



**K.S. SCHOOL OF ENGINEERING AND MANAGEMENT
MECHANICAL ENGINEERING**

CERTIFICATE

This is to certify that the project work entitled **Design & Development Of Fixed Wing Multirotor UAV For Quick Medical Response** is a bonafide work carried out by


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YASHWANTH B S	1KG19ME414

in partial fulfillment for the award of **Bachelor of Engineering in Mechanical Engineering** of **Visvesvaraya Technological University, Belagavi**, during the year 2021-2022. It is certified that all the suggestions indicated during internal assessment have been incorporated in the report and this report satisfies the academic requirement with respect to **Project Work (18MEP83)** prescribed for the degree.


Guide

Head of the Department


Principal

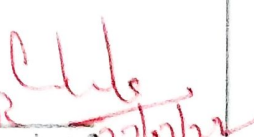

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ABSTRACT

The present automotive industries are focusing on developing such aerial vehicle which operates with minimal human interaction and in a more stable manner.

VTOL is one of the technologies which fulfils these requirements. Due to their high payload capacity and automation with sensors make them more suitable for applications like military, rescue tasks, delivery task and aerial photography. The use of these UAVs is more economic than using a manned aircraft for a certain application.

In this project we are focusing on, a VTOL UAV system design, build, and fly a quadcopter mode and aircraft mode considered for transportation of medicines & health care products through the developed UAV. Providing a quick medical response.



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**K.S. SCHOOL OF ENGINEERING AND MANAGEMENT
MECHANICAL ENGINEERING**

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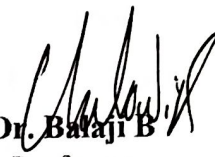
in partial fulfilment for the award of **Bachelor of Engineering in Mechanical Engineering** of **Visvesvaraya Technological University, Belagavi**, during the year 2021-2022. It is certified that all the suggestions indicated during internal assessment have been incorporated in the report and this report satisfies the academic requirement with respect to **Project Work (18MEP83)** prescribed for the degree.

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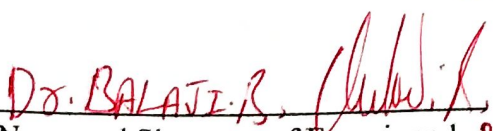

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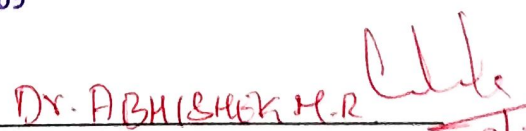

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ABSTRACT

In larger cities, quality of indoor air is completely affected due to growing industrialization that pollutes the air we breathe with contaminants like industrial dust, smog and other particles from traffic. The solution from a user perspective is to use an air purifier that cleans the air from these particles inside the user's home. An air purifier can also be used to ease annoyance for people suffer from allergies.

However, most of air purifiers available in the market are very costly and filters used are onetime use filter that eventually ends up In landfill, which becomes tides work to replace the filters more frequently In this concern, our project aims in developing and fabricating a lowcost air purifiers for indoor operated by solar energy. The air purifier model uses two filters one is activated carbon tubes, which can be reused after easily cleaning and other filter is made by natural ingredients, available in home but this has to replaced frequently and process of replacing is also is easy.

This Air Purifier is uses natural fibres & powered by solar energy results in less cost. Air quality achieved has been improved and is within the WHO standards.



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**K.S. SCHOOL OF ENGINEERING AND MANAGEMENT
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This is to certify that the project work entitled “DESIGN AND FABRICATION OF LOW EFFORT RUNNING CYCLE” is a bonafide work carried out by


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Guide

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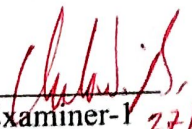
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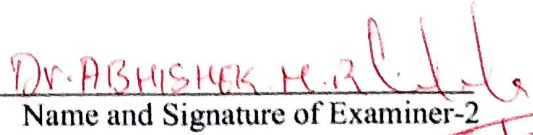

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ABSTRACT

Being Healthy is one of the most basic concerns of all human beings. People these days with advancement in technology have mostly forgotten to be fit and healthy. People believe that the advanced hospitality available in the market can easily cure them from any disease. It is sure that available medicines and technology in the market can cure any disease. Elders believe in the say that "Prevention is the better than cure". Yes, the word is true prevention of any disease is better than its cure. If we talk about daily facing problems, related to health, the word obesity comes to our mind. Obesity is defined as a problem related to overweight in humans. Obesity occurs mainly because of two reasons. Nowadays due to busy schedule people don't even get a chance to think of exercising. Although a few people exercise, they are just in countable numbers.

