TECHINICAL ARTICLE
OF SCIENCE AND MECHAICAL ENGINEERING

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MESSAGE FROM PRINCIPAL'S DESK

It brings me immense pleasure to extend warm greetings to each of you through the pages of our esteemed magazine. As the principal of JSPM's Bhivrabai Sawant Polytechnic Wagholi Pune, I am continually inspired by the remarkable achievements and contributions of our students. Within the vibrant walls of our institution, we witness the blossoming of young minds, each brimming

n. It is this very essence that propels us forward,

nt where creativity, intellect, and character flourish harmoniously. In this edition, I invite you to delve into the stories that reflect the diverse talents and endeavors of our students. From academic triumphs to artistic endeavors, athletic feats to acts of service, each narrative encapsulates the spirit of excellence that defines our school community. As we celebrate these accomplishments, let us also acknowledge the dedication and guidance of our exceptional faculty and staff. Their unwavering commitment to nurturing the next generation of leaders is truly commendable and serves as the bedrock of our collective success. Moreover, I extend my heartfelt gratitude to our supportive parents and guardians, whose encouragement and involvement play an integral role in our students' journey towards greatness. In closing, I encourage you to explore the pages of this magazine with a sense of pride and admiration for our students and the community that surrounds them. Together, we continue to inspire, innovate, and ignite the flame of knowledge that illuminates the path to a brighter future.

-Dr. Kale P.T. (Principal)

HOD DESK

There are numerous career opportunities for **Mechanical Engineers** in government organizations, private industries, and public sector undertakings. Mechanical engineers play a vital role in diverse sectors such as **automobile, manufacturing, power plants, aerospace, defence, robotics, industrial automation, renewable energy, HVAC, and production industries**. They contribute to the design, development, manufacturing, maintenance, and operation of modern machines and industrial systems.

Today, rapid technological advancements, industrial automation, Industry 4.0, sustainable manufacturing, and environmental concerns are creating new challenges and opportunities for mechanical engineers. The coming years will be highly innovative, demanding, and rewarding for aspiring mechanical engineers.

The **Department of Mechanical Engineering** maintains strong connections with industries through **industrial visits, training, expert lectures, internships, projects, and industry-oriented activities**. Students are encouraged to participate in **co-curricular and extracurricular activities**, which help develop technical knowledge, teamwork, leadership qualities, communication skills, creativity, and organizational abilities essential for successful professional careers.

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Sr no	TITLE OF AN ARTICLE	Authors
1	Design & Fabrication of Multi Nut Removing And Tightening Tool For A Car Wheel Fuel	LOKARE SAI[1], KALPNA PAWAR[2]
2	MINI CONVEYOR USING GENEVA MECHANISM	KAJBE SAKSHI1, JAWALE PREM2
3	Biogas Use as Fuel In Spark Ignition Engines	RASKAR UMESH1, SHIVLE GAURANG2,MANE AKSHAY3
4	A Review on Vibrational Analysis of Bicycle Chassis	BHOSURE NIKHIL1, BHUSARE YASH2
5	DESIGN, CAD MODELING & FABRICATION OF AUTOMATIC HAMMERING MACHIN	RATHOD NISHANT1, MAHALE UDAY2
6	ADDITIVE MANUFACTURING: FUTURE OF ENGINEERING	GAURAV KOKATE1 , SHINDE SHREEYASH2
7	DESIGN AND PROTOTYPING OF A LOW-COST PORTABLE MECHANICAL VENTILATOR	DHAKNE DNYANESHWAR1,SANAP SONALI2
8	TURBO JET ENGINE, A REVIEW	SHINDE DIPAK1, WADGHULE ADESH2
9	MINI HACKSAW POWERED BY BEAM ENGINE	SATDIVE ABHISHEK1,POKALE OMKAR2
10	DESIGN AND FABRICATION OF AIR DRIVEN VEHICLE	PAWAR NIKHIL1,PAWAR SHUBHAM2
11	AUTOMATIC BAR FEEDING AND CUTTING MACHINE	SHINDE DIPAK1 WADGHULE ADESH2
12	ADVANCED FOOTSTEP POWER GENERATION SYSTEM USING RFID FOR CHARGING	SHINDE SAMIKSHA 1BHISE TEJAS2

1.Design & Fabrication of Multi Nut Removing And Tightening Tool For A Car Wheel Fuel

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Abstract

The main aim of the project is to design and fabricate a four-wheeler nut removing tool for constriction and removing of four nuts in single time. With the increment of number of car on the road, the number of cars problem due to tyre failure has increased. Often, the car is provided with tyre wheel nuts remover and jack for instance spare tyre replacement. However, due to difficulty in smearing torque to remove nut and to save a time. A tool having a gear planetary mechanism is developed. The main objective of work is to develop a single tool, which can be made use during assembling and disassembling of wheels in automobiles. It can be successfully used as standard tool nevertheless of the model of the vehicle. Also, it can be used garages, workshops and service stations. The remover is designed to be ergonomic to be used, easy maintenance, easy storage, easy to handled and able to remove all nuts at once.

Introduction

Vehicle is an important machine in human daily life. Nowadays, each family has at least one car to make the transportation easier and faster. For a car, the tool set-up for each vehicle is a T-nut wrench and car jacker which is hard to use for a women or teen to open their car's nut. One of the problems of a vehicle is tire problem. If the vehicle tires have some problem then the user must remove the tires and fix the problem. And for a car user, it's difficult to remove tire's nut especially for women users. The disadvantages are waste of time and force needed. In India and other countries automotive market there is no tool that is easy to use to remove the nuts. The time to open a car's tire nut is too long and the car user's time is wasted with utilization of high force and especially this is big hurdle for women users. To overcome the waste of time and high force needed, a tool have been designed to remove four nuts of a tire in single time with decremented applied force.CAR is not a symbol of luxury anymore. It is a need for every family. People need car due to several reasons. Some of them are, to go

to a destination, to travel conveniently, to do daily job and to move things to a greater distance. The problem occurs the most during car operation is the problem with tire puncture. The punctured tire needed to be replaced with spare tire. Therefore, drivers need to know basic knowledge of tire replacement procedure if such problem occurs. In order to change the tire, one requires minimal skills. Virtually every car has a tire replacement tools such as the L-shaped nut remover and jack supplied by the manufacturer [1- 5].

Literature

Known torque-responsive power screw drivers which are driven by electric motors or pneumatically have a relatively high speed of rotation in order to obtain a short screwing in time. Since the maximum moment of tension for the screw to be screwed requires a determined torque, the driving power of the screw driver must likewise be made high in accordance with the relatively high speed of rotation, although a high torque is required for only a short time during the tightening of the screw, unless some shock action is utilized for the purpose of producing this peak degree. The limitation of the degree of tightening of the screw is usually effected by means of ratchet couplings or striking mechanism. When screwing in expansion screws, this degree of tightening must be kept constant within very narrow, since these screws, are stressed almost to their yield point during screwing in. Torque-responsive screwing drivers having a shock effects are useless for this purpose[5-10]. The degree of tightening achieved is greatly dependent on the number of blows applied, which however cannot be kept constant because of the rapid succession of blows, while in addition the power of the individual blow is variable within wide limits because of the indeterminable reaction of work piece, screw and screwing tool on the striking operation. In addition, the shock effect causes rapid wear on the striking surface, which results in a considerable variation of the face of the blows and a relatively short life of the Torque-responsive screwdrivers having striking mechanisms are impractical where accurate tensioning of a screw is necessary. It has moreover been found that, at the high speeds used, ratchet couplings also apply a powerful shock action and are therefore likewise unsuitable for tightening expansion screws.

Conclusion

We have introduced one product that is four- wheeler multiple-opening spanners for tightening and removing of the four nuts in a single stroke of a hand operated lever. We have developed a gear

planetary mechanism to reduce the time and effort of the person. In our project we have tried to focus on the minimization of human effort and time consumed for fixing all four nuts of the ø112mm PCD tire with a single stroke of lever. It can be successfully used as a standard tool provided with a new vehicle. Also, it can be used in assembly line of automobiles, workshops and service stations.

Future Scope

i. The multi nut remover is fixed to certain model of the car so in further work we will change the tool into adjustable type which can be suited for any model of the car.

ii. ii. We will try to reduce the cost of the model in further work.

iii. iii. The weight of the model is heavy so in future we will try to reduce the weight by fabricating the model with different lightweight materials.

iv. Now operating energy of the model is mechanical energy so in further step we will try to arrange motor to rotate the tool.

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2.MINI CONVEYOR USING GENEVA MECHANISM

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Abstract-

Geneva mechanism is a system to convert continuous circular motion into fixed step circular motion. Fixed step circular motion in other words means a circular motion produced in equal spaces of time and resulting in the same displacement which is a requirement in many automation industries. A conveyer belt is simply a linear belt mostly made up of rubber (of greater stability). It has a basic function of transporting raw material/ material in process of manufacturing. A simple Geneva mechanism consists of a drive wheel and a driven wheel. The drive wheel is a disk with a pin or a shaft near it's circumference. The driven wheel consists of several slots. The drive wheel is kept next to the driven wheel in such a way that when the drive wheel is rotated, the pin or shaft fits inside the slot. As it reaches the bottom most point of the slot, the pin exerts a force on the driven wheel. As the driven wheel is pivoted from the Centre, there will be a generation of a moment. This causes the generation of a torque which rotates the driven wheel. Hence there is a fixed step circular motion. There are several types of Geneva rotator such as external Geneva rotator, internal Geneva rotator and spherical Geneva rotator. Geneva mechanism is one of the most simple and inexpensive mechanisms. The mechanism used for conveyer belt is an external Geneva mechanism. This mechanism gives out production of jerks or instantaneous change in acceleration. The mechanism has various applications in many industries especially the automation/automobile industry. Modern day film projectors use a variation of this mechanism to power a motor which is used for fast forwarding. In short the Geneva mechanism converts continuous rotatory motion of the drive wheel to intermittent rotatory motion of the gear. A cheap, convenient and a simple mechanism with a variety of applications.

