

॥ विद्या परम् दैवतम् ॥

Wainganga Bahu-Uddeshiya Vikas Sanstha's



WAINGANGA COLLEGE OF ENGINEERING & MANAGEMENT

Near Gumgaon Railway Station, Dongargaon, Wardha Road, Nagpur - 441 114. (M.S.) INDIA
Tel.:07103 - 202007, 203728 Email:wcem@rediffmail.com, wcem4145@gmail.com, Website-www.wcem.in

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QnM Number of paper published per teacher in the Journals notified on UGC website during the last five years

- 3.2.1 Number of research papers in the Journals notified on UGC website during the last five years

OVERALL SUMMARY DETAILS

Year	2020-2021	2019-2020	2018-2019	2017-2018	2016-2017
No. of Paper's	64	1	4	0	0



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& Management, Dongargaon, Nagpur

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Academic Year: 2020-21

<u>Sr. No</u>	<u>Title of paper</u>	<u>Name of the author/s</u>	<u>Department of the teacher</u>	<u>Name of journal</u>	<u>Year of publication</u>	<u>ISSN number</u>	<u>Page No.</u>
<u>1</u>	Automatic Temperature Control of Flute in Paper Corrugated Box Manufacturing Machine	Bharat Chede	MECH.	Turkish Journal of Computer and Mathematics Education	14-Jun-21	2293-2296	<u>16</u>
<u>2</u>	Design & Analysis of stress on Drill Bit	Nitin Sawarkar	MECH.	Turkish Journal of Computer and Mathematics Education	13-Feb-21	1757-899X	<u>17</u>
<u>3</u>	Artificial Intelligence Based Mask Detection with Thermal Scanning and Hand Sanitization Based Entry System	Rahul Nawkhre	ETC	Turkish Journal of Computer and Mathematics Education	20-Feb-21	1757-899X	<u>18</u>
<u>4</u>	Finite Element Analysis of Diesel exhaust fluid tank	Aditi Subhedar	Mech	International Conference on	06-Nov-21	4801-4804	<u>19</u>

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	holding bracket			Research Frontiers in Sciences			
<u>5</u>	Security for Multi Cloud Using Server Less Registering Approach	Rupali Saha	CSE	Turkish Journal of Computer and Mathematics Education	05-Apr-21	1757-899X	<u>20</u>
<u>6</u>	The nature of catalytic species in wacker oxidation process	Vivek Korde	Science & Humanities	International Conference on Research Frontiers in Sciences	06-Nov-21	2321-9653	<u>21</u>
<u>7</u>	Design Consideration of Material Handling Equipment for Ganga Iron and Steel Limited, Nagpur	Swapnil Choudhary	MECH	International Journal for Research in Applied Science & Engineering Technology	Jul-21	2270-2273	<u>22</u>
<u>8</u>	Field dependent study on formation of ferroelectric domain in KNbO ₃ Single	Vivek Korde	Science & Humanities	Turkish Journal of Computer and Mathematics	28-Apr-21	4197-4201	<u>23</u>

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	Crystal			Education			
<u>9</u>	Scope of Digital Manufacturing in India after Covid-20	Ajay Tinguria	ETC	Turkish Journal of Computer and Mathematics Education	18-Feb-21	1757-899X	<u>24</u>
<u>10</u>	Graphical Indices of some Chemical structure graphs	Prafulla Puri	Science & Humanities	International Conference on Research Frontiers in Sciences	06-Nov-21	1757-899X	<u>25</u>
<u>11</u>	Cosmological model with electromagnetic field admitting conformal motion	Manjushree Muley	Science & Humanities	International Conference on Research Frontiers in Sciences	06-Nov-21	568-576	<u>26</u>
<u>12</u>	Efficiency and Power factor Improvement of three Phase Induction Motor Using just One IGBT Switch	Ankita Mankar	EE	Turkish Journal of Computer and Mathematics Education	06-Feb-21	568-576	<u>27</u>
<u>13</u>	Scope of Digital Manufacturing in India after Covid-19	Swapnil Choudhary	MECH	Turkish Journal of Computer and Mathematics	18-Feb-21	4197-4201	<u>28</u>

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				thics Education			
<u>14</u>	Impact of Electric Vechiles on Indian Distribution System	Ankita Khandait	EE	Turkish Journal of Computer and Mathema thics Education	07-Feb-21	577-582	<u>29</u>
<u>15</u>	The nature of catalytic species in wacker oxidation process	Prafulla Puri	Science & Humanities	Internatio nal Conferenc e on Research Frontiers in Sciences	06-Nov-21	1757- 899X	<u>30</u>
<u>16</u>	The experimental analysis applied to an evacuated tube solar collector equipped with solar parabolic trough and carbon filter for purification of water	Ashish Khelkar	MECH.	Turkish Journal of Computer and Mathema thics Education	04-Jun-21	2274- 2284	<u>31</u>
<u>17</u>	Design & Analysis of stress on Drill Bit	Swapnil Choudhary	MECH.	Turkish Journal of Computer and Mathema thics Education	14-Feb-21	1757- 899X	<u>32</u>

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<u>18</u>	Improving Efficiency By Using Synchronised Parallel Data Transmission Over WSN	Anirudha Bhagwat	CSE	Turkish Journal of Computer and Mathematics Education	05-Apr-21	4795-4800	<u>33</u>
<u>19</u>	Security for Multi Cloud Using Server Less Registering Approach	Amita Suke	CSE	Turkish Journal of Computer and Mathematics Education	05-Apr-21	4801-4804	<u>34</u>
<u>20</u>	Efficiency and Power factor Improvement of three Phase Induction Motor Using just One IGBT Switch	Pravin Mandvikar	EE	Turkish Journal of Computer and Mathematics Education	06-Feb-21	568-576	<u>35</u>
<u>21</u>	Finite Element Analysis of Diesel exhaust fluid tank holding bracket	Bhavesh Bohra	Mech	International Conference on Research Frontiers in Sciences	06-11-2021	1757-899X	<u>36</u>
<u>22</u>	Automatic Temperature Control of Flute in Paper Corrugated Box Manufacturing Machine	Dr. Bharat Chede	MECH.	Turkish Journal of Computer and Mathematics Education	04-Jun-21	2285-2292	<u>37</u>

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<u>23</u>	The nature of catalytic species in wacker oxidation process	Vivek Korde	Science & Humanities	International Conference on Research Frontiers in Sciences	06-Nov-21	1757-899X	<u>38</u>
<u>24</u>	Cosmological model with electromagnetic field admitting conformal motion	Prafulla Puri	Science & Humanities	International Conference on Research Frontiers in Sciences	06-Nov-21	1757-899X	<u>39</u>
<u>25</u>	Graphical Indices of some Chemical structure graphs	Vivek Korde	Science & Humanities	International Conference on Research Frontiers in Sciences	06-Nov-21	1757-899X	<u>40</u>
<u>26</u>	Design & Analysis of stress on Drill Bit	Bharat Chede	MECH.	Turkish Journal of Computer and Mathematics Education	15-Feb-21	1757-899X	<u>41</u>
<u>27</u>	Impact of Electric Vechiles on Indian Distribution System	Yuvraj Chavhar	EE	Turkish Journal of Computer and Mathema	07-Feb-21	577-582	<u>42</u>

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				thics Education			
<u>28</u>	Security for Multi Cloud Using Server Less Registering Approach	Dr. Tryambak Hiwarkar	CSE	Turkish Journal of Computer and Mathema thics Education	05-Apr-21	4801- 4804	<u>43</u>
<u>29</u>	The experimental analysis applied to an evacuated tube solar collector equipped with solar parabolic trough and carbon filter for purification of water	Sharayu Wasu	MECH.	Turkish Journal of Computer and Mathema thics Education	04-Jun-21	2274- 2284	<u>44</u>
<u>30</u>	Scope of Digital Manufacturing in India after Covid-19	Dr Bharat Chede	MECH	Turkish Journal of Computer and Mathema thics Education	18-Feb-21	4197- 4201	<u>45</u>
<u>31</u>	The nature of catalytic species in wacker oxidation process	Venkatara mana Imandi	Science & Humanities	Internatio nal Conferenc e on Research Frontiers in Sciences	06-Nov-21	1757- 899X	<u>46</u>



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<u>32</u>	Investigation of Pipe Inspection Robot by Using Commercial Package	Dr Bharat Chede	MECH	Turkish Journal of Computer and Mathematics Education	04-Jun-21	2264-2269	<u>47</u>
<u>33</u>	The experimental analysis applied to an evacuated tube solar collector equipped with solar parabolic trough and carbon filter for purification of water	Atiq Z. Mirza	MECH.	Turkish Journal of Computer and Mathematics Education	04-Jun-21	2274-2284	<u>48</u>
<u>34</u>	Automatic Temperature Control of Flute in Paper Corrugated Box Manufacturing Machine	Nitin Sawarkar	MECH.	Turkish Journal of Computer and Mathematics Education	04-Jun-21	2285-2292	<u>48</u>
<u>35</u>	Efficiency and Power factor Improvement of three Phase Induction Motor Using just One IGBT Switch	Reshma Kadu	EE	Turkish Journal of Computer and Mathematics Education	06-Feb-21	568-576	<u>49</u>
<u>36</u>	Improving Efficiency By Using	Rahul Bhandekar	CSE	Turkish Journal of Computer	05-Apr-21	4795-4800	<u>50</u>

