaluate thrust force and torque, motionless and active analysis of the work-piece is done. Multi-response optimization is termed as a process of opting the best suitable alternative among all the options available. Optimization of machining parameters is done to improve the product quality, as well as its productivity.

In this perspective, an attempt has been made to develop a vigorous approach for the optimization of multiple responses in Glass – Kevlar FRP composite drilling. For persistent quality change and logged off quality control, strategy of experimentation has been chosen in light of Taguchi's orthogonal configuration along with shifting procedure control constraints like, spindle speed.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
JNANASANGAMA, BELGAVI – 590018
2019-2020



“A PROJECT PHASE II REPORT”
(15MEP85)

On

“SOLAR POWERED HACKSAW MACHINE”

In partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

In

MECHANICAL ENGINEERING

Submitted By:

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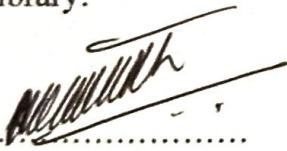


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This is to certify that the Project Entitled **SOLAR POWERED HACKSAW MACHINE** has carried out by

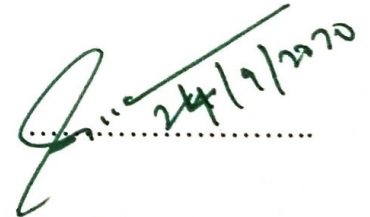
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ABSTRACT

The project is on the design and construction of a solar power hacksaw machine for cutting of metal to different size and length with the help of solar hacksaw. The objective of this project is to save manpower and time, energy in cutting metals in order to achieve high productivity. It is a cutting machine with teeth on its blade used specially for cutting material. The power to the hacksaw provided by the Solar Energy. The motor drives the flywheel connected to the shaft of the motor. The flywheel is connected through a link that transmits the required force for cutting the work piece. Finally connecting rod is connected to the vertical arm connected to the horizontal arm. Rotary motion of the shaft is converted into reciprocating motion of the hacksaw with the help of crank and connecting rod. Work piece of desired length can be cut by feeding it to hacksaw by holding it into bench vice. The various component of the machine were designed and constructed. Test was carried out on the machine using different metals. A solar panel connected to power hacksaw is considered as a solar operated power hacksaw in which sun's energy is used to drive the hacksaw order to cut wood, metal rod etc. A solar connected to the hacksaw converts the solar energy into electrical energy which is stored a 12 v battery as a direct current to run the motor connected to the hacksaw .A DC motor connected to the hacksaw which is used to give the rotary motion to the flywheel connected to the shaft of the dc motor .The energy stored in battery supplied to the dc motor which rotates the flywheel connected to the shaft of motor. The rotary ration of the flywheel is convened to reciprocating motion which gives back-forth motion to blade of the hacksaw known as scotch yoke mechanism The reciprocating motion of the hacksaw reciprocates the blade on the work piece which the cutting action. The work piece is clamped a champers to fix it. The champers is made of cast iron or mild steel. A solar power hacksaw is a cheap and environmental friendly device that is operated without the consumption of any energy other than the solar energy, Solar energy is cheap and easily available on the earth. No heavy machines or devices are required for energy conservation. Solar powered hacksaw can be used in work shop, industries, and many fields where there is a requirement of hacksaw.

Keyword- solar Panel, DC Motor, Battery, Flywheel, Mild steel.

Visvesvaraya Technological University

Belagavi-590018

2019 –2020



A

Project Phase- II

Report

On

**“Evaluation of tribological property of AL7075 alloy with
Re- ageing condition”**

Submitted in the partial fulfillment of the requirement

for the VIII Semester Project Phase- II -15ME85 for the award of degree of

Bachelor of Engineering

in

Mechanical Engineering

By

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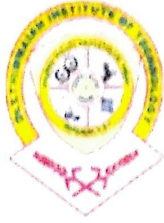
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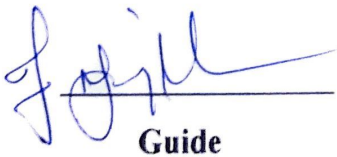


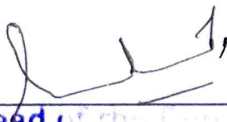
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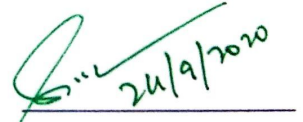
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The students of **Dr T Thimmaiah Institute of Technology** in Partial fulfillment for the award of Bachelor of Engineering in Mechanical Engineering of the Visvesvaraya Technological University, Belgaum during the year 2019-2020. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the department library.


