MECHANIZE

NATIONAL CONFERENCE ON "ADVANCED MECHANICAL ENGINEERING" (NCAME 2020)

7TH & 8th February 2020

Souvenir

Department of Mechanical Engineering
K L University
Greenfields, Vaddeswaram, Guntur District, Andhra Pradesh-522 502

NATIONAL CONFERENCE ON
"ADVANCED MECHANICAL ENGINEERING"
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Organized by

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About Department of Mechanical Engineering, K L University

Koneru Lakshmaiah Charities was established as a trust in the year 1980 and started KL College of Engineering in the Academic year 1980-81. The trust was converted into a Society by the name Koneru Lakshmaiah Education Foundation in the year 1996. The KL College of Engineering has attained autonomous status in the year 2006 and in February 2009, the KoneruLakshmaiah Education Foundation was recognized as Deemed to be University.

The University is situated in a spacious 100-acre campus on the banks of Buckingham Canal of river Krishna, eight kilometers from Vijayawada city. Built within a rural setting of lush green fields, the institute is a virtual paradise of pristine nature and idyllic beauty. The campus has been aptly named as "Green Fields" and the splendid avenue of trees and gardens bear testimony to the importance of ecology and environment. The campus ambience is most befitting for scholastic pursuits. The University has been situated on a built up area of around 15, 00, 000 Sq.ft.

The Department of mechanical engineering at K L University was established in the year 1980-81 with an aim to provide scientific and technical solutions to mankind. Mechanical Engineering is a congregation of science and technology which embeds basic principles of Physics, Mathematics and Chemistry . The Department went for accreditation by NBA of AICTE for the first time in 1986, and was accredited for three years. The department also attracts foreign students from Nepal and Bhutan.

The Department offers a four year undergraduate engineering degree in Mechanical Engineering with specializations in computational fluid dynamics, Robotics and design and Manufacturing. The department offers a post graduate course in Thermal engineering.Robotics and Machine Design which is embedded a one year project in an industry/research organization. The Department offers PhD programs in vivid specializations on a full time and part time basis.

The strength of the department is its very rich treasure of faculty who were drawn from reputed National and International Academic and research organizations. Faculty with good industrial experience and exposure are also a part of our team at the Department of Mechanical Engineering. Faculty with post doctoral research experience and faculty with more than 15 years of experience are feathers in the cap of our department.

The faculty of the department is extensively involved in quality Research and Development. The Department over the last three years has acquired projects worth more than 3 crores in the areas of MR dampers,Roborics and Bio medical applications in vivid fields of mechanical engineering funded by prestigious research organizations like DST, UGC and SERB. The Department has filed patents with IPO in collaboration with industry and a few from sponsored projects.

The Department has 5 well furnished and fully equipped state of the art laboratories along with 3 research centres. The department also has its own computer center with latest ANSAYS,CATIA &PROE software purchased from Adroitech.

As a part of student centric learning various measures and initiatives are taken to improve the skills of students.These include exposure to guest lectures, industrial training and tours, communication and soft skills, Mini Projects, paper presentations in national level paper contests, class room seminars, placement opportunities, academic and career counseling, certificate courses, live projects in industry, exposure to journals and so on.

Another area of concentration for the faculty is Research consultancy. The department has signed MoU's with Liners India, Vijayawada and Kumar Pumps,Kusalava International, for faculty and student training and collaborative research. The department of Mechanical Engineering is collaborating with Indian Institute of Science, Bengaluru and University of Singapore, UK for initiating collaborative research in Mechanical Engineering.

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Er.Koneru Sathyanarayana
President, K L E F

Message

Warm and Happy greetings to all.

I am immensely happy that Department of Mechanical Engineering of our K L University is organizing an ***National Conference On Advanced Mechanical Engineering*** **(NCAME-2020)** during 7th & 8th February, 2020 and is going to discuss on a collection of technical papers in the proceedings.

Department of Mechanical Engineering, K L University continues to march on the way of success with confidence. On this occasion, I wish all the very best.

I congratulate HOD, staff members, students of Department of Mechanical Engineering, Delegates and Participants from different parts of the country and nations for their efforts in participating in this conference and wish the conference all the success.

K. Sathyanarayana

Sri Koneru Raja Hareen
Vice-President

Message

I am glad to learn that Department of Mechanical Engineering, K L University in collaboration with Association of Biotechnology and Pharmacy is organizing a N***ational Conference On Advanced Mechanical Engineering*** **(NCAME-2020)** during 7th & *8th February 2020*.

It is heartening to know that the national Conference-**NCAME-2020** is being organized with the objectives to strengthen the current national and international scenario of Biopharmaceuticals; scaling up from research to production and their usage; thereby prevention and protection from many deadly diseases/ disorders.

I wish the conference all success.

K. Raja Hareen

Dr.L.S.S.Reddy
Vice-Chancellor

Message

I am delighted to know that the Department of Mechanical Engineering of our K L University in collaboration with Association of Biotechnology and Pharmacy is organizing a ***National Conference On Advanced Mechanical Engineering*** **(NCAME-2020)** during 7th & 8th February, 2020. It gives me an immense pleasure that a souvenir is also being brought out.

I am sure that it will provide a platform to discuss the research in Mechanical Engineering happening throughout the world. I hope that the participants from all over the country and abroad would interact on the subject for upgrading their knowledge and skills to enhance their utility to the Biotechnology sector.

My best wishes for the success of the conference.

L.S.S. Reddy

Dr. A. Srinath
Head, Department of Mechanical Engineering
Convener, ***NCAME-2020***

Message

I, on behalf of the Faculty of Mechanical Engineering feel proud in organizing a ***National Conference On Advanced Mechanical Engineering*** **(NCAME-2020)** during 7th and 8th February, 2020. During the conference, participation of people from different disciplines is expected to take place on common platform and hence there would be sharing of views with eminent speakers from all over the world wherein exchange of their knowledge and skills in Biotechnology will happen. This conference will help the students, researchers and academicians to interact with professionals.

I hope the conference a grand success.

A. Srinath

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Analysis of Fluid Structure Interaction in High Pressure Elbow Pipe Connections

Naveen.Janjanam[1], Eswara Kumar[1]. Anna*, Nagaraju. M[2]

[1]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, A.P., India-522502.

[2]Dhanekula Institute of engineering & Technology, Vijayawada, A.P, India

E-mail: naveenj315@kluniversity.in.

ABSTRACT:

In general pipes in power plants subjected to high pressures and temperatures. These are connected by many type of joints. Some of them are elbow, T-joints which are seen commonly to get the continuity between different stages. Due to excessive joints the outlet velocity and pressure will drops by considerable amount. Stresses will be produced due to high pressure and temperature of fluid flow, which in turn creates the failure of the pipes. The turbulence of the fluid passing through the pipes will also plays a vital role to decide the outlet pressure and velocity. In this present study pipes are connected by the elbow joint are considered and observed the effect of pipe thickness, turbulence intensity and length of elbow on outlet pressure, velocity, von mises stress and turbulence kinetic energy. It results that with increase in pipe thickness and length of elbow, the velocity, von mises stress and turbulence kinetic energy are decreases but with increase in turbulence intensity, the velocity and turbulence kinetic energy are increases.

Index Terms** – **Fluid structure interaction, Ansys (CFX), Turbulence kinetic energy, Elbow.

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Experimental investigation on the effect of handling practice on the mechanical compression force and shelf life in apple fruits

D. RAMESH BABU[1], K. V. NARASIMHA RAO[2], M. V. SATISH KUMAR[3], B. SATISH KUMAR[4]

1. Assistant Professor, Department of Mechanical Engineering, S R Engineering College, Warangal, Telangana, India and Research Scholar, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A. P., India.

2. Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Andhra Pradesh, India. 522502. drkvnrao@kluniversiy.in

3. Professor, Department of Mechanical Engineering, Kamala Institute of Technology and Science, Huzurabad, Telangana, India.

4. Associate professor, Department of Mechanical Engineering, S R Engineering College, Warangal, Telangana, India.

Abstract:

Apples are very sensitive to mechanical bruising during post-harvest handling operations and transportation. Experiments were conducted to reduce mechanical damages during sorting-grading, packing operations by using a water tank at the feeding conveyor of sorting-grading machine. Four varieties of apples, i. e. Royal Delicious, Red Delicious, Rich-a-Red and Golden Delicious were studied for bruising effects by comparing handling techniques of manual unloading to conveyor or to water handling system. Conventionally apples are packed in corrugated fiber board (CFB) boxes at orchard level. From the orchards, apples are transported to the storage points, where pre-storage operations like sorting-grading and bin filling are done. When apples are unloaded manually from CFB boxes to the sorting-grading machine conveyor, several mechanical damages, even though appear minor, cause firmness loss on post-storage. A new method is used to unload apples from the CFB boxes into a water tank, from where the sorting-grading feeding conveyor picks the apples for further processing. This experiment resulted in better firm apples during shelf-life period, i. e. after storage of apples for two months in CAS. Higher apple firmness is found in all the four varieties with water unloading technique compared to manually unloading of apple fruits.

Key words: Food security, Apple, Mechanical damage, Firmness loss, Sorting-grading, Bruising, Controlled atmosphere storage.

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Study of awareness on opportunities in food processing among engineering teachers

[1]D Ramesh Babu and [2]K V Narasimha Rao

1. Assistant Professor, Department of Mechanical Engineering, S R Engineering College, Warangal, Telangana, India and Research Scholar, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A. P., India.

2. Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Andhra Pradesh, India. 522502. drkvnrao@kluniversiy.in

Abstract:

Government of India is promoting on development of startups in food processing sector. A survey was conducted in the campus of S. R. Educational group comprising engineering colleges. A structured questionnaire was developed to find the level of awareness of teaching faculty on food processing aspects. It was found that faculty has minimal awareness on food processing areas. In the light of faculty expected to be acting as mentors to promote thrust areas like food processing, a need is identified to train them. Aspects like surplus agri-products of Telangana region and production areas found to be known to people. However processed foods using technologies are not much known to the engineering faculty. Government, to achieve the mission goals of National Horticulture Mission (NHM) and (MOFPI) Ministry of food processing industries, it is necessary to train manpower in the engineering colleges other than food processing institutes and farmers. Survey resulted in finding the awareness levels about entrepreneurial opportunities in food processing sector among the engineering faculty. Being the teaching community for engineering students, they can play a vital role in motivating the young engineers to take-up new venture development in food processing and allied sectors. This will address the unemployment problem.

Key words: food processing, new business venture, entrepreneurship, awareness, engineering faculty.

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Opportunity identification in food processing industries based on agricultural production potential of Andhra Pradesh and Telangana

[1]D Ramesh Babu and [2]K V Narasimha Rao

1. Assistant Professor, Department of Mechanical Engineering, S R Engineering College, Warangal, Telangana, India and Research Scholar, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A. P., India.

2. Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Andhra Pradesh, India. 522502. drkvnrao@kluniversiy.in

Abstract:

This paper presents the data of agriculture processing products, opportunities in and around Telangana and Andhra Pradesh states based on the production opportunities. Horticultural products and their processing are highlighted, keeping in view of vast agriculture sector limitations. This is in line with the focus of the government to develop agri and food processing industries. Make-in India programme is promoting the prime sectors to develop the entrepreneurial opportunities. Telangana and AP are good at producing certain fruit and vegetables bulk quantities and capable of exporting to other states and other countries. Light is thrown on the quantum of opportunities product-wise, particularly where we are leading producers for a particular fruit or vegetable. Apart from local consumption, we need to identify the surplus fruits and vegetables to convert into valuable products by value addition by sorting, grading and processing. Secondary data is obtained from National Horticulture Board of government of India and product wise recommendations are made based on surplus productions of particular item. Recommendations are made for future entrepreneurs to take up new ventures keeping in mind the economic prices of raw materials which are locally produced. This can generate income to the entrepreneurs, farmers and locally employment is generated.

Key words: Food security, Fruit and Vegetable production, Storage, Horticulture.

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OPTIMIZATION OF EDM PROCESS PARAMETERS OF INCONEL 625 USING GENETIC ALGORITHMS

Seeram Srinivasa Rao[1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: ssrao@kluniversity.in.

ABSTRACT:

In electric discharge machining process using electric current spark is generated which is used to melt the materials of high hardness values. EDM is used to manufacture various components such as aerospace material, automobile parts and surgical tools. With generation of spark in dielectric material in a controlled manner is used to melt and evaporate the materials. For higher productivity in industries, optimization is vital. Optimization is selection of various input parameters like material Removal rate, working current, Pulse on time, pulse off time, working voltage, gap between Sparks, and surface finish. Difficulty in finalizing the input parameters for a random desired machining for a specific job optimal parameter is not possible to obtain. To obtain same surface finish different materials require different machining parameters. Usually operating parameters are provided for steel and for other materials is derived through regression analysis. Here different algorithms such as genetic algorithms, fuzzy logics and neural networks developed specifically for this purpose plays an important role. Inconel is very hard material widely used as space material or used in equipment subjected to high temperature and pressure variation. Corrosion resistance property of Inconel provides leverage to use it in unfavorable environment conditions. The simulation is performed in the Minitab and obtained values are used for experimentation. Machining of Inconel 625 is performed on EDM and variation of surface roughness is tabulated in accordance with change in input parameters. In present day production time and good surface finish is the prime priority in the Industries Electric Discharge Experiments have been carried out by changing the current, voltage, pulse-on, pulse-off time and flushing pressure. Evaluation of machining process performance is based on the material removal rate, tool wear rate and surface roughness of the materials.

Index Terms: *EDM, genetic algorithms,taguchi method, fuzzy logics,MRR,TWR, surface roughness*

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Design and Modeling of Agricultural Robot

Seeram Srinivasa Rao[1], Ghanta Vamsi Krishna[2]

[1]Professor Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

[2]Student Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: [1]ssrao@kluniversity.in; [2]gvamsikrishna031@gmail.com;

ABSTRACT:

There are mainly five steps in agriculture that are plowing, seeding, watering, tuning, harvesting. In this paper, we are going to develop model mainly focus on Boring, where a robot with the help of the drilling tool attached at its rear side will be used to remove the soil for the plantation. Secondly comes plantation, here the person will carry out plantation at desired places. Then comes the maintenance of the crop in which the amount of watering, sunlight, pesticide, fertilizer required for the healthy growth of the plant is controlled by the robot with help of electronic circuits present inside a robot. Then we focus on tuning operation, this module will be taken care of by cutters attached to the robot. Finally, fruit picking operation is done by a three-hand jaw attached to a robot which will be used to pick the fruits. Another additional module is a sample of soil that will be taken and processed with different chemicals and give us output as deficient nutrients in the soil and fertilizers to be added to make soil fertile land and suitable atmospheric conditions for the crop

Keywords: Agricultural robot, modelling.

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Feature-based Approach to Automatic Generation of CNC Part Programs

Seeram Srinivasa Rao

Professor Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: ssrao@kluniversity.in;

ABSTRACT:

Purpose: Now-a-days all modern companies tend towards automation in most of the areas. The new concepts of manufacturing processes are required for the development of adequate tools for the automated systems. This paper presents such system for automated programming of CNC machine tools.

Design/methodology/approach: The present research work deals with the development of feature-based approach to automatically extract geometrical data and recognize the external and internal features of the workpiece from an image database without any human intervention. Recognized work piece features are then passed to developed system for the generation of process plan and then utilize this information to generate NC part programs.

Findings: On the basis of the recognized features with different algorithms, the process of manufacture plan, tool, optimum tool path and machining parameters viz speed, feed and depth of cut are selected from the data base. It is developed in the JAVA language

Originality/value: This paper describes the new methodology for the automatic extraction of the co-ordinates from the 2D image files and recognition of turned features, generation of process plans and CNC part programs for rotational parts.

Index words: Image Processing, Geometric data extraction, Feature recognition, CAPP, turning parts, part program.

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Experimental studies on single phase characteristics of multiple tubes in tube heat exchanger

Sai Sarath Kruthiventi

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

sharath@kluniversity.in

ABSTRACT:

Heat exchangers are used whenever there is a need for transfer of heat from one fluid to another fluid. Lots of study has been reported on tube in tube heat exchangers, were as the study reported on multiple tubes in tube heat exchangers are less. The main advantage of tubes in tube heat exchanger is offers lesser pressure drop. The design of such heat exchangers involves in the estimation of heat transfer coefficients and pressure drops. Present work involves the estimation of single-phase heat transfer coefficient and pressure drop characteristics on outer tube side. The study is proposed to carry out with the range of Reynolds number (3,000-20,000).

Index Terms – Heat transfer coefficient, Pressure drop, Reynolds Number

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CFD predictions of Granular Temperature in fluidized bed system

Sai Sarath Kruthiventi, V. Nagaraju

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

sharath@kluniversity.in

ABSTRACT:

In the present study, it is proposed to estimate the granular temperature in the fluidized bed during the collisions between the gas-solids particle interaction. An estimation of basic properties by considering the TFM approach. TFM approach is used to solve the governing equations of mass, momentum and granular temperature for both the gas and solid phases by incorporating the KTGF (Kinetic theory of granular flow), which is available inbuilt with commercial software package ANSYS's FLUENT ^{TM}. To solve fundamental set of equations of continuity, momentum and granular temperature equations with the stress closer from KTGF closures laws. The closure relations based on the KTGF are utilized. The complete details of closure models, physical properties and simulation parameters used in this study are briefly discussed. The partial differential equations of two fluid model (TFM) for particle and fluid flows in the fluidized bed were adopted for the both 2D and 3D geometric simulations.The granular temperature is computed by solving a fluctuating kinetic energy equation for the particles as already reviewed in the KTGF model section. The solid viscosity and granular pressure are computed as a function of granular temperature (Θ) in the CFD model itself, which are two kind of turbulence in fluidization. These two kinds of turbulence give to two kinds of mixing, mixing on the level of particles and mixing on the level of bubbles or clusters. The classical or laminar granular temperature (Θ) is due to random oscillations of individual particles and turbulent granular temperature (Θ_t) is caused by the motion of clusters of particles or bubbles. Total granular temperature is the sum of laminar granular temperature (Θ) and turbulent granular temperature (Θ_t).

Index Terms – Granular Temperature, Fluidization, Ktgf And Gas-Solid,Fluid Model

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Selection of Restrictor and Plenum Model of Muffler Using Finite Elemental Simulation

N.Tamiloli1*, Mudra boyina Venkateswarlu[1],Kurapati Lokesh kumar[1], Yerra Venkatesh[1]

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

E-mail ID:Tamiloli@kluniversity.in

Abstract: This paper mainly focusing on the selection of the restrictor model and plenum model of the muffler. The restrictor models mainly used in formula student racing competition are held across the world coordinated by society of automotive engineers. In this competition rule to restrict the power which is delivered to the cylinder. Three different shapes (oval shape, cylinder and sphere shapes) are chosen for testing. So they restrict the 20mm air restrictor before reaching the cylinder. To eliminate the restrictor to minimizing the pressure difference between the intake and outlet. To achieved the convergent-divergent angles changed by 20mm diameter to find out the angle to get less pressure drop. In-order to acquire the results of convergent angle of 17^0 and divergent angle of 4^0 had less pressure drop so that it is useful in muffler. Among three, sphere shapes is performed less pressure drop than compared with other shapes. ***Keywords****: Restrictor model, Plenum Model and Muffler*

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Conventional Hybrid Power Production Systems for Rural Community

Indra Reddy A.[1,a,*], Robera Daba Bededa[2,b,] , BASAM KOTESWARARAO [3,c,***], Mooli Harish[4,d,****]**

[1,a,*] Assistant Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation (Deemed to University),Vaddeswaram, Guntur,A.P.-522502, India, alugubellyindrareddy@gmail.com

[2,b,**]Lecturer,MADDAWALABUUNIVERSITY, BALE ROBE, ETHIOPIA-247, roberadaba@gmail.com

[3,c,***]Assistant Professor, MaddawalabuUniversity, BaleRobe,Ethiopia-247 ,basam.koteswararao@gmail.com

[4,d,****]Assistant Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation (Deemed to University),Vaddeswaram, Guntur,A.P.-522502, India, harish.m313@kluniversity.in

***Abstract*-**This paper was to get hold of the best possible suitable design of a hybrid electricity generation system using a range of renewables/alternative power sources to meet up the rural community load prerequisite reliably, economically, continuously and sustainably. Hybrid Optimization Model for Electric Renewable (HOMER) was used to accomplish techno-economic analysis to meet up the load prerequisite using solar PV-wind turbine- diesel generator-battery, hybrid electricity generation system.