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	Synchronised Parallel Data Transmission Over WSN			and Mathematics Education			
<u>37</u>	Soil Nutrients Testing Using IR Photo Spectrometer	Rahul Nawkhare	ETC	Turkish Journal of Computer and Mathematics Education	04-Jun-21	2255-2263	<u>51</u>
<u>38</u>	Investigation of Pipe Inspection Robot by Using Commercial Package	Nitin Sawarkar	MECH	Scoups Indexed	18-Feb-21	1757-899X	<u>52</u>
<u>39</u>	Scope of Digital Manufacturing in India after Covid-19	Nitin Sawarkar	MECH	Turkish Journal of Computer and Mathematics Education	18-Feb-21	4197-4201	<u>53</u>
<u>40</u>	Optimization of Strategies for Modelling of Energyabsorbing Structures in Vehicles	Bharat Chede	MECH.	Scoups Indexed	14-Jun-21	2293-2296	<u>54</u>
<u>41</u>	Improving Efficiency By Using Synchronised Parallel Data Transmission Over WSN	Monika Ingole	CSE	Turkish Journal of Computer and Mathematics Education	05-Apr-21	4795-4800	<u>55</u>

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	Impact of Electric Vechiles on Indian Distribution System	Bramhadeo Wadibhasme	EE	Turkish Journal of Computer and Mathematics Education	07-Feb-21	577-582	<u>56</u>
<u>42</u>	Implementation of Three Phase Earth Leakage Circuit Breaker	Dr. D. R. Tutakne	EE	International Journal of Innovative Research in Technology	17-Feb-21	2349-6002	<u>57</u>
<u>43</u>	Cosmological model with electromagnetic field admitting conformal motion	Vivek Korde	Science & Humanities	International Conference on Research Frontiers in Sciences	06-Nov-21	1757-899X	<u>58</u>
<u>44</u>	Design Consideration of Material Handling Equipment for Ganga Iron and Steel Limited, Nagpur	Nitin Sawarkar	MECH	International Journal for Research in Applied Science & Engineering Technology	Jul-21	2321-9653	<u>59</u>
<u>45</u>	Artificial	Ashish	ETC	Turkish	20-Feb-21	1757-	<u>60</u>

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	Intelligence Based Mask Detection with Thermal Scanning and Hand Sanitization Based Entry System	Bandre		Journal of Computer and Mathematics Education		899X	
<u>46</u>	Investigation of Pipe Inspection Robot by Using Commercial Package	Swapnil Choudhary	MECH	Turkish Journal of Computer and Mathematics Education	04-Jun-21	2264-2269	<u>61</u>
<u>47</u>	Field dependent study on formation of ferroelectric domain in KNbO ₃ Single Crystal	Prafulla Puri	Science & Humanities	Turkish Journal of Computer and Mathematics Education	04-Jun-21	2270-2273	<u>62</u>
<u>48</u>	Optimization of Strategies for Modelling of Energyabsorbing Structures in Vehicles	Ashish Khelkar	MECH.	Turkish Journal of Computer and Mathematics Education	14-Jun-21	2293-2296	<u>63</u>
<u>49</u>	Controllable Power factor And Improved Efficiency of Single Phase Induction Motor	Dr. D.R Tatakne	EE	Interntional Journal of Scientific Research	07-Jul-21	2582-3930	<u>64</u>

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	Drive			in Engineeri ng and Managem ent			
<u>50</u>	Automatic Tempreature Control of Flute in Paper Corrugated Box Manufacturing Machine	Swapnil Choudhary	MECH.	Turkish Journal of Computer and Mathema thics Education	04-Jun-21	2285- 2292	<u>65</u>
<u>51</u>	Soil Nutrients Testing Using IR Photo Spectrometer	Ajay Tingurai	ETC	Turkish Journal of Computer and Mathema thics Education	04-Jun-21	2255- 2263	<u>66</u>
<u>52</u>	Optimization of Strategies for Modelling of Energyabsorbing Structures in Vehicles	Aditi Subhedar	MECH.	Turkish Journal of Computer and Mathema thics Education	14-Jun-21	2293- 2296	<u>67</u>
<u>53</u>	The nature of catalytic species in wacker oxidation process	Prafulla Puri	Science & Humanities	Internatio nal Conferenc e on Research Frontiers in Sciences	06-Nov-21	1757- 899X	<u>68</u>
<u>54</u>	Optimization of Strategies for	Swapnil Choudhary	MECH.	Turkish Journal of	14-Jun-21	2293- 2296	<u>69</u>

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	Modelling of Energyabsorbing Structures in Vehicles			Computer and Mathematics Education			
<u>55</u>	Energy Generation Using Solar and Wind Technology	Reshma Kadu	EE	International Journal of Scientific Research in Engineering and Management	07-Jul-21	2582-3930	<u>70</u>
<u>56</u>	Security for Multi Cloud Using Server Less Registering Approach	Shravani Jasthi	CSE	Turkish Journal of Computer and Mathematics Education	16-Feb-21	1757-899X	<u>71</u>
<u>57</u>	Design of Smart Bin for Waste Management	Swapnil Choudhary	MECH	International Journal of Innovations in Engineering and Science	20-Jul-21	2456-3463	<u>72</u>
<u>58</u>	Design Consideration of Material Handling Equipment for	Dr Bharat Chede	MECH	International Journal for Research	Jul-21	2321-9653	<u>73</u>

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	Ganga Iron and Steel Limited, Nagpur			in Applied Science & Engineering Technology			
<u>59</u>	Optimization of Strategies for Modelling of Energyabsorbing Structures in Vehicles	Ashish Khelkar	MECH.	Turkish Journal of Computer and Mathematics Education	14-Jun-21	2293-2296	<u>74</u>
<u>60</u>	Controllable Power factor And Improved Efficiency of Single Phase Induction Motor Drive	Yuvraj Chavhar	EE	Interntional Journal of Scientific Research in Engineering and Management	07-Jul-21	2582-3930	<u>75</u>
<u>61</u>	Improving Efficiency By Using Synchronised Parallel Data Transmission Over WSN	Dr. Tryambak Hiwarkar	CSE	Turkish Journal of Computer and Mathematics Education	05-Apr-21	4795-4800	<u>76</u>
<u>62</u>	Novel Soft-Start Improved Efficiency Single Phase Induction Blower Motor	Ankita Khandait	EE	Interntional Journal of Scientific	07-Jun-21	2582-3930	<u>77</u>



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Automatic temperature control of flute in paper corrugated box manufacturing machine

Dr Bharat Chede ^a, Ayu Kalidas Ramteke^b, Swapnil Choudhary^c, Nitin Sawarkar^d

^{a,b} Professor Mechanical Engineering, Wainganga College of Engineering and Management, Nagpur

Research Scholar (M.Tech CAD/CAM), Wainganga College of Engineering and Management, Nagpur

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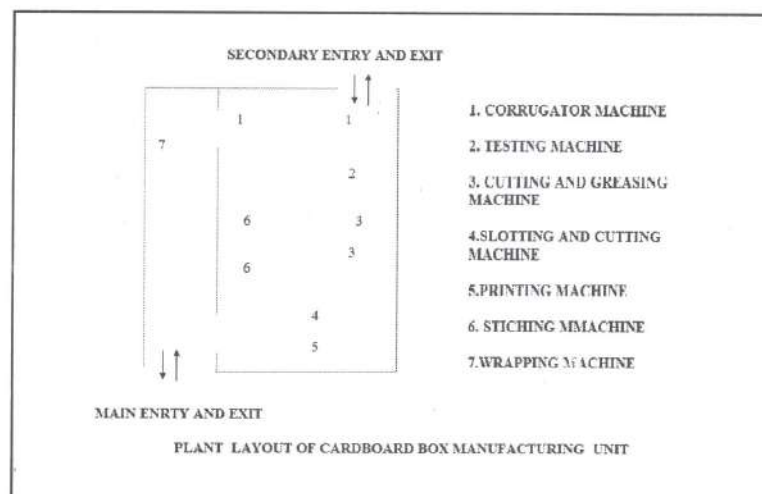
Abstract: Paper corrugate boxes are widely and extensively used for packing of industrial and domestic item. There are various kinds, depending on the item to be package, size, thickness, and strengths. Cardboard pass through flutes at high temperature at 180-250 degree Celsius. Due to continue running of roller, roller temperature increase above 270 degrees Celsius and leads to halt production for some time to cool down rollers. In this paper, studying feasible option to overcome overheating problem..

Keywords: Paper corrugate box, roller temperature, production halts.

1. Introduction

Cardboard manufacturing follows simple manufacturing process and most of processes perform on corrugator machine. Corrugator machine is combination of small machine which performs couple of operation together on raw materials. One of operation, where raw material passes through series of roller which are at high temperature and temperature continuously increase on par critical point where raw material can be damaged.

2. Packing Industry Machine




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Design & Analysis of Stress on Drill Bit

Swapnil Choudhary^a, Chaitanya V. Kakde^b, Dr .Bharat Chede^c, Nitin Sawarkar ^d

^a Asst. Professor Mechanical Engineering , Wainganga College of Engineering and Management

^b PG Scholar CAD-CAM, Wainganga college of Engineering and Management ,

^c Professor Mechanical Engineering , Wainganga College of Engineering and Management

^d Asst. Professor Mechanical Engineering , Wainganga College of Engineering and Management ,

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Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 4 June 2021

Abstract: The manufacturing sector of India mainly depends on its productivity and quality. In many manufacturing activities, drilling is an ordinary operation that forms the main machining cost. This paper reviews development in drill bit with available geometric properties, materials for a drill bit, and coatings. For the lowest machining cost and highest profit rate, it's a difficult task to select the best tool with its cutting parameters.