Keywords: Conservation of Energy, Speed Control.

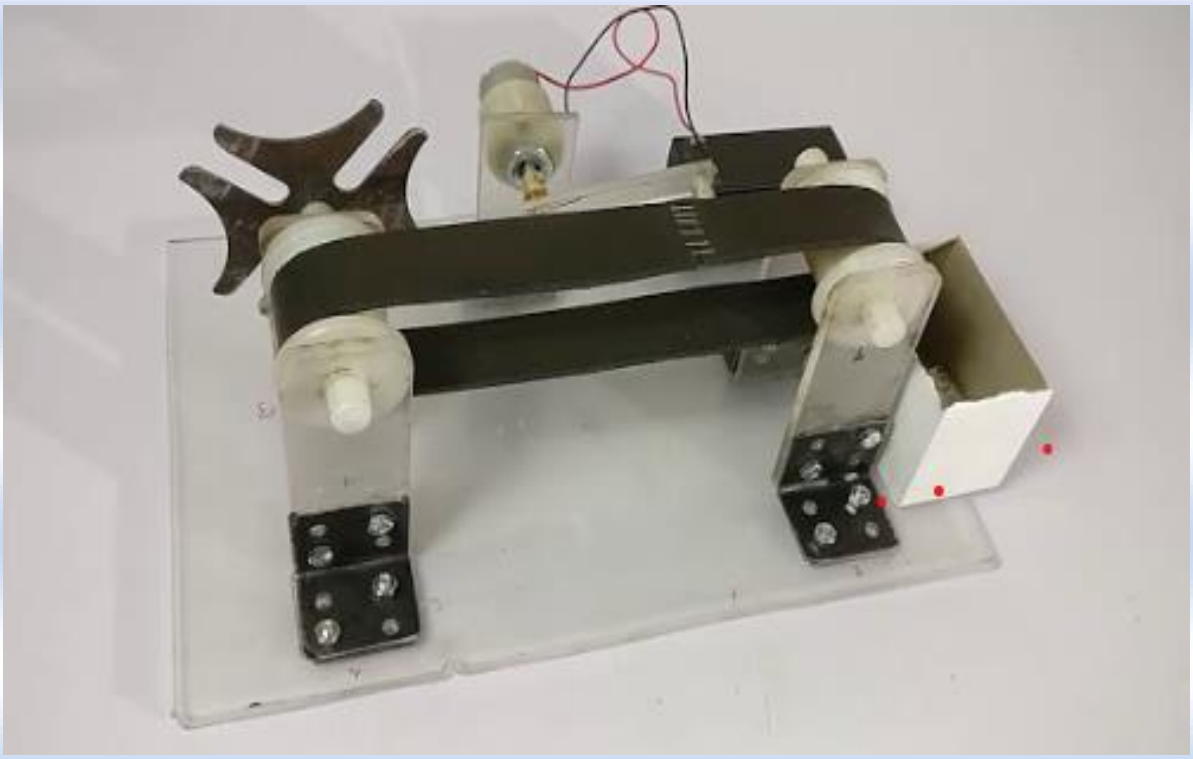
1. Introduction

The Conveyor Belts are used in Industries to carry heavy objects or material from one place to

another place. They are heavily used in all fields. But the conveyor belts require a lot of energy to work. Geneva drive is a gear mechanism that converts a continuous rotation into an intermittent rotatory motion. The rotating drive wheel has a small rod that reaches into a slot of wheel advancing it by one step or round. The drive wheel also has a raised circular disk used for blocking that is it locks the wheel in position between the steps. Nowadays the conveyor made using Geneva mechanism holds a very important place in factories as the Geneva mechanism has many advantages. It is the simplest and most economical system in all intermittent motion mechanisms and thus is of great advantage in current time. They have various sizes and are used in automobile industry, electronic industry, building sites, film projectors, etc. The most important advantage in the conveyor belt using Geneva mechanism is that we can control the speed and direction of the belt by just adjusting the length of the rod attached to the servo motor being used. In this paper, we will discuss about the working, applications and advantages of Geneva mechanism by making a conveyor belt following Geneva mechanism principle.

Working

The Geneva mechanism is a system to convert continuous circular motion into fixed step circular motion. Fixed step circular motion in other words means a circular motion produced in equal spaces of time and resulting in the same displacement. Simple Geneva mechanism consists of a drive wheel and a driven wheel. The drive wheel is a disk with a pin or a shaft near it's circumference. The driven wheel consists of several slots. The drive wheel is nothing but a motor which has a plastic rod with a small rod extruded at its apex. The drive wheel is kept next to the driven wheel in such a way that when the drive wheel is rotated, the extruded rod fits inside the slot. As it reaches the bottom most point of the slot, the rod exerts a force on the driven wheel. As the driven wheel is pivoted from the centre, there will be a generation of a moment. This causes the generation of a torque which rotates the driven wheel. Hence there is a fixed step circular motion. The mechanism used for conveyer belt is an external Geneva mechanism. This mechanism gives out production of jerks or instantaneous change in acceleration. In short the Geneva mechanism converts continuous rotatory motion of the drive wheel to intermittent rotatory motion of the gear.



Conclusion

Geneva mechanism is the simplest and least expensive of all intermittent motion mechanisms. They have a huge variety of sizes, with various applications. They have a better motion curve characteristics compared to ratchets. They are very useful in production, automobile and electronic industries for mass production. Thus, the use of Geneva mechanism in conveyor belt helps in saving excess energy and control the speed of conveyor belt and making the production and handling comfortable.

Acknowledgements

We consider ourselves fortunate to get Prof. (Dr.) S.V. Mukkawar as a guide for our semester project. We thank him for his invaluable guidance. This project would have been difficult without the guidance of Mukkawar sir. We are thankful to our college and the department for giving us the opportunity to do something new. Thus, we thank Honourable Director Dr. Rajesh Jalenekar and Prof.(Dr.) C.M. Mahajan, H.O.D. Deshmukh for their support for our project.

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3.Biogas Use as Fuel In Spark Ignition Engines

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Abstract –

This paper reviews the utilization of biogas in spark ignition engines with a view to making a case for it as an efficient substitute fuel for petrol. However, its gaseous nature which accounts for its low volumetric density implies that apart from the basic modification needed to accommodate the fuel, the engine might need further alterations to get the best from this relatively low cost and readily available fuel. Various modes of enhancing performance particularly methane enrichment, prechamber combustion, alteration of ignition parameters, increasing compression ratio and addition of hydrogen to improve performance and emissions were drawn from previous works to validate its efficiency as a viable substitute fuel in SI engines. Keywords - Biogas, Spark ignition engines, Substitute fuel.

Introduction

The over dependence of humans on fossil fuels to improve their standard of living has led has led to massive depletion of these resources. We are currently past the peak production of these resources with reserves expected to be exhausted in few decades. Exploration, production and utilization of these fuels have directly caused global warming and pollution. The transport sector has felt the pinch more with unstable fuel prices and governments continuing to set stricter fuel and emission standards. The transport sector consumes the largest fossil fuel portion after the industrial sector and accounts for a considerable percentage of the world's total greenhouse gas emissions [1]. 98% of the total energy used to power the different modes of transportation is from fossil sources [2]. The sector recently turned to natural gas which could be adapted to work in conventional spark ignition (SI) and perform better in dedicated engines. Natural gas though cheap, readily available and performs efficiently in internal combustion engines (ICE) is still of

fossil origin [3, 4]. Hence, the need for a renewable substitute fuel to power our internal combustion engines. Biogas, hydrogen and ethanol have been front runners in SI engine alternative fuels [5]. Hydrogen is often regarded as a futuristic fuel and its technologies are

currently very expensive, ethanol on the other hand has been accepted for use more as an additive and is plagued by the food versus fuel argument, leaving biogas as a very viable candidate fuel. Biogas has a lower cost per unit energy when compared to petrol and hydrogen and can be upgraded to natural gas quality to be used in the already established natural gas vehicle market and systems [1, 6].

Biogas Production

Biogas is a clean and renewable energy source, produced from the anaerobic digestion of a wide range of feedstock including wastes. Substrates may include diverse range of biomass, biodegradable waste. It is also generated from landfills and swamps. The bacteria which facilitates the process thrives within 250 C - 400 C (mesophilic temperatures) and 500 C - 650 C (thermophilic temperatures) [7]. The production through feedstock is done in controlled environments in anaerobic digesters (AD) and the quality of the biogas produced is determined by its methane content which is usually from 40% - 75% methane with carbon dioxide between 15% - 50% and other constituents taking minimal percentages. The digestion process is in 4 phases which are hydrolysis, acidogenesis, acetogenesis and methanisation [1]. The closer the methane content of the biogas produced is to natural gas the better its performance in spark ignition engines [5]. Biogas may be upgraded and cleaned by separating every other constituent from combustible methane as they have adverse effect on the engine and the biogas's burning properties. The purification process to create biomethane (methane enrichment) improves biogas's driving distance per unit volume while reducing the fuels affinity to corrode or damage engine components. The Burning of raw biogas directly in SI engines would require alteration of the engine's working parameters or change of components to accommodate unwanted constituents to make it perform as good as petrol [8]. Biogas is compressed to overcome storage requirement, improve volumetric density while easing handling and transportation. It is stored at 200-250 bars in pressure cylinders made from low cost steel and aluminum to more expensive metal and plastic liners wrapped with

composites made of glass and carbon fibre for weight reduction. Biogas could also be cryogenically cooled at - 1610 C to improve volumetric density [1].