Keywords: Electrification, HOMER andHybrid electricity generation system.

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Analysis of delay time and layout using Heuristics algorithms

A Indra Reddy[1] , Habtamu Mitiku Feyissa [2] ,Yakkala. M.K Raghunadh [3], Somanath.B[4]

[1]Department of Mechanical Department, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P. ,

[2]Department of Mechanical Engineering, Maddawalabu University, Bale Robe, Ethiopia-247,

[3]Department ofMechanical Engineeri- -ng, Department, Guru Nanak Institutions Technical Campus, Hyderabad 501516.

[4]Department of Mechanical Engineering, Maddawalabu University, Bale Robe, Ethiopia-247

ABSTRACT:

ALB is commonly known as combinatorial optimization problem in manufacturing industries and operation management circumstances. Because of the NP-hard characteristics of ALB problem, lot of tries have been done to solve the problem professionally. The critical concern in analysing ALB is how to generate a possible task order which does not disrupt the priority restrictions. This job arranging is a vigorous work to be answered prior to passing on jobs to workstation. Balance delay time (total idle time) is the total of idle time on fabrication assembly lines triggered by the irregular partition of work among operators or stations. In this thesis, SALBP-1 analysed using the three heuristic techniques. Kilbridge and Westers Method (KWM), Ranked Positional weight (RPW) and biologically inspired evolutionary computing tool which is heuristic treated Genetic Algorithm (GA) was applied to solve the ALB problem with the main aim of reducing the balance delay time in the workstation and the best method was selected. The selection criterion was based on the minimum balance delay for the sample problem. The result obtained by heuristic treated GA with 4.545% of balance delay for the sample problem taken was the best when compared to other two methods

Index Terms *– Assembly line, Balance delay time, Genetic Algorithm (GA), Heuristic algorithms*

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Analysis of Horizontal Axis Wind Turbine Blade

N.Tamiloli, Kurapati Lokesh kumar, Mudra boyina venkateswarlu, Kanulla Karthik

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur District, Andhra Pradesh, India,

Email: tamiloli@klunivrsity.in

Abstract: The objective of this project is to design the blade of a horizontal axis wind turbine. This work includes the advancement of drag and lift design concepts. This work uses ANSYS workbench to explore the study of a horizontal axis wind turbine blade Concepts. The blade is examined in this work for four different blade materials Aluminium, stainless steel, Structural steeland Titanium. The purpose of the study is to validate blade strength and to analyse with taken materials in order to take the best material for the blade of the horizontal axis wind turbine and to obtain the blades necessary properties.

Keywords*: Blade design, Solid works, Ansys Workbench, Structural Analysis.*

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AUTOMATIC ROBOTIC PALLETIZING FOR OIL CARTONS

Dr. G.Yedukondalu

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: yedukondalu@kluniversity.in.

ABSTRACT:

Palletization is the most common approach and complex operation to perform at the end of production lines. The oil cartons are kept closer to each other, which brought to the necessity of design a special gripper and making it possible to handle the boxes. In this paper, the gripper is designed and developed for palletizing oil cartons. The work is concentrated on carton arrangements on the pallet using offline programming for different pattern generation with the user-defined interface. The total weight of the cartons varies from 12 to 20 kgs. Finally, the IRB 660 ABB robot includes gripper is used and verified for palletizing oil cartons.

Index Terms *–* ***Palletization, IRB 660 ABB Robot, Gripper & Oil Cartons.***

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CHEST COMPRESSION WITH 2-DOF PARALLEL MANIPULATOR FOR CARDIOPULMONARY RESUSCITATION

Dr. G.Yedukondalu

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: yedukondalu@kluniversity.in.

ABSTRACT:

Chest compression process is used for recovering patients who met with a cardiac arrest in emergency situations. Chest compression is the only possibility of rescuing patients during cardiopulmonary resuscitation (CPR). It is hard to achieve the exact chest compression's depth and rate even by experienced professionals as per the CPR guideline. A 2-DOF translational parallel manipulator was designed for delivering chest compressions. The kinematic analysis is carried out analytically. The workspace of the manipulator is examined in consideration of physical constraints imposed by joints. Finally, the manipulator operates with exact compression depth and rate during CPR.

Index Terms *–* ***Parallel Manipulator, chest compression, Cardiopulmonary Resuscitation (CPR).***

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Sustainable manufacturing methods

K. BABU RAJA[1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: kbrme@kluniversity.in.

ABSTRACT:

Sustainable manufacturing methods to minimize the negative effects on the environment and people and for safe products and services, depletions of ozone layer are one of the significant environmental concern due to smoke pollution and water pollution is causing disturbance in aquatic and weather conditions. Recycle is casing more adverse effects on the environment and human health due to toxic materials are developed during the process except in few situations recycle of products is not beneficial for the environment. Challenges always exist for an engineer to provide solutions and preventions of nonproductive and non-ecofriendly manufacturing methods. Traditional manufacturing like lathe machines are replaced with unconventional manufacturing methods like abrasive water jet machining which is a promising green manufacturing method. Welding of metals is carried out by coated consumable electrode in case of arc welding process, now friction welding is found to be an alternative with less impact on the environment.

Index Terms *–* ***Sustainable manufacturing methods, quality, safety, reliability, environment***

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Global change in manufacturing industries

K. BABU RAJA[1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: kbrme@kluniversity.in.

ABSTRACT:

Internet of Things enables physical products such as automobiles, microwave ovens, electric and electronic gadgets to have interaction and collaboration to achieve a common goal to facilitate humans with the quality of life. Smart villages, smart cities with autonomous vehicles, medical facilities will allow sustainable manufacturing and service industries. Industrial internet of things will enable the use of skill and expertise of a person to be utilized globally with the help of cyber manufacturing systems like additive manufacturing. Nations will also develop in terms of monetary as well the quality of life with IoT on a large scale due to minimum barriers for the manufacture of a product or rendering a service that is quite possible with the technology and the internet speeds that are available and improving and Moore'sLaw is quite evident, one can see the existence of micro robots, turbines that are designed for a laptop, miniaturization and sustainable manufacturing is the need of present and future industries in the global scenario.

Index Terms** – **IoT, global, cyber, manufacturing, product, service

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Banana Fiber to increase Bonding strength as another source in Polypropylene Matrix

Santhosh kumar.R [1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: siamsanthosh@kluniversity.in.

Abstract

The point of this work was to creation of banana fiber fortified fiber with polypropylene composites. Assessment of mechanical properties, for example, elasticity, sway quality flexural quality, and miniature hardness and so forth of composites. To contemplate the impact of fiber length and stacking on the mechanical conduct of composites. Inspite of, hoisting the banana fiber as substitute filler material in a polypropylene network to build the holding among fiber and grid. As a characteristic fiber due its accessibility, biodegradability, minimal effort and low weight, its elasticity and tractable modulus alongside the weight rate are assessed and analyzed really during this work.Here the trial arrangement was made like infusion shaping cycle, example planning and composite creations for generally research work.

Keywords— Banana fiber, Polypropylene, Tensile strength, composite bonding.

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MANAGING SHOCK REQUIREMENTS OF SHIPBOARD EQUIPMENT

Santhosh Kumar.R [1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: siamsanthosh@kluniversity.in.

Shock, in layman's term, is commonly perceived as an abrupt and savage blow or effect. It is portrayed as a unique unsettling influence with a brief length contrasted with the common recurrence of the influenced hardware. Gear exposed to stun past its delicacy level can bomb fundamentally and practically. By and large, the degree of these unwanted impacts increments with both the stun extent and length. These impacts can likewise be expanded when the stun beat recurrence harmonizes with the influenced hardware's characteristic recurrence. The administration of stun necessity for gear to be introduced on board the Republic of Singapore Navy's boats is a consistent test. In particular, the gear should have the option to withstand the moderately rare, non-monotonous stuns experienced in taking care of, transportation and administration conditions. This test is made more intense considering the expanding utilization of business off-the-rack segments just as the establishment of similar hardware across various classes of boats. This article gives a short prologue to stun particulars and necessities of shipboard hardware. The peruser is then guided through parts of stun the board, for example, stun confinement and capability, trailed by a short review of a portion of the normal worldwide principles with respect to stun determinations and capabilities.

Keywords: naval shock design, shipboard equipment, shock qualification, shock response spectrum, underwater explosion

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Characterization of Roselle Fiber Composites for Low Load Bearing Structures

Atik Mubarak Kazi[1*], DVA Ramasastry[1], Sunil Waddar[2]

1 Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur District, Andhra Pradesh 522 502, India

2 Department of Mechanical Engineering, M V J College of Engineering,

Bengaluru, Karnataka 560067, India

E-mail address: dvarsastry@kluniversity.in

ABSTRACT:

In this study, the woven roselle fiber epoxy composite has been explored to understand its impact of weaving architecture on mechanical and dynamic mechanical properties of this composite. The woven composites considered in this study are produced using Hand lay-up process in Plain, twill, satin and basket type weaving patterns. Tensile, Flexural and Impact tests and dynamic mechanical analysis (DMA) are conducted according to ASTM standards for material characterization. It is identified from results that there is improvement of storage modulus in Woven composites compared with neat epoxy. Also, the glass transition temperature of this composite has lowered to that of neat epoxy owing to weak fiber-matrix bonding. Further, findings have identified that basket type architecture of woven roselle fiber epoxy composite has better tensile, flexural and impact strengths. Also, scanning electron microscopy (SEM) analysis showed evidences of weaker bonding between roselle yarn and the epoxy matrix, which indicates a nonuniform transfer of stress from fiber to the matrix.

Index Terms: Weaving architecture; Roselle fiber; Mechanical Properties; Dynamic mechanical analysis

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Analysis of Tractor suspension equipped with MR damper

Sudheer Nuvvala, DVA Ramasastry

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

E-mail ID:dvarsastry@kluniversity.in

ABSTRACT:

The vibration conditions to which tractor operators are subjected to complex and varied with multi axis translation and rotational vibration inputs to different parts of the body. Working under such conditions may lead to human fatigue and other driving related hazards. The present work is carried out to study the operators ride comfort under varying conditions of vibration while driving a tractor with and without farm equipment on different fields. The levels of vibration generated at different engine speeds, are identified and vibrations are analysed at the different vibration velocities. The results of the study can be used to develop a tractor where the driver may be relieved of vibration induced stresses.

Index Terms: Tractor suspension system, MR damper, ride comfort

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Typical Stress & Deflection Analysis of Spur Gear in Spur Gear Assembly

MNVRL Kumar

Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: mnvrl.kumar@kluniversity.in.

Abstract

Gear is a mechanical rotating element having cut teeth, or cogs on the periphery of cylinder or disc, which meshes with another toothed rotating element in order to transmit torque or power. Meticulously, this is accomplished by successively engaging of teeth. Gears are widely used in industries; perhaps, spur gear is the simplest model of gears and the radial teeth are designed on the periphery parallel to the axis of the shaft. This research analysis work speaks about the solid modeling of spur gear, stress strain and deflection analyses of the gear and assembly in such a way that, the analysis is done separately for main spur gear, pinion gear and assembly of main spur gear and pinion gear later it is analyzed to gear pair mounted in gear box. Finite Element Methods (FEM), Pro/Engineer and ANSYS simulation methods are widely used to detail the stress and deflection analysis of the spur gear and assembly.

Keywords: Spur Gear, Stress Strain Analyses, Deflection Analysis, Finite Element Methods, Ansys Simulation.

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An Experimental Study on Characteristics of Journal Bearing Material by Friction & Wear

MNVRL Kumar

Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: mnvrl.kumar@kluniversity.in.

ABSTRACT: The aim of this research study was to determine the Coefficient of Friction (μ = F/W) by studying the characteristics of bearing material. Force in journal bearings under realistic operating conditions. The testing of each specimen is carried out in three different conditions namely, fully lubricated condition, semi dry condition and dry condition. In the lubricated test, the bearings are tested using SAE 10 lubricating oil. In the semidry test, after running in, the bearings and the shaft are thoroughly cleaned with acetone and dried to remove traces of oil from the surface. The bearings are then tested without any further lubrication. In dry test, the bearings were tested in completely dry condition without any lubrication.

KEYWORDS: Journal bearing, Zn- Al- Cu Alloy, Friction and Wear, Lubrication conditions and EDXS.

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Static Capacity maximization of Deep Groove Ball Bearing using Genetic Algorithm

Sireesha Koneru1

Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: sireekonerus@kluniversity.in.

Abstract—

Design of machine components involves consideration of several constraints [technical, economical, aesthetic, etc.], thus involving several design variables affecting the performance. Dealing of such complicated problems can be handled efficiently by advanced optimization techniques. Static capacity is one of the important performance criteria for any ball bearing. The objective is to be achieved against various constraints in terms of geometry, kinematics of operation, strength etc. In the present problem, the optimal design parameters for the maximization of static capacity (Cs) of Deep Groove Ball Bearing using Genetic algorithm are determined. Further the same problem has been solved by using DESIGN EXPERT, an RSM software tool, to determine the optimum design parameter ranges to achieve the simultaneously optimal (Pareto optimal) solution and is compared with results obtained from Genetic Algorithm (GA). Another significant thing of the present work is that, the effect of contact angle (α) on static capacity is considered.

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Service Quality Evaluation of Health Care Industry

P.S.Prema Kumar

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502

E-mail: kumar.mech.me@kluniversity.in

ABSTRACT:

Health care sector is one of the most important sectors in the service industries of any country. This paper shows how to measure health care service quality, where multiple interactions occurring internally. Here Patient satisfaction is the criterion taken, which is used to measure the response of the medical centers' examination and treatment for the patient's expectations. Based on previous literature and research, a study was made to identify the factors that affect the satisfaction of the patient. Six factors namely: Responsiveness, Safety and Security, Assurance, Tangibles, Empathy and Reliability are considered. Furthermore, four sub factors for each main factor are considered. A study on hospitals was carried out for measuring the health care service quality performance. In this study, the patient's expectations of service quality provided by hospitals were analyzed based on the responses received from patients of various government and Corporate hospitals in different parts of the state of Andhra Pradesh in India. For the reliability, validity of the variables taken, Confirmatory Factor Analysis (CFA) implemented. Variables were checked for the internal consistency. Prioritization of all the main factors was done using Relative Weight Analysis and all the weights are tabulated.

Index Terms: Service quality, Patient satisfaction, Confirmatory factor analysis and Relative weight analysis

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Service Quality Evaluation of Healh Care Providers Using Fuzzy Axiomatic Design Principles

P.S.Prema Kumar

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502

E-mail: kumar.mech.me@kluniversity.in

ABSTRACT:

Accurate information relating to the service quality of any health care sector is important for its evaluation criteria. Proper methods adopted for the evaluation of quality are also very important for the overall assessment. Selection of the appropriate health care provider is a challenging task for getting a proper treatment. Now a days a variety of hospitals are available for providing services. There are several service quality parameters influencing proper selection of a suitable HCP. Hence it is a multi-criteria decision-making task. In this paper, fuzzy axiomatic design principles are applied for evaluation and ranking of health care providers. As a measure of appropriateness, the total information content is determined for each of the health care providers and the alternatives with the lowest total information content is viewed as the best one.

Index Terms: Health care provider, Fuzzy axiomatic design , System range, Design range, common range

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EXPERIMENTAL INVESTIGATION ON DI DIESEL ENGINE USING VEGETABLE PEEL PYROLYSED OIL AND DIESEL AS FUELS

K.Venkatesan[1]

[1]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: venkatesan@kluniversity.in, venkatgingee1970@gmail.com

ABSTRACT:

Bio mass is an organic substance which has sufficiently more amount of energy content and potential to use as an alternative energy. Mosambi peel and Cashew nut peel which are used as bio oil is produced by pyrolysis of biomass waste and used as fuel in a diesel engine. Among the different biomass,it is found that cashew nut peel and Mosambi peel easily blend with the diesel at around 15% maximum stability. Bio oil blends MCO5 (5%MPO oil +5% CSO+90% Diesel), MCO10 (10%MPO oil +10% CSO+80% Diesel) and MCO15 (15%MPO oil +15% CSO+70% Diesel)are prepared with the given volume. Blending of oil is done with mechanical stirrer at a speed of 1000 rpm for 20 minutes. The properties of these blends such as flash point, fire point, density, viscosity, calorific valuewere analyzed and the FTIR analysis was done using all these blends. These blends were tested in a single cylinder with1500 rpm, 3.5 kW, direct injection diesel engine fitted with eddy current dynamometer. The performance and emission characteristics were studied at various loads on the engine at a constant speed of 1500 rpm and compared with neat diesel fuel operations. The entire sample of MCO was very close to the properties of diesel fuel .The performance shows that, brake thermal efficiency slightly reduced forMCO5 fuel with slightly increased specific fuel consumption and lower exhausts gas temperature. Emissions show considerable reductions for the smoke, CO emissions, HC emissions and No_x when compared to the diesel fuel. With further modification in MCO blend fuel, it can be used as a substitute for diesel fuel in engines**.**

Index Terms *– Mosambi peel biomass; Cashew nut peel biomass; pyrolysis oil; Diesel Engine; Pyrolysis; Performance and Emission.*

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PERFORMANCE AND EMISSION CHARACTERISTICS OF CASHEW NUT SHELL PYROLYSED OIL - WASTECOOKING OIL WITH DIESEL FUEL IN A FOUR STOKE DI DIESEL ENGINE

K.Venkatesan[1]

[1]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: venkatesan@kluniversity.in, venkatgingee1970@gmail.com

ABSTRACT:

India is considered as the fourth largest energy consumer in the world after the United States, China, and Russia. India's energy consumption is increasing a relatively fast rate in the recent years due to population growth and economic development of the country.This paper focus on the performance of waste cooking oil and Cashew nut shell pyrolysis oil blend with diesel fuel used in a four stoke diesel engine. The pyrolysis process was used to extract the cashew nut shell pyro oil from the Cashew nut shell bio mass. The Cashew nut shell biomass was used at the reaction temperature of 800°C to obtain cashew shell pyro oil from fast pyrolysis process.The Cashew shell pyro oiland waste cooking oil properties were studied. The blending of pyrolysis oil and waste cooking oil are by mixing of diesel fuel by volume called as CPO5WC5D90 (5%CPO+5%WC+90D), CPO10WC5D85 (10%CPO+5%WC+85%D) and CPO15WC5D80 (15% CPO + 5%WC + 80% D). Characteristics of a fuel for Diesel fuel, and blending of CPO5WC5D90, CPO10WC5D85 and CPO15WC5D80 were analyzed. All the blended fuels were tested in a 1500 rpm single cylinder four stroke diesel engine for their performance as blended fuel. Engine test results showed that the performance for all CPO5WC5D90, CPO10WC5D85 and CPO15WC5D80 related to diesel fuel. At the maximum power output the brake thermal efficiency was found as 29.0% respectively with CPO5WC5D90 and where as it was 30.5% with diesel fuel. All blended fuel is drastic reduction for the smoke and NOx emissions. The HC and CO emission slightly increased the CPO5WC5D90, CPO10WC5D85 and CPO15WC5D80 as fuel compared to diesel fuel at all power outputs.