With a slight improvement in drill bit geometric properties, we can minimize stress and improve the tool's quality and life. This paper will compare the stress generated over drills by making certain changes in drill geometric properties such as point angle. Drill with lower stress shows longer tool life. Micro drill with point angle 116° shows less stress distribution. Micro drills with lower stress will have longer tool life. Two different materials as Alpha titanium alloy and Beta titanium alloy used for analysis. We got the different results with parameters, from that the beta titanium alloy is best, which comes in the nearby comparison with HSS. Comparison between alpha and beta titanium alloy is done with HSS based on their equivalent stress, strain, and deformation.

Keywords: Drill Bit, Analysis, Stress

1. Introduction

A drill is made with a cutting tool connection for the element with riding force bit used for producing holes or openings in different materials or affixing substances together by using clasp. The connection is held utilizing the use of a toss in the route of one facet of the drill and pivoted while squeezed in the direction of the objective fabric. The tip and time edges of the reducing device take the critical step of reducing the goal material. This could possibly reduce off thin shavings (wood screw bits or bend drills), granulating off little particles, pounding and evacuating bits of the workpiece, counterboring, countersinking, or specific sports. Drills are mostly used in carpentry, metalworking. Extraordinarily planned drills are likewise applied in remedy, area missions, and unique packages. Drills are available with a massive assortment of execution characteristics, for instance, electricity and limit.

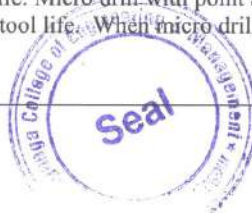
Drilling is the most common material removal process. It is a standard process for producing holes in the workpieces. The drilling tool is called a drill bit which is rotated by the spindle of the machine. Drilling is an essential operation in manufacturing industries. The drill bit is used to produce round holes in solid, hard materials and used for enlarging existing holes provided on the workpiece. It is a type of multipoint cutting tool which has multiple cutting edges. For producing holes on workpieces, either drill is used to rotate, and the workpiece kept fixed, or in some other cases, the drill remains stationary, and the workpiece is used to rotate.

2. Academic Review

"Machining parameters and material of workpiece is mainly responsible for improvement in drill bit used in an industry. Different materials and coating materials are used for improvement in drill bit. Machining of workpiece can be done by using different geometries of drill bit. A proper drill bit selection can be done by using different types of flute style, tip style and shank style for machining of different materials and applications." [1].

"The prevailing FEA investigation the penetrating apparatus essentially with assist of Finite thing examination. Right off the bat the boring apparatus is tested in CATIA and the equivalent is added into the ANSYS for modular and simple examination of current Tungsten carbide tool and D2 metallic fabric tool. The end result from the investigation it's miles seen that with express condition the D2 steel cloth is taken into consideration instead cloth for making drill it. The D2 metallic drill modular investigation the recurrence created is sort of relatively near that of tungsten carbide correspondingly inside the fundamental exam because the similar strain, whole disfigurement and shear stress are likewise visible to be competitive"[2].

"Drill with lower stress shows longer tool life. Micro drill with point angle 116° shows less stress distribution. Micro drills with lower stress will have longer tool life. When micro drill with point angle 116° is compared with



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Artificial Intelligence Based Mask Detection With Thermal Scanning and Hand Sanitization Based Entry System

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Abstract: According to the World Health Organization, the corona virus COVID-19 outbreak is causing a global health disaster, and the most successful safety measure is wearing a face mask in public places. As per reports, wearing a face mask while at work significantly decreases the risk of transmission. Hygiene refers to activities that support health and disease prevention, especially through tidiness such as hand washing. Hand washing will help prevent the spread of any illness that spreads through touch. A method of using artificial intelligence to build a healthy working environment in a manufacturing environment that is both reliable and cost-effective. A hybrid model combining deep and classical machine learning are going to be proposed for mask detection. Images with and without masks make up a face mask recognition dataset. We'll use a Raspberry Pi to detect faces in real time from a live flux from our webcam. Infrared thermography sensors are best used for temperature measurement and non-destructive tracking. Structural Changes Changed Words Thesaurus Create a low-cost smart hand sanitizer dispenser with a Raspberry Pi-based door controller and an ultrasonic sensor to help security guards overcome obstacles at various locations such as bank gates, school gates, and hospital gates.

Keywords: Hygiene, Hand sanitizer, Raspberry Pi, Thermopile sensor, Ultrasonic sensor, Machine Learning, python.

1. Introduction

Due to the worldwide COVID-19 corona virus outbreak, the wearing of face masks in public is becoming more common. Before Covid-19, people wore masks to protect their wellbeing from air pollution. Some people conceal their feelings from the public by covering their faces[1], while others are self-conscious about their appearance. The most recent influenza virus to strike human health in the last century is COVID-19 (also known as corona virus)[2]. Face masks have been shown to help inhibit COVID-19 transmission by scientists. COVID-19 has been declared a global epidemic by the World Health Organization (WHO) in 2020 due to its rapid spread.

In this paper, we present a mask face detection model that is focused on computer vision and deep learning[3]. Artificial Intelligence (AI) based on Machine Learning and Deep Learning will help to combat Covid-19 in several ways. The proposed model can be used in conjunction with observation cameras to prevent COVID-19 transmission by detecting people who aren't wearing face masks.

Our project's goal is to create an infrared thermometer, which is a device that measures the emitted energy from an object's surface. For a broad range of uses, infrared thermometers are used in medical, manufacturing, and home environments. We discovered that infrared thermometers have three essential stages[4]. A sensing stage that converts IR radiation to an electrical signal, a signal conditioning stage that filters, amplifies, and linearizes the analogue signal, and a digital output stage that converts the analogue signal to a digital signal[5].

Hand sanitizers are generally regarded as an appropriate hand hygiene regime for hospitals, health-care settings, and other settings[6]. The COVID-19 epidemic, as we all know, wreaked havoc on the planet and altered our way of life[7]. In this case, alcohol and hand sanitizers are essential fluids, but they must be used correctly. When infected hands touch alcohol containers or hand sanitizers, the virus will spread to the next person. We will develop and implement a smart hand sanitizer dispenser in this research paper that uses an ultrasonic sensor to detect the presence of a hand, activates the first servo motor to pour the liquid on the hand, de-energizes the electromagnetic lock, and sends a signal to the second servo motor to open the entrance door immediately[8].


2. Literature Review

In the literature, we found several face detection, hand sanitizer and thermal scanning system but with different approach and proposed solution.

A. Kumar, A. Kaur, and M. Kumar [5] introduced the artificial face mask detection technique in simple form and low cost device proposed in the paper. Deep learning introduced in this paper.

Hurriyatul Fitriyah [7] proposed automatic hand wash dispenser. So, everyone can wash their hands without touching machine and maintaining hygiene.




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Finite element analysis of diesel exhaust fluid tank holding bracket

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Abstract. With low running costs, diesel engines have performance, longevity and reliability. In addition to their benefits, they play a very significant role in the degradation of the atmosphere. Hence after treatment technology is adopted to control the emissions caused by these engines to treat the exhaust gas coming from the engine. Selective catalytic reduction is one such method after treatment that is used to treat the NO_x (Nitrogen Oxides) content of the engine's exhaust gas. Diesel Exhaust Fluid tank holding bracket supports the (Diesel Exhaust Fluid) tank and its complete assembly. Diesel Exhaust Fluid tank and its assembly is responsible for storage, calculated injection of Aqueous Urea Solution 32. Weight reduction of the Diesel Exhaust Fluid tank holding bracket is a major parameter of concern as it helps us increase the payload capacity of the vehicle and also increase the overall fuel efficiency. This paper presents the steps followed while performing the Finite Element Analysis on the existing Diesel Exhaust Fluid tank holding bracket. Based on the results of the existing dimensions, the new dimensions are designed and analysed.

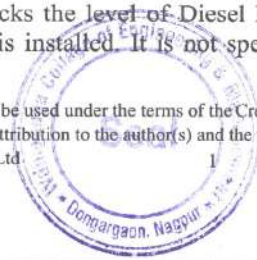
Keywords. Weight reduction, Finite element analysis (FEA), Diesel Exhaust Fluid and bracket.

1. Introduction

A big problem has been the handling of exhaust gas coming out of the diesel engine. Nitrogen oxides (NO_x), carbon monoxide, sulphur oxides and particulate matter are contaminants that are significant causes of concern. Selective Catalytic Reduction is one such technology used to treat nitrogen oxides. Selective Catalytic Reduction is an advanced technology for pollution control that injects liquid reduction fluid known as Diesel Exhaust Fluid or aqueous urea solution (AUS 32) into the diesel engine exhaust stream.