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Head of the Department
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ABSTRACT

In recent years, aluminum and its alloys are becoming more and more popular in the manufacture of automobiles and its body parts. This is due to its excellent strength, low density, thermal stability, good toughness, admirable machinability, ease of casting, better corrosion resistance and accessibility with respect to other materials. One of the most commonly used aluminum alloy for structural applications is Al 7075 alloy which has attractive comprehensive properties such as low density, high strength, ductility, toughness and resistance to fatigue. It has been extensively utilized in aircraft structural parts and other highly stressed structural applications. The present study focus on the mechanical and tribological properties of this aluminium- zinc alloy by varying the percentage of alloying elements. Taguchi method is used to optimize the number of specimens with specific composition. Later these specimens are subjected to evaluate various Mechanical and Tribological properties. Experimental values are evaluated and analyzed. The wear test results are validated using machine learning algorithm and conclusion is drawn.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
JNANASANGAMA, BELGAVI – 590018
2019-2020



“A PROJECT PHASE II REPORT”
(15MEP85)
On

**“CHARACTERIZATION OF MECHANICAL &
TRIBOLOGICAL PROPERTIES OF AA4043”**

In partial fulfilment for the award of the degree of

**BACHELOR OF ENGINEERING
In
MECHANICAL ENGINEERING**

Submitted By:

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DEPARTMENT OF MECHANICAL ENGINEERING**CERTIFICATE**

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ABSTRACT

In recent years, aluminum and its alloy are becoming more and more popular in manufacture of automobiles and its body parts . This is due to its excellent strength, low density, thermal stability, good toughness, admirable machinability, ease of casting, better corrosion and accessibility with respect to other materials. One of the material used in aluminum alloy for structural application that is AA4043 which has attractive comprehensive properties such as low density, high strength, ductility, toughness and resistance to fatigue. It has been extensively utilized in aircraft structural parts and other highly stressed structural applications. The present study focus on microstructure , scanning electro microscope, mechanical behavior such as hardness , tensile strength , compressive strength, Tribological behavior such as wear behavior, corrosion behavior of (aluminum –silicon).

CHAPTER 1	INTRODUCTION	1-14
	1.1 Background	1-4
	1.2 Objectives of the study	1-11
	1.3 Scope of the study	1-11
CHAPTER 2	LITERATURE REVIEW	15-24
	2.1 Scope of the literature review	15-17
	2.2 Corrosion	17
CHAPTER 3	EXPERIMENTAL PROCEDURE	25
	3.1 Material and its preparation by laser cutting	25
	3.2 Sample preparation of tensile for tensile testing	25
	3.3 Preparation of samples for Charpy impact testing	25
	3.4 Preparation of samples for Vickers hardness testing	25
CHAPTER 4	CONCLUSION	26
REFERENCE		27

Visvesvaraya Technological University

Belagavi-590018

2019 –2020



**A
Project Phase- II**

Report

On

**“Study and optimization of heat transfer through fins by
variation in geometry”**

Submitted in the partial fulfillment of the requirement
for the VIII Semester Project Phase- II -15ME85 for the award of degree of
Bachelor of Engineering

in

Mechanical Engineering

By

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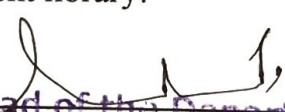
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Abstract

The main aim of the project is to analyze the thermal heat dissipation of fins by varying its geometry. Parametric models of fins have been developed to predict the transient thermal behavior. There after models are created by varying the geometry such as rectangular, cylindrical, cylindrical and rectangular and cylindrical and square. The modeling software used is CATIA V5. The analysis is done using ANSYS 14.5. Presently Material used for manufacturing fin body is generally Aluminum Alloy which has thermal conductivity of 110-150W/m-°C. We are analyzing the fins using material Aluminum Alloy 6061 which has higher thermal conductivity of about 160-170W/m-°C. After determining the material the third step is to increase the heat transfer rate of the system by varying geometrical parameters such as cross sectional area, parameter, length, thickness, e.t.c. which ultimately leads us to fins of varying shape and geometries.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
"JNANA SANGAMA", BELAGAVI - 590018.



