Proceedings
of
National Conference on Recent Innovations in Mechanical Engineering 2021
(Virtual Mode)

RIME'2k21

18th November 2021

Organised by

Department of Mechanical Engineering

JAI SHRIRAM ENGINEERING COLLEGE

Dharapuram Road, Avinashipalyam,
Tirupur -638 660

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PROCEEDINGS

of

NATIONAL CONFERENCE ON RECENT INNOVATIONS IN MECHANICAL ENGINEERING – 2021 (RIME'2k21)

18th November, 2021

Organized by

DEPARTMENT OF MECHANICAL ENGINEERING

JAI SHRIRAM
ENGINEERING COLLEGE

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai, Accredited by NAAC)
Dharapuram Road, Avinashipalayam, Tirupur – 638 660
https://www.jayshriram.edu.in

PREFACE

It gives me immense pleasure to welcome all the delegates from various institutions for the **"National Conference on Recent Innovations in Mechanical Engineering 2021 (RIME'2k21)"** conducted by our department of Mechanical Engineering.

Around 71 research papers are to be presented virtually and lots of knowledge is going to be disseminated with new ideas and understandings of the recent innovations and developments in Mechanical Engineering which the delegates will leave at the end of the Conference. It covers almost all the recent topics in Composite Materials, Manufacturing, CAD, Thermal and Alternate fuels etc.

The organizers have chosen the right heading for the conference which is relevant for the current ongoing research activities.

My greetings and thanks to all the members of the organizing committee.

CONVENER / RIME'2k21

Shri. M. Govindasamy
Chairman
Jai Shriram Engineering College
Tirupur – 638 660

MESSAGE

It is quite gratifying to note that the department of Mechanical Engineering of our college is hosting its **"National Conference on Recent Innovations in Mechanical Engineering 2021 (RIME'2k21)"** on 18th November 2021.

Organizing such an event at this point of time reinforces our objective of developing an environment for the exchange of ideas towards technological developments. I wish the conference would be able to deliberate on current issues of national and international relevance, particularly in the field of Mechanical Engineering.

There have been unprecedented numbers of quality papers that are to be presented in the conference. I am sure that this occasion will provide an affable environment for the researchers and academicians to freely exchange the views and ideas with others. I convey my warm greetings and felicitations to the organizing committee and the participants and extend my best wishes for the success of the conference.

Chairman

Shri.T.K.Karuppannaswamy
Vice Chairman
Jai Shriram Engineering College
Tirupur – 638 660

MESSAGE

I am happy to know that the Department of Mechanical Engineering of Jai Shriram Engineering College organizing a **"National Conference on Recent Innovations in Mechanical Engineering 2021 (RIME'2k21)"** on 18th November 2021. I appreciate the department for organizing a National conference on the areas of Mechanical Engineering covering the topics of current interest.

Mechanical Engineering addresses the needs of all branches of Engineering and Technology towards Innovation and production of new products. Man has been exploring the possibilities to bring the basic scientific concepts to develop new technologies for the benefit of human beings. When the man dependent activities are coming down day by day, equipment dependent is most essential in all our human beings life.

When industries are started focusing on Industry 4.0, the technology revenge should happen very aggressively. Considering the above, this kind of conferences is the best tool to bring the innovative ideas by creating new technology products which is the need required for our Nation.

Vice Chairman

Dr. C. Rameshkumar
Principal
Jai Shriram Engineering College
Tirupur – 638 660

MESSAGE

It gives me immense pleasure to know about **"National Conference on Recent Innovations in Mechanical Engineering 2021 (RIME'2k21)"** organized by the Department of Mechanical Engineering in virtual mode. This conference is aimed to develop advanced knowledge and awareness of social implications in the mechanical discipline.

I hope that this conference would be much information and fruitful to all participants. The paper presentations will definitely enhance views and thoughts in the latest technology. I am also particularly happy to observe that organizers have taken care to invite judges for different events of broad theme of conference. Undoubted, it will be a great benefit to the participants and will enhance and strengthen their skills. It is benefitting that bringing out a **RIME'2k21** to commemorate during this occasion. The articles included will enlight the faculty and students on new opportunities in the field of science and technology.

I congratulate **Dr. R. J. Golden Renjith Nimal**, all the faculty and students for the efforts taken by them to organize the conference.

I wish all grand success for **RIME'2k21.**

Principal

Dr.S.Anbarasu
Administrative Officer
Jai Shriram Engineering College
Tirupur – 638 660

MESSAGE

Today's Companies recognize innovations as a positive practice in their business operations. New technologies, Evolving customer expectations, Globalized market place catalyse the need for companies to adapt quickly, identify new opportunities to capitalize on them faster than ever. The reality is that majority of companies are struggling to master all the dimensions of transcending requirements of the Corporate World. In this context, the **"National Conference on Recent Innovations in Mechanical Engineering 2021 (RIME'2k21** talk about the challenges and methods of facing the changing scenario of corporate sector.

I extend our sincere thanks to our Chairman, Managing Trustee and Principal, faculty members for their constant support and encouragement. I congratulate all the participants for their enthusiastic participation and I extend my thanks for the support in conference.

Administrative Officer

Dr. R. J. Golden Renjith Nimal
Head of the Department
Department of Mechanical Engineering
Jai Shriram Engineering College
Tirupur – 638 660

MESSAGE

This **National Conference on Recent Innovations in Mechanical Engineering 2021 (RIME'2k21)** organized by the Department of Mechanical Engineering, Jai Shriram Engineering College is an attempt to focus the attention of all concerned professionals to discuss at length concerned with the Emerging trends in Mechanical Engineering and its technology, to seek solutions wherever possible and identify areas where further research are needed. Invited contributions from experts on various topics with separate divisions are presented in the proceedings.

Engineering is getting excited by the day. New materials with fascinating possibilities are being explored. Conducting polymers to smart materials would offer enormous in the near future. Micro and Nano materials are likely to change our lifestyle and become part of our daily life and not just the subject of seminar or talks.

Information provided in various papers and reproduced in the proceedings is aimed at benefiting the Engineers and professionals. It is expected that the purpose would be served in a satisfactory manner through in-depth discussion and interaction among participants during the conference. I take this opportunity to record my heartfelt appreciation and gratitude to all the authors, delegates, conference team and all others participants.

Head of the Department

Keynote Address

THE PERFORMANCE OF STEEL PRODUCT FABRICATION CLUSTER, SALEM

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ABSTRACT

40 Micro and Small Steel Products manufacturing enterprises in Salem faced problem in value addition of the Steel Products (Window, Grill gate, Truss work and panel board) manufactured by them. The Special Purpose Vehicle (SPV) approached Government of Tamil Nadu (GoTN) and Government of India (GoI) through Tamil Nadu Small Industries Development Corporation (TANSIDCO) and formed M/s Salem Steel Cluster Pvt Limited; Salem formed during 2012 at Salem, Tamil Nadu. The objective is to find the physical and financial the performance of Steel Product Fabrication Cluster (SPFC), Salem before and after Cluster Development Approach (CDA), to find the Productivity of the cluster by taking independent variable like No. of Units, Employment and Production and dependent variable like Turnover and to find performance of SPFC before and after Cluster Development Approach. The methodology adopted by collecting the primary data like no of units [Un], employment in no's [En], production in crores [Pcr] and turnover in crores [Tcr] from the Madurai Jewellery Cluster before and after cluster development approach and analysing using Compound Annual Growth Rate (CAGR), Descriptive Analysis, Correlation Analysis, Trend Analysis, Regression Analysis, Structural Equation Modelling and T-Test. There is increase in no. of units, employment, production and turnover after Cluster Development Approach when compared to before CDA and which leads to increase in productivity.

Keywords – Steel Fabrication Cluster- Cluster Development Approach.

1. INTRODUCTION

40 Micro and Small Steel Products manufacturing enterprises in Salem faced problem in value addition of the Steel Products (Window, Grill gate, Truss work and panel board) manufactured by them. The Special Purpose Vehicle (SPV) approached Government of Tamil Nadu (GoTN) and Government of India (GoI) through Tamil Nadu Small Industries Development Corporation (TANSIDCO) and formed M/s Salem Steel Cluster Pvt Limited; Salem formed during 2012 at Salem, Tamil Nadu. The Performance of Steel Product Fabrication Cluster (SPFC), Salem is to be Studied for benefit of MSMEs, Policy Makers like Government of India and Government of Tamil Nadu.

2. TECHNICAL SURVEY

The technical survey conducted and the primary data collected is shown in table 1.

Table 1: Status of the SPFC

Name of the Cluster	M/s Salem Steel Cluster Pvt Limited
Created in	2012
Category of Products	Steel Products (Window, Grill gate, Truss work and panel board)
Extent of Land	1.12 Acres (73534 sqft)
No. of Units intended	100
No. of units created/established	40
No of occupancies	40
Present Board of Management	4 Directors
Regularity of Conducting Meetings	As per ROC regulations
No. of Members	38 SPV Members
Access to members/others (as per original plan)	Direct Access
Existing facilities/Maintenance	As per the sanction of GOI
Financial Performance	Starving for working capital
Product refining etc as per original Proposal	No Deviation

The Study was conducted to know the various interventions needed for empowering the entrepreneurs engaged in SPFC in the areas of Social, Technological, infrastructure related, Financial and Marketing for the successful promotion of Cluster. [1] The Ministry of Micro, Small and Medium Enterprises (MSME), Government of India (GoI) has adopted the Cluster Development approach as a key strategy for enhancing the productivity and competitiveness as well as capacity building of Micro and Small Enterprises (MSEs) and their collectives in the country. [2]

Many studies have been made to identify performance for Clusters under Cluster Development Approach like Match, Printing, Auto components, Leather, Plastic, Hosiery, Textile, Lorry Body Building, Pharmaceutical, Ceramic, Wet Grinder, Jewelry and Rice Mill [3]. Tamil Nadu is first to implement 24 clusters in India which includes SSC [4][5][6]. A cluster is identified by two constituents – the product and the place, and is generally localized. [6] However the SPFC is not studied yet and this leads to study on the performance of SPFC before and after CDA.

Under Micro Small Enterprises Cluster Development Programme (MSE-CDP) of Ministry of Micro, Small and Medium Enterprises, Government of India the SPFC has got funding from Government of India, and Government of Tamil Nadu. The SPV also contributed and obtained bank loan to finish the project about Rs.3.56 crore. The details of project cost are given figure 1.

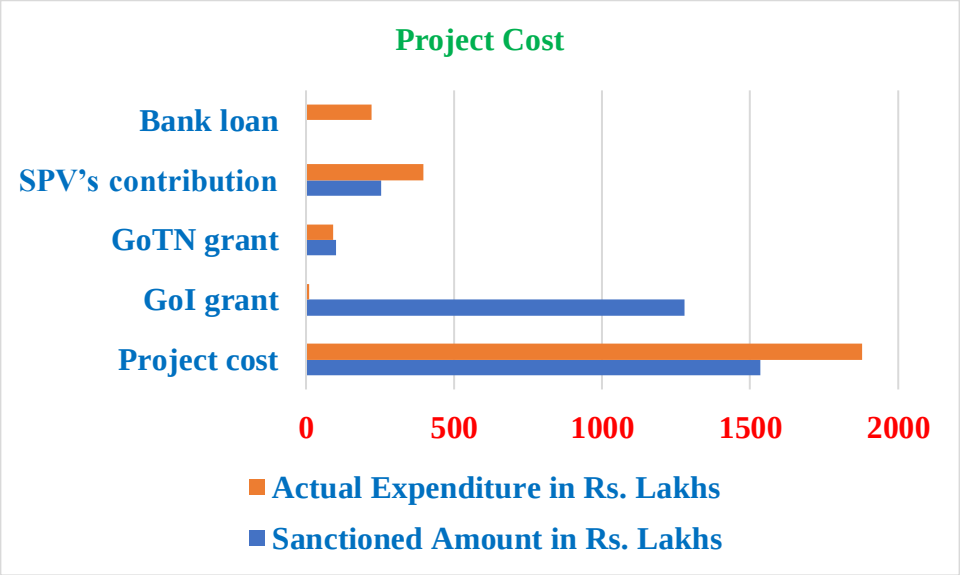

Figure 1: Project Cost of SPFC

3. OBJECTIVE OF THE STUDY

The objective of study is to

1. To find the physical and financial the performance of SPFC before and after Cluster Development Approach (CDA).
2. To find the Productivity of the SPFC by taking independent variable like No. of Units, Employment and Production and dependent variable like Turnover.
3. To find performance of SPFC before and after Cluster Development Approach.

4. METHODOLOGY OF THE STUDY

The methodology adopted by collecting the primary data like no of units [Un], employment in no's [En], production in crores [Pcr] and turnover in crores [Tcr] from the SPFC before and after cluster development approach and analysing using Compound Annual Growth Rate (CAGR), Descriptive Analysis, Correlation Analysis, Trend Analysis, Regression Analysis and Structural Equation Modelling.

5. TECHNICAL ANALYSIS

Before adopting Cluster Development Approach, the Micro and Small Enterprises manufacturing some parts and majority of them are outsourced.