Many companies have developed many exercising equipment's such as cross trainers, treadmill, etc. In spite of so many exercising equipment's in the market people don't go for it because of their cost which tends as a burden to them and the time spent on that. So, to overcome this problem we have built an automobile type exercising equipment named "Low effort running cycle". This cycle is an automobile type exercising equipment as it even travels with exercising. This equipment is actually a combination of a cross-trainer and a bi cycle, i.e., the motion of cross trainer is collated with a bi-cycle to make it an automobile type exercise equipment.

The equipment is provided with kinematic link, i.e., the linear motion is converted to rotary motion. In simple words, a person walks on the pedal mounted on the connecting rod which creates a linear motion. The kinematic link is provided from the connecting rod to the sprocket, this kinematic link provides the rotary motion of the sprocket which is mounted behind the cycle. A chain link is used to transmit the torque from the sprocket to the wheels.

The materials used in making the cycle is so economical that even a common person can buy it. The cycle is of portable type. The entire weight of the cycle is comparatively less than a separate cross-trainer. Bearings are provided for the friction free moment. The angle of inclination provided to the block gives a comfort of walking on it. Guideways is used inside the block so that any wear and tear occurring should not affect the block.



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ABSTRACT

An electric powered incubator using a forced draft principle was developed using the available local materials and it was tested with hatchable hen egg. The aim was to produce a low cost incubator and increase the production of day old chicks for small and medium scale poultry farmers. The incubator has the hatching capacity of 40 eggs. Factors that were considered during the performance evaluation of the incubator were humidity, 55% and temperature, 37 °C during the first 18 days and was maintained at 37.5 °C till hatching. Turning of eggs was achieved with the use of tilting trays mechanism using an electric gear motor (0.5 h p). The trays were lifted through an angle of 40 ° either side of horizontal at every hour and lasted for four minutes.



**K.S. SCHOOL OF ENGINEERING AND MANAGEMENT
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CERTIFICATE

This is to certify that the project work entitled **Investigation of Mechanical Properties of Aluminum 6061 Matrix Composites Reinforced With Nano Gr Particulates Using Stir Casting Process** is a bonafide work carried out by

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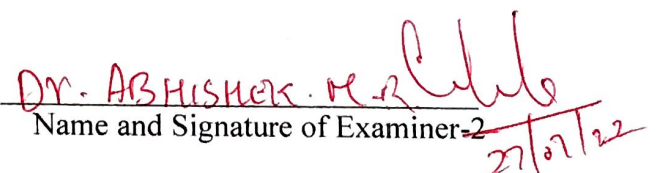


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ABSTRACT

The growing requirement for the product having low cost along with excellent quality has moved work towards composite materials in recent years. Composite materials are very important materials nowadays. A composite material is the mixture of two or more materials, which are having distinct phases and characteristics as well as superior to the base material. Metal matrix composites (MMCs) are constantly evolving due to innovative and exciting technologies and are widely used as well as recognized as a potential material for many industrial applications in various industries. MMCs are having excellent properties in comparison with conventional metals and alloys, in MMCs, a new class of composites, aluminium metal matrix composites (AlMMCs) are gaining increasing attention, AlMMCs are very important for a wide array of applications in industries because of excellent mechanical characteristics, low weight and cost. In the production of MMC materials, there are several production methods available as well as AlMMCs also can be manufactured through a variety of techniques. By changing the methods of the fabrication process and by adding the reinforcement material, different characteristic profiles can be obtained although the materials having the same composition and same quantities. Among several methods to fabricate Aluminium metal matrix composites, stir-casting technique is used for large-scale production due to its being less expensive. This research is concerned with the fabrication of Aluminium composites with Gr nano particles at different volume fraction (0, 0.5, 1, 1.5 and 2 wt.%) as reinforcement material, for sake of producing a cost-effective composite with enhanced properties. The microstructural observation was carried out using optical and scanning electron microscopy. Tensile Strength was escalated with the introduction of reinforcement as load is transferred to strongly bonded reinforcement particles. Al6061/2 wt.% Gr Nano particles AMC exhibited 168.29% higher microhardness and 43.69% and 45.19 % higher YTS and UTS respectively compared to unreinforced Al6061 alloy. The reduction in toughness and elongation were attributed by 3.23 J and 6.44% respectively. Compressive test analysis revealed that there was an improvement of compressive strength from 322 MPa (alloy matrix) to 628 MPa (at 2 wt.% Gr Nano particles). The forgeability test disclosed that due to the presence of hard and brittle nanoparticles (Gr Nano particles), the forgeability property of the fabricated nanocomposite deteriorated on employing Gr Nano particles. SEM and XRD were done and the presence of reinforcing particles was confirmed. The interface bonding mechanisms and strengthening mechanisms were studied in detail.