2019-2020

A Project Report
[17MMD44]
on

**"STATIC STRUCTURAL AND THERMAL FINITE ELEMENT ANALYSIS
OF INTAKE MANIFOLD OF IC ENGINE"**

Submitted in partial fulfillment for the award of degree of

MASTER OF TECHNOLOGY
IN
MACHINE DESIGN

Submitted By

GANGARAJU

USN: 1GV17MMD01

Project Carried Out at:

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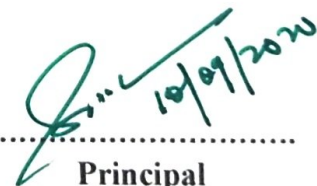
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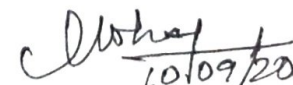
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ABSTRACT

In automotive mechanics, an intake manifold transports the air-fuel mixture to intake port evenly for proper combustion to the engine cylinders. The efficiency and engine performance improve by even distribution of air-fuel mixture. Intake manifold acts as mounting accessories for the carburettor, throttle valve, and fuel injectors of the engine.

A partial vacuum occurs in intake manifold because of throttle valve restriction during the piston downward movement during ignition. This manifold vacuum can be substantial and can be used as an auto auxiliary power source to drive auxiliary systems, cruise control equipment, pollution control, ignition forward, power-assisted braking, fuel injectors, windshield wiper systems, power windows, valves of the ventilation system, etc.

In present work modelling of intake, manifold using CATIA V5 as per company dimensions and Static structural linear analysis of intake manifold to check the structural safety and static thermal analysis to find the temperature difference with heat flux in intake manifold using finite method approach ANSYS Workbench 19.2. Fatigue Life estimation and validation of intake manifold using Goodman's diagram and ANSYS Workbench 19.2

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
JNANASANGAMA, BELGAVI – 590018
2019-2020



“A PROJECT PHASE II REPORT”
(15MEP85)

On

“Optimization of Static Structural Analysis on Wind Turbine Blade
by FEA Analysis”

In partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING
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DEPARTMENT OF MECHANICAL ENGINEERING
Dr. T. THIMMAIAH INSTITUTE OF TECHNOLOGY
OORGAUM, KOLAR GOLD FIELDS, KARNATAKA – 563120

**VISVESVARAYA TECHNOLOGICAL UNIVERSITY
JNANA SANGAMA, BELGAUM – 590018**

2019-2020



A PROJECT PHASE II REPORT

(15ME85)

ON

**“PERFORMANCE EVALUATION OF TWO STROKE PETROL
ENGINE WITH THE AID OF HYDROGEN”**

**SUBMITTED IN PARTIAL FULFILLMENT FOR THE AWARD OF THE
DEGREE OF**

BACHELOR OF ENGINEERING

IN

MECHANICAL ENGINEERING

SUBMITTED BY

- | | |
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| 1. B S CHETAN SRIVATSA | 1GV16ME007 |
| 2. KARTHICK C | 1GV16ME012 |
| 3. NOBLE V S | 1GV16ME022 |
| 4. INDUDHAR N S | 1GV12ME057 |

UNDER THE GUIDANCE OF

**Dr. NARASIMHA C
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DEPARTMENT OF MECHANICAL ENGINEERING



CERTIFICATE

This is to certify that the Project Entitled **PERFORMANCE EVALUATION OF TWO STROKE PETROL ENGINE WITH AND WITHOUT AID OF HYDROGEN** has carried out by

B.S. CHETAN SRIVATSA	(1GV16ME007)
KARTHICK C.	(1GV16ME012)
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Guide

Head of the Department
Dept. of Mechanical Engineering
HOD
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Name of Examiners

- 1.
- 2.
- 3.