Biogas In SI Engines

Biogas is combustible in internal combustion engines, with simple modifications necessary on basic spark as their actual designs can accommodate the burning of biogas as a fuel to produce the energy required. Biogas, due to its high octane rating (MON=130), can attain higher compression ratios without knocking, allowing better engine performance [9, 10]. A very important factor to note in the utilization of biogas in SI engines is its wobbe index, which is the main indicator of the interchangeability of gases. Similar Wobbe indices signify that the gaseous fuels could be interchanged for a given pressure and valve settings with similar energy output [11]. However, a variation of 5-10% in performance is accepted [12].Biomethane like natural gas is interchangeable with gasoline in conventional vehicle engines [9]. $Q \div \sqrt{d} = W$. (1) Wobbe index (W) is a function of the heating value as shown in equation 1.0 where (Q), also known as the calorific value is the amount of heat energy released when a given amount of fuel burns divided by the square root of its relative density (d). For biogas, the calorific value is directly proportional to its methane content, hence the need to ensure the efficiency of the AD. In fuels there are higher and lower heating values (HHV and LHV) and the efficiency of the engine when burning gaseous fuel is determined by these values. Biogas in its purer state (more than 95% methane) has calorific values similar to that of natural gas and can be used in all existing natural gas applications [13]. Comparisons have been drawn in the performances of enriched biogas and natural gas at constant speed internal combustion engines with the experiments reporting similar engine performance in terms of brake power output, specific gas volume, thermal efficiency, fuel economy and emissions [11, 14]

Conclusion

Biogas is a very efficient, sustainable and environmentally friendly fuel which performs optimally in modified spark ignition engines tuned with its specific properties in mind. It can be enhanced by methane enrichment or the addition of hydrogen to improve its flame quality.

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4.A Review on Vibrational Analysis of Bicycle Chassis

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Abstract

It is important to recognize that the design of any machine is an interdisciplinary process, involving aerodynamics, thermodynamics, fluid dynamics, stress analysis, vibration analysis, the selection of materials, and the requirements for manufacturing. The operation of any mechanical system will always produce some vibration. Our goal is to minimize the effect of these vibrations, because while it is undesirable, vibration is unavoidable. The result of excess vibration can vary from nuisance disturbance to a catastrophic failure. Bicycle chassis is a major component in a system. This work involves vibration analysis to determine the key characteristics of a bicycle chassis. The dynamic characteristics of bicycle chassis such as the natural frequency and mode shape were determined by using finite element (FE) method. Al material will replace the conventional MS material. Experimental modal analysis was carried out to validate the FE models. Predicted natural frequency and mode shape were validated against the experimental results. Finally, the modification of the updated FE bicycle chassis model was proposed to reduce the vibration, improve the strength and optimize the weight of the bicycle chassis. Tools used are catiaV5 for 3D modelling, Hypermesh for meshing, and Ansys for post processing. **Keywords:** Vibrational Analysis, Bicycle Chassis

Introduction

Most modern bicycle frames have the simple form. This shape emerged in about 1895 following several decades of vigorous development and evolution and has remained basically unchanged since that time. The need for low weight coupled with high strength and stiffness has lead to continuing trail and development of high performance material for racing bicycles. Thus in trial and error method is costly and slow, and intuition does not always yield reliable result. A promising solution is to turn a proven tool of structural engineering; the Finite Element Analysis method. The method used for modelling will be described and theoretical predictions of frame stresses will be compared with F.E.A

result for some simple loading cases. This design has been the industry standard for bicycle frame design for over one hundred years. The frame consists of a top tube, down tube, head tube, seat tube, seat stays, and chain stays. The head tube of the frame holds the sheerer tube of the fork, which in turn holds the front wheel. The top tube and down tube connect the head tube to the seat tube and bottom bracket. The seat tube holds the seat post, which holds the saddle. The bottom bracket holds the cranks, which hold the pedals. The seat stays and chain stays hold the rear dropouts, which connect the rear wheel to the frame. Riding a bicycle, and mainly at professional level, goes hand in hand with the improvement of state of the art technology. For instance, during a time trial the position of the cyclist is of big importance. For this reason, it is important how air resistance can be reduced. Tests have already been done in wind tunnels to search for the best position on the bicycle, eventually also small adaptations at the frame is possible. This is only one aspect, also research for better gears, brakes, tyres, wheels, etc. makes progress. All these aspects cause the cyclist to achieve better results. The main component on a bicycle is still the frame itself. Even if all the other aspects of the bicycle are of top quality, no top performance will be achieved without a frame of the highest quality. The cyclist wants his bicycle to be light, stiff, durable, strong, nice looking, weather resistant and it must also be comfortable. The developer of bicycle faces a great challenge, because designing a frame which meets all these requirements is barely impossible. For example, stiffness and comfort are each other's opposite, though a compromise between both must be found. Depending on the used material for the Frame, one or other aspect can be fulfilled better. The behavior of the frame is of big importance for the perception on comfort of the rider. Because, the better vibrations coming from the road are absorbed by the frame, the better the rider will perform. Vibrations which are not absorbed by the bicycle (frame) must be absorbed by the rider and this causes fatigue of the muscles and thus diminished performance. Research to the aspect of the dynamic behavior eventually leads to a better frame, so one gets one step closer to the ideal bicycle frame.

Literature Review

The study of Vibrational analysis of bicycle chassis are given by various researchers are as follows M.V.Pazare [1] was studied the stress analysis of bicycle frame by using Finite Element Method. The analysis is carried out in Ansys; The F.E.A. results are compared with theoretical results. In theoretical analysis the frame is treated as truss like structure and the stresses in various members of frame like top tube, down tube, seat tube, chain stay and seat stay are determined, considering various condition like, static start up, steady state paddling, vertical impact, horizontal impact, rear wheel braking. Also

Finite Element Analysis is done considering the above conditions. From the analysis it is found that there is a good agreement between analytical and F.E.A. results. Result of all the cases reveals that maximum stress is found in top tube of the bicycle frame as compared to the frame members and is equal to 24.84 MPa which is less than yield strength in tension (i.e.Syt = 290 MPa)for the material (aluminum T 6061) selected. Sagar Pardeshi [2] was studied static and dynamic loads. Optimization of weight and structure of the frame is the best scope of optimizing the overall performance of the racing cycle. A test base has to set up in hydro pneumatic press by application of which loads will be provided on particular loading points and hence forth stress and deformation on the frame will be noted. Results of all case reveals that the maximum stresses in the member of bicycle frame in top tube is which is less than yield strength in tension for the material selected i.e. Mild steel . So there is also scope to reduce the weight of the frame by considering the current stresses obtained. Nathaniel A. Jannettiet et al. [3] were investigated that tubes are then welded together to create the desired fork or frame geometry. This welding operation is done at high temperatures, which creates areas of degraded material properties called Heat Affected Zones (HAZ). The analysis and testing of these HAZs are performed in this study. Understanding of the heat affected region in welded bicycle forks and proper analysis of the dynamic loading allow for more rapid and effective part design. In addition, the increased demand for lighter bicycle components while maintaining a high level of safety requires an integrated mechanical-metallurgical analysis and validation of a given design and materials-process optimization. This paper presents a methodology for developing the necessary data to enable rapid design iteration of welded bicycle forks that meet current ASTM and CEN standards.

Advantages-

- By using AL material weight reduction achived.
- Easily Available in market.
- Easy to Manufacture.
- Though we are changing material stresses being in safe zone.

Limitations-

- Cost is more.
- Can not be used on mountain area.

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5.DESIGN, CAD MODELING & FABRICATION OF AUTOMATIC HAMMERING MACHIN

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Abstract -

In this project we have prepared solid model of project assembly by using CATIA v5R20 software {Computer aided three dimensional interactive application}. The snapshots of every component are attached in the file in design section. The model consists of motor, shaft, hammer, jigs and fixtures. From this we fabricate conceptual model of automatic hammering machine. Automatic portable hammering machine is one of the new techniques proposed in design in order to achieve instant Hammering accurate repetition and impacting, fast Hammering process. It should be user friendly without any risk and worker manual Effort can be used easily automatically. In the past, a labor used hammer for to drive nail, fit parts, break apart and more. It would be used manually with more effort and man power used in process. But now a day it is possible to make it process easy by invented automatic Hammering. There are very clear benefits that the industry sees while using automated systems. These advantages can be very beneficial in the long run. We assure that our products are one of the best and they are long lasting. Hammering is the most widely used industrial as well as construction activity. Hammering or screws, metal sheets, parts etc. requires a lot of time and effort. So here we propose an automated hammering system that allows for fully automatic hammering process. This allows for accurate, fast and automated hammering wherever and whenever needed using a 12V battery. The person just needs to insert workpiece and start the hammering machine. This machine can be used for automatic hammering work as and when needed. We here use a dc motor in order to move the hammer.