**K.S. SCHOOL OF ENGINEERING AND MANAGEMENT
MECHANICAL ENGINEERING**


CERTIFICATE

This is to certify that the project work entitled "A Study On Effect Of Inorganic Nano Filler On Wear Behaviour Of Glass Fiber Reinforced Polymer Nanocomposites" is a bonafide work carried out by

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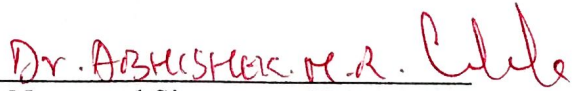

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ABSTRACT

Nanocomposites are new composite materials in which the Polymer material is reinforced by one or more separate nanomaterials in order to improve performance properties. Polymer nanocomposites are another class of material in which inorganic nanoparticles are joined with polymer matrix enhance mechanical, fire and temperature resistance properties. Such change in the properties happen as a result of their predominant phase morphology and more prominent interfacial properties. The most generally utilized nanoparticles are nanotubes, nano clay, silica particles and electro-spun polymeric nano-strands.

In this work an improvement in microhardness value was observed in the all-nanoparticles G+E nanocomposites. This may be attributed to the high intrinsic hardness of the glass fiber and nanoparticles. During indentation, nanoparticles fill in the gap between the fibre and the matrix and form a denser structure. And Addition of nanoparticles in G+E nanocomposites increases the both tensile strength and modulus due to uniform dispersion an interaction developed between filler with fibre-matrix. Thus, the improved properties of the prepared nanocomposites. In this project we can conclude that composite G+E-III has better mechanical properties than any other composites.



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**K.S. SCHOOL OF ENGINEERING AND MANAGEMENT
DEPARTMENT OF MECHANICAL ENGINEERING**

CERTIFICATE

This is to certify that the project work entitled **Experimental Analysis of Heat Exchanger with Perforated Discs Inserts using MWCNT** is a bonafide work carried out by

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ABSTRACT

Heat exchanger is a device which transfers the energy from a hot fluid medium to a cold fluid medium with maximum rate, minimum investment and low running costs.

Perforated discs are provided to improve the capabilities of double pipe heat exchangers. Typically, one or more tubes or binding posts pass through the discs. The discs are attached to the tube or post by press fitting, furnace or torch brazing, welding, or other method of mechanical bonding. The perforations allow heat exchange with the contents of a tube of a fluid flowing essentially parallel to the axis of the tube, in contrast to conventional disc-tube heat exchangers.

The idea behind development of nanofluids is to use them as thermo fluids in heat exchangers for enhancement of heat transfer coefficient and thus to minimize the size of heat transfer equipments. The important parameters which influence the heat transfer characteristics of nanofluids are its properties which include thermal conductivity, viscosity, specific heat and density. The thermo physical properties of nanofluids also depend on operating temperature of nanofluids. Hence, the accurate measurement of temperature dependent properties of nanofluids is essential. This project summarizes recent developments in research on nanofluids and experimental analysis of nano fluids and their results.

The main objective of the present work includes preparation of the nanofluids using Multi Walled Carbon Nano Tube (MWCNT) and composition of carbon nano tubes by dispersing in base fluid as distilled water. The nanofluid is expected to produce better thermal properties compared to individual base fluid. The prepared sample is used as a heat transfer fluid in the double pipe heat exchanger inserted with perforated discs. Performance analysis of the heat exchanger is carried out to determine the heat transfer rate and effectiveness in parallel and counter flow orientation. The results obtained are compared with the performance of base fluid and suitable conclusions are drawn.



K.S. SCHOOL OF ENGINEERING AND MANAGEMENT
Department of Mechanical Engineering

CERTIFICATE

This is to certify that the project work entitled Experimental investigation of forced convection heat transfer through solid and perforated fins is a bonafide work carried out by

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ABSTRACT

Fins are extensions on exterior surfaces of objects that increase the rate of heat transfer to or from the object by increasing convection. This is achieved by increasing the surface area of the body, which in turn increases the heat transfer rate by a sufficient degree. This is an efficient way of increasing the rate, since the alternative way of doing so is by increasing either the heat transfer coefficient (which depends on the nature of materials being used and the conditions of use). Fins are therefore a very popular solution to increase the heat transfer from surfaces and are widely used in a number of objects.

The fin material should preferably have high thermal conductivity. These fins are arranged in an order in such a way that the heat dissipated by a system will immediately enter into the surroundings with the help of perforated fins.

Perforated fins are a set of fins arranged in an order with holes on it to make the system run without any disturbance. The main objective of this project is to develop keyways onto a block of Aluminum that provides flexibility in heat transfer through fins arranged in a sequence order. This is mostly useful in electronic system with slow running capacity. Extending fins improve the rate of heat transfer or increase convection.