ABSTRACT

The fuel that we use today is most commonly petroleum products, which is non-renewable, also these fossil fuels causes pollution, and adverse effects on environment including global warming. The challenge is to get a fuel which should be renewable as well as non-pollutant. There are many alternative fuels among which hydrogen has unique advantages like it's the most abundant element available and can be generated easily by electrolysis etc. Hence this project concentrates on generation of hydrogen from water by the process of electrolysis. Water splits into hydrogen and oxygen, hydrogen is let into the combustion chamber through the air filter of the petrol engine. As hydrogen is flammable, it gets combusted with petrol and air, which results in increase in efficiency of petrol engine, also keeping future problems in mind, the already existing petrol engine which is mostly used can be run by hybrid of petrol and hydrogen and in future completely by hydrogen.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
JNANASANGAMA, BELGAVI – 590018
2019-2020



“A PROJECT PHASE II REPORT”
(15MEP85)
On

“FABRICATION OF DUAL SIDE SHAPER MACHINE USING
SCOTCH YOKE MECHANISM”

In partial fulfilment for the award of the degree of

BACHELOR OF ENGINEERING

In

MECHANICAL ENGINEERING

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**VISVESVARAYA TECHNOLOGICAL UNIVERSITY
JNANASANGAMA, BELGAVI – 590018
2019-2020**



**“A PROJECT PHASE II REPORT”
(15MEP85)
On**

**“INVESTIGATION OF WEAR ANALYSIS ON AUTO AXLE
COMPONENT”**

In partial fulfillment for the award of the degree of

**BACHELOR OF ENGINEERING
In
MECHANICAL ENGINEERING**

Submitted By:

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CHITRA V	(1GV17ME401)
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ABSTRACT

The Project involves the detail study and investigation of wear analysis on auto axle component. Auto rickshaw are small, three wheeled vehicles which are used extensively in many Asian countries for transport of people and goods. Due to continuous running of the part (Auto axle) there is maximum amount wear occurring on that part, to reduce that wear the Analysis are going to be done in this project.

This report presents a methodology for wear analysis of auto axle component. To enhance the designing of this three wheeled vehicle part (Auto Axle). The model were made in CAD software CATIA V5 which were then imported to Simwise 4D for Multybody dynamic simulation and finallybFinite Element Analysis was done in ANSYS 14.0

At present the Auto Axle is typically made from SAE GRADE 41 steel. Also known as "Chrome-Molybdenum steel" To reduce the wear rate we use other materials. As per the observation made the stress concentration is observed which leads to failure of the part which can be taken care to reduce it. The change in the material at certain part may be one of the solution for avoiding the failure of part. Complete design of part is required by considering the load factor.

Structural design was followed by its testing and consequent validity. To analysis the axle design before construction, Finite Element Analysis could serve the purpose. While the process of solving finite element problems is a science, creating the model is quite and art conventionally in FEA, the axle is subdivided into elements, orientation and size of elements as well as loads and boundary conditions are all critical to analysis the auto axle.

Bending loads are caused by weight of the component on the Axle. Bending loads are applied normal to an axis that produce bending moment. To simulate this loads, forces will be applied in the vertical plane to simulate the bending force cause by the weights of the various components, the driver and passengers.

KEYWORDS:

Deformation, stress intensity, FEM analysis, payload

Visvesvaraya Technological University
Belagavi-590018
2019 –2020



A
Project Phase-II
Report
On

“Mechanical and Surface Properties of Su-8 Micro Composite”

Submitted in the partial fulfillment of the requirement
for the VIII Semester Project Phase-II -15ME85 for the award of degree of
Bachelor of Engineering

in
Mechanical Engineering
by

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This is to certify that the Project Entitled **“MECHANICAL AND SURFACE PROPERTIES OF SU-8 MICRO COMPOSITE”** has been carried out by.

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The students of **Dr T Thimmaiah Institute of Technology** in Partial fulfillment for the award of Bachelor of Engineering in Mechanical Engineering of the Visvesvaraya Technological University, Belgaum during the year 2019-2020. It is certified that all corrections/suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the department library.

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