Introduction:

This paper is basically worried about the upset outline process and assembling machine of programmed compact hammering machine. Prototype which can be defeated the issue of off base hammering and strange effect of hammering in procedure of manufacturing. A conceivable arrangement of the issue of moderate hammering speed and anomalous hammering by a work is plan a programmed convenient hammering machine given mechanical advances in assembling process

technique. The suitability of such an idea was explored as far as delivering reasonable and compacted plan for specialist which can be exchange anyplace of this machine by any laborers. Automatic portable hammering machine can be considered as the backbone of any hammering operation in mass production its principle function is to safely and preciously hammering work like to perform the punching operation, filleting operation, riveting operation and smithy operation i.e. upset forging etc for all designed operating conditions. This paper describes cad modeling, design and analysis of automatic portable hammering machine. A programmed hammering machine self-working machine going to assume an imperative part in the assembling procedure (hammering process). Hammering machine utilized as a part of the generation of material extending from instruments, to pivots, car frame forming, molding of metal and so forth. The present development identified with metal squeezing machine and forming machine included certain outstanding challenges in regard of to drive nail, fit parts, forge metal and break separated question. The innovation has for its question cure this downside and to empower, by including helper implies, to drive nail, fit parts, manufacture metal and break separated protest the like. Hammering is the most generally utilized in mechanical operation and also development action. Hammering or screws

Problem Statement

In this project main purpose to reduce the effort of human, and easy can handle this machine so we are going to work on automatic portable hammering machinReduce labour effort Manufacturing cost is less so easy to manufacturing To make it aesthetically suitable for the purpose of application To fabricate automatic portable hammering machine in a such way that its fitment must be very easy and feasible Also cost of the project must also be pinned we are to reduce the cost of whole project to as much minimum as possible.

Objective

1. Determination of impact velocity and torque force of hammer.
2. To determine the time required for the various operations.
3. Prepare the modelling of project on Creo 4.0.
4. Automation with minimum man power.
5. Low initial and operating cost.
6. As time required in less useful in mass production.

Working

- Here we will use a DC motor in order to move the hammer. The DC motor consists of a pulley attached to it which is connected to a larger pulley for efficient power transfer and to increase torque. This large pulley is connected to a shaft that has a connecting rod attached to it. This rod is used to achieve lateral motion from the spinning shaft. We now connect the other end of a hammer to this connecting rod through a mid-swinging arrangement in order to achieve desired hammer motion with enough torque. We now use a suitable bed where work piece can be placed.

- The material you should use to build the frame of the machine is Stainless steel. This is because It is the greatest material mankind has for construction. It is cheap, strong, readily available, easily cut, joined, and formed.
- Here As the power is supplied to the motor starts rotating and rotate the long link by cam like arrangement.
- The cam like arrangement convert in rotary motion to reciprocating motion and this motion is transfer to hammer by link.
- As the hammer is pivoted at middle so the reciprocating motion is transfer to the oscillating motion and the hammer hammers on the plate.

PROTOTYPE MODEL AUTOMATIC HAMMERINGMACHINE

Advantage And Application

Advantage

- Available in wide variety of sizes.
- Maintain good control and required force.
- Low cost.
- Save man power.
- Saves time.
- Time delay can be achieved easily.
- Mass production.

Disadvantages:

- This mechanism is only suitable for few operations.
- As torque force required is more there is difficult to find the motor to achieve the required torque.
- Having little wear

Application:

i. In manufacturing industries to perform different operation as follows
ii. To perform the operation that is upset forging
iii. To perform the punching operation
iv. To perform filtering operation as per force produce is sufficient for the operation
v. To perform riveting operation etc.

Conclusion

We have successfully calculated the torque force of the motor. For the design the impact velocity and torque force for riveting of 2 mm rivet is calculated accurately. The entire modelling of the project is done with the help of CATIA V5R20. The project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding. Planning, Perching, assembling and machining while doing this feel that the project work is good

solution to bridge the gates project work. We between institutions and industries. We are proud that we have completed the work with limited time successfully Automatic hammering machine is working with satisfactory condition. We have done to our ability and skill making ma work.

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ADDITIVE MANUFACTURING: FUTURE OF ENGINEERING

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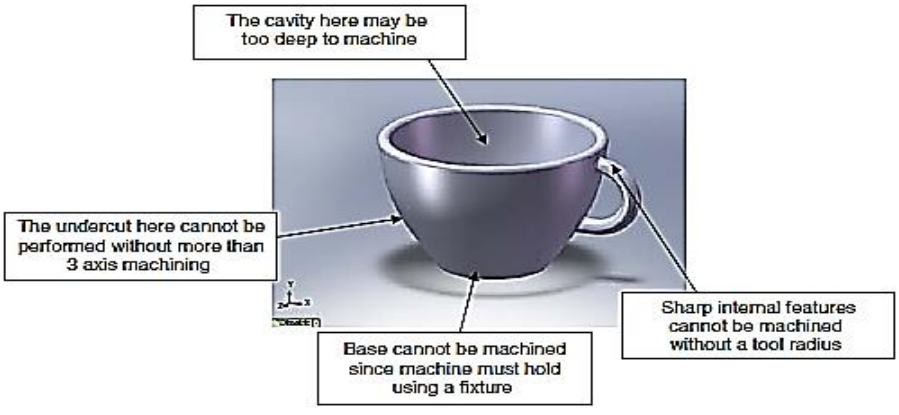
Abstract

Additive Manufacturing (AM) also known as 3D printing is a process to describe the technologies that build 3D objects by adding layer-upon-layer of material, whether the material is plastic, metal, concrete or one day human tissue. Hitherto the geometry of product was determined by the capabilities of manufacturing processes. AM can usher new possibility where the final product will resemble to conceptual model. Additive manufacturing will be the disruptive technology in the coming years.

Keywords: Additive Manufacturing, Generalized Process, Applications, Opportunity.

Introduction

The term Additive Manufacturing (or AM) is used in a variety of industries to describe a process for rapidly creating a system or part representation before final release or commercialization. In a product development environment, the term rapid prototyping is used broadly to describe technologies which created physical prototypes directly from digital data.



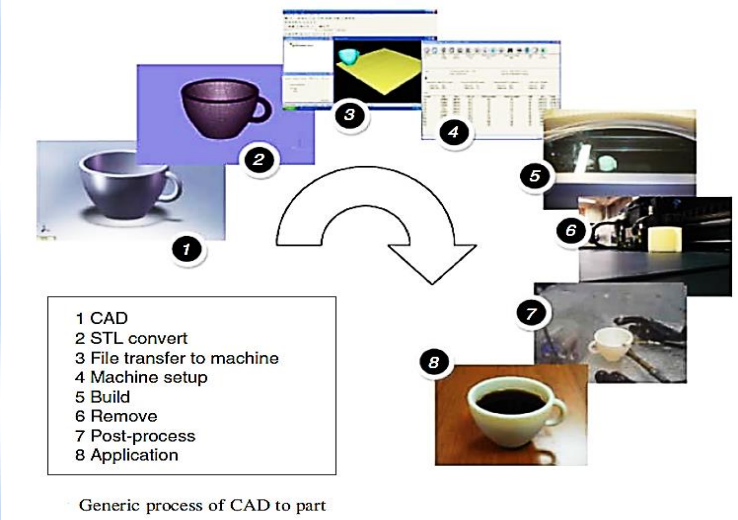
Features that represent problems using CNC machining

Prototypes directly from digital data. Enhancements in the quality of the output from these machines have meant that there is a much closer link to the final product. A lot of parts are in fact now directly manufactured in these machines; so, it is not possible for us to label them as “prototypes.” The term Rapid Prototyping also encompasses the basic principle of these technologies in that they all fabricate parts using an additive approach. Additive Manufacturing (AM) technology has come

Freeform modeling system

a long way because of developments in a variety of different technology sectors.

Similar to many manufacturing technologies, with enhancement in computing power and considerable reduction in mass storage costs paved the way for processing the large quantity of data typical of modern 3D Computer-Aided Design (CAD) models within reasonable time frames.

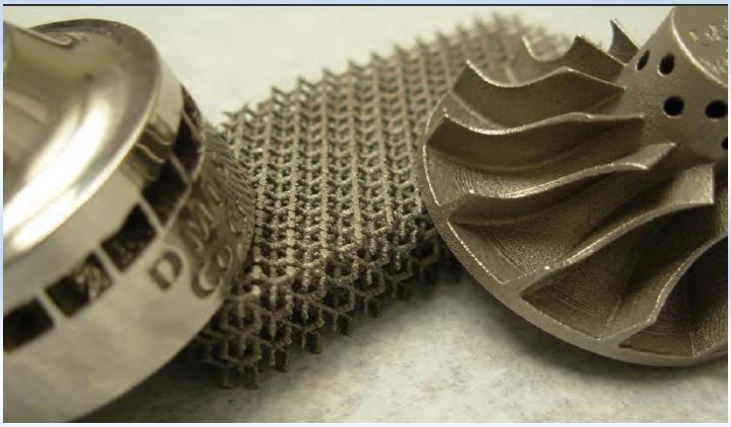


Generic process of CAD to part

Applications of AM

- **Light-weight Machines**

Additive manufacturing technologies makes it possible to manufacture lightweight parts. In the automobile and aerospace industry the main objective is to make the lightest car or aircraft without compromising safety.



Additive manufacturing technologies have enabled the manufacture of complex cross-sectional areas like the honeycomb cell or every other material part that contains cavities and cut-outs which reduce the weight-strength relation.

- **Architectural Modelling**

It's quite difficult to give shape to imagination when it comes to architects. Architects shape their models with hand techniques, but when they encounter complex models which are on their minds making a physical model could be a very hard task. Modelling is very important for the architects to study the models and their functionality. They are also needed for architects to explain them to their customers and convince them to make the project a reality.

AM technologies could prove to be a remedy to architects as a very powerful tool for their business. With Additive Manufacturing architects will be able to create a physical model faster that to without worrying about the complexity of their design. Architects are conversant with CAD software, so there is no need for them to adapt to anything because the STL file itself is created from a CAD file.