Index Terms *– **Cashew nut pyro oil, pyrolysis Oil, Waste cooking oil, Diesel Engine,Engine performance, Exhaust emission.***

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Tool Manufacturing makes easy with Tooling Hole – a review

B Kiran Kumar[1], S Venkata Reddy[2]

Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502

E-mail: buragaddakirankumar15@kluniversity.in

ABSTRACT:

Manufacturing of various tools like Sheet metal stamping dies, Injection moulds, Jigs & Fixtures and Gauges require machining of their individual parts and to be assembled to meet the required functionality. The tool parts are expected to have good dimensional accuracy, surface roughness and geometries are achieved by various conventional and non-conventional machining processes. In the process of machining these parts sometimes require an off-line inspection and the die profiles or holes are to be relocated from two accurate machined reference sides repeatedly. Any inaccurate location of die profiles make the tool malfunctioning. This paper present the concept of Tooling Hole and its methodology at various applications to speed up the manufacturing.

Index Terms *– **Tooling Hole, Reference sides, Tool Manufacturing process***

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Modeling and parametric analysis using modified Taguchi technique in the preparation of SS powders

T Vijaya Kumar[1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: vijay_mech@kluniversity.in.

ABSTRACT:

Today, researchers are paying close attention to nanocrystalline materials in the area of engineering materials science. The researchers were drawn by the improved mechanical properties such as high strength and high hardness of these materials. But the costly equipment and poor performance used in it makes the cost of nanocrystalline materials high. Attempts are being carried out via oblique machining and high-energy ball milling routes to manufacture nanocrystalline materials. Oblique machining is carried out by means of a large plastic strain deformation applied by a cutting tool. For this reason, 316L (SS) stainless steel bars of 50 mm in diameter and 300 mm in length are selected. With distinct cutting conditions, machining parameters such as feed, cut depth, rpm, and rake angle vary. The updated Taguchi L16 orthogonal array optimises the parameters of the unit. The cutting tool used here is tungsten carbide-coated. With the assistance of an ultrasonic system for microstructure analysis, machine chips were collected and cleaned. The chips are further characterised by the use of a scanning electron microscope (SEM) and X-ray diffraction (XRD). The chips produced under optimised machining conditions are further processed with a high-energy ball mill and are thus produced with nanocrystalline powders. In order to optimise the high energy parameters of the ball mill, such as milling speed, milling time and ball mill to powder ratio, the modified Taguchi method is used here. A transmission electron microscope (TEM), SEM and XRD were then used to classify the milled powder. It will be evident from the results that the milled powders will be in the 15-45 nm range.

Key Words: Taguchi, XRD, SEM, high energy ball milling.

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Optimisation of process parameters using Taguchi 's method during the vibratory welding technique

T Vijaya Kumar[1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: vijay_mech@kluniversity.in.

ABSTRACT:

Vibration Welding is a frictional welding technique capable of producing solid, air-tight welds in thermoplastic sections. Vibration occurs in this method through electro-magnetically controlled transverse reciprocating motion via a swing frame assembly containing precision springs, electromagnets and an electromagnetic drive assembly that controls the vibrating head's amplitude and frequency. The Taguchi analysis was applied to the above vibrational welding method. A proper optimization is conducted for process parameters such as yeild strength and hardness. The vibration in the weld pool has increased the value of weld material micro hardness, showing the crystal arrangement and grain refinement that took place.

keywords: Taguchi method, Vibration welding ,yeild strength ,microhardness .

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On Co2 Laser Drilling of Ti-6Al-4V alloy and its parameters optimization using the modified Taguchi approach

Mooli Harish

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: harish.m313@gmail.com

To control the chatter and vibration and too breakage while direct contact between tool and work piece during drilling process here selected Co2 laser drilling for making holes in Ti-6Al-4V alloy. the circularity, taper and spatter area are elements decide the quality of hole in laser drilling. The present investigation attempts to find out the optimum parametric setting during drilling of Ti6Al4V using CO_2 laser in order to achieve quality holes. a simple and reliable modified Taguchi design of experiments is utilized for optimization of Taper, Spatter area(mm^2) and HAZ on drilling of Ti-6Al-4V with Co_2 laser. The optimal drilling parameters (viz., Flushing pressure ($P_{a),}$ Laser power (W) and Pulse frequency(Hz)) and the expected range of output responses (Taper, spatter area(mm^2) and HAZ(mm)) are obtained. Empirical relations for Taper Spatter area (mm^2) and HAZ(mm) are developed in terms of machining parameters and validated through test results. Most of the test data are within the expected range.

Keywords: ANOVA;Flushing pressure; Laser power; Pulse frequency;Taper; Multi-objective optimization; Spatter area(mm^2);HAZ; Ti-6Al-4V alloy; Co_2 Laser drilling.

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Dynamic Analysis of Hybrid Composite Beam Made of Carbon and Glass fibre under thermal Environment

J.Leela Kishan[1], G.Arun Kumar[1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: leelakishan@kluniversity.in.

ABSTRACT:

The evolution of composite material has replaced most of the conventional material of construction in automobile, aviation industry etc. Fiber reinforced composites have been widely used in thousands of applications where ever there is need to optimize the strength of the material, in this Glass fiber composites are widely used in practice. The advantages of glass fibers over others are cost friendly in production, possibility for manufacturing very long fiber, High resistance to impact, good machinability. The basic disadvantage is it has low young's modulus and they lose resistance at elevated temperature. Carbon fiber composites have high strength, high young's modules, low density, excellent machinability, Low thermal expansion coefficient. The main disadvantages are low toughness and high anisotropy which cause additional problems to constructors and high production cost compared to glass fibers. The dynamic environmental conditions due to temperature will have adverse effect on the stiffness and strength of the composites. This wide range of practical applications demands a fundamental understanding of their deformation, vibrations, static and dynamic stability characteristics in different temperature and moisture concentration. The main course of this project is dynamic analysis on hybrid composites in order to evaluate the stiffness and strength at thermal environment conditions.

Index Terms*– *Fiber Reinforced Composites, vibrations, deformation, hybrid composites, stiffness, thermal environment.

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VIRTUAL ANALYSIS OF COMPACT PARALLEL MANIPULATOR FOR LAPROSCOPIC SURGERYAPPLICATIONS

Dr.K. Kishore kumar[1], Dr.A.Srinath[2], Dr.D.Bhavana[3],

[1]Associate Professor, [2]Professor & HOD, [3] Associate Professor

[1,2]Department of Mechanical Engineering,

Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, Andhra Pradesh, India – 522502

[3]Department of Electronics and communication Engineering,

Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, Andhra Pradesh, India – 522502Email ID: kishorekumardavid@kluniversity.in

ABSTRACT

This paper presents a robotic assistant to help surgeons in laproscopic surgeries and eye surgery .compact four arm parallel manipulator is designed in solid works software and analysis is perfomed . Surgery robots should be compact and easy to operate. Considering medical needs a four arm redundant parallel manipulator is simulated using virtual softwares .worksspace simulation is done in ROBODK software Basing on results proposed compact parallel manipulators can be used in medical field for best and safe results

Key words: *Medical applications, manipulators, robot kinematics,robodk,solid works*

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DESIGN AND ANALYSIS OF DELTA PARALLEL MANIPULATOR FOR INDUSTRIAL APPLICATIONS

Dr.K. Kishore kumar[1], Dr.A.Srinath[2], Dr.D.Bhavana[3],

[1]Associate Professor, [2]Professor & HOD, [3] Associate Professor

[1,2]Department of Mechanical Engineering,

Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, Andhra Pradesh, India – 522502

[3]Department of Electronics and communication Engineering,

Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur, Andhra Pradesh, India – 522502Email ID: kishorekumardavid@kluniversity.in

ABSTRACT

Design analysis of parallel manipulator using virtual&3d modelling software tools was done for checking the operational feasibility to use parallel manipulators for Industrial applications like food processing industries Compact parallel robot is feasible to work in limited workspace When compared to serial robotic structures and it is safe and occupies less space in food processing industries .Delta parallel manipulator is simulated using virtual softwares . Basing on results proposed compact parallel manipulators can be used in min workspace tasks in industries for best and safe results

Key words: *industrial applications, manipulators, robot simulation,robodk.*

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Optimization of surface roughness parameters of EDM on Ti6Al4V Using by Modified Taguchi method

Mooli Harish

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: harish.m313@gmail.com

Ti-6Al-4V is classified among the most commonly used Ti-alloys and is extensively used in aerospace and medical industries where low-density, high strength and outstanding corrosion resistance are required. This material cannot be processed by conventional machining methods because of its high strength. Electric Discharge Machining, abbreviated as EDM, is an unconventional machining process suitable for machining Ti-6Al-4V. compared to the recently used S/N ratio, SEM observation of EDM machined surface a simple and reliable modified Taguchi design of experiments is utilized for optimization of surface roughness (Ra) on machining Ti-6Al-4V with copper electrode insert using EDM-30 dielectric fluid. The optimal machining parameters (viz., peak current(I), pulse on time ($T_{on)}$ and pulse of time(Toff) and the expected range of output responses (Ra) are obtained. Empirical relations for Ra are developed in terms of machining parameters and validated through test results. Most of the test data are within the expected range.

Keywords: ANOVA;peak current(I); pulse on time (T_{on}) and pulse off time (T_{off}); Surface roughness (Ra);Ti-6Al-4V alloy.

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Simulation studies on Multi phase characteristics of Single tube in tube Shell and tube heat exchanger

V. Nagaraju

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

nag.mech@kluniversity.in

ABSTRACT

Heat exchangers are utilized at whatever point there is a requirement for move of Heat starting with one liquid then onto the next liquid. Bunches of study has been accounted for shell and tube heat exchangers, where the examination covered numerous cylinders in tube heat exchangers are less. The primary favorable position of cylinders in tube heat exchanger is offers lesser weight drop. The plan of such heat exchangers includes in the assessment of heat move coefficients and weight drops. Present work includes the assessment of single-stage heat move coefficient and weight drop qualities on external cylinder side. The examination is proposed to complete with the scope of Reynolds number (3,000-20,000).

Index Terms – heat exchanger, pressure drop, heat transfer coeffcient

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ANN modelling and multi-objective optimization of µ-EDM using TLBO approach

Himanshu Mishra

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

himanshumishra@kluniversity.in

ABSTRACT: Fabrication of micro-holes has been carried out in Inconel 718 using micro electrical discharge machining operation. Artificial neural network modelling has been carried out to predict Material Removal Rate, Overcut effect and Recast Layer thickness. The training, testing and validation data sets were collected by conducting experiments. It is observed that ANN is a powerful prediction tool. It provides agreeable results when experimental and predicted data are compared. Further optimization of the process variables has been carried out using different meta heuristic approaches like Teachinglearning-based optimization, Multi-Objective Differential Evolution and Multi-Objective Optimization using an Artificial Bee Colony algorithm. The comparisons are carried out to improve the accuracy of the model on the basis of Pareto front solutions.

Index terms:Artificial neural network (ANN) · Material removal rate (MRR) · Overcut (OC) · Multi-objectivedifferential evolution (MODE) · Recast layer thickness (RCL) ·

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Autonomous Robot for Smart Farming

S.**Ramesh Kumar**[1], **Srikanth Vemuru**[1], **Srinath.A**[2]

[1]Department of CSE, Koneru Lakshmaiah Education Foundation,
[2]Department of ME, Koneru Lakshmaiah Education Foundation,
Green Fields, Vaddeswaram, A.P., India-522502.
E-mail: cadramesh@kluniversity.in.

ABSTRACT:

Precision Agriculture and Smart farming include the combination of advanced innovations into existing cultivating practices in order to increase productivity and the quality of agricultural products. As an additional advantage, they also improve the quality of life for farm workers by reducing hefty work and repetitive farm duties. As farms grow in size, the utilization of hardware equipment is also increase, so there is a requirement for approaches to computerize measures for ways to automate processes, previously performed by the farmer himself, such as controlling the fields for pests. These tasks are perfectly suited for autonomous robots, as they often require various reiterations throughout a significant stretch of time and over an enormous zone.In some cases a small agricultural robot would be ineffective in performing farming jobs, as these often require a large quantity of materials, either to put into the ground, such as seeds or fertilizers, or to take from the field during harvest. But when dealing with field scouting, sowing and mapping of fields or precision spraying of pesticides, a smaller robot is ideal, as it is gentler on the crops but also to the ground. This is due to the lower weight compared to a tractor, causing much lesser soil compaction. The level of soil compaction is essential to consider, particularly when dealing with monitoring and planning as this is regularly performed at various occasions consistently, as soil compaction can cause various issues, such as reduced crop growth and yield. Hence by automating these agricultural process and application by the implementation of small size robots leads to reduce in operational time, cost and furthermore beat the deficiency of horticultural workforce.

Index Terms *– Precision Agriculture****, Soil Compaction, crop yield, operational time, field scouting, horticulture.***

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Expert System for Crop Yield Forecasting using Machine Learning Techniques

S.Ramesh Kumar[1], Srikanth Vemuru[1], Srinath.A[2]

[1]Department of CSE, Koneru Lakshmaiah Education Foundation,
[2]Department of ME, Koneru Lakshmaiah Education Foundation,
Green Fields, Vaddeswaram, A.P., India-522502.
E-mail: cadramesh@kluniversity.in.

ABSTRACT:

India is generally an agricultural country, its economy predominantly depends on agriculture yield growth and agro industry products.. Agriculture crop production depends on the season, organic, and monetary cause. The prognostication of agricultural yield is challenging and pleasing task for every nation. Now a day, Farmers are hostile to produce the yield because of erratic climatic changes and scarcity of water resource.

The main objective is collecting agricultural data from the fields and the data published by Agriculture Statistics at a glance, Department of Agriculture, government of India which are stored and analyzed for useful crop yield forecasting. To predict the crop yield with the help of Machine Learning technique, Regression methods are introduced to predict crop yield of a particular crop in a specified region or state for coming years, such that these forecasting results helps the farmer to choose the most suitable crop, thereby improving the value and gain of the farming area.

Index Terms *– Hostile****, Machine Learning, Regression Methods, Prognostication, Yield Prediction.***

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Performance investigation on Compression Ignition Diesel Engine with Lin Seed (Flax) Methyl Esters

K.Srinivasa Reddy

Assistant Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur-522502, AP, India, ksr2000@kluniversity.in

ABSTRACT:

Rapid reduction in petroleum resources and increase in fuel prices and drastic change in global environment due to stringent exhaust emissions has made to search for novel alternative fuel for diesel. Our present experimental work focuses the effect of usage of biodiesel as fuel for diesel engine, linseed oil is extracte

d from the seeds by using expeller machine and the obtained oil is trans-esterified with methanol as reagent and potassium hydroxide as catalyst and linseed methyl esters has been formed, obtained oilis blended with diesel in b5, b10, b20, b30 concentrations and fueled to single cylinder diesel engine by taking ordinary diesel as base reference and observed that blend b20 brake thermal efficiency increases with the increase of brake power, same with in the case of mechanical efficiency also, unburned gases are very less when compared with the b5, b10 and blend b30 can sustain for higher torques.Therefore, the diesel engine characteristics could be improved by using for linseed methyl ester as alternate fuel.

Index Terms – Transesterification, Exhaust emissions, Diesel engine, linseed methyl ester, Performance, Combustion

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DESIGN, MODELING AND ANALYSIS OF HYBRID POWER GENERATION SYSTEM

K.Srinivasa Reddy

Assistant Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur-522502, AP, India, ksr2000@kluniversity.in

ABSTRACT: The project aims at developing a system which makes use of wind, piezo and solar energy for rural and urban electrification. Model that has been developed cuts down the floor space used by conventional windmills and solar panels outside. This configuration allows the three sources to supply the load depending on the availability of the energy sources. Energy is being generated from the three sources such as solar energy, wind energy and piezo electricity and in turn is being generated from the sun light, wind, and from the piezo electric sensors respectively. All three sources need to be placed in a single design and the design was created by using software called Fusion 360.By the end of this project, we will know how to save and generate power from the solar and wind and piezo sensors without creating any damage to the environment and without causing any pollution. The wind energy that is generated will be stored in a battery and battery is connected to supply generator. It utilizes software called MOFSET, which is useful in performing ON/OFF pulses for the different frequencies.

Index terms: Wind Turbines, Piezo Sensors, Arduino Uno,MOFSET

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Multi-Objective Optimization of Wire Electrical Discharge Machining Process Parameters on Inconel 718

Himanshu Mishra[1]Anshuman Kumar[2]
Associate Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, Guntur-522502, AP, India,
himanshumishra@kluniversity.in,anshumit@kluniversity.in

ABSTRACT: Wire electrical discharge machining (WEDM) is an important manufacturing process to meet demands such as precise and low volume product, etc. In this paper, the effects process variables on process responses like material removal rate (MRR) and Surface roughness (Ra). Further optimizations of machining parameters on the MRR and Ra have been investigated. The machining parameters which have been considered in present investigation are wire tension, wire speed, discharge current and Pulse on time. The experimental layout was conducted using L27 orthogonal array, experiment runs are conducted via a Taguchi design of experiment to predict the MRR and Ra responses on Inconel 718 super alloy as a workpiece and brass wire as tool. The level of importance of the machining parameters on the cutting Ra and MRR is determined by ANOVA analysis. Using the signal-to-noise (S/N) ratio, the optimum machining parameters combination has been obtained. To validate a mathematical model between control factors and responses like MRR and Ra are established by means of nonlinear regression analysis. This system model is employed to maximize the MRR and minimize Ra using Simulated Annealing (SA) algorithm. In this study the optimal machining parameters of WEDM process to achieve better MRR and Ra simultaneously.

Index Terms:Wire electrical discharge machining, MRR, Ra,ANOVA, Nonlinear regression ,Simulated Annealing

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Vibrational Analysis on Areca Sheath fiber reinforced composites by Fast Fourier Analysis using NI View Lab

Parvatini Sri Naga Venkat[1], Dr. A Srinath[2]

[1,2]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

E-mail ID: psnvenkat@kluniversity.in[1], srinath@kluniversity.in[2]

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ABSTRACT:

The bio composites natural fibre reinforced are the best alternative for conventional materials. These natural fibres are cheaper in cost and also biodegradable materials. In this research work, The vibrational analysis on areca fibre composites is conducted using fast Fourier technique by varying fibre length. Epoxy L – 12 is used as polymer matrix and the naturally extracted areca sheath fibres are used as a reinforcement material. Using hand lay-up method fabrication is done by and compression moulding technique at 100 – 110 bar pressure and 140 – 150^{o}C temperature. Each specimen is cured for 24 h and then test specimens were cut according to ASTM standards i.e., 150 X 150 mm in length and breadth. The dynamic frequency response of specimens with varying fibre length of 29, 27 and 25 mm and thickness 4, 3.5 and 2 mm is obtained by modal analysis. Finite Element Analysis for all specimens is carried out by ANSYS 14.5 and results are compared with the experimental values. These natural areca fibre reinforced polymer matrix composites are defined for particular applications based up on the mechanical and vibrational characteristics obtain from the experimental results.

Index Terms: Areca fibres; Critical length; Finite Element Analysis(FEA); Natural Fibre Composites(NFC); Modal analysis; Frequency Response function (FRF); Data Acquisition System (DAS).

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Computational fluid analysis on double incision parallel manipulator robot needle for HIPEC cancer treatment

Parvatini Sri Naga Venkat[1], Dr. A Srinath[2]

[1,2]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

E-mail ID: psnvenkat@kluniversity.in[1], srinath@kluniversity.in[2]

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ABSTRACT:

The HIPEC cancer treatment is a type of gastric cancer treatment that need to be done on abdomen part of patient body. In our research work, the mechanism of double incision parallel manipulator was discussed in previous research papers. As part of design validation, the optimization of incision needle diameter is done using computational fluid analysis in ANSYS Software. The needle design parameters are consider using regular practice of incision needles in cancer treatments. Among various needle diameters, the maximum mass flow rates are calculated using computational fluid analysis. The best diameter having maximum mass flow rates are obtained near 27 to 28 mm internal diameter. These design parameters are considered in design prototype of double incision parallel manipulator as an end effector and provided in the research work paper. The application of this double incision parallel manipulator is to replace the conventional medical practise using automated systems in order to avoid different side effects like dehydration and to minimize the no of surgeries on patient body.