- The cluster members do not use modern and sophisticated technology.
- Many Units still following traditional methods
- Unorganised sector
- Obsolete machineries with cluster members – Need for technology infusion.
- Limited market.
- Over dependence on Traders
- Poor Backward (Raw material and Advanced machineries) and Forward integration (Job order, Design, whole sale market and Export)
- Poor R & D activity – No new design development by cluster units
- Lack of in-house testing facilities.
- Lack of training to work with modern machineries.

NEED FOR COMMON FACILITY CENTRE

- Need for modern machineries for product making which are capable of making large number of homogeneous products in short period.
- Lack of Credit / limited resources for Investment in Latest Technology Machineries
- Need for reduction in the cost of production and wastages to compete with big players.
- Investment in latest technology machineries for various activities like beyond the reach of these MSEs.
- Establishment of a Common Facility Centre for the cluster members will bring in radical change for the cluster members in terms of cost reduction, quality improvement, increased productivity, product diversification through design creation etc., and enable them to compete with organized players and create their own brand and market.

Works at Cluster Units before CDA

The following process were done before CDA using machines like CNC , Lathe, welding etc.

Facilities created in Common Facility Centre (CFC)

To improve productivity the following facilities were created in the cluster during 2017 and also shown in figure 2.

Figure 2: CFC created in SPFC

The CFC have Laser cutting, shearing machine, power press, bending hydraulic, milling shaping, slitting machine, for manufacturing steel pipes for sectors like agriculture, defence, engineering etc. After CDA there is increase in productivity of individual MSMEs

5.1 PHYSICAL PERFORMANCE

The physical performance is shown in figure 3

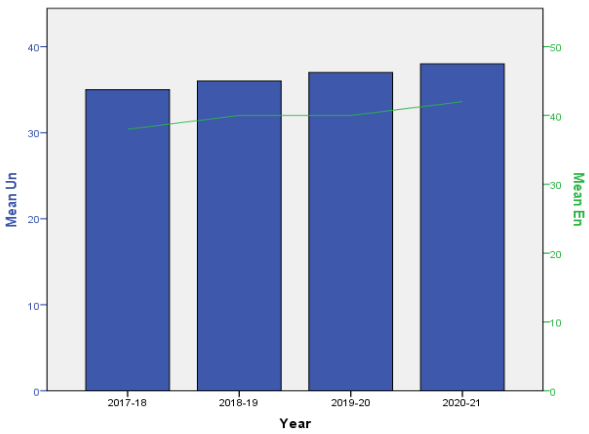

Figure 3: Physical Performance of SPFC

As per figure 3, CAGR for Un = 2.07% and for En = 2.5%

5.2 FINANCIAL PERFORMANCE

The financial performance is shown in figure 4

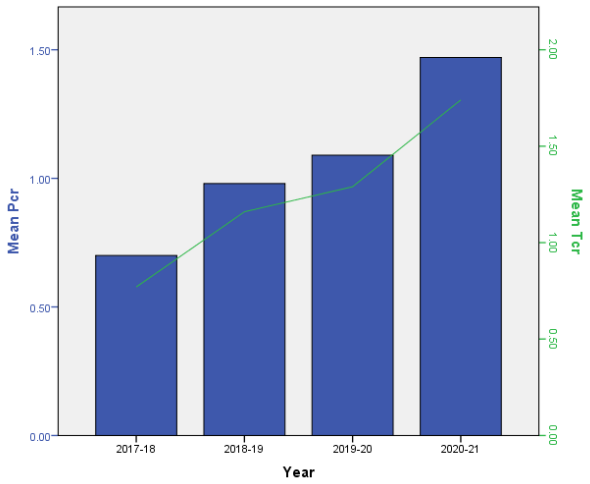

Figure 4: Financial Performance of SPFC

As per figure 4, CAGR for Pcr = 20.38% and for Tcr = 22.60%

5.3 DESCRIPTIVE ANALYSIS

Table 1: Statistics

		Un	En	Pcr	Tcr
N	Valid	4	4	4	4
	Missing	0	0	0	0
Mean		36.50	40.00	1.0600	1.2400
Std. Error of Mean		.645	.816	.15943	.19996
Median		36.50	40.00	1.0350	1.2250
Mode		35[a]	40	.70[a]	.77[a]
Std. Deviation		1.291	1.633	.31885	.39992
Variance		1.667	2.667	.102	.160
Skewness		.000	.000	.448	.217
Std. Error of Skewness		1.014	1.014	1.014	1.014
Kurtosis		-1.200	1.500	1.043	1.010
Std. Error of Kurtosis		2.619	2.619	2.619	2.619
Range		3	4	.77	.97
Minimum		35	38	.70	.77
Maximum		38	42	1.47	1.74
Sum		146	160	4.24	4.96

a. Multiple modes exist. The smallest value is shown

5.4 CORRELATION ANALYSIS

Table 2: Correlations

		Un	En	Pcr	Tcr
Un	Pearson Correlation	1	.949	.980*	.981*
	Sig. (2-tailed)		.051	.020	.019
	N	4	4	4	4
En	Pearson Correlation	.949	1	.986*	.990**
	Sig. (2-tailed)	.051		.014	.010
	N	4	4	4	4
Pcr	Pearson Correlation	.980*	.986*	1	.999**
	Sig. (2-tailed)	.020	.014		.001
	N	4	4	4	4
Tcr	Pearson Correlation	.981*	.990**	.999**	1
	Sig. (2-tailed)	.019	.010	.001	
	N	4	4	4	4

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Ho: There is no relationship between no. of units, and turnover. [Rejected - r= 0.949, p = 0.05 <= 0.05]

Ha: There is relationship between no. of units, and turnover. [accepted [

Ho: There is no relationship between employment and turnover. [Rejected - r= 098, p= 0.02]

Ha: There is relationship between employment and turnover. [accepted]

Ho: There is no relationship between production and turnover. [Rejected - r= 0.98, p = 0.19]

Ha: There is relationship between production and turnover. (accepted)

5.5 TREND ANALYSIS

Un = 34 + T [p = 0.01, R^2 = 1] …… [1]

The annual average increase in no. of units is 1.

En = 37+ 1.2 T [p = 0.51, R^2 = 0.90] ……[2]

The annual average increase in employment is 1.

Pcr = 0.46 + 0.24 T [p = 0.02, R^2= 0.96] ……[3]

The annual average increase in production is Rs.0.24 crores.

Tcr = 0.48 + 0.304 T [p = 0.02, R^2 = 0.96] ……[4]

The annual average increase in turnover is Rs.0.95 crores.

5.6 STRUCTURAL EQUATION MODELLING

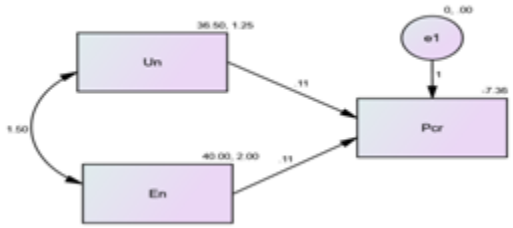

Figure 5: SEM for SPFC

Tcr = -489 +0.064 Un + 0.079En + 0.600 Pcr [p= 0.00 < 0.05, R^2 = 1.00] ……[5]

For one unit increase in no. of units, turnover increases by 0.064, for one unit increase in employment turnover increases by 0.079 and for one unit increase in production turnover increases by 0.60.

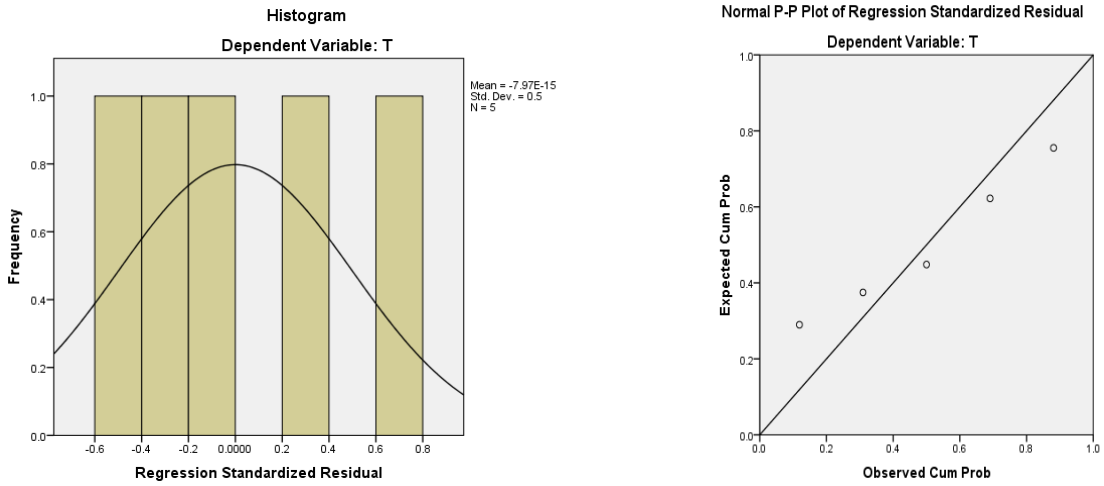

Figure 6: Regression Analysis for SPFC

5.7 REGRESSION ANALYSIS

Pcr = -7.355+0.11 Un + 0.11En [p= 0.91 > 0.05, R^2 = 0.992] ……[6]

For one unit increase in units' production increases by 0.11 units and one unit increase in employment, production increases by 0.11 units.

Tcr = -0.088+1.25 Pcr [p= 0.01 < 0.05, R^2 = 0.998] ……[7]

For one unit increase in production turnover increases by 1.25 units.

5.8 T TEST- PAIRED TWO SAMPLE FOR MEANS

Table 3: Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Una	37.0000[a]	3	1.00000	.57735
	Unb	36.0000[a]	3	1.00000	.57735
Pair 2	Ena	40.6667	3	1.15470	.66667
	Enb	39.3333	3	1.15470	.66667
Pair 3	Pna	1.1800	3	.25710	.14844
	Pnb	.9233	3	.20108	.11609
Pair 4	Tna	1.3967	3	.30436	.17572
	Tnb	1.0733	3	.27062	.15624

a. The correlation and t cannot be computed because the standard error of the difference is 0.

Table 4: Paired Samples Correlations

		N	Correlation	Sig.
Pair 2	Ena & Enb	3	.500	.667
Pair 3	Pna & Pnb	3	.850	.353
Pair 4	Tna & Tnb	3	.831	.375

Table 5: Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 2 Ena - Enb	1.33	1.15	.66	-1.5	4.20	2.000	2	.184
Pair 3 Pna - Pnb	.25	.13	.07	-.08	.59	3.257	2	.083
Pair 4 Tna - Tnb	.32	.17	.09	-.09	.74	3.292	2	.081

Ho: Una = Unb , p = 0.01 < 0.05 (Rejected)

Ha: Una # Unb (Accepted) Una > Unb

Ho: Ena = Enb , p = 0.184 > 0.05 (Accepted)

Ha: Ena # Enb (Rejected) however Ena > Enb and Mean Ena > Enb

Ho: Pcra = Pcrb , p = 0.083 < 0.10 (Rejected)

Ha: Pcra # Pcrb (Accepted) Pcra > Pcrb

Ho: Tcra = Tcrb , p = 0.081 < 0.10 (Rejected)

Ha: Tcrb # Tcrb (Accepted) Tcra > Tcrb

FINDINGS, SUGGESTIONS AND CONCLUSION

A study was conducted to find the productivity of SPFC before and after cluster development approach. There is increase in CAGR after CDA. There is increase in mean value after CDA. There exists strong relationship between dependent variables like turnover and independent variables like no. of units, employment and production. There is annual average increase in no. of units, employment, production and turnover. There is increase in no. of units, employment, production and turnover after Cluster Development Approach. There is cost reduction in individual unit after CDA. Due to CDA, steel fabrication products are diversified, new design has been developed, direct export by cluster units has taken place and brand creation has been developed in Steel Fabrication Products.

ACKNOWLEDGMENT

The author Dr.E.Bhaskaran, acknowledges Department of Industries and Commerce, Government of Tamil Nadu for sending him for UNIDO cluster development training at EDII, Ahmedabad and acknowledges University of Madras for giving Ph.D. in Industrial Cluster Development Approach.

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ROBOTIC AUTO-SOLDERING

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ABSTRACT

Automation is a science and technology by which task can be accomplished without human intervention or with minimal human intervention .Industrial automation is use of control systems such as information technologies and robots or computer systems to handle different process and different machineries to reduce or replace human. For the modern industries to develop automation in production are the basics .The main aspect of automation in manufacturing is to improve the efficiency of labour, increase productivity , to maintain quality of all the manufactured products and optimum utilization of all the production resources. Manual soldering process frequent changes lead to increased training and management costs. Hand-made-causing quality fluctuations, high failure rate, poor consistency, and difficult quality control. Hence robotic auto soldering was introduced which is to automate the process of soldering for different references and different points. The process is designed to solder on printed circuit boards. the operator loads the parts and starts the cycle manually using the finger print anti-tie-button. a reading system by proximity for detecting the presence and proper loading of the product on to the loading fixture. The cycle time was drastically reduced, Fatigue to Operator removed due to continues sitting Operation. Head count of the operator reduces from 10 operators per day to 8 Overall automation played a key role in improving the productivity and increasing the labor efficiency.