- **Medical Applications.**

Additive manufacturing printing technologies will be a boon to medical world. They are transforming the practice of medicine through the possibilities of making rapid prototypes and very high-quality bone transplants and models of damaged bone of the patients for analysis. Additive manufacturing printing methods enable medical practitioner to scan and then build a physical model of defective bones from patients and give doctors a better idea of what to expect and plan better procedure. This will save cost and time and help achieve a better result.

Conclusion

In the coming future additive manufacturing will surely dictate the terms when it comes to manufacturing of any object. Additive manufacturing provides cutting edge when it comes to complex shapes and bulkiness of the machine parts that too in less amount of time. This feature enables manufacturer to keep improving the product by further testing of the part. Sensors can be embedded in the parts manufactured by the AM demonstrates which results in higher performance. AM promises more customizations to its customers. Now, there are proven business benefits additive manufacturing offers to the customers and industries, proving that additive can be used as a mainstream manufacturing technology. Additive manufacturing has the strength to turn the imagination into reality.

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DESIGN AND PROTOTYPING OF A LOW-COST PORTABLE MECHANICAL VENTILATOR

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Abstract

This project describes the design and prototyping of a low-cost portable mechanical ventilator for use in mass casualty cases and resource-poor environments. The ventilator delivers breaths by compressing a conventional bag-valve mask (BVM) with a pivoting cam arm, eliminating the need for a human operator for the BVM. An initial prototype was built out of acrylic, measuring 11.25 x 6.7 x 8 inches (285 x 170 x 200 mm) and weighing 9 lbs (4.1 kg). It is driven by an electric motor powered by a 14.8 VDC battery and features an adjustable tidal volume up to a maximum of 750 ml. Tidal volume and number of breaths per minute are set via user-friendly input knobs. The prototype also features an assist-control mode and an alarm to indicate overpressurization of the system. Future iterations of the device will include a controllable inspiration to expiration time ratio, a pressure relief valve, PEEP capabilities and an LCD screen. With a prototyping cost of only $420, the bulk-manufacturing price for the ventilator is estimated to be less than $200. Through this prototype, the strategy of cam-actuated BVM compression is proven to be a viable option to achieve low-cost, low-power portable ventilator technology that provides essential ventilator features at a fraction of the cost of existing technology.

Keywords: Ventilator, Bag Valve Mask (BVM), Low-Cost, Low-Power, Portable and Automatic

Introduction

Respiratory diseases and injury-induced respiratory failure constitute a major public health problem in both developed and less developed countries. Asthma, chronic obstructive pulmonary disease and other chronic respiratory conditions are widespread. These conditions are exacerbated by air pollution, smoking, and burning of biomass for fuel, all of which are on the rise in developing countries1,2 Patients with underlying lung disease may develop respiratory failure under a variety of challenges and can be supported mechanical ventilation. These are machines which mechanically assist patients inspire and exhale, allowing the exchange of oxygen and carbon dioxide to occur in the lungs, a process referred to as artificial respiration3. While the ventilators used in modern hospitals in the

United States are highly functionally and technologically sophisticated, their acquisition costs are correspondingly high (as much as $30,000). High costs render such technologically sophisticated mechanical prohibitively expensive for use in resource-poor countries. Additionally, these ventilators are often fragile and vulnerable during continued use, requiring costly service contracts from the manufacturer. In developing countries, this has led to practices such as sharing of ventilators among hospitals and purchasing of less reliable refurbished units. Since medical resources in these countries are concentrated in major urban centers, in some cases rural and outlying areas have no access at all to mechanical ventilators. The need for an inexpensive transport ventilator is therefore paramount. In the developed world, where well-stocked medical centers are widely available, the problem is of a different nature. While there are enough ventilators for regular use, there is a lack of preparedness for cases of mass casualty such as influenza pandemics, natural disasters and massive toxic chemical releases. The costs of stockpiling and deployment of state-of-the-art mechanical ventilators for mass casualty settings in developed countries are prohibitive. According to the national preparedness plan issued by President Bush in November 2005, the United States would need as many as 742,500 ventilators in a worst-case pandemic. When compared to the 100,000 presently in use, it is clear that the system is lacking. One example of this shortage occurred during Hurricane Katrina, when there were insufficient numbers of ventilators, and personnel were forced to resort to manual BVM ventilation. Measures to improve preparedness have since been enacted; most notably the Center for Disease Control and Prevention (CDC) recently purchased 4,500 portable emergency ventilators for the strategic national stockpile . However, considering the low number of stocked ventilators and their currently high cost, there is a need for an inexpensive portable ventilator for which production can be scaled up on demand.

Conclusions

A working prototype that can be operated on a test lung has been developed. The prototype has user-controlled breath rate and tidal volume. It features assist control and an over-pressure alarm. It has low power requirements, running for 3.5 hours on one battery charge at its most demanding setting. It is portable, weighing 9 lbs (4.1 kg) and measuring 11.25 x 6.7 x 8 inches (285 x 170 x 200 mm) , and has a handle and easy to use latches. The prototype can display settings and status on a computer screen. Further development of this proof-of-concept is planned. Future iterations will incorporate changes prompted by the results of our prototype testing. It will incorporate an adjustable inspiratory to

expiratory ratio, an option missing in this prototype due to its underpowered motor. We will investigate the effects that changing the motor will cause to cost, weight and battery life. We will also incorporate addon features including a PEEP valve, a humidity exchanger and a blow-off valve. Since BVM infrastructure already supports commercial addons, these components can be easily purchased and incorporated. Ways to minimize deadspace will be explored, including the option of using a Laerdal® brand BVM whose valves can be placed at the patient end of the tubing. In later iterations we hope to be independent from Laerdal® by manufacturing our own bags or contracting their production. The design will be changed to be injection molded such that the mass-produced a version would cost less than $200 to produce. Weight will be minimized and battery-life extended. Consideration to a pediatric version will also be given. Cam arm shape will be optimized to ensure the use of the most efficient rolling contact embodiment. An LCD screen will be included, and alarms programmed for loss of power, loss of breathing circuit integrity and low battery life. Extensive testing of the ventilator's repeatability will be conducted. Finally, we will test the ventilator on a lung model to meet ventilator standards and market the product.

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TURBO JET ENGINE, A REVIEW

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The gas turbine engine is essentially a heat engine using air as a working fluid to provide thrust. To achieve this, the air passing through the engine has to be accelerated; this means that the velocity or kinetic energy of the air is increased. To obtain this increase, the pressure energy is first of all Increased, followed by the addition of heat energy, before final conversion back to kinetic Energy in the form of a high velocity jet efflux the thrust for a turbo jet engine be derived by second law of Newton the force equal to change of momentum.

Turbojets have been replaced in slower aircraft by turboprops which use less fuel. At higher speeds, where the propeller is no longer efficient, they have been replaced by turbofans. The turbofan is quieter and uses less fuel than the turbojet. Turbojets are still common in medium range cruise missiles, due to their high exhaust speed, small frontal area, and relative simplicity .turbojet engine carried one other characteristic: speed was understood to be of the essence by both parties, in Development of the interest of wartime necessity. time constraint. The basic design of the turbojet engines remained essentially the same for nearly 30 years. As metallic materials have been produced to withstand higher temperatures and greater stresses, they have been incorporated directly into engines, replacing components of less suitable materials and thereby increasing performance and reliability. The construction of turbojet engines has been one of the main driving forces in the development of advanced metals and the gas-turbine engine presents almost every kind of severe condition likely to be encountered by an advanced metal in the context of the modern aircraft gas-turbine engine Development of the turbojet engine carried one other characteristic: speed was understood to be of the essence by both parties, in the interest of wartime necessity. Nearly any idea that is good enough will eventually up and fully developed be taken assumes that the development in question is under a time constrain oil.

Jet Engine:

The analysis of the jet engine is similar to that of the gas turbine, the configuration and design of jet engines differ significantly from those of most stationary gas turbines. The criteria of light weight and small volume, mentioned earlier, apply here as well. To this we can add the necessity of small frontal area to minimize the aerodynamic drag of the engine, the importance of admitting air into the engine as efficiently (with as little stagnation pressure loss) as possible, and the efficient conversion of high-temperature turbine exit gas to a high-velocity nozzle exhaust. Turbojet engines are the basis for all other gas turbine engines. We already know their cycle. Air is drawn into the turbojet engine, compressed, mixed with fuel, and burned continuously. The exhaust product of this burning operates the turbine for the compressor, producing thrust which propels the aircraft, such as F-5, T-38, and the Concord passenger aircraft use a Turbojet engine. Adding fans, propellers, or free turbines changes the basic turbojet into a turbo shaft, turboprop, or turbofan. Furthermore we need to design a control system that will secure operation converging to optimal one in all eventual states of environment and also inner states of the system represented by its parameters. Except implementation of classic algorithms ofcontrol, it is possible to design such systems of control and models by use of progressive methods of artificial intelligence. Because the turbojet engines were examined, the descriptions of the structures and properties of these types of engines are important. The thrust of a turbojet is developed by compressing air in the inlet section (between Sections 0 and2) and the compressor section (between Sections 2 and 3); this mixes the air-fuel burns in the combustor chamber section (between Sections 3 and 4), and expands the gas stream through the turbine section (between Sections 4 and 5) and the nozzle section (between Sections 5 and 8). The expansion of gas through the turbine supplies the power to turn the compressor. The net thrust, delivered by theengine, is the result of converting internal energy to kinetic energy. The intake air is compressedin the radial compressor wheel and then it pass through the radial and axial diffuser into the annular combustion chamber where it is mixed together with the fuel. The mentioned fuel is sprayed by the fuel nozzles. The residue gases of combustion which occurs during the burning process of fuel in the combustion chamber expand through the single-stage axial turbine and they get out through the output nozzle at the high speed into the atmosphere and this is the way for creation of motor thrust. The compressor running is provided by axial turbine. Rotor is placed on ball bearings which must be lubricated with pressure