Index Terms: CFD Analysis, HIPEC cancer treatment, double incision parallel manipulator, gastric cancer.

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LARGE SCALE SYNTHESIS OF TURBOSTRATIC GRAPHENE USING BOTTOM UP TECHNIQUE IN CUSTOM DESIGNED INTERMITTENT FLASH REACTOR

Venkata Reddy Sangana[1], B Kiran Kumar[2], Rayasam Sourabh[3], Mouli Raja Puramsetti[4] ,Donthi Reddy Divaykanth Reddy[5]

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: 170070169@kluniversity.in

ABSTRACT:

An industrial scale method for synthesis of graphene is of the essence for commercialising the applications of graphene. Although various methods like ball milling, electrochemical exfoliation, chemical vapor deposition and roll to roll CVD claim to manufacture graphene, only bottom up techniques gives pristine quality graphene. In general bottom up methods produce graphene in ultra-small quantities and are very expensive which is not suitable for applications. In this paper we report a scalable route for one such bottom up technique called flash joule heating process. This Process can produce high-quality low-cost graphene unlike other bottom up process. But its production quantity is still limited to milligrams, flash joule heating can turn almost any carbon source such as coal, petroleum coke, biochar, carbon black, discarded food, rubber tyres and plastic waste to graphene in a fraction of seconds. We have developed an intermittent flash reactor which is an automated machine using two-skewed shaft intermittent mechanism to iterate flash joule heating process to produce turbostratic graphene in kilogram scale. Thus formed graphene can be used in wide range of applications like an additive to strengthen composites such as concrete, reinforced plastics, rubber and other building materials .This methods utilizes small amount of energy per iteration that is 7.6KJ making it cost effective for industrial use. A reciprocating electrode slightly compresses the carbon material and high voltage is applied across the electrodes. This converts the carbon source into graphene. Therefore, low cost and high productivity makes this method feasible for large scale synthesis of graphene.

Index Terms *– **Turbostratic graphene, Flash joule heating, bottom up method.***

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Performance study of CI engine fueled with blended Honge biodiesel

[1]NITIN DATTATREYA KAMITKAR, [2]BASAVARAJU A N, [3]SATISHKUMAR

[1]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

E-mail ID: nitindk@kluniversity.in

[2]Department of Automobile Engineering, Malnad College of Engineering, Hassan-573202

[3]Department of Mechanical Engineering, QIS College of Engineering and Technology, Ongole-523272

Abstract: present work includes preparation of HOME by honge oil and blending it with the diesel to use as CI engine fuel. Performance tests were carried out on single cylinder four stroke water cooled CI engine connected to an eddy current dynamometer with different percentage of HOME blended with the diesel at variable loads and constant rated speed. And found that H20 & H40 blends have relatively higher BTE as that of neat diesel similarly volumetric efficiency of H20 is closer to neat diesel. Whereas peak pressure for neat biodiesel i.e. H100 is slightly higher than that of neat diesel.

Keywords: CI engine, HOME, Bio diesel, Blending.

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PERFORMANCE AND COMBUSTION CHARACTERISTICS OF C.I ENGINE USING ETHANOL AND METHANOL BLENDED HONGE BIO-DIESEL

[1]NITIN DATTATREYA KAMITKAR, [2]BASAVARAJU A N, [3]SATISHKUMAR

[1]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

E-mail ID: nitindk@kluniversity.in

[2]Department of Automobile Engineering, Malnad College of Engineering, Hassan-573202

[3]Department of Mechanical Engineering, QIS College of Engineering and Technology, Ongole-523272

Abstract: Honge biodiesel mixed with different proportions of ethanol and methanol is used to evaluate performance and emission characteristics of single cylinder CI engine. From results it is seen that Biodiesel blend with diesel gives IThE and BThE are higher to compare to diesel but SFC biodiesel blend is higher than diesel. For ethanol blends IThE, BThE and MechE are higher compare to diesel and The SFC for H10D80E10 is slightly less than neat diesel. The H70D20E10 and H50D40E10 blends have higher CYL Pressure compared to diesel and other blends. The IThE and BThE for all methanol blends are higher than diesel. The SFC for H10D80M10 and H30D60M10 are lower than diesel. The H10D80M10 and H30D60M10 have higher CYL Pressure than diesel. From this we can conclude that ethanol blended fuel H30D60E10 and H50D40E10 give better performance than neat diesel. The methanol blended fuel H10D80M10 gives better performance than neat diesel.

Keywords: Biodiesel, Ethanol, Methanol, performance, Emission.

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Mechanically started and Electrically operated Electro Hub Motor Hybrid Bike

T. SRINIVASAN [1, A] *, M. MEGANATHAN [2], and

B HARIHARAN [2C]

[1] *Dept. of Mechanical Engineering, Koneru Lakshmaiah Educational Foundation, A.P., Vijayawada, India*

[2] *Dept. of Mechanical Engineering, Sri Sai Ram Institute of Technology, TN, Chennai, India.*

[a] seenusreeja@gmail.com, [b] megamsubramani@gmail.com,[c] hari21399@gmail.com

ABSTRACT

In Automobile Sectors, there is a requirement for elective fuel as a substitution of traditional Petroleum products, because of its exhaustion and measure of discharge has given a route for new advancements like Electric vehicles. Still, a great deal of headway needs to occur in these innovations for commercialization. The hole between the present non-renewable energy source innovation and zero emanation vehicles can be spanned by Hybrid innovation. Hybrid vehicles are those which can keep running on at least two driving sources powers. This innovation augments the upsides of the two fills and limits the drawbacks of the equivalent. The best favored half-breed combination is an electric and nonrenewable energy source. In this Project, a hybrid bike is made and the power is conveyed both by means of an inside burning motor and electric engine. The electrical power is utilized to accomplish either preferable mileage over a traditional vehicle, better execution and it causes less contamination. Driving mode selectivity enhances this framework progressively conservative, steady and increasingly proficient. The uniqueness of our bike over other vehicles is that we have made a two wheel drive through combination.

Keywords: Electric Bike, Electro Motor, Hub Motor

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Design and Fabrication of Composite Leaf Spring

T. SRINIVASAN [1, A] *, K. PALANIKUMAR [2,B] and

K. RAJAGOPAL [3]

1 Dept. of Mechanical Engineering, Koneru Lakshmaiah Educational Foundation, A.P., Vijayawada, India

2 Dept. of Mechanical Engineering, Sri Sai Ram Institute of Technology, TN, Chennai, India.

3Department of Mechanical Engineering, JNTUH, Hyderabad, A.P, India

a seenusreeja@gmail.com, b palanikumar_k@yahoo.com, c rajagopalmail@yahoo.com

ABSTRACT

An automobile industry have an interest in replacement of conventional leaf spring with composite leaf spring to get better performance with less weight. This paper deals with by replacing the conventional leaf spring with composite leaf spring. Leaf springs are mainly used in suspension systems to absorb shock loads in automobiles like light motor vehicles, heavy duty trucks and in rail systems. The automobile industry has shown increased interest in the replacement of steel springs with reinforced composite leaf springs. As composites are the advanced materials having higher strength to weight ratio and corrosion resistance, water resistance future they are found to be the potential materials for replacing these conventional metallic leaf spring since Glass fibre reinforced plastics are used to increase the shear and it is low cost, high strength and high chemical resistance and good insulating properties. The natural fibre such as tamarind seed is used to increase the stiffness and to resist the vibration. From the experimental result it was observed that conventional leaf springs are replaced by composite leaf springs an appropriate amount of weight reduction and there by improved vehicle performance could be achieved.

Keywords: Composites, Leaf Spring, Suspension, Natural Fibre, polymers

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Single Point Incremental Sheet Forming (SPIF) of Glass Fiber Reinforced Thermoplastic Polymer matrix (GFRTP) Composite

T. Srinivasan [1, a *,] P.Ramu [2,b]

1 Dept. of Mechanical Engineering, Koneru Lakshmaiah Educational Foundation, A.P., Vijayawada, India

2 Dept. of Mechanical Engineering, Sri Sai Ram Institute of Technology, TN, Chennai, India.

a seenusreeja@gmail.com,

Abstract

Single Point Incremental Forming (SPIF) processes is formed polymer sheet, small batch production and low cost components at room temperature. SPIF is an innovative unconventional flexible fabrication process to developed prototype and 3D products. In this process does not need any dedicated tool such as Punch and Die like conventional forming process. The forming processes can be achieved in a Computer Aided Control (CNC) machine with a hemispherical or ball headed tool. The fixture support to hold the work sheet being developed to required three dimensional intricate shapes. The profile is attained by tool traveling along a given path and obtained good surface finish. The tool path is controlled by a part-program created using computer aided manufacturing (CAM) software. In this study were indicated the feasibility for thermoplastic polymer processing whereas limited investigations exist on composite materials. This review paper helps to understand of incremental sheet forming method as a tool for producing Thermoplastic Polymer composite components and promote awareness of this advanced manufacturing process.

Keywords: SPIF, Forming, Spherical Tool, Forming Limit Diagram, CNC

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State of the Art on 4D Printing Technology

D. Kiran Kumar[1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, A.P., INDIA -522502.

E-mail: kirandama@kluniversity.in

ABSTRACT:

4D printing is the technique for 3D printing where the fourth measurement is the time and the shape or structure of the printed body which can change as for time. Numerous looks into have directed analyses to discover if this new thought of 4D printing would work and have turned out to be effective in their examination among them Skylar Tibbits is the primary individual to begin the exploration in relationship with Stratasys and Autodesk. Consequently, the goal of this exploration work was to survey about the distinctive analyses led by various investigates and demonstrate that 4D printing innovation is conceivable. In the present work, an overview of 4D printing was done and the diverse exploratory methods were talked about. Additionally the particulars of the innovation used to exhibit the examination and their favorable circumstances are talked about.Barely any scientists have utilized the ideas of shape memory polymers to exhibit their analysis and few have utilized the up and coming innovation of the water retaining materials and hydrogels to show their tests. Pretty much the diverse materials used to show give a similar outcome yet what contrast as for one another is as for their properties, for example, cost, accessibility, concoction properties, physical properties and so forth. Last finish of the present work was that this innovation is certain to change the world when put into work but since of the multifaceted nature it would require investment for this to turn into a reality. 3D printing has just caught our brain and adding fourth measurement to the condition would do ponders which anybody on earth has ever seen till date.

Index Terms *– **Stare of the Art, Additive Manufacturing, 4D Printing.***

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IMPACT ANALYSIS ON FRONT BUMPER OF A PASSENGER CAR USING FEM SOFTWARE

Siva Kishore Babu K[1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, A.P., INDIA -522502. E-mail: sivakishore@kluniversity.in

ABSTRACT:

The aim of this work is to study front bumper of one of the existing passenger car in Indian market and suggest good material in front bumper of a passenger car using Impact Analysis. The study will focus on existing design performance, advantage and limitations. Based on observations design improvements will be made in terms of shape, size and or material based on design modification objectives. Modified front bumper design will be tested using FEM software for impact loads as per international standards.

Index Terms:Bumper**,** impact, passenger car, FEM.

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Design of Heat Exchanger with Corrugated Louver Fins

P Appalaraju[1],Parvatini Sri Naga Venkat[2]

[1,2]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

E-mail ID: raju.polavarapu@kluniversity.in[1],psnvenkat@kluniversity.in[2]

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ABSTRACT:

Normally compact type heat exchangers are used as an evaporator in automobile air conditioner. Compact heat exchanger is characterized by the large heat transfer area per unit volume of the exchanger, resulting in reduced space, weight, support structure and footprint, energy requirement and cost. A gas to fluid exchanger is referred to as a compact heat exchanger if it incorporates a heat transfer having a surface density greater then about 700 m^2/m^3. **Plate and fin heat exchanger** is a compact type heat exchanger which has corrugated fins (most commonly triangular and rectangular cross sections) or spacers sandwiched between parallel plates (referred as plates or parting sheets). Sometimes fins are incorporated in a flat tube with rounded corners (referred as a formed tube), thus eliminating the need for side bars. The plates or flat tubes separate the two fluid streams, and the fins form the individual flow passages. Alternate fluid passages are connected in parallel by suitable headers to form the two or more fluid sides of the exchanger.

Index Terms: Heat exchanger, Fins, Effectiveness of FIN, Efficiency of FIN

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VCR An Alternative to Car Air Conditioning System

P Appalaraju[1],Parvatini Sri Naga Venkat[2]

[1,2]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

E-mail ID: raju.polavarapu@kluniversity.in[1],psnvenkat@kluniversity.in[2]

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ABSTRACT:

Due to the wide range of operating conditions and constraints impose by available space and weight, transport refrigeration equipment have lower efficiency than stationary systems. One of the first cars with actual air-conditioning systems was the 1940's Packard mode. This is based on the vapor compression system cycle.

Trucks used for perishable items are commonly equipped with refrigeration system. Some have VCR machines powered by the engine via pulley and belt or by an auxiliary power unit and others use expandable liquid nitrogen or carbon dioxide spray systems. One of the drawbacks of the automobile VCR system is that, compressor draw significant power from the engine which decreases the overall efficiency of the cycle. Therefore, automobile become costlier, uneconomical and less efficient.

Index Terms: VCR (Vapour compression refrigeration), VAR(Vapour absorption refrigeration),COP(Coefficient of performance).

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Experimental Study on Tensile strength of ABS and PLA 3D printed Sandwich composite

Shashikant Kushnoore[1], Nitin Kamitkar[1], Anshuman Kumar1, Vinay Atgur[1] and Satikumar M[2]

E-mail ID: shashikushnoore@kluniversity.in

[1]Koneru Lakshmaiah Educational Foundation, Guntur, Andhra Pradesh, India

[2]Qis College of Engineering and Technology, Ongole, Andhra Pradesh, India

A new demand throughout the industry for Additive Manufacturing (AM) products in recent due increase in application in industry. Although FDM-based products are used in different fields, they still appear to have weaker mechanical properties than those of products manufactured via traditional manufacturing processes. Improving the mechanical properties of FDM-printed products is therefore a key factor which can contribute greatly to the manufacturing industry. In this study, tensile tests are conducted on a sandwich composite material of ABS and PLA specimens to analyze the influence of various experiment variables that may add up to the enhancement of the mechanical properties of 3D printed products. Tests were performed on samples prepared according D638. It has been observed that sandwich composite shows the similar tensile property as that of ABS with better flexibility property of high stain rate.

Index Terms: ABS, PLA, Sandwich composite, Tensile property.

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Condition Monitoring on Gear

AUTHORS: G.Diwakar 1 Ch.Harshith 2

1.Professor Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

2.PG Student, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502. E-mail ID:diwakar4236@kluniversity.in

ABSTRACT:

This paper presents a pre-processing technique to select the optimal filtering frequency band identifying gear fault signature and use the filtered signal to calculate statistical features. The selected technique the cyclic spectral correlation, as proposed by Antoni. It allows the visualization of excitations of the signal on a map. According to the literature, this technique appears to be more powerful than the time-frequency methods as it exploits the cycle stationary nature of signals, emitted by rotating machinery. This work analyses the benefits of filtering the signal before proceeding to feature extraction. The last step of this analysis is related to dimensionality reduction using the Principal Component Analysis method. In order to understand the influence of different gear fault conditions, healthy, chipped-tooth and missing tooth measurements have been performed in a Machine Fault Simulator from Spectra Quest under different speed regimes. The central goal of this paper is to obtain key features that allow the identification of the condition of the gear at different speeds.

Index Terms: monitoring,spectrum, fault simulator,gear

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THERMOGRAPHY USED IN AUTOMBILES AS A SAFETY FEATURE

AUTHORS: G.Diwakar 1 N.V.V.Pardhu 2

1.Professor Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

2.PG Student, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502. E-mail ID:diwakar4236@kluniversity.in

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ABSTRACT:

INFRARED THERMOGRAPHY is a proactive troubleshooting and predictive maintenance tool. In the hands of a thermographer an infrared camera can be used to make the world that is invisible to the human eye come to life. Thermal imaging for safer autonomous vehicles for the automotive industry, pedestrian safety has been a serious concern since the horseless carriage. The pace of technology over the last thirty years has been astronomical, yet technology to make driving safer has not kept pace. One of the most advanced automotive sensors is a thermal sensor that allows a driver and the automobile to perceive the heat signature of anything ahead of the driver. Like all other automotive sensory systems, the goal of thermal imaging is simple: to give drivers and ADAS computers information about their surroundings and assist a quick reaction to road hazards, sometimes automatically.

Index Terms: monitoring,thermography,automobile safety

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MONITORING OF BEARINGS

AUTHORS: G.Diwakar 1 Sudheer 2

1.Professor Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502.

2.PG Student, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Vaddeswaram, A.P., India-522502. E-mail ID:diwakar4236@kluniversity.in

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ABSTRACT:

Recently, at the University of Southampton, a series of taper roller bearing tests have been conducted to evaluate the effectiveness of using on-line sensing technologies to detect incipient faults. The test rig instrumentation included vibration and electrostatic sensors as well as off-line processes such as debris analysis and tribological assessment of bearing condition, which are used for corroborative purposes. The test results indicate that the combination of these techniques are capable of detecting bearing deterioration shortly before complete failure, but the expected precursor events related to fatigue failure initiation are indistinguishable from the conventional univariate signal plots. Therefore, more advanced data fusion techniques have been developed to extract further information and enhance the detection of abnormal trends. This paper describes work on intelligent processes of both training and testing data and demonstrates how the prognostic window is significantly improved relative to original processed features. The approach also identifies the main variables which drive the anomaly detection so as to provide diagnostic information.

Index Terms: monitoring,bearing,diagnosis ,defects

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IMPACT OF FLOWER BAFFLE PLATE CONFIGURATION IN SHELL AND TUBE HEAT EXCHANGER

G.Murali[1] , M.ArunKumar[2], J.Jaya[3]

1Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Guntur Dt, Andhra Pradesh-522 502

[2]Assistant Professor, Department of Mechanical Engineering,

Dhanalakshmi Srinivasan College of Engineering, Coimbatore Dt, Tamilnadu -641105.

[3]Principal, Akshaya College of Engineering and Technology, Kinathukadavu, Coimbatore, Tamilnadu- 642109, India.

ABSTRACT:

Along with a conventional single plate, a study of shell and tube heat exchanger ere represented in this paper. Not only with a conventional single plate but also a new type of baffles is also designed. CFD(Computational Fluid Dynamics) flow simulation helps in the testing of new type of baffles. The performance of baffle plate heat exchanger is compared with the conventional one. CFD flow simulation software helps in remodelling the baffle plate, which in turns improve the cooling efficiency of heat exchanger. Then the overall performance of segmental baffle plate heat exchanger is not more efficient than the conventional one. Hence the overall performance of the conventional model is more efficient.

Keywords: Computational Fluid Dynamics, baffle plate, shell and tube heat exchanger, efficiency, performance.

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Simultaneous Scheduling of Machines and AGVs in Flexible Manufacturing System Through Metaheuristic Algorithm

*Dr.M Nageswara Rao

Department of Mechanical Engineering, K L E F Deemed to be University

*medikondu@kluniversity.in

Abstract: High degree of flexibility and quick response times became essential features of recent manufacturing systems where customers are demanding for a spread of products with reduced product life cycles. Flexible manufacturing system (FMS) is proved to be the right answer to meet these challenges of global competition. The performance of an FMS is highly dependent on the selection of the right scheduling policy for the control system. Traditionally scheduling problems consider machines because the only constraining resources, but this is often not correct as material handling equipment is becoming more and more valuable resource in an FMS. Hence its operations should be optimized and above all synchronized with machine operations. Scheduling of an FMS is a well-known NP-hard problem which is very complex, due to additional considerations like material handling and alternative routing. Literature reveals that, in many of the cases scheduling of both the machines and material handling system was addressed independently. Hence in this work an attempt has been made to schedule both of them simultaneously Optimum Automated Guided Vehicles (AGVs) operation plays a crucial role in improving the performance of Flexible Manufacturing System (FMS). One of the most elements within the implementation of AGV is task scheduling. This will enhance the productivity, minimize delivery cost and optimally utilize the whole fleet.