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Department of Mechanical Engineering

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This is to certify that the project work entitled "Experimental Investigation on Performance Analysis of a VCR with Nano-Refrigerant" is a bonafide work carried out by

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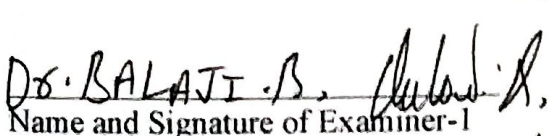
are the bonafide students of Department of Mechanical Engineering in partial fulfilment for the award of Bachelor of Engineering in Visvesvaraya Technological University, Belagavi, during the year 2018-19. It is certified that all the suggestions indicated during internal assessment have been incorporated in the report and this report satisfies the academic requirement in respect of project work prescribed for the degree.


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ABSTRACT

Performance enhancement of refrigeration is an emerging research topic recent technological developments in the fields of electronics, transportation, medical and HVAC systems have resulted in a pressing need for a performance enhanced cooling system. Now days, refrigeration has become one of the most important systems for people's daily lives. Based from some research, the use of refrigeration & air conditioning systems consumes 30 to 40% of total electricity consumed. The traditional method for increasing heat dissipation is to increase the area available for exchanging heat, However, this approach involves an undesirable increase in the size of a thermal management system; therefore, there is an urgent need for new and novel coolants with improved performance. The innovative concept of 'nanofluids' heat transfer fluids consisting of suspended of nanoparticles has been proposed as a prospect for these challenges. In this review, we summarize the Performance enhance of Vapour Compression System Using Nanofluids. Moreover, challenges and future directions of Performance enhance of VCRs and to try finding some challenging issues that need to be solved for future research.

The use of conventional refrigerants such as R600a (Methyl propane) and R134a (Tetrafluoroethane) in domestic refrigerators has led to a continuous increase in global power consumption as well as the rate of global warming. In recent times, more efficient and eco friendly working fluids are being sought after. This work investigated the effectiveness of a monometallic nanofluids; Aluminium Oxide (Al_2O_3) when used with refrigerant R134a refrigerant in vapour compression refrigerators. The nano-refrigerants were used in a vapour compression refrigerator without any system reconstruction. The refrigerator performance was then investigated using energy consumption test and freeze capacity test. The results indicated that the performance of three nano refrigerants when used in the vapour compression system, surpassed that obtained when the pure R134a and Aluminium Oxide (Al_2O_3) were used. The best refrigerator performance was however achieved with R134a – Al_2O_3 with 15.9% less power consumed and about 6.62 % more COP overall compared to the R134a working fluid.

2021-2022



K.S. SCHOOL OF ENGINEERING AND MANAGEMENT MECHANICAL ENGINEERING

CERTIFICATE

This is to certify that the project work entitled **analysis on Friction Stir Welding of Al 5052 and Al 7075 using hexagonal tool Profile** is a bonafide work carried out by

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SUHAS M 1KG17ME038

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ABSTRACT

Friction stir welding is a solid-state welding process that involves joining similar or dissimilar metals using a rotating tool. Tool geometry and traverse speed and rotating speed of motion of the tool, tool axial force, and tilt angle are some of the variables in this process. Friction stir welding of aluminum alloys has been conducted for the past 20 years. A non-consumable tool with a pin is made to traverse through the joint line of the material to be joined. Heat is produced due to friction between tool shoulder and workpiece which softens the material around the pin and produces a few microstructural changes in and around the weld zone. The resultant microstructure of the weld cross-section, the size, and distribution of the precipitates in the case of precipitation strengthened alloys, mechanical properties of the weldment, and other microstructural features are dependent on the welding parameters, tool dimensions, initial microstructure of workpiece material, and temperature distribution during welding.

We have chosen Aluminium 5052 and aluminium 7075 as our dissimilar aluminium materials at the rotational speed of tool 1000 rpm and feed rate of 40 mm/min and 50 mm/min using hexagonal tool profile.

Tribological testing of the Friction stir welded joints are taken into consideration and compared to both the feed rate.



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ABSTRACT

Friction stir welding is a solid-state welding process which involves joining similar or dissimilar metals using a rotating tool. Tool geometry and traverse speed and rotating speed of motion of the tool, tool axial force and tilt angle are some of the variables in this process. Friction stir welding of aluminum alloys has been conducted for the past 20 years. A non-consumable tool with a pin is made to traverse through the joint line of the material to be joined. Heat is produced due to friction between tool shoulder and workpiece which softens the material around the pin and produces a few microstructural changes in and around weld zone. Resultant microstructure of the weld cross-section, the size and distribution of the precipitates in the case of precipitation strengthened alloys, mechanical properties of the weldment, and other microstructural features are dependent on the welding parameters, tool dimensions, initial microstructure of workpiece material, and temperature distribution during welding.

We have chosen Aluminium 5052 and aluminium 6061 as our dissimilar aluminium materials at the rotational speed of tool 1000 rpm and feed rate of 40 mm/min and 50 mm/min using hexagonal tool profile.

Tribological testing of the Friction stir welded joints are taken into consideration and compared to both the feed rate.