Keywords: Automation, Robot, PCB, SCARA, KPI

DESIGN AND DEVELOPMENT OF A ROBOTIC WORK CELL TO REDUCE HUMAN INTERVENTION AND INCREASE PRODUCTIVITY

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ABSTRACT

The work station consists of two CNC turning centers and they are handled by two workers separately. These machines are used for various lathe operations such as turning, facing and chamfering. The parts loading, unloading, handling and inspection is carried out by manual workers each and every time which makes him fatigue and in turn cause failure in loading the component properly. This may result in breakage of the tool or the component. Also, if the labor become fatigue he will take more time to load the component to machine and also for inspecting the component. This will result in increased cycle time. With manual work station, it is difficult to meet the demand and also machine idle time is more. This work is an attempt to solve an industrial problem where an ergonomically unsound manual work station is to be automated. This problem can be addressed by developing a robotic work cell with flexibility and accuracy. Initially robotic work cell was developed as a prototype using software and later it was introduced into real production. Automating the cell resulted in saving cycle time and also reduction in manpower, which in turn results in increased productivity and saving the labor cost.

Keywords: Ergonomically, Productivity, Fatigue, Turning center, Prototype.

INTEGRATION OF ROBOT FOR VERTICAL INJECTION MOLDING MACHINE TO HANDLE HOT INSERTS

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ABSTRACT

Automation is a technology which is used to reduce human intervention in processes like predetermining decision criteria, sub process relationships, and related actions. Industrial automation and robotics refers to use of control systems, computer and information technology. Automation is widely used in different applications such as pick and place, welding, soldering, assembly, inspection, quality. In this project automation is adopted for pick and place application in vertical injection molding machine for handling medical parts. Before implementing automation the loading and unloading of inserts were done manually by operator, tool damage occurred frequently due to wrong orientation of inserts on the machine fixture, constant cycle time couldn't be achieved which leads to less production rate. After over molding process, the inserts are at 45℃ to 50℃ resulting operator faced difficulty in unloading these inserts. In order to achieve present day requirements and overcome all these manual errors in loading and unloading of inserts robot, vision system and other automation elements are interfaced for this project. FANUC 6 axis robot along with grippers to handle inserts, camera for inspecting correct orientation of inserts during loading, double decker shuttle mechanism table is used as input system. Robot picks inserts from the pallet and loads in to the machine fixture then molding process begins, after completion of the process robot unloads the hot inserts into the gravity chute. By implementing this process reduction in inserts handling time, increase in production rate, less man power involvement and elimination tool breakage achieved

Keywords : Automation, Robot, Molding, Hot Inserts

A REVIEW ON LPG, JATROPHA BIODIESEL AND RUBBER SEED BIODIESEL

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ABSTRACT

Biodiesel fuel is growing interest recently and has been strongly recommended as a substitute for petroleum diesel. Liquefied petroleum gas (LPG) is also considered as a promising alternative fuel and has been widely used in transportation due to its environmental and economic benefits. Smoke emission can be largely reduced if diesel vehicles are changed to liquefied petroleum gas (LPG) – diesel as its fuel. Jatropha oil biodiesel has higher cetane number compared to diesel which makes it a good alternative fuel. Rubber Seed Oil is a second-generation feedstock which is mostly used in paint industry. Rubber Seed Oil biodiesel is also considered as a good alternative to conventional diesel.

Keywords: Biofuel, Jatropha, Rubber Seed, Biodiesel, Liquefied Petroleum Gas

COMPUTATIONAL ANALYSIS OF AERODYNAMIC DRAG

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ABSTRACT

This work proposes an effective numerical model based on the Computational Fluid Dynamics (CFD) approach to obtain the flow structure around a passenger car with Spoiler. The focus of the project is to expose such aspects using a CFD packages. Our project is to study and investigate the aerodynamics characteristics of a sedan car with rear spoiler, without rear spoiler and with body profiles and its impaction Lift i.e. vehicle stability and moderate impact on Drag i.e. Fuel consumption. Three different velocities are chosen for this analysis. It is found that the installation of a spoiler with an appropriate angle of attack affect the coefficient of lift and coefficient of drag. It will results in increasing stability of the car and decrease the fuel consumption.

Keywords: Spoiler, coefficient of lift, coefficient of drag, stability

PERFORMANCE ANALYSIS OF THERMAL BARRIER COATING ON PISTON

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ABSTRACT

Within the last few years there has been a rapid increase in the utilization of aluminum-silicon alloys, particularly in the automobile industries, due to their high strength to weight ratio, high wear resistance, low density and low coefficient of thermal expansion. The advancements in the field of application make the study of their wear and tensile behavior of utmost importance. In this present investigation, Aluminum based alloys containing 7%, 12% and 14% weight of Silicon were synthesized using casting method. Compositional analysis and tensile studies of different samples of same composition have shown near uniform distribution of Si in the prepared alloys. Study of microstructure has showed the presence of primary silicon. Tensile tests were carried out with universal testing machine. Yield strength and ultimate tensile strength has increased with increase in silicon percentage. Wear behavior was studied by using computerized pin on disc wear testing machine. Resistance to wear has increased with increase in silicon amount. The worn surfaces were analyzed using scanning electron micros.

Keywords: Thermal Barrier Coating, Aluminium alloy, Piston

PROPERTIES AND CHARACTERIZATION OF HYBRID COMPOSITE WITH FILLER MATERIAL FOR AEROSPACE

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ABSTRACT

Composite material is a combination of two or more distinct materials, having a recognizable interface between them. Composites are being utilized as alternatives to metallic materials in structures where weight is a major consideration, e.g., aerospace structures, high speed boats and trains. Strength of materials to accommodate the load in a system plays an important role in everyday life .Fiber reinforcement plastic (FRP) materials are widely used in various engineering industries because of their superior performance. FRP composites are widely used in various fields. The high modulus to density ratio, leads to the research in composite materials where an attempt is made to study the properties of composite materials by composing the different materials together to obtain the desired properties by reducing the weight as much as possible. Advantages of composite are corrosion resistance, design flexibility, high performance at elevated temperatures etc. In this present work attempt is made to carry out characterization of E-Glass fiber Hybrid polymer composite material with Graphite powder as a filler material with epoxy resin Lapox L-12 for different volume fraction, Notch size and fiber orientation, Specimens were prepared by using Hand layup technique as per ASTM Standards. Result revealed that the properties are significantly dependent on percentage of E-Glass fiber reinforcement, fiber orientation and varying Graphite powder. The results also indicated that strength is also dependent on Notch and Hole sizes for Aerospace.

Keywords: E-Glass fiber, Composite Material, Fiber Reinforcement

DESIGN AND ANALYSIS OF F1 CAR MODEL FOR 2022

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ABSTRACT

Two chassis frames (Model 2020 and Model 2022) of F1 race car have been designed and developed according to the specifications of Formula 1 Standards of 2020. Commercial computer aided design (CAD) software (Fusion 360) is used in design and analysis stages. Once the results of the analysis are desirable, actual chassis frame fabrication is performed using available materials Information. Chassis is the supporting member for all the load operator, engine, brake system, fuel system and steering mechanism thus it should have adequate strength to protect the driver in the event of on impact. There are four types of chassis Frame Ladder Chassis, Tabular Space Frame, Monocoque and Backbone. We choose space frame in this study. In design of a chassis different modes of analysis are done like finite element analysis, static and dynamic analysis, forces acting on truss, torsional vibration, etc. The aim of this Study is gauge the transpose of Design and specs that are brought by the new F1 Car model of the year 2022 in the counter of the model of the year 2020. The load / force act on front, back, side, top. The safety of the driver is achieved either by using high strength chassis against the applied load. The chassis is constructed by carbon fibre tubing with minimum dimensional and maximum strength. Circular cross-section is employed for the chassis development as it helps to overcome difficulties as increment in dimension rise in the overall weight decrease in the performance due to reduction in acceleration.

Keywords: Carbon Fibre Tubing, Chassis Frames, F1 race car, CAD

APPLICATION OF CHEMICAL MACHINING TECHNIQUES IN METAL WORKING INDUSTRIES

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ABSTRACT

Chemical machining is a type of material removal process for the production of desired shapes and dimensions through selective or overall removal of material by controlled chemical attack with acids or alkalis called as etchant solutions. Chemical Milling is one of the chemical machining processes, otherwise called as Chemilling or Contour machining or etching. Chemical milling is used in the aerospace industry to remove shallow layers of material from large aircraft components, missile skin panels, and extruded parts for airframes. Chemical blanking is similar to the blanking of sheet metals in that it is used to produce features which penetrate through the thickness of the material, with the exception that the material is removed by chemical dissolution rather than by shearing. Typical applications for chemical blanking are the burr-free etching of printed-circuit boards, decorative panels, and thin sheet metal stampings, as well as the production of complex or small shapes. Photochemical blanking is otherwise called as photo etching process. It is a modification of chemical milling. Material is removed usually from a flat thin sheet by photographic techniques. Typical applications for photochemical blanking are fine screens, printed circuit boards, electric motor laminations, flat springs, and masks for color televisions. Electrochemical machining is one of the newest and most useful machining processes of metal removal by the controlled dissolution of the anode of an electrolytic cell. This process is particularly suited to metals and alloys which are difficult or impossible to machine by mechanical machining. The main applications of ECM process are in machining of hard-heat-resisting alloys, for cutting cavities in forging dies, for drilling holes, machining of complex external shapes like that of turbine blades, aerospace components, machining of tungsten carbide and that of nozzles in alloy steels. In this review paper, the above mentioned nontraditional machining processes like chemical milling, chemical blanking, photochemical blanking and electrochemical machining are discussed. Besides, process parameters involved in the above chemical machining techniques and applications are explained.

Keywords: chemical machining, chemical milling, chemical blanking, photochemical blanking, electrochemical machining, process parameters, applications

DESIGN OF LOW-COST POWER GENERATION FROM PLAYGROUND SEE-SAW

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ABSTRACT

Power is defined as the rate at which work is performed. In this planet, electricity is the primary source of energy for emerging countries. Numerous nations are keen to generate electricity using a variety of power plants, including nuclear power plants, steam power plants, and hydraulic power plants. All nations are now focused their efforts on alternate energy sources. In this project, energy is created from waste energy, specifically waste energy generated by see-saws. We can see youngsters playing on the see-saw at the park. A see-saw is a balanced plank or board that is made to move alternately up and down by two people at opposing ends. It is also known as a teeter. The oscillating motion of the balanced plank is utilized to generate electricity in this instance. The weight pressing on both ends of the balanced plank generates this oscillating motion. By use of a separate arrangement, this oscillating motion is translated to rotational motion. This rotating motion is what generates electricity.

Key words: Alternate Energy, Electricity, See-Saw

DUAL MODE CONTROLLED SMART WHEELCHAIR FOR PHYSICALLY DISABLED

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ABSTRACT

There are many different types of wheel chairs on the market, some of which are manual, some of which are semi-automatic, and some of which are totally automatic. The development of the wheel chair system is carried out on a daily basis in order to provide support to differently abled people. In this regard, our smart wheel chair system is likewise a work in progress, provide assistance to this group of people. The goal of this project is to create a Smart Wheel Chair System for the physically challenged, handicapped persons at a reasonable price. An Android messenger application controls the system, which consists of For navigating aid, use the HC-06 Bluetooth module and proximity sensor. Our wheel chair system is linked to a Bluetooth module, which allows it to automatically move to the desired horizontal position. The system is controlled by an Android application. We used G-chat to link the Wheel Chair to the Bluetooth module at work, but any Bluetooth messenger application can be utilised. Two proximity sensors are installed at the back and front of the system to safeguard it from collisions. Our wheel chair assembly has a dual password security system, with the first password needed to connect the Bluetooth device and the second password used to control the wheel chair's movement.

Keyword: Mind control, quadriplegic, cerebral palsy, multiple sclerosis,

ENERGY CONSERVATION THROUGH PHASE CHANGE MATERIAL -BUILDING THERMAL ENERGY STORAGE

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ABSTRACT

In the modern day's scenario environmental conditioning is a critical factor for keeping the temperature inside the buildings in a safe state using the air-conditioner. Phase change materials promise innovative materials that are used for the construction of building to construct a wall which should have a property of maintaining a cool atmosphere inside the building. Development of parametric study of heat transfer across the insulated panel by numerical simulation and to develop an empirical model to predict the heat transfer characteristics of wall panel. The current work is aimed at managing the heat transfer characteristics in buildings using PCM materials and controlling the transfer of heat from various states to store the energy for future use. This paper proposed a simulated parametric study to investigate the thermal management of the roof panel using phase change materials (PCM). The heat absorption and releasing nature of PCM is used to control the heat generated inside the room. A single- and double-layer method of PCM was kept between the roof and concrete. The energy saving level has noted on particular time without PCM materials, the same method has been performed after the installation of single layer PCM and double layer PCM. It is necessary to improve the thermal performance to achieve the goal of energy saving. So, the thermal Energy Storage (TES) is one of the best ways to improve thermal performance of the building.