The basic operating parameters for turbojet engine TJ 100: Operating engine speed (revolutions per minute):-idle engine speed 30 000 rpm,-maximum output engine speed (100%) 60 000 rpm. Maximum fuel consumption is 60 litres per hour. Temperature of gas in front of turbine is about 890°C

Description Of Experimental Layout:

It is a small turbojet engine that produces a thrust of up to 230 N. The engine has the ability to operate with different fuels, such as kerosene and paraffin oil. The micro-turbine also uses the fuel for lubrication, so the fuel is premixed with lubrication oil. The Olympus turbine is controlled and protected from improper use by a microprocessor controller (ECU). The ECU uses the exhaust gas temperature, the rpm and the control box inputs as the input data Basic engine data –

Engine parameter Value Length (mm) -384 Diameter (mm)

-131 Maximum thrust (N) - 230 Maximum rotational speed (rpm)

- 108-500 Pressure ratio

- 3.8:1 Mass flow (kg/s)

- 0.45 Fuel consumption (kg/min)

- 0.64 Normal EGT (K)

- 973 Maximum EGT (K)

Twin-Spool Turbojet Engine

The first significant development after the introduction of the early axial-flow, single-spool turbojets was the introduction of a second shaft. • This second shaft allowed the engine to have two independent stages of compression powered by two independent turbines. • The compressors and turbines could now be more accurately matched to the characteristics of the airflow through the engine, creating an improvement in efficiency.

Factors Affecting Jet Thrust

Air Velocity:

Incoming air velocity affects the thrust in two different and opposite ways. When the aircraft is static, as when an engine is being run up prior to take-off at the end of

a runway, momentum drag is equal to zero, because 0=V. However, as the aircraft commences to move, the velocity of the air entering the engine also begins to increase because of the speed of the aircraft. Therefore, the difference between V and V1 will become less as airspeed, or V, increases. On the other hand, as the aircraft gains speed down a runway, the movement of the aircraft relative to the outside air causes air to be rammed into the engine inlet duct. This compression of air in an inlet duct arising from forward motion is called ram pressure or ram effect. The ram effect thin creases the air mass flow to the engine and the intake pressure, and consequently, increases the thrust. Figure 2 shows how the thrust varies with airspeed considering both velocity difference variation and ram effects

Air Temperature:

The thrust generated by a jet engine is inversely proportional with the ambient air temperature, thus the thrust decreases as the air temperature decreases, so that an engine may generate higher thrust than its design rating at lower ambient air temperatures. Higher thrust above the design rating can harm the engine "flat rating," and engine. For this reason, engines are restricted to a maximum thrust. This thrust restriction is called with restricted maximum take-off thrust are called "flat rated." At a given pressure altitude, temperature has no influence on engine takeoff thrust, below the so-called reference temperature (ref T) or flat rating

System Component:

The inlet nozzle directs air into the compressor. The air flowing into the nozzle is assumed total place is entropic ally and determines State 1 for the thermodynamic cycle. The SR-30 is instrumented with a Piton-static tube in the inlet nozzle, which is used to measure the differential pressure of the flow entering the engine. The static pressure, P, is then calculated assuming the total pressure,that is atmospheric pressure, which is monitored independently (the subscript „t" refers to stagnation conditions). There is estimated by assuming a constant velocity an density

profile over the inlet area. P mass flow rate of properties are evaluated using the ideal gas law, and the intake velocity is estimated from the Piton-static tube, assuming incompressible flow conditions. The radial compressor takes the inlet air and com presses it from State 1 to State 2 to provide air to the combustion chamber. Because heat loss from the compressor is assumed to be small compared to the change in enthalpy of the air passing through the compressor, the compressor is modelled as adiabatic.

Jet Noise: Is widely recognized to be one of the most objectionable impacts of aviation and an important environmental issue for those living close to airports as well as further a field under the main arrival and departure tracks. Therefore taking effective measures to control and mitigate the effect of aircraft noise is fund a mental to achieving the sustainable development of the aviation industry. Although new jet transport airplanes in today‟s fleet are considerably quieter than the first jet transports introduced about 40 years ago

Control System In Turbo Jet Engine

The main global aim of control of turbojet engines is similar to other systems and that is increasing their safety and effectiveness by reduction of costs. This demands application of new technologies, materials, new conceptions of solutions demands for control and regulation systems result mainly from specific properties of the object of control – a turbojet engine. Among the basic functions of control systems of turbojet engine belong the following ones – manual control, regulation of its parameters and their limitation. Manual control and therefore choice of regime of the engine is realized by a throttle lever according to a flight situation or expected manoeuvre. By regulation of a turbojet engine we understand such a kind control where the chosen parameters of the engine are maintained on certain set , thus keeping its regime.

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MINI HACKSAW POWERED BY BEAM ENGINE

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Abstract

A beam engine mechanism is one where we use an overhead beam to create motion. Here we use a beam engine motion based assembly in order to achieve hack saw cutting motion using a circular cutting disc. Our system uses a motorized disc to drive a connector which is in turn connected to anover head beam. The overhead bean has a connecting rod in turn connected to a mini hacksaw blade. When the motorized disc below is turned on the connecting arm starts reciprocating the overhead beam. This beam now heals achieve a back and forth cutting motion as required by the hacksaw blade. We construct a small bed in order to rest the work piece to achieve desired cutting. Thus we study the design and fabrication of mini hacksaw using beam engine mechanism.

Introduction:

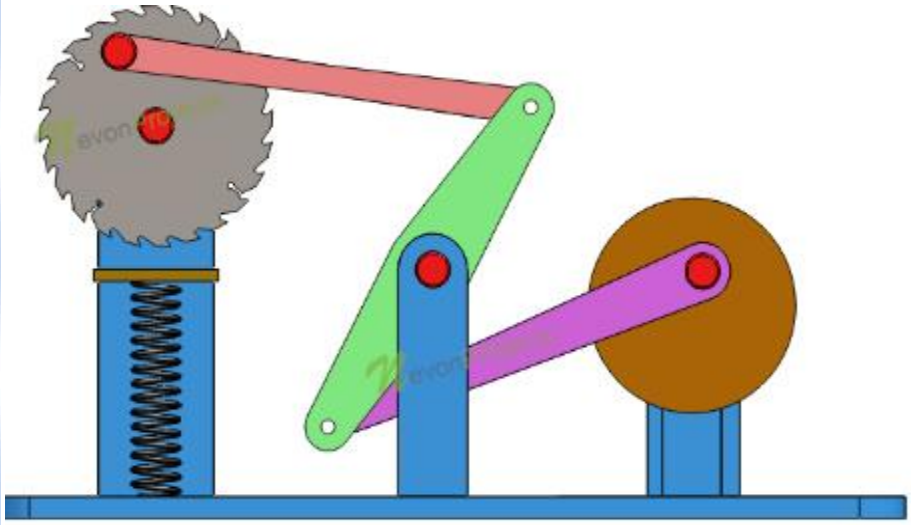
In this project, the output of a Beam Engine is used to drive a reciprocating saw to cut timber. Here, instead of the rotating fly wheel, it is intended to have a rotating reciprocating saw. This rotating reciprocating saw is used to cut timber. Reciprocating saws driven with electric power are a common feature. But in places where electricity is scarce, or absent, it is difficult to operate these Equipments. But since the Beam Engine powered saw runs on fuel, it can be operated even in places where electricity is totally absent. A beam engine is a design of stationary steam engine. A stationary engine is an engine whose framework does not move. Usually, a stationary engine is used not to propel a vehicle but to drive a piece of immobile equipment such as a pump or power tools. In a beam engine, the piston is mounted vertically, and the piston rod does not connect directly to the connecting rod, but instead to a rocker or beam above both the piston and flywheel. The beam is pivoted in the middle, with the cylinder on one side and the flywheel, which incorporates the crank, on the other. The connecting rod connects to the opposite end of the beam to the piston rod, and then to the flywheel.

Advantages of Mini Hacksaw Powered By Beam Engine:

1. The cutting speed can be varied according to our needs by adjusting the timer.
2. It is portable.
3. It does not have any prime mover like electric motor.
4. Simple in construction than mechanical hacksaw.
5. It is compact one.
6. Less maintenance.

Disadvantages of Mini Hacksaw Powered By Beam Engine:

1. Only smaller size and soft metal can be cut.
2. It is costlier than the mechanical hacksaw because of compressor unit.
3. Less efficiency when compressor to mechanical device.
4. Leakage of air affects the working of the unit.



Applications of Beam Engine Powered Hacksaw:

1. It is used in small scale industries and in large scale industries.
2. It useful when materials need to be cut in hazardous areas such as oil & gas refineries, chemical factories or oil rigs as well as dusty and wet environments where electric tools are not effective.
3. It is valuable tools in production environments such as pallet repair, shipbuilding or fiberglass workshops, because they will last longer than electric tool

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DESIGN AND FABRICATION OF AIR DRIVEN VEHICLE

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Abstract

The rate depletion of conventional sources of energy are much faster than the new ones are made, which puts us in place to consider and identify the other sources of energy to drive the needs of the world. Compressed air as the energy source has shown promising results in the field of automobile. Efforts are being made by many organizations to design and develop compressed air-driven vehicle which definitely going to reduce the uses of fossil fuels and its share in the environment. This study presents the methodology towards design and fabrication of an Air-Driven vehicle equipped with pneumatic power generating concept. Performance test was conducted at different valve opening position to find the optimum rate of compressed air inlet to the engine. The result of the performance test revealed that out of three different valve conditions, the optimum power generated and transmitted by the engine took place at full open valve condition and the time taken to reach 10 meters distance for the full open valve is lesser in comparison with the 3/4th and half open valve. The estimated cost of the machine is Rupees Twenty Eight Thousand approximately.