2. Description of diesel exhaust fluid tank holding bracket and its assembly

The Diesel Exhaust Fluid tank holding bracket and its assembly components include the Diesel Exhaust Fluid tank, the air/oil separator, and the dosing module. The dosing module is another assembly consisting of the dosing pump, the level sensor within the Diesel Exhaust Fluid tank and the respective ties between all these components. The aim of the dosing pump is to pump the Diesel Exhaust Fluid from the tank and spray it into the engine exhaust stream into the catalyst. Inside the Diesel Exhaust Fluid tank, the level sensor tracks the level of Diesel Exhaust Fluid present inside the tank. On the bracket, the air / oil separator is installed. It is not specifically involved in the process of the after-



Security for Multi Cloud Using Server less Registering Approach

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Abstract: These days, in any application development, security for specific area has become crucial job in the service access environment. Since clients needs to utilize the unique services and resources in distributed computing environment. Here the security administrations and cloud portal frameworks have been highly advanced based on the client necessities. However cloud offers a lot of resources through the global service vendors and Multicloud technologies are rapidly in use, but still the cloud requires security enhancement. Applications become complex and have attacks when deployed on multiclouds .So it is very important factor to protect the data and resources from the hackers. In multiple cloud environments it is possible to control all the applications, user resources, secret information and other confidential user process level with the help of server less approach. The server less computing approach is a sort of Distributed computing execution model through which Cloud Service provider will allocate the resource to the client in a dynamic manner .This paper represents what is Multi cloud, advantages of Multicloud, Why Security issue with Multi cloud, How server less is different from monolith services and Security Approaches to multi cloud with server less computing.

Index Terms: cloud services, multicloud, server less computing

1. Introduction

As we know Cloud delivers computing power (CPU, RAM, Network Speeds, Storage OS software) a service over a network called Internet. But if all the resources and services of the website are on one cloud, a DDoS (Distributed Denial of Service) attack can take the website down, sometimes the single cloud service provider cannot fit all requirements to the tee. Hence many organizations are making use of multiple cloud environments. Multicloud is an approach which contains more than one cloud, mix of public and

private cloud components where service provided by different vendors. Fig:1 represents overview of multi cloud environment. Organizations/IT sectors normally deploy Multicloud environments to meet various IT-related goals like improved flexibility, reduced costs for IT services, avoiding vendor lock-in (restructure of the functions will be easy), and tapping into regional cloud providers (especially some companies operate globally, where a single provider may not be available in certain locations, or where they offer specific cloud features might be unavailable).

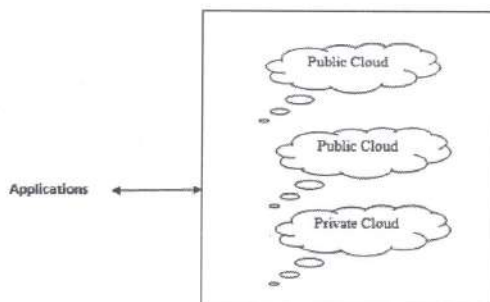


Fig:1: Multi Cloud Representation

Public cloud platforms are available from third-party vendors like Amazon Web Services, Microsoft Azure, Google Cloud Platform, Alibaba Cloud, the IBM Cloud, and others. Private cloud means delivering cloud services



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Cosmological model admitting conformal motion

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Abstract. In general theory of relativity cosmological model of spherically symmetric string cloud has been investigated with respect to electromagnetic field. In present work conformal motion of one parametric group was used to obtain Einstein field equations solution.

Keywords: Cosmological model; conformal motion.

1. Introduction

The string theory was developed [1, 2] after the big bang outburst. Phase transition play an important role for arrangement of topological constant imperfection such as domain walls [3, 4], domain wall motion [5, 6], strings and monopoles. String produce torque and stress energy which is similar phenomenon shown in gravitational field. Letelier et al. [7] obtain explanation of Einstein field equation for a cloud of string of various symmetries. String theory is important and broad that solve many important questions of fundamental physics and mathematics. The interaction and propagation of string with each other is briefly described by string theory. It is possible to unify known forces and particles using string theory. The magnetic field plays a vital role in cosmology, galactic and intergalactic spaces. Melvin et al. [8, 9] studied about matter which is in highly ionized state predict it responsible for expansion of universe. Herrera et al. [10] obtained solution for isotropic and anisotropic matter in framework of general relativity [11]. Yauz et al. [12, 13] have solved the Einstein field Equations through conformal motions space-times in the context of string by using one parameter group of conformal motions [14].

In the present work explanation of gravitational field equation for space-times is obtained by using conformal motions with respect to magnetic field.

The energy- momentum tensor of string implies as.

$$T_{ij} = \rho u_i u_j - \lambda x_i x_j + E_{ij} \quad (1)$$

Here ρ is the rest energy cloud string and λ is the string tensor density.



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Graphical indices of some chemical structure graphs

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Abstract. In present situations for theory and applications point of view graph theory is useful. Graphs are used as a representative tool for many problems of applied consequence. For illustration, a system of towns, which are considered by vertices, and connections among them make a biased graph. In present work graphical structure of graphene and ferroelectric hysteresis curve is explain.

Keyword: -Graphene; Graph Index; Hysteresis curve.

1. Introduction

Graph technique is a useful mathematical implement which are very useful in various subject of research point of views from chemistry to genetics and from materials science to various fields of engineering and similarly it is used in geography, sociology and architecture. Equivalently, it has also appeared as a useful mathematical discipline in its individual factual. The object represented by vertices, this relationship is showing in graph theory. A point where all lines are meet it is consider as vertex in other ways it is also called as node [1]. In order, associations between vertices are characterised by influences. In overall, one modest technique of expressive the construction of any scheme is graph.

For a countless change of difficulties such graphic pictures may main to a solution. Examples of such claims comprise signal-flow graphs, map colourings, databases, physical networks, and web graphs, organic molecules, tracing mazes as well as less tangible connections happening in social networks, ecosystems and in a flow of a computer program [2].

Swiss Mathematician, Leonhard Euler projected the explanation which directed to the accepted of a branch of mathematics called graph theory. Euler proved that there is no solution to the difficult based on the number of bonds joining each land part. Euler also observed that the amount of bonds at every land area would add up to twice the number of bridges. This seems as the hand-shaking lemma in graph theory, which states that the sum of the vertex degrees in a graph is equal to twice the number of edges [3]. This result infers to the preparation of an often used consequence in graph theory that states that the sum of vertex degrees in a graph is continuously even.

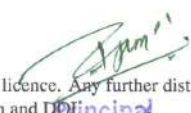
In present situations for theory and applications point of view graph theory is useful. Graphs are used as a representative tool for many problems of applied consequence. For illustration, a system of towns, which are considered by vertices, and connections among them make a biased graph. The well-known travelling salesman tricky asks for the direct conceivable tour, which appointments all the



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Design & Analysis of Stress on Drill Bit

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Abstract: The manufacturing sector of India mainly depends on its productivity and quality. In many manufacturing activities, drilling is an ordinary operation that forms the main machining cost. This paper reviews development in drill bit with available geometric properties, materials for a drill bit, and coatings. For the lowest machining cost and highest profit rate, it's a difficult task to select the best tool with its cutting parameters.

With a slight improvement in drill bit geometric properties, we can minimize stress and improve the tool's quality and life. This paper will compare the stress generated over drills by making certain changes in drill geometric properties such as point angle. Drill with lower stress shows longer tool life. Micro drill with point angle 116° shows less stress distribution. Micro drills with lower stress will have longer tool life. Two different materials as Alpha titanium alloy and Beta titanium alloy used for analysis. We got the different results with parameters, from that the beta titanium alloy is best, which comes in the nearby comparison with HSS. Comparison between alpha and beta titanium alloy is done with HSS based on their equivalent stress, strain, and deformation.

Keywords: Drill Bit, Analysis, Stress

1. Introduction

A drill is made with a cutting tool connection for the element with riding force bit used for producing holes or openings in different materials or affixing substances together by using clasp. The connection is held utilizing the use of a toss in the route of one facet of the drill and pivoted while squeezed in the direction of the objective fabric. The tip and time edges of the reducing device take the critical step of reducing the goal material. This could possibly reduce off thin shavings (wood screw bits or bend drills), granulating off little particles, pounding and evacuating bits of the workpiece, counterboring, countersinking, or specific sports. Drills are mostly used in carpentry, metalworking. Extraordinarily planned drills are likewise applied in remedy, area missions, and unique packages. Drills are available with a massive assortment of execution characteristics, for instance, electricity and limit.

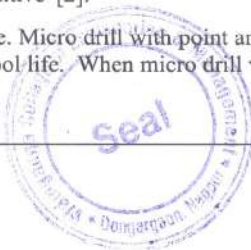
Drilling is the most common material removal process. It is a standard process for producing holes in the workpieces. The drilling tool is called a drill bit which is rotated by the spindle of the machine. Drilling is an essential operation in manufacturing industries. The drill bit is used to produce round holes in solid, hard materials and used for enlarging existing holes provided on the workpiece. It is a type of multipoint cutting tool which has multiple cutting edges. For producing holes on workpieces, either drill is used to rotate, and the workpiece kept fixed, or in some other cases, the drill remains stationary, and the workpiece is used to rotate.


2. Academic Review

“Machining parameters and material of workpiece is mainly responsible for improvement in drill bit used in an industry. Different materials and coating materials are used for improvement in drill bit. Machining of workpiece can be done by using different geometries of drill bit. A proper drill bit selection can be done by using different types of flute style, tip style and shank style for machining of different materials and applications.” [1].

“The prevailing FEA investigation the penetrating apparatus essentially with assist of Finite thing examination. Right off the bat the boring apparatus is tested in CATIA and the equivalent is added into the ANSYS for modular and simple examination of current Tungsten carbide tool and D2 metallic fabric tool. The end result from the investigation it's miles seen that with express condition the D2 steel cloth is taken into consideration instead cloth for making drill it. The D2 metallic drill modular investigation the recurrence created is sort of relatively near that of tungsten carbide correspondingly inside the fundamental exam because the similar strain, whole disfigurement and shear stress are likewise visible to be competitive”[2].