Keywords: PCM, Thermal Energy Storage, Insulated panel

EXPERIMENTAL INVESTIGATION OF HEAT TRANSFER RATE IN LITHIUM ION BATTERY USING HEAT PIPE WITH FREON R22 AS PHASE CHANGE MATERIALS (PCM)

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ABSTRACT

Thermal management system (TMS) for commonly used lithium-ion (Li-ion) batteries is an essential requirement in electric vehicle operation due to the excessive heat generation of these batteries during fast charging/discharging .In the current study, a thermal mode of lithium-titanate (LTO) cell and the three cooling comprising natural air cooling, forced fluid cooling, and a flat heat pipe-assisted method is proposed experimentally. A new thermal analysis of the single battery cell is conducted to identify the most critical zone of the cell in terms of heat generation. This analysis allowed us to maximize heat dissipation with only one heat pipe mounted on the vital region. For further drawing we have drawn SOLIDWORKS 2017 Multiphysics and validated with surface temperature profile along the heat pipe and cell. For real applications, a numerical optimization computation is also conducted in the module level to investigate the cooling capacity of the liquid cooling system and liquid cooling system embedded heat pipe (LCHP). Moreover, in the module level, the liquid cooling system and LCHP shows better performance compared with natural air cooling while reducing the module temperature respectively.

Key Words: Thermal management system, Solid works.

PERFORMANCE AND EMISSION CHARACTERISTICS OF DIESEL ENGINE FUELLED BY BIO-DIESEL

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ABSTRACT

In this fast growing world of Industrialization, quick transport plays a vital role. The majority of this transportation is fulfilled by Road-ways, where mostly vehicles with combustion engines are used where engines are primarily run by diesel. These engines in turn emit lots of pollutants, such as Carbonmonoxide, Carbon-dioxide, Hydrocarbons, NOX smoke etc, which are harmful for the Environment as well as us. Also, these petroleum fuels are limited in nature. Many scientific repons says there will be shortage of petroleum in the near future. So, To mitigate these challenges, many research have been done on different types of bio-diesels to reduce the pollutant emissions and fulfill the future demands of our upcoming generations. Surprisingly, it is found that alternate fuels gives better engine performance and reduce emission by a great percentage. Here in these projects, we used Transesterification of Waste Cooking Oils and hence produced conventional bio-diesel. During this process, a glyceride (also known as glycerol) reacts with alcohol (typically methanol or ethanol) in the presence of a catalyst forming fatty acid alkyl ester and alcohol. Those fatty acid alkyl ester are subjected to mild refining process and thus the non-toxic biodegradable Bio-diesel are produced by transesterification process which reduces the high viscosity of the waste cooking oils.

Keywords: - Transesterification, Combustion Engine, Bio-diesel, Engine Performance, Reduction in Emissions

EXPERIMENTAL INVESTIGATION OF DIFFUSION BONDED DISSIMILAR MATERIALS

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ABSTRACT

Diffusion bonding of Az80 Magnesium alloy with AA7075 Aluminum alloy dissimilar materials was carried out in a vacuum under 10 Mpa for 15 minutes bonding period at various temperatures under 10 Mpa for different temperatures. Diffusion bonding of Az80 magnesium alloy with AA7075 aluminium alloy dissimilar materials in vacuum has been researched to determine the optimal process conditions. When the joints were tested at room temperature, the bonding quality of the joints was evaluated using microstructure analysis, ram tensile testing, and lap shear testing. Through the use of optical microscopy, researchers were able to examine the microstructure of bonded joints, as well as the primary elements that influence the diffusion bonding process.

Key words: Diffusion bonding, Magnesium alloy, bonding quality

INVESTIGATION OF NI2+ IONS ON STRUCTURAL, MORPHOLOGICAL AND MAGNETIC PROPERTIES OF NIXCO1-XFE2O4 NANOPARTICLES

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ABSTRACT

Spinel NixCo1-xFe2O4 (x = 0.0, 0.3 and 0.5) nanoparticles (NPs) have been investigated through structural, morphological and magnetic measurements using powder X-ray diffraction (XRD), Scanning electron microscope (SEM), transmission electron microscope (TEM) and selected area electron diffraction pattern (SAED) analyses. Powder XRD and SAED data indicated the presence of Nano crystalline cubic spinel with single phase. The lattice parameters of the samples gradually increased with increasing Ni content and follow Vegard's law. The crystallite size (D) and X-ray density of NixCo1-xFe2O4samples decreased with increasing Ni content. The spherical shape morphology of spinelNixCo1-xFe2O4 ferrite particles and grain size (26.45, 24.36 and 22.65 nm for x = 0.0, 0.3and 0. 5, respectively) was established by TEM. VSM analysis showed the typical magnetic properties of NixCo1-xFe2O4 spinels. The shape of the magnetic hysteresis (M-H) loops revealed the dependence of super Paramagnetic behavior at room temperature (RT). The further effects also investigated and presented in this paper.

Keywords : Spinel NixCo1-xFe2O4; Sol-gel combustion; Nanoparticles; Super paramagnetic behavior.

EXPERIMENTAL INVESTIGATION ON NATURAL FIBER WITH FILLER REINFORCED POLYMER COMPOSITE MATERIALS

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ABSTRACT

The composite enters a recent development by utilizing natural fibers, both as reinforcement or filler in polymer matrix. The benefits of utilizing natural materials are being environmentally friendly, abundant natural availability, high strength, low cost and simple extraction process. There are some synthetic materials which produce toxic substance when heated to some temperature. Hence replacing these materials with natural materials has more benefit of environment. In this research work, the Palmyrapalm leaf stalk fiber (PPLSF) and coconut shell powder (CSP) reinforced polymer composites were fabricated by compression molding method and the tensile properties were investigated experimentally. The weight fraction of the composite was fixed as 35:65. The composites were fabricated by different compositions by weight fraction such as 25:10, 20:15, 15:20, 10:25 and (PPLSF/CSP). The result shows that the 20:15 composition (PPLSF/CSP) exhibited highest tensile strength is 33 N/mm^2 and the flexural Properties of PPLF composite is 83.56 MPa respectively.

Keywords: Natural fiber, Polymer matrix, Extraction process, PPLSF, CSP, Compression Molding, weight fraction, Tensile strength, Flexural Properties.

GESTURE BASED MINI ROBOTIC WHEELCHAIR USINGARDUINO

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ABSTRACT

Hand Gestures have been defined as the mode of communication while interacting with the machine robot. The hand gesture robot is beneficial to reduce human efforts and carry out effective results. Hand gesture robot uses simple module like Arduino, accelerometer, and nRF2401L, etc. which is found to be effective than other wireless modules. The majority of industrial robots are autonomous as they are required to operate at high speed and with great accuracy. But some applications require semi-autonomous or human-controlled robots. Some of the most commonly used control systems are voice recognition, tactile or touch-controlled, and motion control. One of the frequently implemented motion-controlled robots is a Hand Gesture Controlled Robot. Taking into consideration of the revolutionary technology, we have built a project to reduce the dependency of the people paralyzed half side of their bodies. By using the gestures for the movement of the wheelchair rather than using remote controls or joysticks, so the person can control the wheelchair themselves easily. Additionally, we have mounted the mini wheelchair prototype with a robotic arm, which acts as combined support for the deadened side for picking and placing some necessary objects like water-bottle, books, food, etc. Through the gestural controllers given by the body's active side with minimal effort. It is based on wireless communication, where the data from the hand gestures is transmitted to the robot over the RF link (RF Transmitter – Receiver pair), the project is divided into transmitter and receiver sections. The circuit diagram and components are explained separately for both transmitter and receiver sections.

Keywords: Arduino, Hand Gestures, Robot, transmission, Sensors

TOWARDS THE FUTURE OF SMART VEHICLES

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ABSTRACT

Transportation contributes for 18% of worldwide CO_2 emissions (as of 2019). Consumers and businesses must embrace sustainable transportation that meets the UN Sustainable Development Goals of enhanced energy efficiency and decreased greenhouse gas emissions. To achieve these goals, a new vehicle class called smart vehicles has just developed, reducing CO_2 emissions by up to 43% compared to diesel vehicles. However, supporting architecture is required to optimize these vehicles in a sustainable way.The report examines contemporary research and business developments in smart electric cars which includes autonomous navigation, enhanced driver assistance, vehicle health monitoring, battery management systems, vehicle power electronics, and electrical power drive systems. This study will give an eclectic picture of the smart car system by discussing each component in detail. This examination helps understand the function of this technology inside each categorization from a technological standpoint.

Key words: Smart vehicles, Sustainable transportation

DESIGN AND DEVELOPMENT OF SEMI-AUTOMATIC WHEEL CHAIR CUM STRETCHER

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ABSTRACT

The wheelchair and stretcher are generally used in hospitals, airports, train stations, shopping malls, etc. This design here is a modified wheelchair with stretcher as needed. This machine can be used to convert the wheelchair to a stretcher as needed. It is accessible semi-automatically. The chair transforms into a stretcher when the rocker switches are pressed by using electric actuators. The stretchers can be detached from the main frame for the convenience of the patient and clinician, facilitating patient access with less effort and transport. The folding mechanism makes it easy to store a large number of stretchers inserted as chairs in a relatively smaller space. The number of patients around the world is increasing day by day. Thus, in hospitals, patients must be moved from wheelchair to stretcher, from stretcher to bed, from bed to wheelchair or vice versa; which creates dangerous conditions for patients. A wheelchair with stretcher is required to facilitate the mobility of the disabled patient and to provide new medical equipment for use in hospitals. This paper focuses on Design and Development of Semi-Automatic Wheel Chair cum Stretcher.

Keyword: Wheel Chair, Automatic controller, Linear Actuators, Kinematic analysis

ADVANCEMENTS OF AI AND ITS APPLICATIONS ON MACHINE TOOLS

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ABSTRACT

AI can be implemented in agriculture by means of modern machineries instead of manual processing by which we can conserve lots and lots of time and energy. These robots does not require any non renewable resources and human guidance for every time they work. Some may use solar energy thus these can work on daytime and others perhaps work on both day and nights. Next are some robots that are now rapidly developing in the medical field. For example, a robot that is used to reduce anxiety in 'anxiety therapy'. Last but not least, the world richest man Elon Musk is now eagerly in efforts of creating the tesla bot, the robot. Hence, we may conclude that AI is now developing adversely in each and every sector and we engineers are responsible for any sectors that needs developments and betterments.

Keywords: AI, Modern Machineries, Robots

DESIGN AND FABRICATION OF AUTOMATED MOTORIZED SCREW JACK

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ABSTRACT

A jack is a device which is used to raise part of vehicle in order to facilitate vehicle maintenances or breakdown repairs. In normal jack system a mechanical jack is used for lifting the vehicles. The most common form is a car jack, garage jack, floor jack which lifts vehicles so that maintenance can be performed. Jacks are generally used to increase mechanical advantage (lifting the vehicle).Generally jacks undergo buckling when they reach maximum load conditions (as per the tests conducted by consumer affairs). For this reason, we have to develop the system which can use toggle jack which is automatic in operation using electric motor. Vehicle's battery can be used as a source of power for this motor. Our research in this regard reveals the facts that mostly some difficult methods were adopted in lifting the vehicles for reconditioning. This paper attempts to overcome this difficulty and a suitable device is to be designed such that the vehicle can be lifted from the floor without any application of impact force. The operation remains to be an essential part of the system although with changing demands on physical input, the degree of mechanization is increased.

Keywords: Jack, mechanical jack, Motorized Screw Jack

SOLAR ASSISTED COMBINED REFRIGERATION SYSTEM

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ABSTRACT

Solar energy is a periodic unsteady heat source. In the utilization of solar energy, direct recovery at about 100°C is feasible and economical. In the solar driven ejector-absorption refrigeration cycle with re-absorption of the strong solution and pressure boost of the weak solution. High COP is obtained by increasing the efficiency of the absorber with the help of Ejectors (liquid - gas) Low pressure refrigerant vapour is injected and pressurized high pressure solution. Flow resistance is minimized. A small solution pump is used, in this system No moving parts, No Lubrication, Low maintenance and simple in operation. Working fluids is based on salt absorbent, low evaporation temperature and reduce the problem of crystallization. Working pairs used in the system is NH3 - H20 (or) NH3 - Lithium Nitrate.

Keywords: Solar energy, refrigeration

STUDY ON CURRENT AND POTENTIAL APPLICATIONS OF ROBOTIC FOR COVID-19 ENVIRONMENT

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ABSTRACT

Robots and flexible technology play their key role in serving under COVID-19 situations. Because of the ongoing coronavirus epidemic caused by the novel corona virus, healthcare professionals around the world are at high risk for infection through the treatment of infected patients. The risks are not limited to them, people working in the service sector who need to move out with various other commercial institutions are also at risk of economic hardship due to the instability of resources and personnel. This paper discusses a brief review of the current and potential uses of robots and automation in health care, education, and various industries that prove to be beneficial not only in reducing the spread of COVID-19 by maintaining social distance but also in accomplishing additional tasks. safely and effectively.