Key words: Flexible Manufacturing System, Automated Guided Vehicle, Makespan, Metaheuristic Algorithm

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Integrated Scheduling of Machines and AGV's Through Heuristic Algorithm

*Dr.M Nageswara Rao

Department of Mechanical Engineering, K L E F Deemed to be University

*medikondu@kluniversity.in

Abstract: Recent advancement in meta-heuristics for simultaneous scheduling of machines and AGV studies have applied various techniques like Differential evaluation (DE), Simulated Annealing (SA) and Ant Colony Optimization (ACO) to solve the simultaneous scheduling problem. All of those technique requires an initial scheduler so as to initiate the scheduling process and therefore the priority rule algorithms will typically be used. However, from the literature, none of those studies elaborate and justify their selection of a specific priority rule algorithms over another. Since the initial scheduler can significantly affect the entire scheduling process, it is important that the correct initial scheduler be selected. In this paper we quantitatively compared three initial scheduler algorithms to determine the best algorithm performance. We believe the performance comparison would enable users to utilize the best initial scheduler to fit their heuristics simultaneous scheduling studies.

Key words: Flexible Manufacturing System, Automated Guided Vehicle, Makespan, Metaheuristic Algorithm

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PERFORMANCE STUDY OF BRIQUETTES FROM AGRICULTURAL WASTE FOR WOOD STOVE WITH CATALYTIC COMBUSTOR

G.Murali[1] V.Nagaraju[2]

1Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Guntur Dt, Andhra Pradesh-522 502

2 Assistant Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Guntur Dt, Andhra Pradesh-522 502

Abstract:

The study was undertaken to assess the calorific value and to evaluate the performance of briquettes prepared from agricultural wastes such as coconut pith, saw dust and sugarcane waste when fired in modified wood stove with catalytic combustor. All the briquettes were made sun dried, prepared and compressed without addition of any bonding agents. Combustion related properties namely percentage volatile matter, percentage ash content, percentage fixed carbon and calorific value of briquettes were determined. The performance of the modified stove with three different briquettes by conducting water boiling test and cooking test has been investigated. The Test results show that the calorific value of coconut pith briquette, saw dust briquette and sugarcane briquette were 23980.14 kJ/kg, 20371.29 kJ/kg and 18894.94 kJ/kg, respectively. The ash content of sugarcane briquette has lesser value (1.8 %) and the saw dust briquette has higher value (28.13 %). The Efficiency produced by the modified wood stove for coconut pith briquette, saw dust briquette and sugarcane briquette is 63.63%, 61.62% and 53.85% respectively when briquettes were fired in modified wood stove. Thus, the study proves that coconut pith briquette is best suited for firing in modified wood stove with catalytic combustor.

Keywords: .Wood stove, briquette, coconut pith briquette, sawdust briquette, sugarcane briquette.

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EFFICIENCY ENHANCEMENT OF WOOD STOVE INTEGRATED WITH CATALYTIC COMBUSTOR AND MODIFIED CHIMNEY

G.Murali[1] V.Nagaraju[2]

1Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Guntur Dt, Andhra Pradesh-522 502

2 Assistant Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Guntur Dt, Andhra Pradesh-522 502

Abstract:

Domestic wood combustion produces smoke that is harmful to human health and increases fine particle level in the atmosphere. Some necessary changes in the design are essential in the domestic wood stove in order to improve the performance and scale down the emission. In this work, an improved wood stove integrated with the catalytic combustor and modified chimney that uses wood as fuel has been experimentally evaluated. Water boiling test, cooking test and emission test have been conducted to evaluate the performance of the stove. It was observed that emission has been considerably controlled because of the incorporation of catalytic combustor. The heat losses through the walls of stove decresed by providing ceramic insulation. The thermal efficiency value of an improved wood stove obtained was 41.18% and this is 31.52% higher than traditional stove. The improved wood stove results better performance than a traditional wood stove.

Key words: Wood stove, Catalytic combustor, Emission, Cooking, Water boiling

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SIMULATION OF AISI 1015 CARBON STEEL BILLET ON OPEN DIE FORGING PROCESS UNDER DIFFERENT TEMPERATURES AND LOADS USING DEFORM-3D

K. V. Durga Rajesh

Associate Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: kanchurajesh@kluniversity.in

ABSTRACT:

This paper explains the methodology of developing an Open Die Forging model using Deform-3D Software to simulate hot forging process of AISI 1015 Carbon Steel billet used in various forming applications. AISI 1015 Carbon Steel can withstand temperature upto 1100^0C. 3D Finite Element model of open die forging model is designed in the Deform-3D Software. During Simulation, it consists of three modules like Pre processing, Simulation and Post Processing. In Pre Processing module of the software, after creation of model AISI 1015 Carbon Steel material will be assigned to billet and different temperatures 700^0C, 900^0C & 1100^0C will be applied at 100 Ton and 200 Ton loads. After Simulation run with 150 steps, during Post processing step results like Effective Stress, Total displacement and Total Deformation was noted. Deform 3D software is used for finite element simulation to predict the metal flow behaviour effectively, during the forging process.

Index Terms *– **Deform-3D, Simulation, Forging, AISI 1015 Carbon Steel***

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AN ALTERED SIMILITUDE COEFFICIENT BUILD METHOD FOR SOLVING THE PROBLEM OF CELL FORMATION

K. V. Durga Rajesh

Associate Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: kanchurajesh@kluniversity.in

ABSTRACT:

This paper centers around Cellular Manufacturing Systems (CMS) that depends on Group Technology (GT) ideas. Cell Formation (CF) is one of the significant advance in the plan of CMS. The fundamental target of CF is to aggregate machines and parts into cells. This paper proposes another way to deal with acquire CF dependent on similitude coefficient thinking about likenesses and dis-similitudes in CMS. This methodology defeats numerous burdens inborn in some customary methodologies like Rank Order Clustering-2 (ROC-2). Additionally an examination between the proposed technique and one of the notable customary methodologies ROC-2 has been led. Level of Exceptional Components (EC), Grouping Efficiency (GE) and Cell Efficiency (CE) are considered as execution measures. The outcomes got are superior to the after effects of ROC-2. A Java Program is produced for Proposed technique which will take care of any size of CF issue inside fraction of seconds.

Index Terms – Cellular Manufacturing, Group Technology, Cell Formation, Cell Efficiency

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Experimental investigation of wire electric discharge machining process parameters

G R Sanjay Krishna[1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

Wire electric discharge machining (WEDM) is one of the non-traditional machining process. WEDM process is based on thermo electric energy between the workpiece and a wire electrode. The main aim of this research article is to optimize the process parameter of WEDM by optimizing the material removal rate and surface roughness Physically and metallurgical properties don't deliver any restriction for the materials to be machined on WEDM as there's no physical among instrument and work piece. The main constraint in that the WEDM will machine just electrically conductive components. this is regularly why WEDM is very standard, as a machining technique.Part one concerned the literature study of various analysis papers concerning the machining and optimization processes carried out on WEDM, particularly on the influence of input parameters on performance measures/output characteristics (MRR, SF). The study helped in knowing varied ways to carry out the machining of a material on the WEDM machine, optimally. The literature survey also helped us identify Nimonic75 as a work piece material, Experiments were carried out on WEDM by taking Nimonic75 as work piece material and brass wire as electrode material.For experimentation, Pulse - on - time (Ton), Pulse - off - time (Toff), Servo voltage (SV), Wire Feed (WF) are taken as input parameters . Material Removal Rate (MRR) and Surface Roughness (SR) are taken as execution measures and in this manner the Taguchi's structure of examinations system has been utilized for test examination. Second part includes the enhancement of procedure parameters for the best execution measures by using Genetic algorithm.

Key words: WEDM, Pulse - on - time , Pulse - off - time , Servo voltage , Wire Feed

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PARAMETRIC ANALYSIS OF WIRE EDM PROCESS VARIABLES

G R Sanjay Krishna[1]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

. The Wire cut Electrical Discharge Machining (WEDM) is one of the non-traditional methodswhich work on the spark erosion principle between the workpiece and an electrode. Wire EDM's surfacefinish is deliberately influenced by its parameters and machined material properties. So a bettercombination of the machining parameters need to be selected for the better results, this may come through either by an experience or through experimental investigation. The experiment is done in accordance to Taguchi design methodology. The material selected was stainless steel ss 420 using design of experiments with L27 orthogonal array. The process parameters of wire EDM we selected are pulse on time(T on), pulse off time(Toff), wire tension(wt), wire feed(wf), servo voltage(SV), kerf width(KW) which are used to determine the performance and increase the efficiency of the stainless steel metal. This analysis includes Grey Relational Analysis(GRA).GRA is used to evaluate the multiple performance characteristics according to grey relational coefficient of each response.

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STABILITY ANALYSIS OF A SIGMOID FUNCTIONALLY GRADED BEAM

S.N.Padhi

Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

Abstract

This paper reports the evaluation ofstability behavior of cantilever sigmoid functionally graded ordinary (SFGO)beam.A finite element method is used considering first order shear deformationfor the analysis.The element chosen in the present case is different from the conventional elements.The shape functions of the element is obtained from the exact solution of the static part of the governing differential equation derived fromHamilton'sprinciple. Along with this the shape functions are dependent on length, material and cross-sectional properties ensuring better accuracy of the solution. The material properties are assumed to follow sigmoid distribution of power law. It has been observed that an SFGO beam with lower power index is a better beam as per as parametric instability is concerned.

Key words-Stability, sigmoid distribution, Power law, load factor.

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BUCKLING BEHAVIOUR OF SIGMOID TIMOSHENKO BEAM ON VARIABLE ELASTIC FOUNDATION

S.N.Padhi

Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

Abstract

In the present article, Functionally Graded Ordinary (FGO) simply supported beam hinged at both the ends and resting on 2 -parameter variable elastic foundation is considered for buckling analysis. A functionally graded sigmoid beam with steel and aluminum as its constituent phases is considered for analysis. The material properties of the constituents in the thickness direction according to the power-law distribution with the surrounding elastic medium is modeled as an elastic foundation of the Pasternak-type.Finite element method is used for simply supported end condition of the beam. The static part of thegoverning differential equation ofthe beam is solved to determine the shape functions to obtain accurate results. The effect of geometry, power index, foundation stiffness and foundation parameter on critical buckling load of the beam is investigated for various foundations.

Key words: foundation parameter, foundation modulus, power index, Finite element method, sinusoidal foundation.

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EFFECT OF FOUNDATION MODEL ON DYNAMIC BEHAVIOUR OF SIGMOID TIMOSHENKO BEAM

S.N.Padhi

Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

Abstract

In the present article, Sigmoid Functionally Graded Ordinary (SFGO)simply supported beam with both ends hinged and resting on variable elastic foundation is considered for dynamic analysis. The effect of variable elastic foundation on dynamic behavior of the sigmoid Timoshenko beam is investigated.Finite element method is used for simply supported end condition of the beam. The static part of the governing differential equation of the beam is solved to determine the shape functions to obtain accurate results. Various variable foundation models like linear, parabolic and sinusoidal model are considered for investigation. It is observed that parabolic foundation out of the chosen models renders better dynamic behavior for the beam.Beam with higher slenderness parameter leads to better dynamic stability.Sigmoid distribution with power indexas one ensures the better performance of the beam.

Keywords: Slenderness parameter, Sigmoid, Sinusoidal, Foundation modulus, Power index

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SCAN TO PRINT A HUMAN BONE , CUSTOMIZED PATIENT SPECIFIC DATA BASE

L.Rangnath [1], Dr.A.Srinath [2]

[1] Research scholar, Department of Mechanical, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: lollarangnath@kluniversity.in

ABSTRACT:

Implants are changing the domain of the medical industry, in the traditional process the effective rate of implantation is minimal, but in recent years it took an upturn by employing concepts of the additive manufacturing process. This work starts with identifying a particular bone to obtain the CT scan image of bone and convert .dcm files to .stl file and print. This further will be analyzed with analysis software .focus on how to convert a CT scan data to a 3D model and how we can print and test will be discussed in detail. It is evident that the recent year's successful output on the implantation of bone with materials like calcium sulfate and phosphate with hydroxyapatite and other materials during this research work the bone will be tested with PEEK, Ceramic these results will be compared. Not only implants especially the grafting, instruments for surgery, robotic surgery all are the advancements in this area. Once the bone is analyzed it will be printed and tested with mechanical parameters is what the work focused on will be discussed in detail below.

Index Terms – Bio implants, bone replacement, substitute, Ctscan, .dcm, Additive manufacturing,

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Biofabrication of bone using additive manufacturing

L.Rangnath [1]

[1] Department of Mechanical, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: lollarangnath@kluniversity.in

The growing population creates more demand for effective approaches for the rising bone disorders that are being seen in the world today, especially in aged people. Bone tissue engineering is serving as a medium by helping us to develop alternates through bone fabrication using different biopolymers, and signaling cells also conventional bone scaffold grafting. this project aims to develop a bone fabricated with the aid of additive manufacturing, which can become a potential solution due to its inherent capability of reproducibility, accuracy, and customization of scaffolds. 3d printing is a promising strategy to obtain precise results as it permits vascularisation and diffusion of nutrients and regulatory molecules inside. Moreover, additive manufacturing enables control over scaffold pore size, porosity, and interconnectivity more efficiently. Bone tissue engineering has seen an expeditionary greater development in recent years. developing an artificial implant to suffice the need for replacement as in the form of scaffold using osteoblasts, and regulating factors. these factors play a major role in promoting cell attachment, differentiation, and mineralized bone formation. the porosity has gradient importance in the cell compatibility, the higher the porosity the greater the cell proliferation during cell seeding. various parameters in the field of architecture connecting scaffold parameters are discussed.

Index Terms -bone tissue engineering , additive manufacturing , 3D printing , scaffolding , vascularisation , porosity

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THERMAL CHARACTERIZATION OF GASOLINE BLENDS

Dollu Bhaskar[1], Karimulla Syed [2],

[1&2] Assistant Professor,Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: dbhhaskarr@kluniversity.in

Petroleum by-products are now contemporary utilization rate it will be consuming in upcoming periods. Ethanol usage is one of the transport sectors can fulfill the requirement and contribute to mitigating the greenhouse gas emissions of the vehicles. To expand the SI engine which can function on 100% ethanol or append ethanol in petrol and operate the blends of that. The intention of this project is going to prepare the thermal and rheological behavior of pure petrol, E5 and E10, E15 ethanol-gasoline blend. All thermograms of heat flow exhibited at a 35ºC-280ºC temperature range at air atmosphere. This contemplation concludes that ethanol blending is the lowest exhaust gasses with considerable improvement in the performance of the Spark Ignition (SI) engine and promising, Ethanol as a new fuel which can be fortunately replace petrol and its depletion problem.

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Experimental Investigation and Optimization of Process Parameter for Inconel 625 Using Electrical Discharge Machining (EDM)

Anshuman Kumar ,§, *K.Vivekananda*†, and Kumar Abhishek‡,‖

Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation Vaddeswaram, Andhra Pradesh, India.

†Department of Mechanical Engineering, Faculty of Science and Technology, ICFAI Foundation for Higher Education, Hyderabad, Telangana, India.

‡Department of Mechanical Engineering, Institute of Infrastructure, Technology, Research and Management (IITRAM), Ahmedabad, Gujarat, India.

§anshu.mit06@gmail.com

kvnanda@ifheindia.org

‖krabhishek1987@gmail.com

Inconel 625 is a nickel based superalloy owning high strength and low thermal conductivity. Due to its properties, WEDM has been selected for machining. The paper reports an experimental investigation of Inconel 625 using brass electrode. Based on L27, Box-Behnken design of Response Surface Methodology (RSM) has been adopted to estimate the effect of process parameter on the machining responses. Four controllable process parameters (viz., Pulse-on time (Son), Pulse off time (Soff), Peak Current (Ip) and Gap Voltage (Vg)) varying, each at three discrete levels, between parametric domain. The following machining responses, in terms of Material Removal Rate (MRR), and Surface Roughness (Ra), have been investigated. Finally, an evolutionary computation method has been used based on non-dominated sorting genetic algorithm (NSGA-II) in order to find out the optimal set of solutions for rough-cutting. The experimental data has been used to develop regression models to optimize the process. The adequacy of the developed mathematical model has also been tested by the analysis of variance (ANOVA) results. The Pareto optimal settings obtained through NSGA-II have been ranked by Gray Relation Analysis (GRA) to identify the best optimal set of solutions to avoid lengthiness and impreciseness in the judgment. The confirmations tests have been conducted for optimum machining parameter from the set of Pareto-optimal solutions for prove the betterment.

Keywords: wire electrical discharge machining, NSGA-II, material removal rate, corner deviation, surface roughness

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OPTIMIZATION and Analysis OF ABRASIVE WATER JET MACHINING PROCESS PARAMETERS on INCONEL 718.

B.V. Dharmendra, Shyam Prasad Kodali and BoggarapuNageswaraRao

Department of Mechanical Engineering, KoneruLakshmaiah Education Foundation,

K L Deemed to be University, Green Fields, Vaddeswaram, Guntur-522 502, India.

Abstract

Abrasive Water Jet Machining (AWJM) is a versatile non-traditional machining process primarily used to machine hard and difficult to machine materials. The objective of this paper is to optimize material removal rate and kerf width simultaneously using AWJM process on INCONEL 718. The process parameters are chosen as abrasive flow rate, pressure, and standoff distance. Taguchi L9 orthogonal method is opted because of multi objective optimization gives more clear result.

Key words: Abrasive water jet, Inconel , Tatguchi

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Optimization and Analysis of Laser Beam Machining Parameters for Al7075-TiB_2 In-situ Composite.

B.V. Dharmendra, Shyam Prasad Kodali and BoggarapuNageswaraRao

Department of Mechanical Engineering, KoneruLakshmaiah Education Foundation,

K L Deemed to be University, Green Fields, Vaddeswaram, Guntur-522 502, India.

Abstract

The paper focuses on laser beam machining (LBM) of In-situ synthesized Al7075– TiB2 metal matrix composite. Optimization and influence of laser machining process parameters on surface roughness, volumetric material removal rate (VMRR) and dimensional accuracy of composites were studied. Al7075–TiB2 metal matrix composite was synthesized by in-situ reaction technique using stir casting process. Taguchi's L9 orthogonal array was used to design experimental trials.

Key wards: Laser beam Material removal rate

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Parametric Optimization of EDM of AISID3 steel using Taguchi Method

B.V. Dharmendra, Shyam Prasad Kodali and BoggarapuNageswaraRao

Department of Mechanical Engineering, KoneruLakshmaiah Education Foundation,

K L Deemed to be University, Green Fields, Vaddeswaram, Guntur-522 502, India.

Abstract

Present work is aimed to investigate electrical discharge machining process parameters such as material removal rate (MRR), electrode wear rate (EWR), radial overcut (ROC) for AISID3 Steel. The Taguchi method is used to formulate the experimental layout, to analyse the effect of each parameter on the machining characteristics, and to predict the optimal choice for each EDM parameter such as peak current, gap voltage, duty cycle and pulse on time. The analysis using Taguchi method reveals that, in general the peak current significantly affects the MRR, EWR and ROC. A simple multi-objective optimization approach is suggested for specifying a set of optimum input parameters to achieve maximum material removal rate, and minimum EWR and Radial Overcut.