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IMPACT OF ELECTRIC VEHICLES ON INDIAN DISTRIBUTION SYSTEM

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Abstract- Vehicles driven by fossil fuel drastically increases green house gases and air pollution and uncontrolled air pollution is going to deplete ozone layer. For this all governments all over the world is trying to make publicity and promoting electric vehicles to low down percentage of carbon dioxide, carbon monoxide like poisonous gases emission in environment. In this well thought mathematical calculations and modelling and simulations of e-vehicles. The disadvantages associated like more losses, more voltage fluctuations, excessive overloading and higher cost. So a reference model is made to design a complete electric vehicle.

Keywords: Electric vehicles, MATLAB/Simulink, Mathematical modelling, Load profile

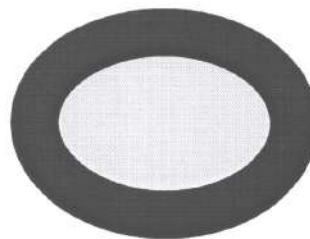
I. Introduction:

Electric vehicles are powered by a rechargeable battery. They have both good as well as a harmful impact on the distribution system. In all vehicles, range and performance are essential. Some features of electric vehicles make the mathematical modelling performance easier than the other vehicles. The first model vehicle performance means its top speed and acceleration. If a better target of an electric vehicle is achieved, the understanding of electric vehicles should be better than fuel vehicles. Another feature of an electric vehicle is range. The range can also be demonstrated.

In this paper, the electric vehicle 'Mahindra e2o' has been simulated. Its performance and range have been analyzed by the simulation results. The mathematical calculation and simulation modeling is developed, and the results are shown in the form of a graph.

Wheel diameter is calculated from the data of the spare wheel.

Tyre dimension = 155/70 / R13 inch



The total diameter of the wheel = $2 \times (\text{tyre width} \times \text{side wall} \frac{\text{height}}{100}) + (\text{diameter of the rim in mm})$
 $= 2 \times \frac{155 \times 70}{100} + (13 \times 25.4) = 0.5472 \text{ m}$

Radius = 0.2736 m

II. MATHEMATICAL CALCULATION OF PERFORMANCE OF VEHICLE

To perform the mathematical model of an electric vehicle, its performance and range are important. To move a vehicle, various forces are required, and its total force is considered as a total tractive force. This force is accomplished with rolling resistive force (F_{rr}), aerodynamic drag force (F_{ad}), hill climbing force (F_{hc}), and acceleration force.

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Security for Multi Cloud Using Server less Registering Approach

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Article History: Received: 10 November 2020; Revised 12 January 2021 Accepted: 27 January 2021; Published online: 5 April 2021

Abstract: These days, in any application development, security for specific area has become crucial job in the service access environment. Since clients needs to utilize the unique services and resources in distributed computing environment. Here the security administrations and cloud portal frameworks have been highly advanced based on the client necessities. However cloud offers a lot of resources through the global service vendors and Multicloud technologies are rapidly in use, but still the cloud requires security enhancement. Applications become complex and have attacks when deployed on multiclouds. So it is very important factor to protect the data and resources from the hackers. In multiple cloud environments it is possible to control all the applications, user resources, secret information and other confidential user process level with the help of server less approach. The server less computing approach is a sort of Distributed computing execution model through which Cloud Service provider will allocate the resource to the client in a dynamic manner. This paper represents what is Multi cloud, advantages of Multicloud, Why Security issue with Multi cloud, How server less is different from monolith services and Security Approaches to multi cloud with server less computing.

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1. Introduction

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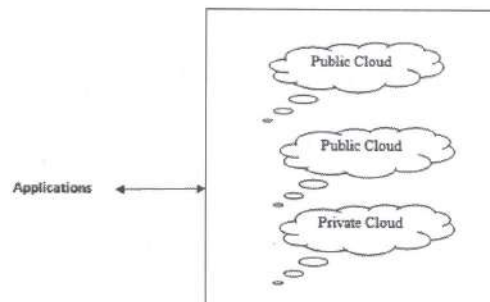


Fig1: Multi Cloud Representation

Public cloud platforms are available from third party vendors like Amazon Web Services, Microsoft Azure, Google Cloud Platform, Alibaba Cloud, the IBM Cloud, and others. Private cloud means delivering cloud services



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The experimental analysis applied to an evacuated tube solar collector equipped with solar parabolic trough and carbon filter for purification of water

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Abstract: Carbon filters are vital at eliminating elements such as chlorine, radon, benzene, solvent, compounds, volatile organic chemicals, pesticides, herbicides, lots of man-made chemicals and a particle are contact with tap water and removes the bad tastes and odor of the water. Initially by carbon filter water is purified then passed to evacuated vacuum tubes for further purification. A solar thermal collector is parabolic trough with a polished mirror-like finish metal straight in one dimension and curved as a parabola in the other two dimensions. The energy of sunlight reflects and focused along the focal line on vacuum tube

Keywords: Water Purifier, carbon filter, parabolic collector, evacuated tube

1. Introduction

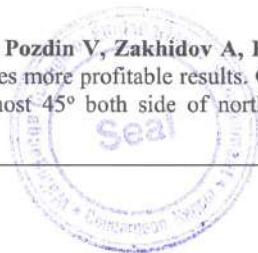
Energy is a must for the economic increase and public advancement of any nation. The worth of living is strongly related to power expenditure, which has incessantly amplified over the previous few decades in developing nations. Water is vital for individual beings, and it consists of more than 60% of the mass of a human. Secured drinking water is the fundamental call for of individual beings. But microbial stain of drinking water is a key health danger. The general difficulty still wants more alliance to reduce the quantity of people in require of drinkable water. The system designed will target the impure water into drinkable water using a carbon filter and parabolic trough collector with evacuated tube technology. This technology works by passing water through a carbon filter and concentrating the sunlight into the pipes, i.e., an evacuated tube through a parabolic trough type collector. A solar water purifier is a continuing deal that will keep capital used up on water purification following the system has compensated for itself. Also, along with the reduced electricity power and money-saving from the water purification, there are numerous other profits extracted. The use of a solar water purification system improves environmental impact and reduces greenhouse gas emission through less or zero use of fossil fuels. Charged carbon is normally used for eliminating organic components and remaining disinfectants in water supplies and water purification to eliminate water contaminants from tap water and well water; it improves taste and reduce health hazards. Activated carbon is use in home water purification systems due to its excellent adsorption capacity.

The evacuated tube is the central component of the heating as well as purification systems, and the tube is prepared with two concentric borosilicate glass tubes. The radiation from the sun is focused on the evacuated tube through trough; it passes through the outer covering of tube and reach to the surface coating of The reflectors underneath the evacuated tubes reflect the radiation, so the incident energy on the evacuated tubes is concentrated inner tube. As the internal glazing is black covered with a selective coating, they absorb the incident energy and get worm up. The obtained heat is transferred to working fluids passing through the glass tube. The heated water goes to the tank due to density differences by Thermosyphon effect. The complete method is runs for the period of sunshine hours.

2. Review of Literature

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Scope of Digital Manufacturing in India after Covid-19

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Article History: Received: 10 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 28 April 2021

Abstract: Digital Manufacturing has got wide Scope after COVID-19 pandemic Digital Manufacturing is a wider term .in new age of manufacturing, where material and digital innovations makes the industry to achieve the desired design and quantity in shorter time period compared to conventional method. It comprise of ergonomics, human factor analysis, visualization, manufacturing simulation, product design to process and process design. After pandemic there is increase in demand of many commodity for which high rate of production is required to overcome this digital manufacturing can play vital role in overcoming this.

Keywords: Digital Manufacturing, Virtual reality, Smart factory COVID-19

INTRODUCTION

In Indian Scenario after COVID-19 Pandemic, Digital manufacturing can play vital role in balancing the demand and supply of Products as by increasing the Production the required products. Digital manufacturing is basically design centered, control centered, manufacturing centered and management centered. Further if we again go in details of the manufacturing, we can have virtual manufacturing and rapid prototyping. In this century, which is been analysed by network and information, it will change the way of processing, obtaining, transferring and using proper information and high knowledge by human that will propel an significant improvement of human well being, production patterns and social structure.[1] The network manufacturing, E-Commerce manufacturing can be done by information sharing and collaboration. In digital manufacturing all are interconnected digitally by internet, intranet, and extranet. After the manufacturing process has to be checked in digital condition, also control data is loaded to NC machine to start production process.

Manufacturing to digital manufacturing

Digital Manufacturing is nothing but it is use of an integration of computer integrated system comprised of 3 D visualization, Simulation analytic and collective tool to produce product and manufacture the product simultaneously. Conventional way to manufacture where there is line process and in which the design of product and drawing is shared with highly skilled worker in the machine shop for creating the prototype. Whereas in Digital manufacturing we make use of Computer aided design software [2]. These design and process are simulated for checking its feasibility for the manufacturing of the product.