Keywords: Robotic patient Assistance systems, Mitra Robot, Disinfection Robots

LEVEL CONTROL OF THREE TANK SYSTEM USING OPTIMUM TECHNIQUES

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ABSTRACT

A Three Tank System can be used for water treatment or storing liquids in many industrial plants. The Liquid levels need to be controlled in order to provide desired specifications. In this paper, level control of Three Tank system using PID controller by various optimization technique such as Differential Evolution algorithm (DE) and Teaching Learning based Optimization algorithm (TLBO). The response of PID controller, DE based PID controller and TLBO based PID controller are compared using MATLAB/ Simulink Software. Simulation results show that the performances of optimized PID controller are better than those obtained by the classical ZN-PID controller.

Keywords : Tank System, Water treatment, MATLAB, Simulation

SIX STROKE ENGINE: AN INNOVATION IN AUTOMOBILE ENGINE

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ABSTRACT

Two-stroke and four-stroke engines have ruled for over a hundred years now. The Two Stroke Engine paved the way for the introduction of the Four Stroke Engine. The benefit has been on both fronts: increased mileage as well as reduced emission. As the prices of oil continually increase as also the emissions from millions of vehicles. This demanded the development of a new hybrid engine with increased efficiency and lower emissions. The Six-Stroke Engine is a completely new development of the internal combustion engine. Termed six-stroke due to the radical hybridization of two- and four-stroke technology, the engine achieves increased torque and power output, better fuel economy, and cleaner burning with reduced emissions, longer service intervals, and considerably reduced tooling costs when compared with a conventional OHC four-stroke engine. It is these that make it seem so viable, the most important being the ubiquitous fuel economy. Six stroke engine is 35 percent more economical at low revs/throttle openings than the equivalent conventional engine, and 13 percent less thirsty at high rpm/full throttle. Therefore, there are reduced hydrocarbon emissions, because it uses less fuel to achieve the same performance. Next, there's improved torque at lower revs. The most attractive benefit is the significantly reduced number of moving parts, compared to a four-stroke not as few as a two-stroke. Fewer moving parts also mean reduced manufacturing costs and mechanical noise from the engine. Torque, which together with the crisp, responsive throttle pickup and the reduced vibration are the three strong points of the six-stroke motor. So this is a hybrid engine design with the above advantages, allied with good squish, the ability to run radical bore/stroke ratios, quiet mechanical operation, and no exotic materials such as ceramic coatings or costly alloys required, nor complicated machining operations.

Keywords: Six-Stroke Engine, Internal Combustion Engine, Hybrid Engine Design

IMPACT OF PHYSICAL / CHEMICAL PROPERTIES OF NANOPARTICLES IN THE FIELD OF AGRICULTURAL SCIENCES AND THEIR COMPUTATIONAL ANALYSIS

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ABSTRACT

Nanotechnology is a technique to bring enrichment in the field of agriculture with new tools to increase the rate of productivity as well as the new innovations. Nanoparticles can exhibit significantly different types of physical and chemical properties to their larger material counterpart. Even though nanoparticles have many positive effects in the agricultural field for crop production or new improvements, the adverse effects of the some of the nanoparticles has been identified. In this case, the effect of nanoparticles characteristics such as shape, size and diameter on agriculture have their significant role. The impact in the agricultural field which is based on the species of plants, Type of nanoparticles and their concentration. Once nanoparticles are reached into the soil, they may undergo series of transformation which ultimately determines the toxicity of nanoparticles and generate oxidative stress and can be absorbed by plants, posing a potential threat to human health via transferring in the food chain. These physical and chemical properties of the nanoparticles are visualized and analyzed by using the one of the well-known technique called computational analysis. This review is an attempt based on the physical and chemical properties of the nanoparticles in the agricultural sciences and in the agro industry involves the analysis of the computational method.

Keywords: Nanoparticles, Computational analysis, Agro industry, Computer-Based models, Silver Nanoparticles.

APPROACH, DEVELOPMENT AND FIELD ASSESSMENT OF A ROBOTIC ROVER TO EARLY DETECTION OF COMMON DISEASES IN TOMATO (SOLANUM LYCOPERSICUM) WITH INTELLIGENT VISION

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ABSTRACT

These days, Robotic vision is one of the unavoidable techniques in precision farming. For the instantaneous crop monitoring in larger farmhouses, robotic vision can recognize evolving ailments and inform farming community for identification and to take remedial action of the related ailments. In this exploration, an intelligent vision-guided detecting and monitoring robotic rover was programmed to spot the various diseases that can infect Tomato (Solanum Lycopersicum) plant at the early stages to prevent further contamination of stem, fruit, leaves through color changes of the entire plant. The major components of the intelligent robotic vision system are a mobile robot unit with precision-controlled robotic camera and a digital image evaluation element with graphical representation. The intelligent rover with robotic vision system will capture Tomato leaf, stem, fruit features to govern the complete plant growth and healthiness instantaneously. These features extracted are color, texture, and shape. This system will monitor the farm field autonomously with minimal human intervention and instant, proactive alerts will be send to the farming community for remedial actions, so that the harm can be minimized. The captured data can also be viewed from anywhere over the cloud and intelligent analysis can be done using historical data.

Keywords— Septoria, robotic vision, tomato, predictive analysis, robotic rover

DESIGN AND DEVELOPMENT OF ARTIFICIAL INTELLIGENCE BASED INSPECTION MACHINE

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ABSTRACT

Robots and flexible technology play their key role in serving under COVID-19 situations. Because of the ongoing corona virus epidemic caused by the novel corona virus, healthcare professionals around the world are at high risk for infection through the treatment of infected patients. The risks are not limited to them, people working in the service sector who need to move out with various other commercial institutions are also at risk of economic hardship due to the instability of resources and personnel. This paper discusses a brief review of the current and potential uses of robots and automation in health care, education, and various industries that prove to be beneficial not only in reducing the spread of COVID-19 by maintaining social distance but also in accomplishing additional tasks safely and effectively.

Keywords: Robotic patient Assistance systems, Mitra Robot, Disinfection Robots

HIGH-VOLTAGE BATTERY MANAGEMENT SYSTEMS (BMS) FOR ELECTRIC VEHICLE

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ABSTRACT

Due to the limited operating windows of lithium-ion batteries regarding temperature, voltage, and current and the dangerous situations that can arise if those operating windows are violated, a battery management system (BMS) is required to supervise and control the batteries in a multicell battery energy storage system. This chapter presents the requirements for an automotive BMS, the different possible topologies, and a typical implementation of a master/slave BMS for hybrid electric vehicle or battery electric vehicle applications, with a focus on the challenging design aspects.

Keywords: Battery management system (BMS), Hybrid vehicle, Multicell battery

MINI GROUNDNUT & PEANUT SHELLING MACHINE

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ABSTRACT

Groundnut is the sixth most important oilseed crop in the world and it is belongs to beans family. Shelling is a fundamental step in groundnut processing and it can be done by hand or machines. Hand shelling process is labor intensive, slow and tiresome. Numbers of groundnut Sheller machines are available in the market but they are large in size, costly and not suitable for domestic applications, they are best suitable for industrial applications where mass production is required. Hence it is essential to design and fabricate a portable groundnut Sheller machine for domestic application.

Keywords: -Groundnut oilseed, Shelling process, Compact size, Sheller machine.

VIBRATION FREE SHEET METAL HOLE PRODUCING ATTACHMENT IN DRILLING MACHINE

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ABSTRACT

"Diamond cuts Diamond', says the adage. This is the philosophical statement. This is the underlying idea that underpins the machining of material from a solid. The use of a punching machine in sheet metal punching is a highly expensive and time-consuming procedure. Instead of utilizing a punching machine to solve the aforementioned difficulty, we are using our vibration-free sheet metal hole generating attachment to do so. The primary focus of this research was to minimize vibrations in the work material. Specifically designed spring and ball attachments are employed to accomplish this task. Using this sheet metal hole creating attachment, you may create holes with precise proportions. Sheet metal hole generating attachment is used to cut arcs in sheet metal, which is accomplished by the use of sheet metal hole creating attachment. Designing and modelling the attachment, as well as identifying the advantages and disadvantages of this drilling method, are the primary goals of this project. Another goal is to increase the machining rate of this machine.

Key words: Sheet metal, Drilling, Vibration, Diamond cuts Diamond, Vibration-Free

INVESTIGATION OF BATTERY MANAGEMENT SYSTEM FOR ELECTRIC VEHICLES

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ABSTRACT

The electric vehicle depends upon the power battery. The Research on battery technology in electric vehicle application is advancing tremendously. The effectiveness of electric vehicle depends on functionality and diagnosis of the battery system. However poor monitoring and safety stratigies of the battery system can lead to crictal issues such as battery overcharging, over discharging, overheating, cell balancing. To overcome these problems the battery management system plays a main role for battery performance including overcharging, discharging control, heat management, battery safety. In this paper the main goal is to deliver a review of different approaches and control scheme of battery management system in electric vehicle.

Keywords: Electric vehicle, Battery, Battery overcharging

FABRICATION OF PNEUMATIC RECIPROCATING GRINDING MACHINE

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ABSTRACT

We have pleasure in introducing our new project "Fabrication Of Pneumatic Reciprocating Grinding Machine'' is the process of removing metal by the application of abrasives which are bonded to form a rotating wheel. When the moving abrasive particles contact the work piece, they act as tiny cutting tools, each particle cutting a tiny chip from the work piece. It is a common error to believe that grinding abrasive wheels remove material by a rubbing action; actually, the process is as much a cutting action as drilling, milling, and lathe turning. The grinding machine supports and rotates the grinding abrasive wheel and often supports and positions the work piece in proper relation to the wheel. The grinding machine is used for roughing and finishing flat, cylindrical, and conical surfaces; finishing internal cylinders or bores; forming and sharpening cutting tools; snagging or removing rough projections from castings and stampings; and cleaning, polishing, and buffing surfaces. Once strictly a finishing machine, modem production grinding machines are used for complete roughing and finishing of certain classes of work. A grinding section with spring and lock arrangement is used to attach the grinding tool with the rotating wheel. Thus simultaneously the cutting/grinding section will be rotated and the speed of rotation is depending upon the velocity of wind flow. This equipment has a good efficiency compared to other and also forward and reverse speed is constant, so good finishing is obtained by using this machine. This project is developed for the users to grind and cut objects and also provide a hole using air pressure. The vanes are rotated by wind energy. A set of gears is connected with the axle to reduce the speed and to increase the power. A chain drive mechanism is connected with the gear to extend the rotation at the bottom. When the axle is rotated, the cutting section will be rotated.

Keywords: Grinding Machine, Chain Drive Mechanism, wind energy

ISOLATION AND IDENTIFICATION OF ENZYME FROM SEAWEED

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ABSTRACT

Protease occurs naturally in all organisms and is an essential constituent for all the existing live forms. Microorganisms such as bacteria and fungi and yeast are the main source of protease enzyme. They act as an important industrial enzyme occupying for about 60% of total enzyme market. In this study, protease was isolated from marine algae such as Gracilariacorticata, Chladophoravagabunda, Chaetomorphaattenina and Ulva spp. Protein concentration and special activities were measured and compared for these species. Among these, Gracilariacoricata, Chladophoravagabunda and Chaetomorphaattenina showed maximum specific activity (7.53, 6.77 and 6.75 units/mg of protein) of protease respectively.

Keywords : Enzyme, Seaweed, Gracilariacoricata, Chladophoravagabunda

DESIGN OF AUTONOMOUS MULTIPURPOSE ORNITHOPTER ROBOT

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ABSTRACT

In nowadays, the biologically inspired robotic systems which closely resemble the actions of small insects, birds and animals are used for many applications like surveillance and monitoring. This paper explains the design of an ornithopter which is a robot that mimics the flapping action of the wings of the birds. It is an aerial vehicle that generates its thrust and lifts forces from the mechanism of flapping wings. The ornithopter consists of two sections on-board control and user control. The on-board control which is placed on the body of the ornithopter to control the flapping action of the wings receives a signal from the user control. The user control is used to control the flapping action, pitch and yaw movement of the ornithopter by the user. The onboard control and the user control are connected by using a wireless module and a camera is also mounted on the body of the ornithopter for surveillance purposes. Environmental pollution is monitored by using various sensors for measuring the levels of CO2, O3, NO2, temperature and humidity. The ornithopter which resembles a bird can be used for various purposes like surveillance, spying and monitoring the pollution in the areas where the humans cannot reach. Also this is used to carry the sanitizer to spray at a specified region as CORONA relief activities.