Keywords: Design, Air driven vehicle, Pneumatic system

Introduction:

The exhaust emission standards are getting more and more stringent and there now exists a discussion about the introduction of a mandatory emissions standard for CO_2, a greenhouse gas that contributes to the climate change which is an issue of growing international concern. This demand for lower exhaust emission levels together with increasing fuel prices leads to the demand of combustion engines with better fuel economy, which forces engine developers to find and investigate more efficient alternative engine management. Gasoline is already the fuel of the past. Automobile manufacturers know all of this and have spent lots of time and money to find and develop the fuel of the future. An air powered engine is a type of motor which does mechanical work by expanding compressed air. Pneumatic motors generally convert the compressed air energy to mechanical work through either linear or rotary motion. Linear motion can come from either a diaphragm or piston actuator, while rotary motion is supplied by either a vane type air motor, piston air motor, air turbine or gear type motor. Compressing

a gas into a small space is a way to store energy. When the gas expands again, that energy is released to do work.

The cars that increase in numbers every day emit toxic emissions on our highways and consume huge amount of fossil fuels, but oil and gas reserves will last until 2042. Consequently, unconventional energy sources must be increasingly harnessed. Because of the low efficiency of CAEs, they were not used for a long time. Piston-type CAEs have been commonly used in high-power machines that require a high-starting torque [1]. The compressed air storage tanks built with carbon fibers will carry high amount of pressure with minimum volume space which obviously meets the requirement with the conventional engines with zero emission [2]. Using the two-stage pneumatic on/off valves for gas exchange could simplify the structure of APE because they need not have the traditional engine valves and valve springs [3]. Force and moment originating in the assembly components also influence the physical behavior of pneumatic actuators. As a consequence the assembly components force and moment considerably influence the speed of the pneumatic actuator and hereby also the duration of the assembly process [4]. Compared to batteries, compressed air is favorable because of a high energy density, low toxicity, fast filling at low cost and long service life. It has zero emission and is ideal for city driving condition [5]. The four stroke vehicle that runs with the assistance of compressed air can succeed a 50km/h speed and refilling of compressed air to the tank is for 70-80 km. [6].

Working:

Connections are done as per the circuit diagram as shown in figure 1. When the accelerator pedal is pressed, air is passed through the solenoid valve from the reservoir to the cylinder. Now the piston inside the cylinder is pushed forward. When it attains maximum position, the reed switch sensor which is connected along the cylinder changes the direction of flow of air. Hence, the piston is pushed backward. Thus the forward and backward movement of the piston is connected to the crank shaft. Hence linear movement of the piston is converted into a rotary motion by means of chain and sprocket which is connected with the rear axle. Thus the vehicle attains its motion.

Conclusion:

The air driven vehicle is designed and developed which runs with the help of compressed air as the fuel. The pneumatic three wheeler reduces the environmental pollution and is beneficial for handicapped people and old age people for easy transportation. The vehicle is operated in three

different valve conditions. The result of the performance test revealed that out of three different valve conditions, the optimum power generated and transmitted by the engine took place at full open valve condition and the time taken to reach 10 meters distance for the full open valve is lesser in comparison with the $3/4^{th}$ and half open valve.

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AUTOMATIC BAR FEEDING AND CUTTING MACHINE

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Abstract:

Machining of a shaft requires the shaft to be cut to appropriate length and then put it on machining. Today it is a time consuming task as the process of cutting the bar to required length happens manually. This is not only time consuming but also erroneous marking may result in rejection of the job. Most of the industries use band saws or hacksaws as current equipment for the purpose of cutting operations. This process is not only slow but is also error some. The project deals with the concept of smart automated multi bar feeder and cutter. In this project a concept is proposed to feed multiple bars at once and cut it accordingly to length input given by input panel. The developed machine is smart mechatronic system which can automatically feed the bar to required length and accordingly cut it. The number of pieces as well as length to be cut can be altered using the control panel. Keywords: Buttons, Feeding, Bar cutting, Automation, Input panel, Length, Number of pieces etc.

Introduction:

Bar cutting is employed almost every industry. This includes small industries such as fabrication to very large industries from hydraulic to aerospace. This involves bars of different engineering materials, pipes of various diameters and shafts. Conventionally bar is measured of required length as per the application manually using tape or any other measuring instrument. Then the bar is mounted over the cutting machine and cut to required length. This is a time consuming procedure and requires effort for loading and unloading the bar on the cutting machine. The common cutting machines used in the industrial application are hacksaws, abrasive cutters, reciprocating hacksaws etc.

Thus this is a lengthy procedure and involves the following steps:

1) Measuring the bar to required length and marking it.
2) Loading the bar on the cutting machine.
3) Setting up for the cutting procedure.
4) Cutting the bar to marked length.
5) Unloading the cut bar.

Also the bar which is cut may depend on the accuracy of the operator who is marking it and also the operator who is setting up the machine for cutting the bar. At present condition many electrically operated power hacksaw machines of different companies with different specifications are available for the use in shop floor. These machines are so precise that they can cut metal bars with minimum

time made up of different materials but they have one and major disadvantage that those are able to cut at faster rate as well as these require manual intervention for every operation of bar to be cut. Also Bar cutting is not an infrequent industrial operation and needs to be done on regular basis. The bar once cut further involves operations such as turning milling and key way slotting on them. Thus a system needs to be developed which can handle the operation of bar cutting effectively in such a way that it requires minimum mechanical effort and carry out the bar feeding as well as cutting operation automatically. To overcome these advantages, this project involves designing and fabrication of automatic bar feeding and cutting machine (for fixed size of 16 mm), which not only saves the time but also is accurate as it is computerized. This involves developing a system in which user just enters the length of the bar to be cut using a keypad and the bar is fed and cut automatically.

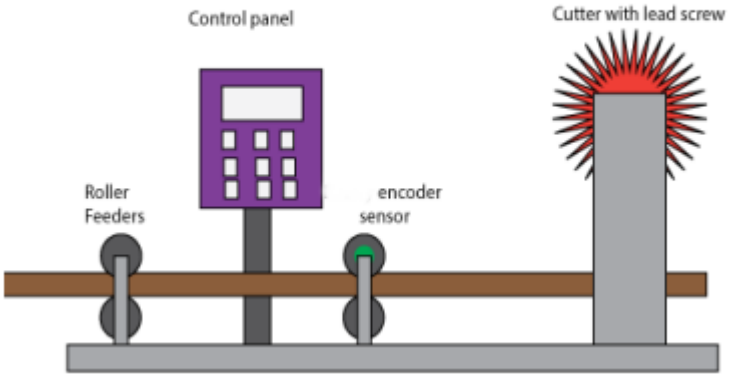
Literature Review

The actual implementation of the project it is very necessary to understand the current work done in this. Since this is a field of major attention a lot of research scholars have carried out different research work on this field. A few notables ones are mentioned below. Prof. Iman Hajizadeh Chi-Ghun Lee (1992) studied „alternative configuration for cutting machine in a tube cutting mill". In this paper stock material exist as a continuous stream. They formulated and solved the new type of cutting stock problem and demonstrate that significant saving is expected when the new configuration is employed. The paper conclude that opening the end of the cutting machine they have shown numerically that the production time could be decreased by up to 44% such improvement would help production managers in tube mills reduce costs such as finished product inventory, labor cost [1]. Prof. Rushikesh Gadale et al,(2015) developed PLC based automatic cutting machine. . A cutting machine is available in various shapes and sizes, with small hand-held power cutting systems and to bench mounted and finally floor-mounted models. They showed procedures for maintaining, and proper setting up the work and methods of selecting various tools, and object holding devices to get a job done safely without causing damage to the equipment, yourself, or someone nearby [2]. Prof. Kshirsagar Prashant R. et al,(2015) proposed the model of multi-way hacksaw machine which is able to cut four pieces simultaneously without any jerk and minimum vibrations. The model implies conversion of shaft motion into the reciprocating motion for proper working of hacksaw. This model overcomes the limitations of conventional hacksaw machines which can cut single piece at a time. It is able to cut metal bars of different materials at same time and will be helpful in many industries due its compatibility, reliability

and efficiency. Though there is lot of research work carried out on this field, majority of the expected work on automation of the present day practice to cut the bar is missing. Most of the papers focus of manual aspects of cutting which is least efficient as compared to automated bar cutting. Also the developed systems are manually operated which yet do not handle the errors occurred in cutting the bar manually [3]

Fabrication and Working

This project involves automatic bar feeding and cutting machine. The bar is first fed into the machine automatically using the rollers mounted on the machine. The operator needs to needs to enter the length of bar to be cut using the keypad provided on the machine. When the operator initiates the cutting procedure by pressing the switch, the bar starts feeding towards the cutter till the required length is reached .Thus this forms a fully automated bar feeding and cutting machine which can be used for the purpose of industrial automation. The entire approach towards the project can be divided into following modules. These modules work towards achieving the intelligent bar feeding and cutting machine. 1) The feeding mechanism. 2) The smart sensor assembly with feedback. 3) The microcontroller unit 4) The cutter assembly.