The product is inspected at every level of operations by using computer oriented quality control methods. Digital Supply chain management is very effective in getting the customized product and which helps in reducing the inventory. Social media is involved for digital marketing in order to improve profitability.[3]

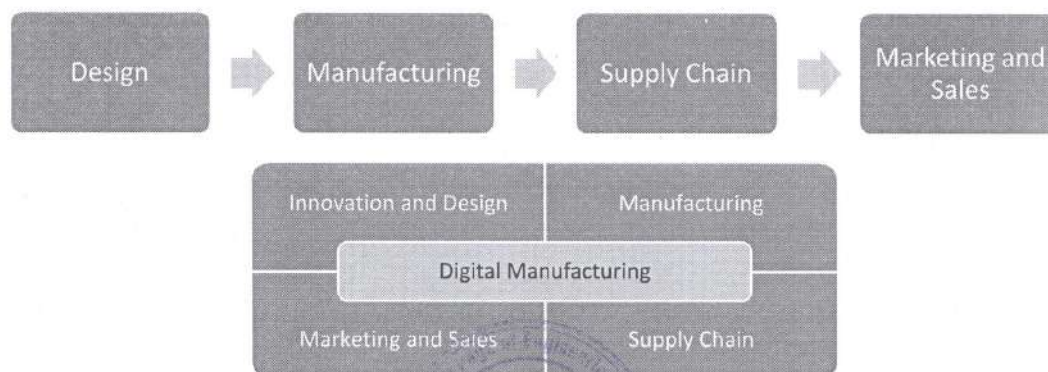


Figure 1 Basic Concept of Digital Manufacturing



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Investigation of Pipe Inspection Robot by using Commercial Package

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Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 4 June 2021

Abstract: There will be a great commercial and industrial advantage to the robot device competent of operating in lively pipelines. While a pipe is carrying fluid and pipe inspection is vital in order to recognize flaw owing to wear and corrosion. As Pipelines are usually obscured subversive, therefore they are getting in occurrence with soil and susceptible to deterioration. The wall thickness decreases efficiently due to oxidizing in wall of the steel pipe. The pipes and drains of many plants have recently become old and many robots have been built in the past to inspect these pipes. In several fields of manufacturing, inspection robots are used. The major application of the pipe inspection method is scrutinize the interior of the channels and pipes, detecting and resolve troubles from the interior of channels or pipes.

Keywords: Industrial, pipe flaw, economical cost

1. Introduction

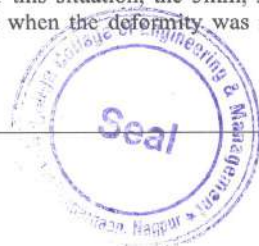
One of today's fastest rising engineering fields is robotics. Robots are intended to eliminate the individual from hazardous work. It is also function in unapproachable milieu. The utilization of robotics is more widespread now and is no longer employ solely by the weighty manufacturing industry. Pipe examination may be important to the improvement of safety and competence in industrial plants. Such precise tasks like testing repair, washing are costly, so utilization of robots materialize to be most desirable solutions. Pipelines, which are devices for the transport of fuels, gases and other liquids such as chemicals, have long been used in a variety of countries as major utilities. If the fault in the pipe is cause by natural calamity and rust then it's intricate to figure out the flaws and the position of the flaws. There is also a significant amount of damage. Therefore, scheduled inspections must be carried out. If we want to manually do this inspection, then it is vital to excavate up the pipes which are hidden under the soil for an extensive amount of efforts and time. If the robot can inspect the inside of the tubes, it will be possible to conduct simple and precise inspections at a low cost.


2. Academic Review

Pipes made of steel, ceramic, concrete, and plastic worn for gas as well as water shipping become old in many plants. Because of degradation and corrosion, these tubes become cracked. Pipe inspection is therefore significant for humanizing safety as well as productivity in industrial plants. It includes scrutiny; repair, cleaning which are costly, so one of the most desirable choices appears to be the application of the robots. Pipelines, which are devices for the transport of fuels and gases have long been used in a variety of countries as major utilities. Many robots were built in the past to inspect these pipes, nevertheless had a weighty power contribution and a signal cable. The desire to travel is definitely the hardest challenge to pact with. It offers a study of different pipe inspection strategies, taking into account the advantages and disadvantages of current systems.

It has a turning test, and a vinyl chloride pipe test has been tried, and another channel pipe assessment robot framework has been created. They assembled a channel pipe assessment robo that can be worked inside the line through remote radio correspondence and can likewise transfer continuous picture data from within the line. A 19 m cleaned fired line with a distance across of 25 cm and 30 cm was utilized. Utilizing recently tried robots, this trial examined transmission misfortune in fired lines and furthermore investigated transmission misfortune in soil and space. Also, the social condition between the measurement of a line and the potential radio transmission distance in a ceramic line was explained. A channel pipe assessment robot outfitted with a useful remote radio correspondence framework was made from those discoveries. The robot was assembled dependent on the 'Mogurinko250' channel pipe investigation robot.

In a spotless vinyl chloride pipe with a distance across of 25cm, this investigation utilized a resting robot with a turning test. In free turn, and when the test contacted absconds with statures and widths of 5 mm, 3 mm and 1 mm, the voltage shift was estimated. For this situation, the 5mm, 3mm and 1mm deformities in the vinyl line could be dictated by a test. At the point when the deformity was influenced by a test, the voltage showed an enormous decline[6]




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The experimental analysis applied to an evacuated tube solar collector equipped with solar parabolic trough and carbon filter for purification of water

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Abstract: Carbon filters are vital at eliminating elements such as chlorine, radon, benzene, solvent, compounds, volatile organic chemicals, pesticides, herbicides, lots of man-made chemicals and a particle are contact with tap water and removes the bad tastes and odor of the water. Initially by carbon filter water is purified then passed to evacuated vacuum tubes for further purification. A solar thermal collector is parabolic trough with a polished mirror-like finish metal straight in one dimension and curved as a parabola in the other two dimensions. The energy of sunlight reflects and focused along the focal line on vacuum tube

Keywords: Water Purifier, carbon filter, parabolic collector, evacuated tube

1. Introduction

Energy is a must for the economic increase and public advancement of any nation. The worth of living is strongly related to power expenditure, which has incessantly amplified over the previous few decades in developing nations. Water is vital for individual beings, and it consists of more than 60% of the mass of a human. Secured drinking water is the fundamental call for of individual beings. But microbial stain of drinking water is a key health danger. The general difficulty still wants more alliance to reduce the quantity of people in require of drinkable water. The system designed will target the impure water into drinkable water using a carbon filter and parabolic trough collector with evacuated tube technology. This technology works by passing water through a carbon filter and concentrating the sunlight into the pipes, i.e., an evacuated tube through a parabolic trough type collector. A solar water purifier is a continuing deal that will keep capital used up on water purification following the system has compensated for itself. Also, along with the reduced electricity power and money-saving from the water purification, there are numerous other profits extracted. The use of a solar water purification system improves environmental impact and reduces greenhouse gas emission through less or zero use of fossil fuels. Charged carbon is normally used for eliminating organic components and remaining disinfectants in water supplies and water purification to eliminate water contaminants from tap water and well water; it improves taste and reduce health hazards. Activated carbon is use in home water purification systems due to its excellent adsorption capacity.

The evacuated tube is the central component of the heating as well as purification systems, and the tube is prepared with two concentric borosilicate glass tubes. The radiation from the sun is focused on the evacuated tube through trough; it passes through the outer covering of tube and reach to the surface coating of The reflectors underneath the evacuated tubes reflect the radiation, so the incident energy on the evacuated tubes is concentrated inner tube . As the internal glazing is black covered with a selective coating, they absorb the incident energy and get worm up. The obtained heat is transferred to working fluids passing through the glass tube. The heated water goes to the tank due to density differences by Thermosyphon effect. The complete method is runs for the period of sunshine hours.

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Automatic temperature control of flute in paper corrugated box manufacturing machine

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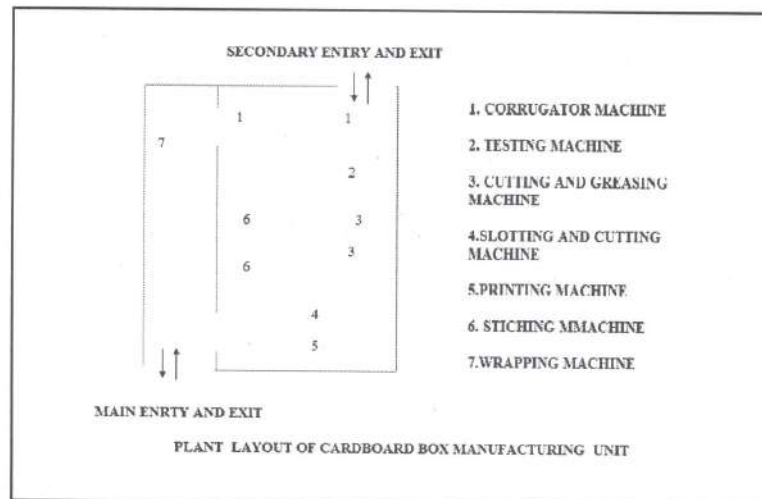
Abstract: Paper corrugate boxes are widely and extensively used for packing of industrial and domestic item. There are various kinds, depending on the item to be package, size, thickness, and strengths. Cardboard pass through flutes at high temperature at 180-250 degree Celsius. Due to continue running of roller, roller temperature increase above 270 degrees Celsius and leads to halt production for some time to cool down rollers. In this paper, studying feasible option to overcome overheating problem..

Keywords: Paper corrugate box, roller temperature, production halts.

1. Introduction

Cardboard manufacturing follows simple manufacturing process and most of processes perform on corrugator machine. Corrugator machine is combination of small machine which performs couple of operation together on raw materials. One of operation, where raw material passes through series of roller which are at high temperature and temperature continuously increase on par critical point where raw material can be damaged.