KEYWORD: Ornithopter Robot, Environmental pollution Monitoring, Actuators

AERODYNAMIC STUDY OF HL-20 DESIGN MODIFICATION

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ABSTRACT

Lifting Body Re-entry Vehicle configuration is one of the most promising approaches for developing a reusable re-entry vehicle. The combination of lifting re-entry and ballistic re-entry enables these vehicles to achieve deceleration values optimum for crewed re-entry. It also provides the vehicle an increased accuracy in landing, minimized heating rates and fair control over the maneuvers. The optimization of the vehicle body shape to achieve desired lift to drag ratio and low ballistic coefficient is one of the prime focuses of research on these vehicles. The diameter of launch vehicles imposes a constraint on the width of the re-entry vehicle design which directly affects the platforms area of the re-entry vehicle. HL-20 PLS vehicle is a lifting body configuration developed by NASA Langley Research Centre in the 1990s with intent to achieve frequent manned orbital missions. This study focuses on the aerodynamic effects of incorporating a retractable wing extension on the HL-20 PLS design. The simulation results indicate an improved lift to drag ratio performance at lower angles of attack for the modified HL-20 PLS design with wing extensions. The modified design is also observed to showcase an early stall character in comparison with the original design.

Keywords: Re-entry, HL-20 PLS,

OPTIMIZATION OF MATERIAL AND CROSS SECTION OF HOISTING HOOK A NUMERICAL INVESTIGATION AND EXPERIMENTAL VALIDATION

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ABSTRACT

Hoisting Hook is one of the critical components in various cranes and hoisting systems. In particularly, a five ton capacity hoisting hook has very wide applications in various industries as well as in building constructions. The impact of such hosting hook failure is sometimes very high. So this research focuses the measures of prevention of failure five ton hosting hook. The factors like loadings near the capacity, three previously recommended cross section of the hooks as well as two proposed cross sections were considered for analysis. The proposed cross sections are incremented and decremented types from the trapezoidal cross section. The commercially available five different materials of hook considered for the investigation. Taguchi mixed L25 orthogonal array is used for designing the experiments. The total deformation, equivalent stress and maximum principle stress were considered as a measure of performance. The hook tested near to the capacity at five different loads. The optimal result is validated numerical method and experimental method.

Keywords: Crane Hook, Cross Section, material, Numerical Analysis, Experimental Analysis, Taguchi Method, Optimization.

EVALUATION OF PERFORMANCE AND EMISSION PARAMETERS OF DIESEL ENGINE USING DIFFERENT BIODIESEL BLENDS

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ABSTRACT

In recent years, the acceptance of fatty acid methyl esters (biodiesel) as a substitute to petroleum diesel has rapidly grown in India. The raw materials for biodiesel production in this country mainly include traditional seed oils and used frying oils. In the search for new low-cost alternative feed stocks for biodiesel production, this study emphasizes the evaluation of Celosia oil and Eucalyptus Oil. The experimental results showed that the oil content of Celosia were remarkably high (45%). The main emphasis has been laid on optimum production of biodiesel from Celosia oil and Eucalyptus Oil then using the biodiesel blends with diesel studying the comparative exhaust emission characteristics and engine performance and also optimizing the compression ratio and the blends made from the biodiesel with diesel. The oil was chemically converted via an alkaline transesterification reaction with methanol to methyl esters, with a yield nearly 97.5 wt.%. All of the measured properties of the produced biodiesel met the current quality requirements. Oils were esterifying (butyl esters) before blending with pure diesel in the ratio of 10:90, 15:85, 20:80,25:75 and 30:70 by volume. Pure diesel was used as control. Initially the properties of the Celosia oil and Eucalyptus Oil blends were determined density, viscosity, dynamic viscosity, flashes point, fire point and calorific value. An assessment of engine performance brake power (BP), brake specific fuel consumption (BSFC), brake thermal efficiency (BTE) and emission characteristics HC, NOx (ppm volume), CO, CO2, O2(% volume) etc., was carried out for pure diesel and the oil blends. However, Celosia oil at 25% blend with diesel gave best performance as compared to other blends in terms of low smoke intensity, emission of HC and NOx.

Keywords: Celosia oil, Transesterification, Methyl esters, Smoke intensity, Esterifying, Eucalyptus Oil

MANUFACTURING OF CEMENT AND ITS VARIOUS HAZARDS AND SAFETY MEASURES PROVIDED IN THE CEMENT INDUSTRIES

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ABSTRACT

Cement is the basic material for constructions which is made from a mixture of elements that are found in natural materials such as limestone, marl and/or clay. Cement manufacturing is an energy and resource intensive process with both local and global environmental, health and safety impacts. Because of these impacts, ensuring healthy and safe working conditions for employees is one of the most significant issues for the cement industry. From limestone loading to dispatching of cement various hazards takes place which causes harm. Cement is typically made form limestone and clay or shale. These raw materials are extracted from the quarry crushed to very fine powder and then blended in the correct proportions. The pollutants in the cement industry are emitted from the various production processes from the material such as the raw material, crusher, rotary kiln, cranes, mills, storage silos and packing section, etc., Airborne respirable dust levels from less than 5 to more than 40 mg/m 3 have been recorded in the work place air of cement factory workers and it leads to causes a disease. Cement manufacturing process was clarified briefly and potential hazards and their risks in cement industry were investigated.

Keywords: Natural Materials, Airborne respirable dust, Cement Industry

ANALYSIS OF TURNING PROCESS PARAMETERS USING TAGUCHI METHOD

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ABSTRACT

Selection of machining process parameters to a achieve a set of quality attributes is important in bridging up the quality and productivity requirements, Especially in machining processes such as turning, milling, a set of process parameters such as feed, speed and depth of cut are to be selected appropriately to provide a minimum surface roughness which is considered as the quality attribute. In this project, turning process is carried out on medium carbon steel bar using H.S.S. tool bit in a conventional lathe. Free length of the specimen is used as key a process parameter. Whereas the feed widely used parameter. The reason for selecting free length is that the increase in free length might increase the vibration and hence influence the surface roughness. Experiments are designed and conducted based on Taguchi's L9 orthogonal array.

Key words: Turning process, Surface roughness and Taguchi method.

REGENERATIVE BRAKING SYSTEM USING ELECTROMAGNETIC CLUTCH

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ABSTRACT

The objective of this paper is to stored the kinetic energy dissipated in the brakes to accelerate the vehicle. This project is based on prototype model of Regenerative braking system using electromagnetic clutch. Regenerative braking results in an increase in energy output for a given energy input to a vehicle, the efficiency is improved. The amount of work done by the engine of the vehicle is reduced, in turn reducing the amount of prime energy required to propel the vehicle. In order for a regenerative braking system to be cost effective the prime energy saved over a specified lifetime must offset the initial cost, size and weight penalties of the system. The energy storage unit must be compact, durable and capable of handling high power levels efficiently. The energy can be directly provided to dynamo itself to generate current and will be displayed on the Ammeter installed in the set up. This set up also consists of an Infrared Sensor which helps to prevent the frequency of accidents increasing due to inefficient braking system and therefore can be considerably avoided using IR sensors. The vehicle instantly stops as any object appears in front of it where IR Sensors are installed.

Keyword: Dynamo, Efficiency, Electromagnetic Clutch, Infrared Sensor, Regenerative Braking

EXPERIMENTAL INVESTIGATION ON THE PROPERTIES OF HYBRID NATURAL COMPOSITE

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ABSTRACT

Natural fiber reinforced composite is an emerging area in the polymer science. Natural fibers are usually low cost fibers with low density and have high specific properties. These are biodegradable and non-abrasive. The natural fiber composites offer specific properties comparable to those of conventional fiber composites. The purpose of this project is to produce a hybrid composite suitable for various applications. In this hybrid composite loofah fiber (obtained from plant L.Cylindrical) is used with tamarind seed powder, coconut shell powder and epoxy araldite resin. Hand layup method is used to fabricate the hybrid composite. Tamarind seed powder, coconut shell powder and loofah fiber are mixed in the ratio of 7:2:1 and 5:4:1. There is an increase in the tensile strength and the hardness of the composite with the increase in filler materials. Tensile strength was found to increase from 4 Mpa to 8 Mpa, and Rockwell hardness value was found to be increase from 56.66 to 57.66.

Keywords: Hybrid natural composite, loofah fiber, hand layup method, coconut shell powder, tamarind seed powder.

AIR CONDITIONING PURIFICATION USING SIMPLE CARDBOARD

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ABSTRACT

An Air or Air cleaner is a device which removes contaminants from the air in a room to improve indoor Air Quality. These devices can be beneficial to Allergy sufferers Asthmatics, and at reducing or eliminating Tobacco-Smoke. Air pollution is now a global Problem and Especially in major cities. The air pollution levels in many cities usually reach pollution levels way beyond health air standards. And there is an increasing concern about air pollution levels both outdoors and indoors. According to the Indian "Environmental Protection Agency" (EPA), indoor air can be five times as polluted as outdoor air. Because indoor air is not circulated as much as outside air, many airborne pollutants continue to thrive inside.

Keyword: - Cardboard Air Conditioning, Simple Cardboard Air Conditioning, Air Purifier, Air Freshener, Room Freshener, Low Cost AC

MACHINING PARAMETERS IN WEDM OF EN31 STEEL USING TAGUCHI TECHNIQUE OPTIMIZATION

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ABSTRACT

Wire electrical discharge machining (WEDM) is often used in the machining of conductive materials when precision is important. The current study looked at wire-cut electric discharge machining of EN31 steel. Taguchi's L27 orthogonal array was used to finish the investigation using various amounts of input parameters. This method was used to determine the optimal parameter combination. The experimental findings show that the machining model is correct, and Taguchi's approach meets the practical requirements. Surfaces having micro cracks and porosity, as well as poor surface quality, are produced by rough machining with WEDM. Finish machining yields a better surface finish (Ra) but at a slower rate (MRR). As a result, the Taguchi approach's purpose is to improve MRR while lowering Ra. To check the performance measures in terms of Surface Roughness, control parameters such as voltage applied, pulse width, pulse interval, and speed were used.

Keywords: WEDM, EN31, SN method, DOE, MRR

SOLAR POWERED ELECTRIC VEHICLE

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ABSTRACT

In the current state of technological development, the future of vehicles seems to be with the hybridization of various energy sources. This sort of development in vehicles seeks to take the benefits from the best quality of each energy source and it is especially useful in urban driving vehicles. In cities of India one of the major medium of transportation is auto rickshaws, which is producing a huge amount of air pollution as well as greenhouse gases like CO2. Fuel, which is used is a non-renewable source and also which costs high as a result of that transportation charges increases. It would also affect the economy as well as the users of the auto rickshaw. Thus they should go for a reliable source as know that current trend of using the reliable source like solar energy which is available in plenty in country like India. We using the solar panel, controller and DC motor setup to convert the light energy as an electrical energy which is fed to the DC motor to obtain mechanical motion. The mechanical motion was transferred to wheels through chain drive which leads to cheap and effective transmission. Finally, fabricated a concept auto rickshaw with the help of modified transmission system and energized with solar energy to run it.

Keywords : Solar panel, DC motor,CO2,Non-renewable source ,controller, chain drive, Effective transmission

STUDY OF COMPOSITE MATERIALS IN MECHANICAL APPLICATIONS

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ABSTRACT

The objective of this paper is to eliminate the water leakage on FRP material & to increase the life time by providing a special Anti-graffiti coat on the surface. Composite materials are formed by combining two or more materials that have quite different properties. The different materials work together to give the composite unique properties. There are 3 types of Composite material available. 1. Polymer Matrix Composite (PMCs**)** **2**. Metal Matrix Composite **(**MMCs**)** 3. Ceramic Matrix Composite **(**CMCs**).** Now a days, Fibre Reinforcement Plastic (FRP – comes under Polymer Matrix Composite) materials are unavoidable and which is having equal strength of steel at the light weight and less cost compared to steel. Also, it has good corrosion resistance. Ex: Manufacturing of yacht, lifeboat, cruise ship, fishing boats, Light weight bridges are made up of Composite material, which should be leak proof. In General, Gel coat is used on the surface of the composites (FRP) which is in contact with water. In long run, the Gel coated composite material absorbs water which leads leakage and reduction in strength and life of the product. Some time it may leads to accident also. To avoid such kind of problem in FRP composites, there is a special coat called 'Anti-graffiti Clear coat' which give Glossy finish and leak proof for the entire surface of the material (both interior and exteriors). By this way, we can use the composite material for long duration without any replacement.

Keywords: Composite material -FRP -Water leakage– Surface coat -Anti graffiti Clear

INVESTIGATION ON ENERGY MANAGEMENT AND RENEWABLE ENERGY INTEGRATION IN SMART GRID SYSTEM

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ABSTRACT

Smart grid technology is enabling the effective management and distribution of renewable energy sources such as solar, wind, and hydrogen. The smart grid connects a variety of distributed energy resource assets to the power grid. Renewable Energy Integration focuses on incorporating renewable energy, distributed generation, energy storage and demand response into the electric distribution and transmission system. Smart grid aids interface among the consumer and utility which allow the ideal usage of energy based on environmental, price preferences and system technical issues. This enables the grid to be more reliable, resourceful and secure, while reducing greenhouse gases. This paper presents evaluation of ecological benefits and a cost benefit analysis of the energy management system while integrating renewable energy sources into smart grid system. Numerous objectives, such as increasing energy efficiency, maximizing utilization, cost reduction, and controlling emission have been investigated. Results show that the system is economic only by using energy management systems with renewable energy.