As shown in the figure (a) the mechanical construction of the machine involves fabrication of the frame. The frame of the chassis houses all the other components of the machine. The dimensions of chassis frame are 11.78 x 5.08 x 4.32 (all dimensions are in meters). The machine chassis is fabricated in such a way that it consists of number of rollers which are present on the machine. The rollers are used for feeding the bar into the machine. Further the rollers consist of powered rollers as well as idlers. The power rollers are motorized which are used to feed the bar to required length. The machine also consist of cutter as shown in the figure which is used to cut the bar to the required length .The control panel

shown in the figure is used to enter the length of the bar to be cut. Based on the length of the bar to be cut, and the input entered by the operator, the machine feeds the bar to the required length. Once the feeding is complete, the cutter is activated and cuts the bar. As the system is completely automated, this saves the time required in cutting the bar. Due to the microcontroller and feedback based cutting system, the accuracy in cutting is high as the system is computerized. This system is very cost effective as compared to other automated. Machine can be used in bar cutting Industries. The limitation of this project we are fabricating this machine only for a shaft of 16 mm dimension.

Conclusion

Thus this works provides an alternative to the existing automatic bar cutting machine, in terms of automatic the bar entry into the cutting apparatus ,eliminates power fluctuation and lesser initial investment. Time consumption is less when compared to manual cutting this work provide desired output.

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ADVANCED FOOTSTEP POWER GENERATION SYSTEM USING RFID FOR CHARGING

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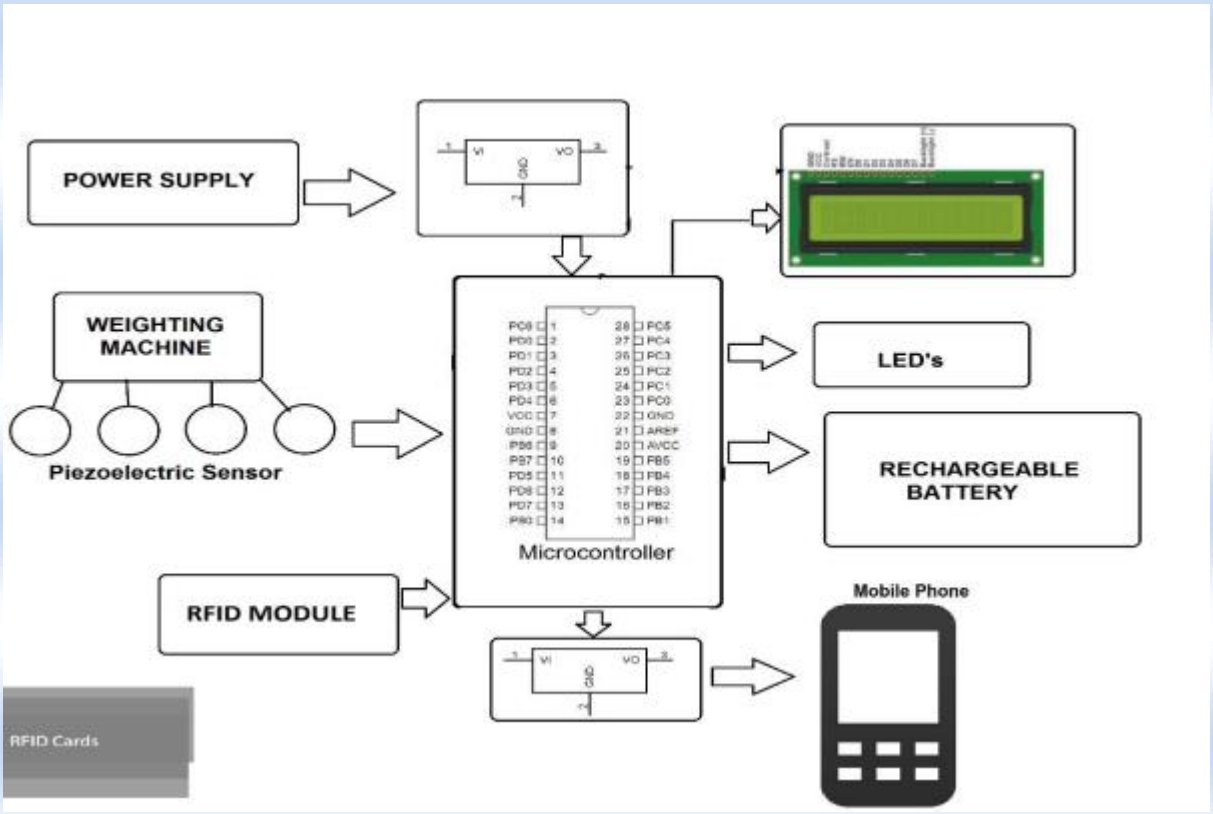
Abstract:

As with energy demand, the country`s populace is developing rapidly. At the equal time, energy waste is growing in diverse ways. Therefore, the principle answer is to translate this power without delay right into a useful form. In this step strength technology project, power is generated from human footsteps and used to price the battery. Energy is saved in batteries that may be used to price cell telephones with RELAY. The device includes an Arduino IDE, USB cable, and LCD. Switch to the strength of this device to enter registration mode. You can add 3 new customers. When all clients enter the device, the device clears the map panel and connects to the charger. By default, all clients are given 5 minutes of load time. With that, the relay will turn on and the charger will turn on the to charge the phone. If the customer wants to interrupt the loading process, they will have to pull the field again. To prevent loading, the downtime is credited and the swipe card is displayed again. To fill the carton, press the refill button on the device. The device then begins wiping the paperboard. Swipe a card and you may see for a particular card every 5 minutes.

Introduction

Nowadays, road infrastructure could be a key concern within the developed world. consistent with recent studies, tierce of fatal or serious accidents square measure caused by excessive or unsuitable speed, additionally as changes within the route (like the presence of road-work or sudden obstacles). Accident reduction and mitigation square measure major issues for traffic authorities, the automotive business, and transportation analysis organizations. One essential course of action is that the adoption of advanced driver aid systems, that square measure acoustic, haptic, or visual cues provided by the automobile to alert the motive force to the danger of a collision. These systems square measure currently accessible in some business vehicles, Associate in Nursing future trends predict that automatic driving controls and an increasing range of sensors on each the road infrastructure and also the vehicle itself can improve safety. controller, that has the facility of maintaining a gentle user predetermined speed, and its evolution, accommodative controller (ACC), that adds to CC the aptitude of maintaining a secure

distance from the preceding vehicle, square measure 2 distinguished samples of driver help systems. One disadvantage of those systems is that they can't severally discriminate between straight and c sections of the road, wherever the speed should be reduced to avoid accidents. An embedded system could be a code and hardware combination that performs a selected task. Microprocessors and microcontrollers square measure 2 of the foremost common physical science found in embedded product. Microprocessors are referred to as general processors since they merely settle for input, process it, and output the results. A microcontroller, on the opposite hand, not solely accepts information as inputs however conjointly manipulates it, interfaces it with alternative devices, regulates it, and thus produces the end result.



Working of Piezoelectric Sensor

There are units for measuring different types of electrical materials. Specimens of electrical materials A measuring unit for measuring single crystal crystals and bones, which can be obtained from artificial proposals, purchased at stores such as PZT ceramics. Electrical detector features electrical detectors typically measure a combination of physical quantities (acceleration and pressure). Both pressure gauges and accelerometers use the same concept of in piezoelectricity, but the views applied to the police

investigation differ by 0.5. A thin film is applied to the huge base of the pressure sensor to transfer the applied force to the electrical element. As soon as pressure is applied to the existing thin film, the electrical material is charged and voltage begins to be generated. The voltage generated is proportional to the pressure applied. The seismic mass is associated with the accelerometer Crystal 0.5 and transfers the applied force to the electrical material. According to Newton's second law of motion, when motion is applied, the unstable mass becomes a complete mountain of electricity. Current materials produce electric charges, or calibrated movements. The pressure sensor uses the associated accelerometer in combination with them to detect unwanted vibrations and eliminate false readings.

Working:

When an electric current is being sent through an electromagnet, a magnetic field is generated around it, that's how relays work. • The diagram above depicts how the relay works. • The copper coil and iron core operate as electromagnets in relays. • When a direct current is delivered through the coil, the connections attract each other, as indicated. This is used to activate the relay. • It will return to its original when the power is switched off. This is known to it as the relay's power. For some relays, the contact closes first and then opens when the relay is activated. This is direct across from the relay. A detector element in solid-state relays senses the input voltage and utilizes it to control the relay. It uses piezoelectric sensors. To generate a maximum output voltage from footstep the piezo sensors are mounted below the platform. The circuit is the microcontroller-based monitoring circuit that allows users to monitor the charges and voltage of a connected battery. The energy from the sensors is stored by using the battery, and it is helpful to charge the mobile. The main controlling part of the whole system is the Atmega328 Microcontroller. The current is distributed using (radio-frequency Identification) RFID cards.

Advantages

- Helps in renewable energy generation.
- Just take a step to generate electricity.
- It is an authentic and genuine device.
- No fuel is required in this hence it is eco-friendly.
- It is a self-producing device using our footsteps.
- Efficient and low-cost design.
- This is a Non-conventional system.
- Easy to operate.

Conclusion

The proposal has been tried and tested, and it is the most conservative, practical vitality answer for ordinary folks in our nation. When control accessibility is restricted or non-existent in remote regions, this can be employed for some applications. India's enormous population makes energy management a critical concern for a growing country. Based on the power connected to the piezoelectric sensor, we may drive both alternating current and direct current loads with this task. By decreasing control demand without polluting the environment, this method allows for efficient power generation in highly inhabited places. In reality, just 11% of renewable energy sources contribute to our well-being. We will not only be able to address the energy issue if this project is done, but we will also be able to be able to make significant global environmental changes.

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