2. Packing Industry Machine



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Efficiency and Power factor Improvement of Three phase Induction motor Using just one IGBT switch

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Abstract- With the help of proposed scheme the chopped and modulated three phase AC voltages appears across the stator terminals . The Three phase induction motor makes use of single controllabled IGBT switch connected across the three phase diode bridge rectifier forming A.C. switch for chopping three phase A.C. voltage. With the help of given technique .the chopped and modulated three phase A.C. voltages appear across stator voltage terminals of three phase induction motor .The of A.C. voltage magnitude is controlled with the help of high frequency PWM controlled switch . The peculiar feature of this scheme with high frequency controlling the speed and power factor of induction motor with single semiconductor switch .The speed of the three phase induction motor with fan load will be controllable within around 50% of the rated motor speed. This induction motor drive find utility in Industrial high power cooling fans, blowers and pumps. This drive will provide higher efficiency, improved power factor and required speed control over wide range for above applications with simple design and control feature and good economical advantage.

Keywords- Three phase Induction motor, PWM technique. IGBT , power factor , VVVF drive.

1. INTRODUCTION

The main limitation of firing angle control technique using SCR bridge is very poor power factor at low speed control range and thereby increase in source current requirement for a required power output. Another technique of speed control which is most common and widely popular is voltage variable frequency drive with PWM technique the speed is controllable in wide range but it requires one additional power factor more improve stage by using additional bridge rectifier and IGBT switch in boost converter topology, the efficiency of the converter reduced due to additional stage and difficulty and cost of the circuit is also increase .

The inverter is construct with the help of six controllabled switches operated consequent manner. The control techniques required exact sequential control of six switches using SPWM or SVPWM. In current situation power conservation is an main issue across the world. This project mostly deals with the minimum power utilization by enhancing


the output efficiency and providing capacitor as a freewheeling element of three phase squirrel cage Induction motor, it requires less maintenance and rugged in construction .For industrial application induction motors are most favoured and widely used drive in pumps, fans and blower. Speed control techniques of these machines can be achieved by various methods [1].

2. PROPOSED TECHNIQUE

Phase angle control (PAC) technique was used earlier for this purpose but it has some disadvantages such as lagging power factor at the input supply side especially at low speeds due to increased firing angle.

To get rid of above disadvantages, the said research work focuses on reduce in power consumption and enhancing power factor of induction motor drives. A variable voltage control scheme is suggested using diode bridge by varying duty ratio of the bridge for said induction motor drives. A 3 KHz high frequency PWM controlled direct AC to AC voltage controlled converter is suggested for three phase induction motor to enhance the efficiency and improve input power factor and speed control along with fan using three phase induction motor . In this advanced technique only one active switch and six diodes are connected to form a bridge . The current continuity in the stator winding of the motor is maintained using parallelly connected low value capacitors causing free wheeling action in both quarters of AC voltages. The three phase balanced voltage fed to stator the motor is controlled simply by varying duty ratio of diode bridge. Motor current control is not allowed to lag much more as in the technique using firing angle control. The main features of the scheme are high frequency of 3Kz PWM switching and by eliminating additional three A.C. switches that is SCR , in place of it we are using here three parallel connected low value capacitors, which gives high power factor and high efficiency and one more thing is minimum number of controlled power semiconductor switches are required . One more dominant feature is that in the proposed scheme here we are using single active IGBT switch instead of using six or four A.C. switches topology. In this scheme the induction motor drive can operate in entire complete range of speed and torque which is not possible in conventional phase angle control scheme. The supply current from AC




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Improving Efficiency By Using Synchronised Parallel Data Transmission Over Wsn

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Abstract: As the data transmission speed and the efficiency over the wireless network depend on the network or transfer device bandwidth. After physical implementation of wireless network which is difficult to dynamically control transfer in order to get high or low data transfer rate. Dedicating the fixed network for such a dynamic requirement network is not feasible. Many researchers are trying to enhance the wireless network speed by joining the transfer speed of multiple lines which will result in asynchronous data transfer and data leakage. Hence the proposed system is to design and implements a dynamically controllable wireless network using the multiple radio frequency wireless devices. Here the proposed system will use multiple wireless devices and transfer data over multiple line depending upon the user configuration and synchronize the data over the receiving end. It will let the user control the wireless data transmission speed as per the requirement.

1. Introduction

Wireless Sensor Networks (WSNs) are a new class of networking technology that is increasingly becoming popular today. Huge strides taken in sensing technology, low power microcontrollers and communication radio have spurred the mass production of relatively inexpensive sensor nodes. Such large scale sensor networks far reimburse use of conventional networks in situations where terrain, climate and other environmental constraints obstruct the deployment and setting up of regular networks. Because of the tremendous scale at which such nodes can be deployed, they are extremely robust in terms of individual node failures which make them all the more favorable in such extreme situations. There has been an explosion in the use of sensor networks for environmental measurement and study. A range of applications have been built using sensor networks, from environmental monitoring to radiation detection to lots of tracking applications.

Broadly, sensor applications can be categorized into data gathering or tracking. Data gathering applications use sensor nodes to periodically measure the value of a particular environmental variable and recorded values are collected by a sink node for further processing. A WSN typically consists of a large number of low-cost, low-power and multifunctional sensor nodes that are deployed in a region of interest. These sensor nodes are small in size but are equipped with sensors, embedded microprocessors and radio transceivers and thus they have not only sensing capability, but also data processing and communicating capabilities.

Sensor networks have the following unique characteristics and constraints:

- (i) Dense node deployment
- (ii) Battery powered sensor nodes
- (iii) Severe energy, computation and storage constraints
- (iv) Self configurable
- (v) Unreliable sensor nodes
- (vi) Frequent topology change
- (vii) No global identification
- (viii) Many to one traffic pattern




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Soil Nutrients Testing using IR Photo Spectrometer

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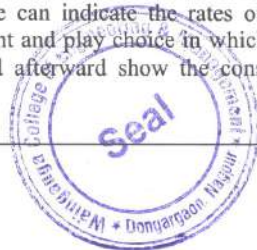
Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 4 June 2021


Abstract: In India 70 of the general population economy clearly or by suggestion depending on the agricultural association which can be 15 - 20% of offers in the hard and fast Indian economy. it's a huge neighborhood a Green Nation India. in view of the shortfall of preparation and old advancement consistently a considerable number of farmers doing implosion in light of less productivity. Our Project's standard way to grow the productivity of the best piece of the general population to evolve the rural country into a made country to make this dream of made country we need to examine to the cultivating territory for present-day propels. one of them we are finding the in all cases free structure to measure the soil supplements are N (Nitrogen), P (Phosphorus), K (Potassium) and show with their thought for farmers at their own lingos like Englis, Hindi, Marathi (Regional Language Support) to better transparency of an enormous bit of the clueless social classes. with the help of this endeavor, we need to change the circumstance of developing in India. for this, we are developing the system from the above feature with its own power supply necessities fulfilled by Solar Energy and advanced lithium-molecule battery pack. we are developing the system in what course the soil testing technique is at present done in the exploration place by an answer/substance-based testing whose important 6 - 10 Hours of time are cleared out and our farmers can test its earth at its own site two or three minutes. while developing this system we are thing about to 95% of accuracy over the lab

Keywords: Soil Nutrients, IR spectrophotometer, Precision Agriculture, DSP Processing.

1. Introduction

India Is an Agricultural country, thus we are compelling to an agrarian field while picking our task. while we study the current circumstance in the agrarian field we will track down a 60 - 75% of the Indian Economy is dependant on Farmers who are living in unassuming communities and towns. out of the most people groups are unskilled. large numbers of the public authority authorities and manures provider or the people groups experiences in this field they are taken benefits of the absence of lack of education of their clients which are the helpless ranchers. We can track down the main downside in our ranchers while they are developing their territories by deficient information on their areas soil and water quality that is the reason the profitability is extremely poor now and then it not may recuperate their put away cash for development and their actual endeavors. out of them, a few ranchers are taught henceforth they ought to follow the logical method of cultivating and get great outcomes. however, the cash and speculation are more in an ordinary method of soil testing procedure. Currently, soil testing is done in just the labs whose don't put close to ranchers, henceforth 90% of people groups can skirt this interaction and follows the regular method of the estate, treatment, and water supply. to make an Indian economy and GDP a lot more grounded we need to instructed or mindful our ranchers about how much soil wellbeing upkeep and improved by providing appropriate supplements to it. in the dirt there are numerous supplements are available out of this three principle significant supplements are N (Nitrogen), P (Phosphorus), K (Potassium), and other are optional supplements like a C (Calcium), S(Sulphur), M(Magnesium), C(Carbon), H(Hydrogen), O(Oxygen), and so forth Horticultural scientists are determined how to supply supplements in the dirt by straightforwardly forced or provided through the water. In this undertaking our mean to gauge every one of those supplements and show them on the screen to find satisfactory ways to keep up supplements in the dirt on the off chance that the dirt is solid, our croup likewise becomes sound and delivers huge creation to help the abundance of our ranchers. this why we are making an independent and simple to-utilize framework with the provincial language whose effectively open to peruse data to our ranchers. until we are doing an investigation on the most proficient method to quantify the supplements inside the dirt with no substance cycle collaboration which are effectively open runs with no consumable parts or fluid and zero support cost. while building up the framework above is the principle reason for the on the grounds that the people groups which are utilizing our framework they don't have effectively supply of required synthetic substances and support parts. from the examination, we have found another system that can be performed by as it were the Light source and photodiode called a Photospectrometer. in this interaction one of the light sources whose can 750-1500nm frequency passed from the under testing soil test, according to the supplements contains in the dirt it will mirror back the light beams at a specific frequency. as per radiation, we can indicate the rates of supplements that contain it. performing this interaction is very is it like an attachment and play choice in which the sensor should profound into soil least of 30mm separation from the surface and afterward show the consequences of its supplements on Display. in




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Investigation of Pipe Inspection Robot by using Commercial Package

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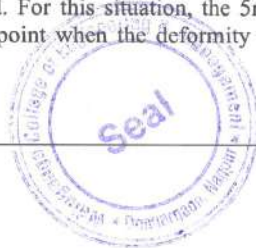
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Article History: Received: 10 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 28 April 2021

Abstract: Digital Manufacturing has got wide Scope after COVID-19 pandemic Digital Manufacturing is a wider term .in new age of manufacturing, where material and digital innovations makes the industry to achieve the desired design and quantity in shorter time period compared to conventional method. It comprise of ergonomics, human factor analysis, visualization, manufacturing simulation, product design to process and process design. After pandemic there is increase in demand of many commodity for which high rate of production is required to overcome this digital manufacturing can play vital role in overcoming this.