Keyword: Smart Grid Technology, Energy Efficiency, Emission

DESIGN AND ANALYSIS OF HEAT TRANSFER ENHANCEMENT OF DOUBLE PIPED HEAT EXCHANGER USING DIFFERENT INSERTS

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ABSTRACT

Heat transfer enhancement is an active and important field of engineering research since increase in the effectiveness of heat exchangers through suitable heat transfer augmentation techniques can result in considerable technical advantages and savings of costs. Analysis is done by placing different twisted tapes such as normal twisted tape, W-Shaped cut twisted tape, Rhombus cut twisted tape, Rectangular cut twisted tape, Triangular cut twisted tape at different mass flow rate 2.2 kg/s, 2.75 kg/s, 3 kg/s for cold water and 2.4 kg/s, 2.8 kg/s, 3.2 kg/s for hot water. The result shows that Triangular cut twisted tape is 33% more efficient than Rhombus cut twisted tape of heat transferring.

Keywords: Heat transfer enhancement, Effectiveness, Twisted Tapes, Heat Transfer

A REVIEW PAPER ON NATURAL FIBER COMPOSITE MATERIALS

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ABSTRACT

Natural fibers are basically considered to have potential use and as a reinforcing material in polymer matrix composites due to their high strength, good stiffness, lower cost ,light in weight and it is eco-friendly. Natural fiber composite can be coconut, cotton, bamboo, wheat straw, abaca, wood, sisal, pineapple, banana leaf fiber, kenaf, flax, jute, etc.,. Natural fibers are cheap and they are partially recyclable, inexpensive and bio degradable. Hand layup method or Compression moulding technique can be used to fabricate the composite. The test specimens are basically prepared with different values of weight ratio of fiber to matrix. The fibers are randomly oriented, hence the test specimens are cured for different periods of time. The Specimens are cured for studing the effect of curing time on the mechanical properties. The results of the various tests such as tensile test, compression test, impact test, bending test and hardness tests are conducted on the test specimens and reported. The final failure morphology analysis is done by using SEM to determine the fracture direction, fiber orientation and the matrix structure. A detailed study of chemical, physical and mechanical properties will bring out reasonable utilization of fiber for various applications. Natural fibers are employed as filler material for several industrial applications. Some of the realistic applications are real view mirror, name plate, bumper beam, switch boxes, automobile door panels, dash board, etc.

Keywords : Natural fibers, Mechanical Properties, Compression moulding, SEM

STUDIES ON EFFECT OF SURFACE TREATMENTS ON MILD STEEL "J-BOLT" AISI 1008

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ABSTRACT

Surface treatment plays an important role in increasing the protection against Corrosion and wear. In the present work the comparative study of surface treatments on Mild steel J-Bolt(AISI 1008) were studied. The treatments such as Nitroxy-QPQ, Zinc Plating and Hard Chrome Plating are considered for this work. Impact energy is found to be higher for Nitroxy-QPQ than zinc plating and hard chrome plating. Hard chrome plated sample to be the best in Hardness test, however Nitroxy-QPQ sample has closer to chrome plated sample. Nitroxy-QPQ had more corrosive resistant than hard chrome plating, zinc plating.

Keywords: Mild Steel, AISI 1008, Surface treatments, Corrosion analysis

DESIGN AND FABRICATION OF SMART STAIR CLIMBING AND STUFF DELIVERING ROBOT

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ABSTRACT

People who work in office, school, colleges, industries etc. are often running from ground floor to all floors to deliver files or some other stuff. Due to this their works has been interrupt and disturbed. To overcome this problem we design and fabricate a robot which climbs stairs and delivers the stuff. In this system we use microcontroller (Arduino) as a heart of robot, then wheels with belt driver unit to climb the stairs, which was controlled by high torque D.C motors unit. For path finding, we using wireless A.V camera which is an vision unit for robot and which will be controlled by computer using RF modules for serial communication between robot and computer. And the Transmitter (TX) unit connected to computer will transmit the encode to Receiver unit (Rx) where decoded process takes place and makes the robot to move as per the received signal from computer. And for locating robot position, we used GPS module as an advantage. Thus via computer we could control the robot and delivers the stuff.

Keywords- Stair climbing, Wireless camera, Arduino and RF unit, Transmitter

CFD ANALYSIS OF HEAT TRANSFER IN A PARTIALLY HEATED ENCLOSURE FILLED WITH HYBRID NANOFLUIDS – A CONJUGATE HEAT TRANSFER

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ABSTRACT

A numerical study of conjugate natural convection heat transfer of hybrid nanofluids inside a partially heated square enclosure with the thick baffle attached to its hot wall has been carried out. The length of heating varies from 20% to 100% on the left side hot wall. In this study, Al_2O_3-Cu, Al_2O_3-SiO_2 and Cu-SiO_2 hybrid nanofluids combinations are used. A detailed parametric study has been carried out to analyze the effect of Rayleigh number ($10^4 \leq Ra \leq 10^6$), volume fraction and thermal conductivity ratio on heat transfer. The presence of the baffle affects the heat transfer significantly. The average Nusselt number is found to be an increasing function of Rayleigh number, volume fraction of the hybrid nanofluid and thermal conductivity ratio. The maximum heat transfer enhancement is found by using Al_2O_3-Cu hybrid nanofluid.

Keywords: Conjugate heat transfer, Enclosure, Hybrid nanofluid

THERMO ELECTRIC AIR CONDITIONER FOR BIKES

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ABSTRACT

This project is developed for users to use the air conditioner in the vehicle using the heat energy emitted from the silencer. A lot of energy is being wasted every second, for example, engines produce power to make the bike move with just around 20% efficiency. Most of energy is wasted as heat energy. we can reuse the heat energy to make more cooling for the bikes, we are saving the energy world. This is a process which is opposite to thermoelectric generator. We can use Peltier Effect to make thermoelectric refrigeration machine. It has some advantages which normal refrigeration doesn't have, such as small size, smaller mass, very low noise, no environmental pollution, quick reaction time and so on. Thermoelectric materials are becoming more important as an alternate energy source, and applications for these materials are increasing this is a process which is opposite to thermoelectric generator. We can use Peltier Effect to make thermoelectric refrigeration machine. It has some advantages which normal refrigeration doesn't have, such as small size, smaller mass, very low noise, no environmental pollution, quick reaction time and so on. Thermoelectric materials are becoming more important as an alternate energy source, and applications for these materials are increasing. The useless heat emitted from the bike silencer can be given to the Thermoelectric material and the resulting cooling can be used as a mini air conditioner in bike. Thermoelectric material is a thermoelectric material. Thermoelectric materials are used for the thermoelectric refrigeration.

Keywords : Thermo Electric**,** Peltier Effect, Thermoelectric Material, Refrigeration

EFFECT OF NICKEL INTERLAYER ON DISSIMILAR WELDED Cu-Al SHEET BY ULTRASONIC WELDING

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ABSTRACT

Copper(Cu) and Aluminium(Al) are welded by ultrasonic spot welding which forms intermetallic compounds to a large extent at the weld zone. So to reduce the formation of intermetallic compound, Ni powder of mesh size 50 (297 microns) are applied at the interface between Al-Cu so due to this the intermetallic compound formed is less compared to welded sample without interlayer. This is due to fact that the Ni powder reduces the diffusion of Al and Cu atoms so the intermetallic formed will be less and the brittleness at the weld zone get decreases. The Grade of Copper is Cu-110 (99.99% pure), The grade of Aluminium used is 5754. The pressure used in welding was 4, 6 and 8 bar. Ni powder of 0.05gram is placed as interlayer between Cu and Al. The effect of interlayer is studied using microstructure examination, Vicker's Microhardness test and Shear Test. The dimension of specimen used was 60*30*1 mm. In this work it is concluded that the use of Ni Interlayer reduces the precipitate formation and increases the shear strength. Ultrasonic Spot Welding of Aluminium and copper with and without Nickel as a interlayer is successfully fabricated with sound weld. The shear strength increased with increase in pressure. The strength of the welded specimen with interlayer is slightly higher than the specimen without interlayer at the interface .he Intermetallic Compound formed is less when Ni is used as an interlayer which is observed from the microstructure evaluation. The Microhardness value at the interface is lower when Nickel is used as a interlayer compared to one without interlayer.

Keywords: Ultrasonic welding, Dissimilar welding, Ni – Interlayer, Material characterization

DESIGN AND ANALYSIS OF E- VEHICLE ANATOMY

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ABSTRACT

Electric vehicle drives offer a number of advantages over conventional internal combustion engines, especially in terms of lower local emissions, higher energy efficiency, and decrease dependency upon oil. In current days the E-vehicle is moving to a part of major role in the road transportations. Electric vehicles could represent a sustainable technology path. They may constitute an important component of a larger roadmap for sustainable transportation. Aesthetics of E-vehicles can be quite different from what we see today in fuel cars or hybrid vehicles to depict the uniqueness of this breed of products. Only using the scrab materials to build a anatomy Analysis of aesthetics for E-vehicle by using ANSYS software. Aerodynamics represents a special scientific field that has a huge impact on modern automotive engineering. Vehicle design in this context is primarily concerned with developing the visual appearance or aesthetics of the vehicle, through it is involved in the creation of the product concept. Electric Vehicles (EVs), compared to classic internal combustion engine (ICE) vehicles, are fairly simple and easy to operate.

Key words: E-vehicles, Aesthetics E-vehicles, Aerodynamics, Ansys

DESIGN AND ANALYSIS OF SOLAR HYDROGEN POWER GENERATION

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ABSTRACT

There is a lot of concern nowadays about the efficiency of the various plants. Here we are introducing the use of non renewable energy sources. Hydrogen produced through renewable energy sources, most commonly with a device which uses electricity to separate water into hydrogen and oxygen called an electrolyzer, is an emissions-free way to carry energy. Hydrogen is plentiful and can safely be harnessed for a variety of stationary and mobile applications.

Keyword : Hydrogen Power**,** electrolyzer, Non Renewable Energy

CARBON FIBER ELECTRONIC INTERCONNECT

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ABSTRACT

Carbon fiber is an emerging material in electrical and electronics industry. It has been used as contact in many applications, such as switch, potentiometer, and commutator brush. A new technique of electronics interconnect is developed, with carbon fiber as a conductive medium. This carbon fiber interconnect can provide interconnection between two planes in different levels of electronics packaging, from semiconductor die, substrate, packaged component to printed circuit board. For example, it can provide a separable interconnect between a land grid array (LGA) or ball grid array (BGA) IC package to a printed circuit board, as an LGA or BGA socket. The interconnect device consists of an array of contact pins. Each contact pin consists of a large number of carbon fibers which can act cooperatively to provide a high degree of reliability and predictability to the interconnect function. A nickel coating can be applied over carbon fibers to enhance its conductivity and solderability. Analytical evaluations and experimental mechanical and electrical characterizations have been conducted to conclude that the carbon fiber interconnect is a promising interconnect technique.

Keywords: Solderability, interconnect technique, Carbon fiber, ball grid array

EXPERIMENTAL INVESTIGATION ON DIFFUSION BONDING OF AA 7075 AND AZ80 WITH ZINC AS AN INTERLAYER

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ABSTRACT

Aluminium-Magnesium alloys are widely in fields of aeronautical and automotive body structure, wind and solar energy management. When, aluminium alloys are joined by fusion welding process there is a formation of extensive brittleness and oxide films are occurred. However, solid-state welding process such as diffusion bonding is suitable for joining both similar and dissimilar alloy. This bonding process works through the diffusion of atoms across the joint interface at elevated temperature. Various methods are used to determine the physical phenomena and optimum parameters of diffusion bonding. The Characteristics of the material are tested by SEM analysis & Optical microscope and the physical phenomena that have significant influence on diffusion bonding such as time,temperature&pressure on joints and metallurgical characteristics.It also aimed to obtain optimum parameters for diffusion bonding of aluminium over magnesium with Zinc as an interlayer

Keywords: Diffusion Bonding, AA7075, AZ80, SEM , Optical microscope, time, temperature & pressure.

OPTIMIZATION OF FACTORS AFFECTING DIFFUSION BONDING EXPERIMENTS USING TAGUCHI'S ANALYSIS

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ABSTRACT

Solid-state welding process such as diffusion bonding is suitable for joining both similar and dissimilar alloys. This bonding process works through the diffusion of atoms across the joint interface at elevated temperature. Here AA7075 (Al alloy) & AZ80 (Mg alloy) are the materials welded by diffusing bonding. There are various mathematical and statistical algorithms used for optimization process. Using Taguchi's technique because it is used to specify the relationship between the input and output parameters and here optimizing the parameters of diffusion bonding. The parameters to be optimized are bonding temperature, bonding pressure, holding time, bonding strength, shear strength and a combined analysis. Hence, this work is an effort to make the optimization of diffusion bonding by Taguchi's technique to attain maximum bonding strength.