Key words: Material removal rate, Electrode wear rate ,EDM

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Thermal characterization of Seemaruba Oil Methyl Ester and Dairy washed scum oil Methyl Ester for wide temperature range

Vinay Atgur [1, 2*], G. Manavendra [2], G.P. Desai[3] and B.Nageswara Rao[1]

[1] Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation (KLEF),
Deemed to be University, Green Fields, Vaddeswaram, Guntur-522502, Andhra Pradesh, India
[2]Department of Mechanical Engineering, Bapuji Institute of Engineering and Technology (BIET), Davangere-577055, Karnataka, India
[3]Department of Chemical Engineering, Bapuji Institute of Engineering and Technology (BIET),
Davangere-577055, Karnataka, India
[*]**Corresponding author**- Vinay Atgur, Mobile No: +919880903759 Email: atgurvinay@gmail.com

ABSTRACT:

At the present situation, knowledge of thermal profiles and thermal conductivity value oils are necessary to carry thermal energy in processes of heating, cooling, and product design purpose. In this work, two non-edible oils are considered and their thermal conductivity, specific heat, and thermal degradation are experimentally determined as a function of temperature using, Guarded hot plate method, differential scanning calorimetry and Thermogravtic analyzer. Miniature difference between obtained and actual thermal conductivity values are influenced by the fatty acid composition. In the present work, biodiesel produced from two sets of non-edible oils namely Seemaruba oil and dairy washed scum oil are studied and their properties are determined experimentally from a temperature range of 25^0C to 80^0C. It has been observed that thermal conductivity of Seemaruba oil Methyl Ester decreases from 0.172 to 0.132 W/mk and for dairy washed scum oil Methyl Ester thermal conductivity decreases from 0.158 to 0.124 W/mk. Thermal degradation and specific heat were determined using the TG-DSC instrument. Specific heat was studied in the range 30^0C to 130^0C for Seemaruba oil Methyl Ester specific heat varies from 2.384 to 2.86 kJ/kg K for dairy washed scum oil Methyl Ester specific heat varies from 1.594 to 2.117 kJ/kg K.

Index Terms: Thermal Conductivity, Specific Heat, Viscosity, and Thermal Degradation.

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Simulation of Sloshing Velocity in a Partially Filled Moving Tank

A.Bhattad[1]

[1] Department of Mechanical, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail:drathul@kluniversity.in

ABSTRACT

Numerical simulations have been carried out on a partially filled rectangular tank using volume of fluid method. The tank has been given to and fro motion. Numerical simulation has been carried for a two dimensional case having laminar flow. The effect of sloshing on velocity at different times has been observed using ANSYS software. The study was conducted for two sec. Variations in the velocity has been observed with the time period.

Index Terms -Sloshing, Laminar flow, ANSYS, VOF, Velocity.

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Simulation of Sloshing in a Partially Filled Moving Tank

A.Bhattad [1]

[1] Department of Mechanical, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail:drathul@kluniversity.in

ABSTRACT

Numerical simulations have been carried out on a rectangular tank filled partially with liquid using volume of fluid technique. The tank has been given to and fro motion in one direction. Numerical simulation has been carried for a two dimensional case having laminar and unsteady flow. The changes in free surface displacement and dynamic pressure at different times has been observed using ANSYS software. The study was conducted for two sec. It was observed that free surface displacement of fluid increases with velocity. Also, with an increase in volume of liquid the sloshing effect decreases.

Index Terms -Sloshing, Laminar flow, ANSYS, VOF, Surface displacement.

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NUMERICAL ANALYSIS OF SHELL AND TUBE HEAT EXCHANGER OPERATING WITH DIFFERENT HYBRID NANOFLUIDS

S. SUDHAKAR BABU[1], G. CHENNA MAHESH[2], K. HANISH CHANDRA[3]

[1]Associate Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur, Andhra Pradesh, 522502, India

[2,3]PG scholar, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur, Andhra Pradesh, 522502, India

ABSTRACT

Over the decades, scientific research was increased rapidly on nanofluids. Inspite of uncertainty in there ported outcomes and inadequate knowledge of the mechanism of nanofluids heat transfer. In the advancement of nanofluid science, scientists have recently attempted to utilize hybrid nanofluid, which is designed by stiring different nanoparticles in neither in a blend or a composite form. The aim of utilizing hybrid nanofluids is to farther boost the elements with pressure drop and heat dissipation by trade-off between the benefits and drawbacks of individual suspensions due to a fine characteristic ratio, better thermal bond and adaptive outcomes of nano-materials. Utilizing CFD tools, the drop in pressure, the heat dissipation properties of different hybrid nanofluids and base fluids are studied through turbulent flow conditions. Hybrid Nanofluids are used as a cooling medium. Finally, the theoretical results of the simulated CFD are compared. Effects of dissolved nano particle volume concentration, peclet number and thermal transfer characteristics were studied. The results show a convincing enhancement in the heat dissipation characteristics by introducing hybrid nanoparticles into the basic fluid. This paper discusses recent studies on thermophysical properties and hybrid nanofluid thermal dissipation and flow properties used in the STHEs.

Keywords: Numerical analysis, Shell and tube heat exchanger, Hybrid nanofluids.

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NUMERICAL ANALYSIS OF TRIPLE TUBE HEAT EXCHANGER WITH FINS

S. SUDHAKAR BABU[1], K. HANISH CHANDRA[2], G. CHENNA MAHESH [3]

[1]Associate Professor, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur, Andhra Pradesh, 522502, India

[2,3]PG scholar, Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation, Green Fields, Vaddeswaram, Guntur, Andhra Pradesh, 522502, India

ABSTRACT

System in which heat transfer takes place is a heat exchanger. Current paper attempts heat transfer analysis in concentric triple tube heat exchanger, with fins on the inner annulus. Material used for fins and tubes is steel, because it is a good conductor of heat. Fins of different height are added and at different temperatures, analysis is carried out. fin heights considered is 6 mm 8 mm 10 mm, temperature range of 345K, 353K, 363K, temperatures at 345K is considered and values calculated at fin height of 6 mm, 8 mm, 10 mm. In same process temperatures for 353K and 363K is carried out for fin heights of 6 mm, 8 mm, 10 mm.

Keywords: Triple tube heat exchanger, Nanofluids, Corrugation technique.

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Influence of Base Fluid on Thermal Conductivity of Fe_3O_4 and SiC Nanofluids

T.Kanthimathi[1,2], P.Bhramara[3]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,
Green Fields, Vaddeswaram, A.P., India-522502.
[2,3]Department of ME, Jawaharlal Nehru Technological University, Kukatpally
Hyderabad, Telangana, India
E-mail: kanthi2014@kluniversity.in.

ABSTRACT:

Heat transfer augmentation is better achieved using nanofluids which are colloidal solution of solid nanometer sized particles and conventional heat transfer fluids generally called as base fluids. In the present study the thermal conductivity of Fe_3O_4 and SiC based nanofluids is experimentally studied by suspending these nanoparticles in Distilled Water (DW), Ethylene Glycol-Water mixture in the volume ratios of 20:80 and 40:60(20:80 EG-Water and 40:60 EG-Water). The experiments are conducted at the temperatures of 40, 45 and 50°C. The nanoparticles are suspended in the base fluids in the volume concentrations of 0.02%, 0.04%, 0.06% and 0.08%. Results indicate that the thermal conductivity of DW based nanofluids is higher than EG-Water based nanofluids, whereas the enhancement in the thermal conductivity compared to base fluid is higher for EG-Water based nanofluids. SiC suspended nanofluids proved to have higher thermal conductivity than Fe_3O_4 suspended nanofluids

Index Terms** – **nanofluid, nanoparticles, thermal conductivity, ethylene glycol, volume concentration

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Base Fluid Effect on the Viscosity of SiC and Fe_3O_4 Nanofluids

T.Kanthimathi[1,2], P.Bhramara[3]

[1]Department of ME, Koneru Lakshmaiah Education Foundation,
Green Fields, Vaddeswaram, A.P., India-522502.
[2,3]Department of ME, Jawaharlal Nehru Technological University, Kukatpally
Hyderabad, Telangana, India

E-mail: kanthi2014@kluniversity.in.

ABSTRACT:

Suspension of nanometer sized solid particles in the conventional heat transfer liquids have proved to augment the heat transfer performance of the base fluids. The present paper experimentally investigates the base fluid effect on the viscosity of Fe_3O_4 and SiC based nanofluids. Fe_3O_4 and SiC nano particles are suspended in Distilled Water (DW), mixture of Ethylene Glycol-Water in the volume ratios of 20:80 and 40:60(20:80 EG-Water and 40:60 EG-Water). The temperature range considered for the experimentation is 40 to 50°C. The nanoparticles are suspended in the base fluids in the volume concentrations of 0.02%, 0.04%, 0.06% and 0.08%. Results indicate that the viscosity of DW based nanofluids is lower than EG-Water based nanofluids. Fe_3O_4 suspended nanofluids proved to have higher viscosity than SiC suspended nanofluids

Index Terms *– **nanofluid, nanoparticles, viscosity, ethylene glycol, volume concentration***

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INVESTIGATION ON PERFORMANCE OF COUNTER FLOW VORTEX TUBE COOLING SYSTEM

Tirumala Sandeep Thota

Department of ME, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

Email: tsandeep@kluniversity.in

ABSTRACT

Refrigeration plays an important role in developing countries, primarily for the preservation of food, medicine, and for air conditioning. Conventional refrigeration systems are using Freon as refrigerant. As they are the main cause for depletion of ozone layer, extensive research work is going on alternate refrigeration systems. Vortex tube is a non-conventional cooling device, having no moving parts which will produce cold air and hot air from the source of compressed air without affecting the environment. When a high-pressure air is tangentially injected into vortex chamber a strong vortex flow will be created which will be split into two air streams, one hot stream and the other is cold stream at its ends.

In this present work an attempt is made to improve performance characteristics using different materials for hot tube as well as varying number of tangential nozzles and inlet pressures at a fixed L/D ratio. In this connection the operating variables are varied to evaluate performance characteristics.

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CFD simulations on a zig-zag microchannel heat sink

M. Raja[1], A.V.S. Sasidhar saketh[1], B. Nageswara Rao[1]

[1]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: bnrao52@kluniversity.in

ABSTRACT:

To examine the adequacy of the turbulent models in computational fluid dynamics (CFD) codes, the test data of a zig-zag microchannel heat sink is considered in the present study. The pressure drop and heat transfer characteristics of a single-phase microchannel heat sink are examined. Zig-zag microchannel is having 120mm long, 1.5mm outer diameter and 0.5mm inner diameter. The test fluid is SiO_2–water nanofluid with particle concentration of 0.3 and 0.6%. Flow rate is from 0.77 to 1.65(kg/s). The test section has a constant heat flux of 33(kW/m^2). Models are generated using ANSYS Design Modeler and ANSYS (FLUENT) is used for the flow analysis. Turbulent model is selected based on the outlet temperature in the heat sink. Numerical simulations are close to the measured ones. The Nusselt number is evaluated for the specified nanofluid and microchannel properties, inlet temperature and mass-flow rate. This study confirms the validation of models and numerical simulations useful in the design and performance evaluation of zig-zag microchannel heat sinks.

Index Terms *– ANSYS Fluent****, flow simulations, inlet temperature, nanofluids, outlet temperature.***

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Optimal process parameters for biodiesel production from equally mixed dairy waste and karanja seed oil

Ganesh Vijay More[1], Y.V.H. Rao[1], P. Issac Prasad[1], B. Nageswara Rao[1]

[1]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: bnrao52@kluniversity.in

ABSTRACT:

Quality of biodiesel is essential for the desirable engine performance, in which fattyacid methyl esters (FAME) yield play an important role. This paper deals with the transesterification optimization of equally mixed dairy waste and karanja seed oils (DK Oils) for biodiesel production utilizing the Taguchi's L_9 orthogonal array. The significance of the process parameters (viz., molar ratio, catalyst concentration, reaction temperature and reaction time) is examined on the % FAME yield. The optimal process parameters are identified for achieving a high % FAME yield. An empirical relation is developed for the % FAME yield in terms of the process parameters and validated by conducting several experiments. 96% of FAME yield is achieved for the transesterification process parameters of 6:1 molar ratio, 1wt% catalyst concentration, 60^0C reaction temperature and 75-minute reaction time. Quality of the biodiesel is assessed through GC-MS characterization and physico-chemical analysis.

Index Terms –DK oils, optimization, Taguchi L9 orthogonal array, property investigation

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Characterization of biodiesel produced from dairy waste and karanja seed (DK) oils

Ganesh Vijay More[1], Y.V.H. Rao[1], P. Issac Prasad[1], B. Nageswara Rao[1]

[1]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: bnrao52@kluniversity.in

ABSTRACT:

Current environmental issues and depletion of natural petroleum resources demand alternative fuels for transportation. Present investigations are on the properties of dairy waste and karanja seed (DK) oils, production of biodiesel from DK oils and its characterization. FTIR, GC-MS, and CHNSO analysis have been carried out and generated the properties following IS1448 standards. The DK oils have 37.64%FFA content, which is very high and minimized to below 1% through a two-step transesterification process. The esterification process is completed utilizing methanol as alcohol and sulfuric acid (H2SO4) as a catalyst. The transesterification process is carried along with three different catalysts such as calcium oxide (CaO), potassium hydroxide (KOH) and sodium hydroxide (NaOH) for selecting an appropriate catalyst to achieve better performance. Maximum 96% FAME yield is achieved for the transesterificationprocess parameter of 6:1 molar ratio, 1wt% catalyst concentration, 650C reactiontemperature and 75 minute reaction time.

Index Terms –DK oils, FTIR, GC-MS, CHNSO, IS1448 standards, Two-step transesterification.

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On the usage of signal-to-noise (S/N) ratio transformation in Taguchi method for optimum process parameters in the fiber laser keyhole welding of GA-DP590

G. satyanarayana[1], K.L. Narayana[1], B. Nageswara Rao[1]

[1]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation,
Green Fields, Vaddeswaram, A.P., India-522502.
E-mail: bnrao52@kluniversity.in

ABSTRACT:

This paper examines an integrated method proposed recently by Ai and his co-researchers for identifying optimum process parameters in the fiber laser keyhole welding of the hot-dip galvanized dual phase sheet (GA-DP590) adopting Taguchi approach and finite element analysis (FEA) simulations. Large discrepancy is noticed in the usage of additive law in estimating the output response (viz., the ratio of weld penetration to width). The signal-to-noise (S/N) ratio transformation on a single value of each test run output response seems to be unnecessary. Scatter in the output response of repeated experiments due to unknown influential input process parameters demands the expected range of the output response for the process parameters. This paper incorporates such capabilities in the Taguchi approach and suggests for utilizing reliable numerical simulations for improving the integrated method of Ai and his co-researchers.

Index Terms –Fiber laser, Focal point, Laser power, Optimization, Ratio of weld penetration to width, Taguchi approach, Welding speed.

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Modified Taguchi approach and multi-objective optimization to specify optimal abrasive jet machining parameters for glass fibre reinforced plastics

Shyam Prasad Kodali[1], B.V. Dharmendra[1], B. Nageswara Rao[1]

[1]Department of Mechanical Engineering, Koneru Lakshmaiah Education Foundation,

Green Fields, Vaddeswaram, A.P., India-522502.

E-mail: bnrao52@kluniversity.in

ABSTRACT:

Abrasive jet machining is preferred for hard and brittle materials like glass fibre reinforced plastics (GFRP). Scatter in the nonlinear nature of output responses in repeated experiments is unavoidable due to measurement errors and unknown influencing input process parameters. This paper follows a simple and reliable multi-objective optimization process utilizing the Taguchi approach. Using the modification in the Taguchi approach the expected range of output responses for the optimum abrasive jet machining parameters is obtained and validated through test data. Empirical relations developed for the output responses in terms of input process parameters can be used for determining the output responses to the specified AJM process parameters. To carry out the analysis, there is no need to use any standard software tool based on the statistical regression methodology. The paper recommends the modified Taguchi method in finding the optimal input AJM process parameters by representing functionally the dissimilar quality characteristics of multiple responses to a single response characteristic (after non-dimensioning them). The Taguchi based multi-objective optimization utilized in the present study is quite simple and easy to handle with calculators.

Index Terms –Abrasive Jet Machining, Abrasive Pressure, Glass Fibre Reinforced Plastic, Material Removal Rate, Nozzle diameter, Overcut, Stand-off Distance, Taper cut.

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TORSEMIDE AND FUROSEMIDE AS GREEN INHIBITORS FOR THE CONSUMPTION OF GENTLE STEEL IN HYDROCHLORIC CORROSIVE MEDIUM

K J Babu, BATHULA ANUSHA, BATHULA SAHITYA

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

The performance of torsemide and furosemide drugs as corrosion inhibitors for mild steel in 1 N HCl was thoroughly investigated by weight loss and electrochemical methods. The inhibition efficiencies of drugs obtained by all methods were in good agreement with each other. Torsemide exhibited higher inhibition efficiencies than furosemide in all the experimental studies. Polarization studies revealed that the inhibiting action of the compounds is under mixed control. The free energy of adsorption and the influence of temperature on the adsorption of inhibitors onto a mild steel surface have been reported. The adsorption of the compounds was found to obey the Langmuir adsorption isotherm. The mechanism of inhibition and formation of the Fe-inhibitor complex were confirmed by FT-IR and UV-visible absorption spectral analysis. The scanning electron microscopy (SEM) and atomic force microscopy (AFM) results established the formation of a protective layer on the mild steel surface. Quantum chemical calculations were applied to correlate the inhibition performance of inhibitors with their electronic structural parameters. © 2013 American Chemical Society.

Key words:HCL,performance,methods,agreement,etc

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IDEAL VALUE MARKING DOWN AND PARCEL ESTIMATING ARRANGEMENTS FOR PERISHABLE THINGS IN A PRODUCTION NETWORK UNDER PROPEL INSTALLMENT PLAN AND TWO-ECHELON EXCHANGE CREDITS

K G SUDHAKAR, CHUNDURI RAVITEJA, DANDA SRAVYA

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

In this paper, an effective approach, Taguchi grey relational analysis, has been applied to experimental results of wire cut electrical discharge machining (WEDM) on Inconel 825 with consideration of multiple response measures. The approach combines the orthogonal array design of experiment with grey relational analysis. The main objective of this study is to obtain improved material removal rate, surface roughness, and spark gap. Grey relational theory is adopted to determine the best process parameters that optimize the response measures. The experiment has been done by using Taguchi's orthogonal array L36 (21 × 37). Each experiment was conducted under different conditions of input parameters. The response table and the grey relational grade for each level of the machining parameters have been established. From 36 experiments, the best combination of parameters was found. The experimental results confirm that the proposed method in this study effectively improves the machining performance of WEDM process.

Key words: Taguchi,SR,MRR,WEDM,etc

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LASER ENGINEERED NET SHAPING PROCESS IN IMPROVEMENT OF BIO-COMPATIBLE IMPLANTS

KL Narayana, K Teja,Ganzi Suresh, M KedarMallik

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

Additive manufacturing or Rapid Prototyping (RP) is an advanced manufacturing technology emerging as key player in both industrial and medical fields. Dissimilar to traditional manufacturing processes, in additive manufacturing process material is added as sequential thin layer to achieve the build parts with minimal post processing and it requires less time to fabricate prototypes with high accuracy. Additive manufacturing shows desired results for fabricating the customized medical implants. As there is a large variation to part structure from patient to patient, it is difficult to make implants from conventional manufacturing processes. So, rapid prototyping is most advanced and convenient to fabricate a medical implant that suits the patient's requirements. The present paper reviews the works produced by Laser Engineered Net Shaping (LENS) technique to fabricate the medical implants from bio-materials.

Key words: prototyping, fields, manufacturing, etc.

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CONDITION MONITORING AND DIAGNOSTIC ANALYSIS OF INDUCED DRAUGHT FAN ROTOR SYSTEM

KL Narayana, KV Ramana, K Teja

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

Today's machines are more complex as they have to meet more stringent functional and operational requirements. Growing demand on reliability and performance of these machines and maintaining high productivity without sacrificing product quality have made it imperative for maintenance engineers to device newer strategies in maintenance of plant and machines. One of such strategies is condition monitoring, which has emerged as the most powerful tool in maintenance engineering to prevent uneconomical, unreliable, unhealthy, unsafe and even lethal conditions. In this paper an attempt has been made to monitor the condition of induced draught fan rotor system of a large utility thermal power plant. The data has been logged for a period of 6 months and has been rationalized for ease of investigation. The values are plotted on time-domain for velocity to facilitate trend monitoring. Fault diagnosis of the rotor.