Keywords: Diffusion Bonding, AA7075 , AZ80, Taguchi's Technique, L9 Orthogonal Array

AERIAL ROBOTS PATH PLANNING STRATEGIES

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ABSTRACT

This paper presents the meticulous study of path planning strategies of aerial robot and its evaluation. Most of the criteria's are taken into account such as known and unknown environment, obstacles, etc and then compared with all the methodologies present. There are various strategies used for path planning which are mainly classified into two categories, Classical approach and Reactive approach. In this paper we concentrate on reactive approaches such as genetic algorithm (GA), fuzzy logic (FL), neural network (NN), firefly algorithm (FA), particle swarm optimization (PSO), ant colony optimization (ACO), artificial bee colony (ABC) and cuckoo search (CS) are considered for study. These are the most commonly and widely used algorithms and strategies which are compared for further study.

Keyword : Genetic Algorithm, Neural Network, Aerial Robots

EXPERIMENTAL ANALYSIS FOR CORROSION RESISTANCE OF AISI-2205 DUPLEX STAINLESS STEEL USING ELECTROCHEMICAL POTENTIOSTAT TEST

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ABSTRACT

The effects of cryogenic treatment which is used to improve the mechanical properties of a material, on the corrosion of AISI 2205 Duplex stainless steel in 3.5% NaCl solution were examined by electrochemical Potentiostat test. The materials were cryo-treated using the cooling medium (Liquid Nitrogen) with the temperature of (-196˚C) for 24 hours and the hardness tests were conducted. It was shown in this study that in hardness tests cryogenically treated material showed an increase in material life. The surface structure of the AISI 2205 Duplex stainless steel was examined by scanning electron microscopy (SEM) after the electrochemical Potentiostat investigations.

Key words: Corrosion, Cryogenic treatment, Electrochemical impedance spectroscopy, AISI 2205 duplex steel.

REDUCTION OF BUTT WELDING USING FAILURE MODE AND EFFECTS ANALYSIS

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ABSTRACT

In the globally competitive environment, reduced time to market, cost competitiveness and customer delight are important for the survival of a product. Concurrent Engineering (CE) concepts are applied extensively to achieve the same. In this paper, Failure Mode and Effects Analysis (FMEA), which is one of the CE tools, has been applied to a scale industry, where job works such as manufacturing of Boiler Drum, which is a part of power plant Process FMEA has bean applied in the manufacturing process of the boiler drum to identify the errors and the defects before manufacturing the inspection of the component. The process FMEA is represented in the form of a table for each process. Based on the highest RPN values obtained from the FMEA table, the potetial failure modes are prioritized and recommended act ions are suggested. The implementation of process FMEA resulted in the reduction of failures.

KEY WORDS: Concurrent Engineering, Failure Mode and Effects Analysis

PERFORMANCE ENHANCEMENT OF SOLAR AIR HEATER WITH QUATREFOIL SHAPED ARTIFICIAL ROUGHNESS

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ABSTRACT :

Solar air heater is one of the best methods to convert solar energy into heat energy. Solar heating technologies use only free, renewable and clean energy. Large number of experimental investigations, Involving different types of artificial roughness element have been carried out to improve the heat transfer from the absorber plate to air flowing in solar air heaters. In this study Experimental investigates the glazed solar air heater with quatrefoil shaped artificial roughness is placed above the absorber plate in the solar air heater. The solar air heaters with quatrefoil shaped artificial roughness and conventional solar air heater are tested. The result shows that the maximum temperature of artificial roughened SAH and Conventional SAH are 670C and 470C respectively. Due to increase of heat transfer area and increase the turbulence lead to higher heat recovery rate of quatrefoil shaped artificial roughness is 47% more compared to conventional type.

Keywords: quatrefoil shaped artificial roughness,Diameter,Heat transfer area, Solar irradiation.

SMART TRAFFIC CLEARANCE SYSTEM WITH IMAGE PROCESSING

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ABSTRACT

Vehicle use has grown exponentially in the past decades and is still growing so that we need advanced systems to control the vehicle flow at traffic signals. In this paper we are providing a system to control traffic flow which is (Smart traffic clearance system with image processing). Image processing will be able to sense when a vehicle approaches and change the light accordingly. This will lead to faster and more efficient travel times for commuters, which will improve their overall experience on the road. Image processing used to control the turn-on time of traffic lights according to the density (number) of vehicles on the road. Images from CCTV cameras are processed to detect any accidents and make response to it. By in two ways one way is alerting the emergency workers and another way is controlling the traffic signal in response to the accident. The system enables the identification of the emergency vehicle and gives the green light to emergency vehicles such as ambulances, fire engines, etc. Image processing is used to detect pedestrians, monitor pedestrian safety and modify traffic signals accordingly.

Keywords: Traffic light control, image processing, vehicle density, Flow control, pedestrian's detection, Accident Detection.

A REVIEW ON USAGE AND PRODUCTION OF ETHANOL AS AN ALTERNATIVE FUEL FOR IC ENGINES FROM SUGARCANE

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ABSTRACT

The IC engine fuels are the tight spot of the people because of the increasing price and dilemma in price fixation. The demand of energy and depletion in the fossil fuels leads to search for supplementary fuel. Molasses is the byproduct of sugar industry which is under research and Consideration for effective utilization. Brazil is a major sugarcane producer and its production more than doubled over the last decades to meet global bioenergy demands for reducing crude oil dependency and mitigating climate change. The government has an interest in maintaining the use of this alternative fuel because of several merits, e.g., the large number of jobs created in the field and the significant amount of hard currency saved on oil imports. On the other hand, most of the subsidies provided to ethanol producers have been removed because they have been in existence for a long time. The first use continues and all gasoline sold in the country contains 24% ethanol. The cost of molasses in increasing so there is a need to improve the ethanol production from cane molasses. Molasses nearly involved about 10 % unfermentable sugars relative to the fermentable sugars. Depolymerising enzymes such as alpha amylase, glucoamylase, dextranase and cellulose were applied to break down the biopolymer such as starch; dextral and cellulose to monosaccharide can be fermented to bio-ethanol during the process of fermentation. Petroleum Planning and Analysis Cell, India has imported 198 million tons of crude oil worth $62.7 billion in 2020-21.The consumption slightly reduced in the second pandemic time. The enhancement of sugar cane cultivation and development of alternate fuel from sugar cane products will reduce the investment in crude oil and thus increases the Indian economy. This paper deals the review of investment in crude oil import and effective utilization of sugarcane products.

Key words: Depolymerising enzymes, Alpha amylase, Glucoamylase, Dextranase, Molasses

REVIEW UPON THE ADVANCED IN AUTOMOBILE

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ABSTRACT

The automotive industry plays a vital role as the stamina of any countries economy. Automotive Glove Box is one of the most important parts in vehicle interior parts. One of the business strategies is finding out what you want from this product and help them achieve customer satisfaction. The specification for choosing a Glove Box unit is analyzed with the customer's preference and converted into engineering characteristics. Automobile engineering is a branch of applied engineering that involves incorporating elements of mechanical, electrical, electronic, software and safety engineering a as applied to design manufacture and operate automobiles. The advances in automobile engineering journal provide an open access platform to automotive engineering. Automation devices are the devices used in the technique of making an apparatus, a process, or a system operate automatically. Some automotive industry is a wide range of companies and organizations involved in the design, development, manufacturing, marketing, and selling of motor vehicles. It is one of the world most important economic sectors by revenue. Automotive engineering is a combination of; mechanical, electrical and materials science. Engineers in this field can design new vehicles or look for ways to improve existing automotive engineering technology. The automotive industry is a wide range of companies and organizations involved in the design, development, manufacturing, marketing, and selling of motor vehicles. It is one of the world's most important economic sectors by revenue. The new product development requirements are identified from the market survey, and the voice of the customer is converted into the customer's requirements. Advance automobile method was using important development in car glove box material quality, cooling unit ant increasing the inner dimension and modifying the current design to add a multi-compartment partition and knee airbag should be in the right place and convenient to use according to the customer's expectation. Automotive engineering, along with aerospace engineering and naval architecture is a branch of vehicle engineering, incorporating elements of mechanical, electronic, software and safety engineering as applied to the design, manufacture and operation of motor cycles and trucks and their respective engineering subsystems. It also includes modification of vehicles. Manufacturing domain deals with the creation and assembling the whole pars of automobiles is also included in it. The automotive engineering field is research-intensive and involves direct application of mathematical models and formulas. The study of automotive engineering is to design, develop, fabricate, and test vehicles or vehicle components from the concept stage to production stage.

Keywords: Glove box material, Multi-compartment partition, Knee Airbag Vehicle, Automotive Engineering.

INVESTIGATION OF MECHATRONICS EQUIPMENTS AND ITS APPLICATION IN ENGINEERING AND MEDICINE

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ABSTRACT

Mechatronics, also called mechatronic engineering, is a multidisciplinary branch of engineering that focuses on the engineering of both electrical and mechanical systems, and also includes a combination of robotics, electronics, computer, systems, control, and product engineering. Some of our students get access to mechatronics equipment through the Integrating Studies modules as part of their undergraduate degree. Other students will also come into contact with mechatronics when developing a product and require assistance from our technicians to understand how their product can work electronically and what options they have. Mechatronics is an exciting, multidisciplinary application, which facilitates a basic introduction to various engineering disciplines. Measurement systems consisting of sensors and instrumentation are well suited for physics-based modeling, so that teachers, drawing upon their existing science and mathematics skills, can collect/analyze data and gain valuable insights to draw conclusions. Control systems consisting of physical plant, actuators, and power electronics provide the teachers an opportunity to apply their existing science and mathematics skills for physics-based system modeling. Exposure to computer hardware and software for measurement and control introduces the teachers to modern tools such as data acquisition boards, micro-controllers, Lab-VIEW, Mat lab, etc. Teachers are given an opportunity to learn and apply modern, state-of-the-art, computerized, remote data acquisition, monitoring, and control and computerized delivery tools such as presentation graphics, document preparation, and spreadsheets.

Keywords: Multidisciplinary, Measurement systems, Control systems, Data acquisition boards

PORTABLE E- SPRAYER FOR AGRICULTURAL APPLICATIONS

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ABSTRACT

In order to protect food and fiber crops against insects, disease and weed pests used agricultural chemicals such as insecticides, fungicides herbicides. With classical methods more chemical than theoretically needed is often applied due to the variability in field conditions and the need to ensure complete. In this case, 95% of the chemical applied can be wasted to the ground, for soil pollution, or at most 50% of mass transfer onto the desired plant. The project shows that electrostatic spraying can offers a possible solution to those environmental problems by reducing spray drift and improving coverage of chemical to target plant .In this project are presented principle of Electrostatic Spraying, the equipments, technological aspects and application .There are more product in market but they are should be carried in shoulder another type product should be kept in a place and they don't have storage tank. To make a solution for this we created this product. This doesn't need of electricity to charge solar panel is also provided. It operated with a double diaphragm pump with 8.5 bar .provided with 15Ahm lithium ion battery backup of 3hours running time. It also provided with solar plane of 75watts. It has a carrying capacity of 50 litter of water.

Keywords: E- Sprayer, Lithium ion battery, Electrostatic Spraying, Fiber crops

ABOUT THE INSTITUTION

Jai Shriram Engineering College was endowed by Shenthil Velevan Trust in the year 2009 with a motto of equipping and implanting the seed of higher education blended with communal harmony to the rural community in and around the Textile City. JSREC reinforces to impart knowledge, teamwork, innovation, entrepreneurship, courage, sacrifice and duty which are innards of a meaningful life. Here we look at education as a complete experience, not just as academics and it laid a pavement for JSREC to a world-class education environed with an eco-friendly greenery rich campus life.

JSREC is also promoted by leading industrialist having 3 major manufacturing divisions in Coimbatore with international reputation and hence we stand forth in creating great minds with optimal advantage in terms of advanced technical knowledge and skills in the distinct aspects of intellectual growth and development. JSREC is renowned for its Industry-Academic Interaction.

ABOUT THE DEPARTMENT

The department was started in the year 2009 for the undergraduate program in B.E Mechanical Engineering with an intake of 60 students. The department offers high quality education to the students through very good infrastructure, laboratories, and faculty and by means of exposure to latest technologies.

The department has highly qualified and well experienced teaching staff, who take extreme care for the development of the careers of the students. The department is very much oriented towards research and development as well as in consultancy.

ABOUT THE CONFERENCE

Jai Shriram Engineering College, Tiruppur is one of a pioneer in the field of Technical Education happy to declare its National Conference on Recent Innovations in Mechanical Engineering (RIME'2k21) on November 18, 2021. It is a platform for intellectuals from various universities, research institutes, enterprises and experts across the globe to gather and exchange their ideas and findings of recent developments in Mechanical Engineering. This conference is also promulgated, through presentations, basic expeditions, applications and case studies in the broad area of Mechanical Engineering.

RIME'2k21 acts as a forum for the academic as well as industrial community to address the opportunities & challenges and to discuss the scope for future research. The conference will bring together academicians, research scholars, engineers and scientists to exchange and share their expertise. The conference will provide an opportunity for the presentation of new advances in theoretical and experimental research in the fields of Mechanical Engineering. It will also focus on emerging fields like Energy, Robotics, Mechatronics, Automation, CAD/CAM, Composite Materials, Green Manufacturing and Nano-technology. These are expected to create new job opportunities for Mechanical engineers in our country.

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