Keyword: complex, demand, engineering, etc.

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RESEARCH ARTICLE DESIGN OPTIMIZATION OF A MICRO AIR VEHICLE (MAV) FIXED WING

DVA Rama Sastry, KV Ramana, KL Narayana, K Teja

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

Micro air vehicles are gaining attention due to their wide range of applications in civilian and defense fields. The wings of these vehicles generate a particular flow regime which is to be explored further. Since the theories on the aerodynamics of all affects are still to be investigated, simulation based computational fluid dynamics is a good approach rather than wind tunnel experiments which involves cost and long periods of experimentation. This study mainly emphasize on the lift, lift coefficient, drag and drag coefficient with respect to Reynold's number and angle of attack, by modelling and analyzing the fixed wing of a micro air vehicle. The analysis has been done selecting NACA25411 air foil. Modelling has been done in Gambit and analysis is taken up using Fluent. Angle of attack and Reynold's number have been optimized to increase the lift and decrease the drag.

Key words: vehicles, aerodynamics, air, angle, etc.

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DESCRIPTION AND WEAR PROPERTIES OF CO-CR-W ALLOY DEPOSITED WITH LASER ENGINEERED NET SHAPING

Ganzi Suresh, KL Narayana,K Teja, M KedarMallik

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

Commercially available Co-Cr-W alloy, known as Stellite 6, samples are deposited using Laser Engineered Net Shaping process using L9 orthogonal array of Taguchi method with three different process parameters, each at three levels. All the samples are tested for the microstructure analysis with ESEM and wear resistance. The EPMA mapping is also presented for analysis. The wear testing results reveal that the samples fabricated with 350W laser power, 7.5 g/min powder feed rate and 15mm/s laser scan speed have exhibited highest wear resistance at 30N load and 300rpm.

Key words: satellite, samples, EPMA, ESEM, etc.

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VALID ARE SUGIYAMA′ S EXPERIMENTS ON FOLLOWER FORCES

M Mutyalarao, D Bharathi, KL Narayana, B Nageswara Rao, K Teja

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

This paper is inspired by the review articles of Langthjem and Sugiyama, and Elishakoff on the dynamic stability of non-conservative elastic systems. It examines Sugiyama′s experimental results on a cantilever column subjected to the weight and thrust of a small rocket motor mounted at the tip end. The test results cannot be utilized directly for comparison with estimated critical loads of the column but they demonstrate the stabilization of the system due to rocket thrust.

Key words: force,end,estimate,loads,etc

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ELECTRO CHEMICAL BEHAVIOUR OF LENSTM DEPOSITED CO-CR-W ALLOY FOR BIO-MEDICAL APPLICATIONS

Ganzi Suresh, KL Narayana,K Teja, M KedarMallik, V Srinivas, G Jagan Reddy,

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

In additive manufacturing processes, Laser Engineered Net Shaping (LENS) is the promising technology in developing medical implants with minimal material wastage and high accuracy in shape and size. It enables the custom design of implants that vary from patient to patient. In the present work, the LENS process has been used to fabricate and test Co-Cr-W alloy for its corrosion resistance. The process parameters selected for fabricating the samples are laser power; powder feed rate and laser scan speed, each at three levels. Samples are fabricated as per the Taguchi L-9 orthogonal array and analysis is carried out through the ANOVA and Grey Relational Grade Analysis. Through this methodology, the primary process parameters viz. Laser power (LP), Powder feed rate (PFR) and scan speeds (SS) can be optimized simultaneously for achieving a better combination of multiple performance characteristics. From the experimental results, the multiple performance characteristics of the corrosion potential (Ecorr) and corrosion current (Icorr) of Co-Cr-W alloy are evaluated. The combination of high Laser Power (350W), high Powder Feed Rate (20 g/s) and low scan speed (10 mm/s) are most influencing process parameters to achieve the best corrosion resistance samples.

Key words: ANOVA,SS, samples, etc

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A REVIEW ON DEVELOPMENT OF MEDICAL IMPLANTS BY RAPID PROTOTYPINGTECHNOLOGY

Ganzi Suresh, M KedarMallik

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

Rapid prototyping/manufacturing is computer operated manufacturing technique, builds parts directly from CAD data by additive sequence layerby-layer, unlike traditional manufacturing process where material is removed in sequence to obtain a desired part. Rapid prototype plays a crucial role in development of medical implants. As medical implants have complex design and vary from patient to patient. It is easy to make custom made medical implants by rapid prototyping at very less cost and time, compared to conventional manufacturing techniques. The present article showcases the significance of rapid prototyping applications in medical industry with suitable bio-compatible materials and manufacturing techniques used to fabricate the complex medical models.

Key words: prototyping, CAD ,rapid, techniques, etc

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EFFECTS OF LASER PARAMETERS ON MORPHOLOGICAL CHANGE AND SURFACE PROPERTIES OF ALUMINUM IN MASKED LASER SURFACE TEXTURING

Ganzi Suresh, K Teja, M KedarMallik, V Srinivas, G Jagan Reddy,

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

The masked laser surface texturing process was used to produce micro-pattern arrays. Using mesh grids as masks, the surface of the workpieces were selectively ablated and hundreds of micro-patterns were simultaneously generated by a single laser irradiation. The effects of laser energy intensity and number of laser pulses on surface morphologies and properties were investigated. It was found that it is more efficient to control the number of laser pulses than the laser energy intensity to form a uniform micro pattern array and to control the pattern shape. In addition, hardness values of the material surface can be selectively increased by adjusting laser parameters. When the laser energy intensity increased, the hardness of the hole region which was directly affected by the laser irradiation increased. When the surface was irradiated repeatedly by the multiple laser pulses, however, the increase in hardness was much pronounced in the masked bar region adjacent to the ablation zone. The structural changes of the patterned surface and the work hardening effect due to laser shock loading were superimposed to increase the hardness of the masked region. The contact angle decreased with increasing laser energy intensity and number of laser pulses. This is mainly due to an increase in surface heterogeneity at high laser energy intensities and an increase in bar width at multiple laser pulses condition.

Keywords: Masked, laser, surface, texturing, etc.

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AN EVALUATION FOR MECHANICAL AND MICROSTRUCTURE BEHAVIOR OF DISSIMILAR MATERIAL WELDED JOINT BETWEEN NUCLEAR GRADE MARTENSITIC P91 AND AUSTENITIC SS304 L

D.Loknath, Kiran Kumar

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

The microstructural evolution and mechanical properties of gas tungsten arc welded creep might enhanced martensitic (CSEM) and austenitic stainless steel (SS) dissimilar welded joint is explored in the as welded (AW) and post weld heat treated (PWHT) conditions. The as received normalized and tempered P91 steel has been welded with SS304 L by preparing a conventional groove and employing a P91 GTAW filler wire. The welded plate is subjected to PWHT at 760 °C for 120 min followed by air cooling. The P91 steel in as received condition exhibited fully martensitic (tempered) structure with lathe morphology and prior austenite grain boundaries while SS304 L have austenitic structure with twins. The heterogeneity (as-welded condition) across the welded joint were produced in terms of microstructure and mechanical properties (hardness, Charpy toughness and tensile strength). The variation in mechanical properties has been minimized after the PWHT. PWHT has experimental a drastic influence on mechanical properties and microstructure of weld fusion zone and HAZ of P91 side however, remain unaffected for the SS304 L side HAZ. The strength of the welded joint have been measured 1016 ± 2.5 MPa and 906 ± 6.5 in as-welded and PWHT condition with joint efficiency of 140 % and 125 %, respectively.

Keywords: SS304 L, Dissimilar welded joint, Microstructure, Mechanical properties

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A EVALUATION OF THE WIRE ARC ADDITIVE MANUFACTURING OF METALS: PROPERTIES, DEFECTS AND QUALITY IMPROVEMENT

K Teja, M KedarMallik

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

Due to the feasibility of economically producing large-scale metal components with relatively high deposition rates, significant progress has been made in the understanding of the wire arc additive manufacturing (waam) process, as well as the microstructure and mechanical properties of the fabricated components. as waam has evolved, a wide range of materials have become associated with the process and its applications.this article reviews the emerging research on waam techniques and the commonly used metallic feedstock materials, and also provides a comprehensive over view of the metallurgical and material properties of the deposited parts. common defects produced in waam components using different alloys are described, including deformation, porosity, and cracking. methods for improving the fabrication quality of the additively manufactured components are discussed, taking into account the requirements of the various alloys. this paper concludes that the wide application of waam still presents many challenges, and these may need to be addressed in specific ways for different materials in order to achieve an operational system in an acceptable time frame. the integration of materials and manufacturing process to produce defect-free and structurally-sound deposited parts remains a crucial effort into the future.

Keywords: WAAM, Materials, Defects, Quality improvement.

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TRANSIENT LIQUID PHASE BONDING OF AZ31 MAGNESIUM ALLOY: METALLURGICAL STRUCTURE AND MECHANICAL PROPERTIES

K.L Suresh, K Teja, JanosPlocher, AjitPanesar

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502.

ABSTRACT

In the present paper, AZ31 magnesium alloy was transient liquid phase bonded using aluminum interlayers (with two different thicknesses of 9 and 14 μm), two bonding temperature of 440˚ and 455℃ and different holding times. Optical and scanning electron microscopies were employed to determine the progression of isothermal solidification. In addition, X-ray diffraction method was used to determine the formation of the brittle $Al_{12}Mg_{17}$ compound. The hardness was found to be higher at the joint center compared to the joint sides, which can be related to the eutectic structure and high amount of intermetallic compounds at the center. The results showed that the 9 μm-interlayer led to greater shear strength, elongation and failure energy than the 14 μm interlayer, and the highest shear strength of ~35 MPa was obtained for 75 min bonding time and 9 μm interlayer. The fracture surface evaluation revealed the presence of more plastic deformation for the joints made by the thinner interlayer.

Keywords: TLP, bonding, AZ31, magnesium alloy, Metallurgy, characterization

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EFFECT OF LASER BEAM WELDING PARAMETERS ON MORPHOLOGY AND STRENGTH OF DISSIMILAR AA2024/AA7075 T-JOINTS

K TEJA, M KEDARMALLI
Department of Mechanical Engineering
Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

This paper investigates the effect of laser welding parameters, such as beam power, welding speed, incident beam angle, incident beam position and beam diameter, on the weld geometry, microstructure, porosity and mechanical properties of successive double-sided laser beam welded AA2024-AA7075 T-joints using 4047 filler wire. A change in the welding parameters influences the weld geometry and porosity, but does not cause significant variations in the weld microstructures, though some liquation cracking was observed in the heat-affected zone of alloys AA7075 and AA2024. The macroporosity occurs more in the second weld seam than in the first one. The pull-out test results presented higher values than those obtained by other authors. The ultimate tensile load in pull-out test is influenced by the laser power, laser beam diameter and incident beam position. Macroporosity plays a relevant role in fracture initiation during pull-out tests. Porosity and liquation cracking influenced the fracture mode of the pull-out test specimens, but they do not significantly affect the results.

Keywords:Laser, welding,parameters,T-joints,Defects,

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EFFECT OF METAL TRANSFER MODE ON SPATTER AND ARC STABILITY IN UNDERWATER FLUX-CORED WIRE WET WELDING

K.L Suresh, K Teja, JanosPlocher, AjitPanesar

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

The effect of metal transfer mode on spatter and arc stability during underwater flux-cored wire wet welding at different process parameters are investigated adopting the synchronous acquisition system of X-ray image and electric signal. Two spatter modes i.e. the local droplet repelled spatter and the droplet explosion spatter were observed for the first time. The generation of the local droplet repelled spatter is attributed to the excessive and unstable repulsive forces, while the droplet explosion spatter is caused by the unstable repulsive forces and gas dynamic force. Welding spatters and arc stability depend on the metal transfer mode. During wide-angle globular repelled transfer mode, the droplet repelled spatter mode is observed and the forming frequencies of the local droplet repelled spatter and droplet explosion spatter are higher than other transfer modes. The short-circuit explosions are observed in short-circuit explosive transfer mode, causing numerous short-circuit explosive spatters. With the increase of arc voltage, both the spatter loss coefficient and voltage variation coefficient decrease firstly to the minimum at the arc voltage of 32 V and then increases gradually, attributed to the type and proportion of metal transfer mode.

Keywords: wet welding, Welding spatter, Arc stability, Metal transfer mode,etc

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INVESTIGATION OF EXPLOSIVE WELDING THROUGH WHOLE PROCESS MODELING USING A DENSITY ADAPTIVE SPH METHOD

K.L NARAYANA, K.L Suresh, K Teja, JanosPlocher, AjitPanesar

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

Explosive welding (EXW) involves processes like the detonation of explosive charge, impact of metal structures and strong fluid-structure interaction with complex features such as interfacial waves and jet generation. The whole EXW process has not been well modeled before due to the large deformation and moving interfaces while the associated mechanisms inherent in EXW are also not well understood. In this paper, the whole EXW process is simulated using a density adaptive smoothed particle hydrodynamics (SPH) model, in which a density adaptive algorithm is used to treat variable large density ratio in EXW and the kernel gradient correction (KGC) is used to improve computational accuracy of SPH. The mechanisms in EXW are investigated, and typical phenomena including the wavy interface, jet formation, interfacial temperature and pressure distribution as well as melting voids are examined. The mechanisms of wave formation are studied while two existing mechanisms, namely, the Jet Indentation Mechanism and the Vortex Shedding Mechanism are revealed with the present SPH simulations. It is demonstrated that with proper amount of explosive charge and initial welding angle, the present SPH method can well reproduce the morphology evolution of the welding interface from straight to wavy and further to wavy with vortex shedding. Furthermore, based on comprehensive numerical data from SPH simulations, two types of numerical weldability windows for EXW are presented together with discussions about different welding limits and effective explosive charge.

Keywords:Smoothed, particle, hydrodynamics,etc

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INVESTIGATION ON THE FRACTURE BEHAVIOR OF TITANIUM GRADE 2 SHEETS BY USING THE SINGLE POINT INCREMENTAL FORMING PROCESS

KL NARAYANA, K TEJA,MBSS REDDY

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

The objective of the present research work is to study the fracture behaviour (void coalescence) of titanium grade 2 sheets using the Single Point Incremental Forming (SPIF) process and its dependence on various process parameters. The importance of tool diameter on the fracture behavior of the titanium grade 2 was investigated and it was found that the maximum deformation fracture strain was observed for the highest (12 mm) tool diameter. The Forming Limit Diagram (FLD) is plotted for each speed of titanium grade 2 sheets. The variation of fracture behaviour with respect to speed was examined and it showed that this was the maximum for higher speed of 600 rpm spindle speed. The void coalescence analysis was carried out using AutoCAD software, and the strain triaxiality was determined. The Energy Dispersive X-ray Spectroscopy (EDS) analysis was investigated to confirm the elemental composition of titanium grade 2 sheets.

Keywords: Ti.tanium,SPIF,FLC,etc

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METAL PROTOTYPING THE FUTURE OF AUTOMOBILE INDUSTRY: A REVIEW

KL Narayana,K Teja, M KedarMallik, M Gopinath

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

Metal prototyping an advanced rapid prototyping technique has shown a very high potential to reduce the time of manufacture and cost of product effectively. Implementation of metal prototyping to the extent of 4d printing improves the future of small, medium and large-scale enterprises of automobile industry. This paper gives a glance of metal prototyping to automobile industry. The implementation of future metal prototyping automobile industry involves 1. Re- engineering model generation for spare parts of two, three, four-wheeler automobiles, 2. Mathematical and software simulation by using fem techniques, 3.3d printing, 4. Metal prototyping though 3d/ 4d printing, 5. Prototype testing and research labs are described in detail. Finally this review gives a glance on future automobile industry through metal prototyping

Keywords: FEM,Metal prototyping,Automobile, scrap,etc.

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STUDY ON COLD METAL TRANSFER WELDING–BRAZING OF TITANIUM TO COPPER

L Narayana,K Teja,MBSS Reddy
Department of Mechanical Engineering
Koneru Lakshmaiah Education Foundation
Vaddeswaram, Pin-522502

Abstract

3 mm Pure titanium TA2 was joined to 3 mm pure copper T2 by Cold Metal Transfer (CMT) welding–brazing process in the form of butt joint with a 1.2 mm diameter ERCuNiAl copper wire. The welding–brazing joint between Ti and Cu base metals is composed of Cu–Cu welding joint and Cu–Ti brazing joint. Cu–Cu welding joint can be formed between the Cu weld metal and the Cu groove surface, and the Cu–Ti brazing interface can be formed between Cu weld metal and Ti groove surface. The microstructure and the intermetallic compounds distribution were observed and analyzed in details. Interfacial reaction layers of brazing joint were composed of Ti_2Cu, TiCu and $AlCu_2Ti$. Furthermore, crystallization behavior of welding joint and bonding mechanism of brazing interfacial reaction were also discussed. The effects of wire feed speed and groove angle on the joint features and mechanical properties of the joints were investigated. Three different fracture modes were observed: at the Cu interface, the Ti interface, and the Cu heat affected zone (HAZ). The joints fractured at the Cu HAZ had higher tensile load than the others. The lower tensile load fractured at the Cu interface or Ti interface was attributed to the weaker bonding degree at the Cu interface or Ti interface.

Keywords: Titanium, Copper, Cold metal transfer, Welding–brazing,etc

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EFFECT OF STRAIN RATE AND TEMPERATURE ON STRAIN HARDENING BEHAVIOR OF A DISSIMILAR JOINT BETWEEN TI–6AL–4V AND TI17 ALLOYS

K Teja, MBSS Reddy

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

The aim of this study was to evaluate the influence of strain rate and temperature on the tensile properties, strain hardening behavior, strain rate sensitivity, and fracture characteristics of electron beam welded (EBWed) dissimilar joints between Ti–6Al–4V and Ti17 (Ti–5Al–4Mo–4Cr–2Sn–2Zr) titanium alloys. The welding led to significant microstructural changes across the joint, with hexagonal close-packed martensite (α') and orthorhombic martensite (α'') in the fusion zone (FZ), α' in the heat-affected zone (HAZ) on the Ti–6Al–4V side, and coarse β in the HAZ on the Ti17 side. A distinctive asymmetrical hardness profile across the dissimilar joint was observed with the highest hardness in the FZ and a lower hardness on the Ti–6Al–4V side than on the Ti17 side, where a soft zone was present. Despite a slight reduction in ductility, the yield strength (YS) and ultimate tensile strength (UTS) of the joints lay in-between the two base metals (BMs) of Ti–6Al–4V and Ti17, with the Ti17 alloy having a higher strength. While the YS, UTS, and Voce stress of the joints increased, both hardening capacity and strain hardening exponent decreased with increasing strain rate or decreasing temperature. Stage III hardening occurred in the joints after yielding. The hardening rate was strongly dependent on the strain rate and temperature. As the strain rate increased or temperature decreased, the strain hardening rate increased at a given true stress. The strain rate sensitivity evaluated via both common approach and Lindholm approach was observed to decrease with increasing true strain. The welded joints basically failed in the Ti–6Al–4V BM near the HAZ, and the fracture surfaces exhibited dimple fracture characteristics at different temperatures.

Keywords: Titanium alloy,Electron beam welding,Strain , hardening behavior,etc

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FRICTION STIR WELDING OF DISSIMILAR MATERIALS BETWEEN AA6061 AND AA7075 AL ALLOYS EFFECTS OF PROCESS PARAMETERS

DVA Rama Sastry, KV Ramana, KL Narayana, K Teja

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

Abstract

Dissimilar AA6061 and AA7075 alloy have been friction stir welded with a variety of different process parameters. In particular, the effects of materials position and welding speed on the material flow, microstructure, microhardness distribution and tensile property of the joints were investigated. It was revealed that the material mixing is much more effective when AA6061 alloy was located on the advancing side and multiple vortexes centers formed vertically in the nugget. Three distinct zones with different extents of materials intercalations were identified and the formation mechanism of the three zones was then discussed. Grain refinement was observed in all three layers across the nugget zone with smaller grains in AA7075 Al layers. All the obtained joints fractured in the heat-affected zone on the AA6061 Al side during tensile testing, which corresponds very well to the minimum values in microhardness profiles. It was found that the tensile strength of the dissimilar joints increases with decreasing heat input. The highest joint strength was obtained when welding was conducted with highest welding speed and AA6061 Al plates were fixed on the advancing side. To facilitate the interpretation, the temperature history profiles in the HAZ and at zones close to TMAZ were also measured using thermocouple and simulated using a three-dimensional computational model.

Keywords: Dissimilar, materials, joining,etc

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FATIGUE CRACK PROPAGATION BEHAVIOUR IN WIRE+ARC ADDITIVE MANUFACTURED TI-6AL-4V: EFFECTS OF MICROSTRUCTURE AND RESIDUAL STRESS

DVA Rama Sastry, KV Ramana, KL Narayana, K Teja

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

Fatigue crack propagation tests of Ti-6Al-4V fabricated by the Wire+Arc Additive Manufacturing (WAAM) process are analysed. Crack growth rate and trajectory are examined before and after the crack tip crossing an interface between the WAAM and wrought alloys. The study has focused on the microstructure and residual stress effect. First, the differences in crack growth rate and path between WAAM and wrought alloys are attributed to their different microstructure; the equiaxed wrought alloy has straight crack path, whereas the WAAM lamellar structure causes tortuous crack path resulting in lower crack growth rate. Second, based on measured residual stress profile in the as-built WAAM piece, retained residual stress in the much smaller compact tension specimens and its effect on crack growth rate are calculated by the finite element method. Numerical simulation shows considerable residual stress in the test specimen and the stress magnitude depends on the initial crack location and propagation direction in relation to the WAAM-wrought interface. Residual stress is released immediately if the initial crack is in the wrought substrate; hence it has little effect. In contrast, when crack grows from WAAM to wrought, residual stress is retained resulting in higher stress intensity factor; hence greater crack growth rate.

Keywords:Additive manufacturing,Titanium alloy,Fatigue crack propagation,Residual stress.

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FORMATION MCHANISM OF TYPICAL ONION RING STRUCTURES AND VOID DEFECTS IN FRICTION STIR LAP WELDED DISSIMILAR ALUMINUM ALLOYS

DVA Rama Sastry, KV Ramana, KL Narayana, K Teja

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

Abstract

The formation mechanism for typical onion ring structure and void defect with heat input during FSLW was continuously visualized by an exit-hole continuous observation technique. Based on this result, the compatibility between microstructure, microtexture, element maps and strain maps using electron backscattered diffraction (EBSD) with the chemical indexing assisted by EDS analysis was simultaneously investigated. The results revealed that the threaded probe was significantly correlated to typical onion ring structure and the onion structure formed as soon as it touched the probe. This result is different from the results so far. On the other hand, the remnant of original interface between top and bottom plates after FSLW and asymmetrical flow around rotating tool were significantly correlated to the formation of void defect in low heat input condition.

Keywords:Friction stir lap welding,Dissimilar aluminum alloy,Material flow.etc

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CHARACTERIZATION OF HEAT AFFECTED ZONE LIQUATION CRACKING IN LASER ADDITIVE MANUFACTURING OF INCONEL 718

KL Narayana, K Teja

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

Abstract

The heat affected zone liquation cracking behavior was studied in laser additive manufactured Inconel 718. Liquation cracking was found initiating from the weak site near the fusion line in the pre-deposited layer, propagating along the interdendritic region with the further deposition proceeding layer by layer. Total cracking length calculation results showed that when controlling the heat input and height increment constant, liquation cracking susceptibility increased with the increase of laser scanning speed; and when controlling the laser scanning speed and height increment constant, liquation cracking susceptibility increased with the increase of heat input. The effect of grain boundary misorientation on susceptibility to liquation cracking was also investigated through electron backscatter diffraction (EBSD) measurement, and the results showed that liquation cracking tendency increased with the increase of grain boundary angle, which was considered to be attributed to the higher stability of liquation film at larger grain boundary during the last stage of solidification.

Keywords:HAZ cracking,Laser cladding,EBSD,Grain boundary misorientation

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3D PRINTING FOR FUNCTIONAL ELECTRONICS BY INJECTION AND PACKAGE OF LIQUID METALS INTO CHANNELS OF MECHANICAL STRUCTURES

KV Ramana, KL Narayana, K Teja

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

Abstract

With the fabrication freedom and high efficiency introduced by 3D printing, such technology has been explored in the electronic manufacturing processes. In the present work, we reported a developed method for the fabrication of functional electronics with liquid phase electronic circuits. The technique involves printing hollow channels within elastomer structures via fused deposition modeling (FDM), then injecting and encapsulating liquid metal to form electrical traces. The process parameters in printing elastomer objects and the design of hollow channels were investigated via the extrusion experiments. The influence of flow rates on liquid metal injection was also studied under pressure injection. Based on these discussions and validations, the relationships between process parameters and the printing structures were demonstrated, and the flexible substrate with hollow channels was successfully printed by optimization of the process parameters. Moreover, a probe signal circuit has been fabricated to demonstrate the ability of injecting and packaging liquid metal into 3D printed structures for functional electronics.

Keywords: 3D printing,Functional electronics,Additive manufacturing,Hollow channel

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POLYMER-BASED SMART MATERIALS BY PRINTING TECHNOLOGIES: IMPROVING APPLICATION AND INTEGRATION

KL Narayana,K Teja,MBSS Reddy

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

Abstract

Smart and functional materials processed by printing technologies reveal an increasing interest due to reduced cost of assembly, easy integration into devices and the possibility to obtain multifunctional materials over flexible and large areas. After introducing smart materials, printing technologies and inks, this review discusses the materials that are already being printed, mainly piezoelectric, piezoresistive, magnetostrictive, shape memory polymers (SMP), pH sensitive and chromic system materials. Since polymer-based smart materials are particularly attractive for device implementation, this review will focus on printed polymer-based smart materials. Finally, critical challenges and future research directions will be addressed.

Keywords:Printing, technologies,Smart materials,Internet,Additive manufacturing,Polymers

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3D PRINTING OF POLYMER-BONDED MAGNETS FROM HIGHLY CONCENTRATED, PLATE-LIKE PARTICLE SUSPENSIONS

KL Narayana,K Teja, MBSS Reddy

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT

This paper reports the 3d printing of polymer-bonded magnets using highly concentrated suspensions of non-spherical magnetic particles. In a previous study, magnets of arbitrary shapes have been successfully fabricated using the uv-assisted direct write (uadw) method. The magnetic remanence (b_r) of the uadw magnets was limited by the type of magnetic particles used and the highest printable particle loading. Magnetic particles produced from melt spinning have better intrinsic magnetic properties, but their plate-like shape has resulted in a higher working viscosity, posing a major challenge in 3d printing with uadw. Inspired by the "farris effect" in rheology, we mixed the plate-like particles of two different sizes to increase the polydispersity and reduce the overall viscosity of the mixture as the smaller particles can now fill the interstitial space between the larger ones. Using this rheological technique, a particle loading of as high as 65% by volume, or 93% by weight, was 3d printed. The resulting magnet has a density of 5.2 g/cm^3, an intrinsic coercivity (h_{ci}) of 9.39 koe, a remanence (b_r) of 5.88 kg, and an energy product ($(bh)_{max}$) of 7.26 mgoe, marking the highest values reported for 3d printed polymer-bonded magnets.

Keywords:3D printing,Magnets,Rheology,Direct write,Suspensions

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WIRE + ARC ADDITIVELY MANUFACTURED INCONEL 718: EFFECT OF POST-DEPOSITION HEAT TREATMENTS ON MICROSTRUCTURE AND TENSILE PROPERTIES

KL Narayana,K Teja,MBSS Reddy

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

Abstract

Wire + Arc Additive Manufacturing (WAAM) can be used to create large free-form components out of specialist materials such as nickel-base superalloys. Inconel (IN) 718 is well suited for the WAAM process due to its excellent weldability. However, during deposition, WAAM IN718 is susceptible to micro-segregation, leading to undesirable Laves phase formation in the interdendritic regions. Further, the WAAM process encourages columnar grain growth and the development of a strong fibre texture, leading to anisotropy in grain structure. This unfavourable microstructure can be addressed through specialised post-deposition homogenisation heat treatments. A new modified heat treatment was found to be effective in dissolving Laves phase, whereas a standard treatment precipitated δ phase. Tensile test results revealed that Laves and δ phases lead to low ductility when present in a precipitation-hardened matrix. The modified heat treatment also reduced the anisotropy in grain structure, leading to almost isotropic elevated temperature tensile properties, which meet minimum specifications for conventional cast but not for wrought material. Specialised post-deposition heat treatments, which address the unique microstructure of WAAM IN718, are crucial to achieving optimal mechanical properties.

Keywords: manufacturing,Nickel-base superalloy,Heat treatment,Microstructure,etc.

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REVIEW ON DESIGN AND STRUCTURAL OPTIMISATION IN ADDITIVE MANUFACTURING: TOWARDS NEXT-GENERATION LIGHTWEIGHT STRUCTURES

K.L Narayana, K.L Suresh, K Teja, JanosPlocher, AjitPanesar

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

Abstract

As the application of additive manufacturing (AM) reaches an unprecedented scale in both academia and industry, a reflection upon the state-of-the-art developments in the design for additive manufacturing (DfAM) and structural optimisation, becomes vital for successfully shaping the future AM-landscape. A framework, highlighting both the interdependencies between these two central aspects in AM and the necessity for a holistic approach to structural optimization, using lightweight strategies such as topology optimization and/or latticing, was established to summarize the reviewed content. Primarily focusing on isotropic material considerations and basic stiffness-optimal problems, these concepts have already found wide application, bridging the gaps between design and manufacturing as well as academia and industry. In pursuit of streamlining the AM-workflow towards digitally print-ready designs, studies are increasingly investigating mathematically-based structural optimization approaches in conjunction with DfAM-specific constraints, providing a portfolio of solutions like generative design, which is gaining traction in industry. Besides an overview on economically-driven to performance-driven design optimizations, insight into commercial AM-specific software is provided, elucidating potentials and challenges for the community. Despite the abundance of AM design methods to-date, computationally inexpensive solutions for common engineering problems are still scarce, which is constituting one of many key challenges for the future.

Keywords: DfAM,AM etc

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PERFORMANCE OF TRANSMISSION LOSS ON HYBRID MUFFLER BY USING ROCK WOOL AND GLASS FIBER AS A ABSORBING MATERIALS

Venkateswarlu , lokesh ,Prof. N. Tamiloli
Department of Mechanical Engineering
Koneru Lakshmaiah Education Foundation
Vaddeswaram, Pin-522502

Abstract

Muffler is categorized in two broad manners as absorptive muffler and reactive muffler. A Muffler (silencer) is an important noise control element for reduction of machinery exhaust noise, fan noise, and other noise sources involving the flow of gases. Reactive mufflers which reduce noise by reflecting sound energy back to its source, and absorption mufflers, which absorb sound due to the energy dissipated in the sound-absorbing material. The attenuation levels of these types of muffler are dependent on the frequency of the noise source. Investigations on absorption mufflers have indicated that these have fairly good noise attenuation over a relatively wide frequency band. The combination of both reactive and absorptive muffler is termed as hybrid muffler. Hybrid muffler design may be expected to provide broadband high noise attenuation and low pressure drop. Experimental Two load setup and Wave 1-D is used to predict the transmission loss of hybrid muffler. Hybrid muffler generally includes the number of perforated tubes, number of perforated baffles with absorptive materials like asbestos, rock wool, bensoil, powertex & advantex etc. Transmission loss measurement using hybrid muffler is discussed in this paper. Various sound absorption materials that are currently used for noise reduction are used. This paper shows the acoustic performance of packed dissipative muffler with the variation in packing density of absorptive material. Here easy available absorptive materials glass fiber & rock wool is used with same space. This study is performed by taking four designs to observe the transmission loss performance by applying different absorptive materials with different packing density.

KEYWORDS: Transmission Loss (TL), Hybrid Muffler, Sound Absorptive Materials, Two Load Method, Wave 1-D.

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EFFECT OF CHANGE IN DIAMETER ON MUFFLER TRANSMISSION LOSS USING COMSOL

Kiran kumar reddy, venkateswarlu and Prof. N. Tamiloli.

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

Abstract

Muffler analysis is always challenging task due to complex design, shape and size limitation for specific application. In this paper the inlet diameter of muffler is varied for comparison. Two finite element methods (FEM) Results are compared using COMSOL 5.0 software. Two different muffler configurations are considered, representing the effects of adding absorptive lining and without absorptive lining to increase the transmission loss (TL), from computational analysis it is observed that for 40 mm inlet transmission loss is more compared with 30 mm inlet diameter.

Keywords – Transmission loss (TL), Acoustic liners.

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DESIGN, ASSESSMENT AND OPTIMIZATION OF AUTOMOTIVE MUFFLER.

Lokesh, venkateswarlu and Prof. N. Tamiloli.

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT: Mufflers are important part of engine system and commonly used in exhaust system to minimize sound transmissions caused by exhaust gases. Design of mufflers is a complex function that affects noise characteristics, emission and fuel efficiency of engine. Therefore muffler design becomes more and more important for noise reduction. The objective of the paper is to propose a design of simple reactive muffler for effective sound attenuation and for getting highest transmission losses. The paper contains two optimization problem to get optimize model which can further optimize by using Taguchi method. The problem were built and analysed by using 'COMSOL MULTIPHYSICS' in pressure acoustic analysis domain for getting Maximum Transmission Losses and minimum Sound Pressure Level (SPL). First optimization problem contain muffler in which perforation diameter and pipe diameter are varied which again optimizes by eliminating perforation and by varying pipe lengths in second optimization problem. Among the best problem is further optimized by using Taguchi method.The effect of SPL on the walls of the muffler is not considered. The material of the muffler is also not considered. This optimized model of elliptical muffler is manufacture and then validate with the experimental analysis.

KEYWORDS: Transmission Losses, Sound Pressure Level, Acoustic, Optimization

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ANALYSIS OF EXHAUST SYSTEM- 'SEMI ACTIVE MUFFLER'

Kodati teja, venkateswarlu and Prof. N. Tamiloli.

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

ABSTRACT: Main drawback of I.C. engines working is that it is a major source of noise pollution. That is why the reduction of exhaust noise generated from engine is in today's world an important issue. Attaching a muffler in the exhaust pipe is the good option for reducing noise. But muffler requires specific design and construction considering various noise parameters produced by the engine. Since early development of mufflers, the main objective of design was attenuation of sound in regular mufflers. Which causes a great amount of back pressure at the exhaust port thus losing power,increasing fuel consumption and piston effort to exhale the gases out. For high performance engines the free flow exhaust is made in which the sound level is not important but zero or less back pressure is. There is no intermediate muffler type in between both these, so semi active muffler is an step between these two, in which it attenuates sound when engine is running at low rpm , and converts in free flow when engine at higher revs.

KEYWORDS: CFR-cylinder firing ratio, EFR-engine firing ratio, Semi active muffler, Vm-volume of muffler.

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ANALYSIS OF FLOW FIELD AND PRESSURE LOSS FOR FORK TRUCK MUFFLER BASED ON THE FINITE VOLUME METHOD

Venkateswarlu , Vaibhav and Prof. N. Tamiloli
Department of Mechanical Engineering
Koneru Lakshmaiah Education Foundation
Vaddeswaram, Pin-522502

ABSTRACT

Having the premise of the certain acoustic performance, a muffler should make the pressure loss as small as possible. A simulation model of a fork truck muffler with a complex structure is established. Based on the finite volume method, multidimensional numerical simulation regarding velocity field and pressure field of steady flows for a muffler is performed using CFD (computational fluid dynamic method). Flow characteristics and pressure distribution of the muffler are analyzed. It is found that the vortex inside the muffler creates a great pressure loss. With the increases of inlet gas flow rate , the pressure loss of the muffler increases gradually. The internal structure of the muffler is redesigned for obtaining the optimized structure on the basis of analysis. The influences of the inner tube length on the flow and pressure loss of muffler are researched. The study will provide a theoretical basis for designing a complex muffler.

Keywords: Complex muffler, Velocity field, Pressure field, Structure improvement.

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STUDY OF MULTI-CHAMBER MICRO-PERFORATED MUFFLFLER WITH ADJUSTABLE TRANSMISSION LOSS.

Venkateswarlu , Vaibhav and Prof. Hujare

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

abstract

The noise behavior of the blower used on fuel cell vehicles is measured and analyzed. According to the noise behaviors, the multi-chamber micro-perforated mufflfler with adjustable transmission loss is pro posed for silencing. The adjustment is achieved by the change of the third chamber length. The relation model between the chamber length and the mufflfler resonant frequency is fifitted. In addition, the mufflfler sample is manufactured for experiment. According to the study, the blower noise contains the wide band noise with frequency range of 500–1000 Hz and the narrow band harmonics with frequency range of 2000–3500 Hz. The experimental results show that the proposed mufflfler is effective and effifficient to attenuate the low-medium frequency wide band noise and the narrow band harmonics simultaneously.

Keywords: Blower noise ,Micro-perforated mufflfler ,Adjustable transmission loss .

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ASSESSMENT OF VARIOUS ALGORITHMS FOR IMPROVING ACOUSTIC ATTENUATION PERFORMANCE AND FLOW CHARACTERISTIC OF REACTIVE MUFFLFLERS

Venkateswarlu , Loknath and Prof. N. Diwarkar

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

abstract

The parametric optimization of the reactive mufflflers is researched by numerical analysis, regarding the performance of the acoustic and flflow fifields synthetically. The fifinite element method, based on the Helmholtz equation and the Navier–Stokes equation respectively, is utilized in the analysis of the acoustic and flflow fifields. And the initial and boundary conditions are set up in the physical fifields respectively. The weighting multi-objective function about acoustic and flflow fifields is formulated. In addition, the optimization results of multidisciplinary, obtained by the Nelder Mead algorithm (NMA) based on the sensitivity analysis, the Monte Carlo algorithm (MCA) and Genetic Algorithm (GA) based on the random sampling, are analyzed comparatively. The optimization results indicate that the NMA can maximize the transmission loss (TL) and minimize the pressure drop with the given weight factor. Finally, numerical optimization examples confifirm the validity and reliability of the proposed optimization method in the acoustic-flflow fifield.

Keywords: Transmission loss, Pressure drop, Reactive mufflfler, Multidisciplinary optimization

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TOPOLOGY OPTIMIZATION OF A SUCTION MUFFLER IN A FLUID MACHINE TO EXPLOIT ENERGY COMPETENCE AND MINIMIZE BROADBAND SOUND

Venkateswarlu , Vaibhav and Prof. Ramane

Department of Mechanical Engineering

Koneru Lakshmaiah Education Foundation

Vaddeswaram, Pin-522502

abstract

A suction mufflfler used in a fluid machine has three functions: noise reduction; minimizing pressure drop and improving energy efficiency using acoustic effects. However, no method of suction mufflfler design considers all three of these functions concurrently. Therefore, in this study, we attempt to provide an integrated design method of a suction mufflfler in a flfluid machine that considers all three functions. The topology optimization method for acoustic and flfluid systems was applied to an integrated design. However, the interaction between fluid and acoustic was not considered. In addition, the acoustic input impedance of a suction mufflfler was used for a specifific acoustical resonance frequency to improve the energy effificiency of a fluid machine. Finally, the sequential optimization method based on physical investigations was proposed to satisfy several design criteria.The proposed method was applied to the suction mufflfler in refrigerator's compressor.

Key wards: Muffler,efficiency,Method,etc.