Keywords: Digital Manufacturing, Virtual reality, Smart factory COVID-19

INTRODUCTION

In Indian Scenario after COVID-19 Pandemic, Digital manufacturing can play vital role in balancing the demand and supply of Products as by increasing the Production the required products. Digital manufacturing is basically design centered, control centered, manufacturing centered and management centered. Further if we again go in details of the manufacturing, we can have virtual manufacturing and rapid prototyping. In this century, which is been analysed by network and information, it will change the way of processing, obtaining, transferring and using proper information and high knowledge by human that will propel an significant improvement of human well being, production patterns and social structure.[1] The network manufacturing, E-Commerce manufacturing can be done by information sharing and collaboration. In digital manufacturing all are interconnected digitally by internet, intranet, and extranet. After the manufacturing process has to be checked in digital condition, also control data is loaded to NC machine to start production process.

Manufacturing to digital manufacturing

Digital Manufacturing is nothing but it is use of an integration of computer integrated system comprised of 3 D visualization, Simulation analytic and collective tool to produce product and manufacture the product simultaneously. Conventional way to manufacture where there is line process and in which the design of product and drawing is shared with highly skilled worker in the machine shop for creating the prototype. Whereas in Digital manufacturing we make use of Computer aided design software [2]. These design and process are simulated for checking its feasibility for the manufacturing of the product.

The product is inspected at every level of operations by using computer oriented quality control methods. Digital Supply chain management is very effective in getting the customized product and which helps in reducing the inventory. Social media is involved for digital marketing in order to improve profitability.[3]

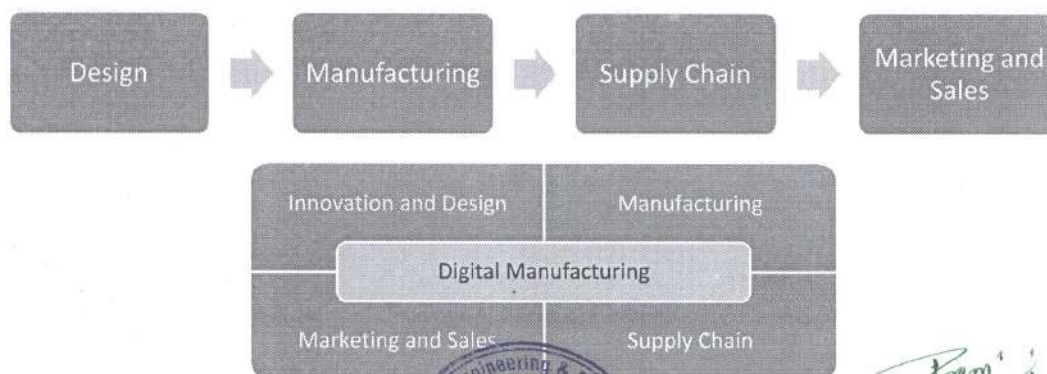


Figure 1 Basic Concept of Digital Manufacturing



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Optimization of Strategies for Modelling of Energyabsorbing Structures in Vehicles

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Abstract: Crash performance is imperative to ensure safety of vehicle. A major challenge in the design and optimization of vehicle crash systems is the high computing costs needed for crash analysis. It is imperative that energy-absorbing structural principles can be introduced and optimized at the early stages of vehicle design in order to improve crash efficiency by creative and optimized vehicle architecture. Through developing rapid modelling strategies, this potential can be maximized. In this paper modelling approaches are investigated using Finite Element Method for one application. Description for energy absorption structures are studied and implemented into new user defined model description for an explicit Finite Element Crash Solver. The simplified energy absorbing structure is verified using Finite Element Models

Keywords: Energy Absorption Structures, Finite Element Models, Crash Performance, Optimization, Rapid Modelling

1. Background

With increase in the number of population, there is increase in the number of vehicles on road, leading to accidents. Passenger safety is of the topmost criteria. Vehicle design is incorporated with Energy Absorbing structures; these help in absorbing the impact caused due to sudden collision of car or violent deceleration. Hence design of Energy Absorption structure plays a crucial role in Vehicle validation. A computational cost for assessing Crashworthiness of the vehicle is very high. Hence to minimize the cost required for the Crash analysis of the vehicle, energy absorbing structures are optimized at early stage of vehicle design.

2. Motivation

Lightweight vehicle structure has always been the interest of manufactures, as it increases the payload capacity and decreases the cost in manufacturing. Vehicle design or vehicle structure needs to be validated. Validation of the vehicle structure is done in three different ways namely – analytically, numerically and prototype testing. Numerical validation of the vehicle is given more importance as it gives accurate results than analytical method and the cost of prototype build is skipped. To reduce the computational cost involved in crash analysis of the vehicle structures, Energy Absorption Structures are optimized in the early phase of vehicle design to reduce the cost and get the optimum design of Vehicle.

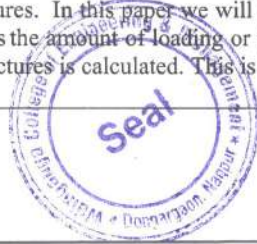
3. Objective

The Objective of the paper is to optimize the design of Energy Absorption structures. The optimization process includes exploring the rapid modelling strategies by understanding the manufacturing capabilities for Laser Beam Melting additive manufacturing process. This is done to get a better visual of the design of the Energy Absorption Structure prototype made through Additive Manufacturing during the optimization process. The optimized design of the Energy Absorption Structure is validated structurally in Ansys to understand the deformation and stresses experienced by it.

4. Statement of Contribution and Methods

4.1 Optimization of Energy Absorption Structure

Energy absorption structures are the mechanical structures, designed to absorb maximum energy experienced by the vehicle during vehicle frontal crash. Optimal design of energy absorption structures complies to higher energy absorption capabilities of the structures. Hence, optimization of energy absorption structures, includes, optimal geometry and material selection for the structure. Rapid modelling strategies are explored at the design stage to understand the design closely for analysis and better visualization. When the vehicle is in motion, it acquires kinetic energy. After the collision of the vehicle, this kinetic energy gets converted into destructive mechanical energy due to sudden and violent deceleration of the vehicle. This destructive mechanical energy is absorbed by the energy absorption structures. In this paper we will be considering direct and oblique collision of the vehicle. For these two impacts what is the amount of loading or in other words amount of violent deceleration experienced by the energy absorbing structures is calculated. This is done to evaluate the stresses and deformation



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Improving Efficiency By Using Synchronised Parallel Data Transmission Over Wsn

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Abstract: As the data transmission speed and the efficiency over the wireless network depend on the network or transfer device bandwidth. After physical implementation of wireless network which is difficult to dynamically control transfer in order to get high or low data transfer rate. Dedicating the fixed network for such a dynamic requirement network is not feasible. Many researchers are trying to enhance the wireless network speed by joining the transfer speed of multiple lines which will result in to asynchronous data transfer and data leakage. Hence the proposed system is to design and implements a dynamically controllable wireless network using the multiple radio frequency wireless devices. Here the proposed system will use multiple wireless devices and transfer data over multiple line depending upon the user configuration and synchronize the data over the receiving end. It will let the user control the wireless data transmission speed as per the requirement.

1. Introduction


Wireless Sensor Networks (WSNs) are a new class of networking technology that is increasingly becoming popular today. Huge strides taken in sensing technology, low power microcontrollers and communication radio have spurred the mass production of relatively inexpensive sensor nodes. Such large scale sensor networks far reimburse use of conventional networks in situations where terrain, climate and other environmental constraints obstruct the deployment and setting up of regular networks. Because of the tremendous scale at which such nodes can be deployed, they are extremely robust in terms of individual node failures which make them all the more favorable in such extreme situations. There has been an explosion in the use of sensor networks for environmental measurement and study. A range of applications have been built using sensor networks, from environmental monitoring to radiation detection to lots of tracking applications.

Broadly, sensor applications can be categorized into data gathering or tracking. Data gathering applications use sensor nodes to periodically measure the value of a particular environmental variable and recorded values are collected by a sink node for further processing. A WSN typically consists of a large number of low-cost, low-power and multifunctional sensor nodes that are deployed in a region of interest. These sensor nodes are small in size but are equipped with sensors, embedded microprocessors and radio transceivers and thus they have not only sensing capability, but also data processing and communicating capabilities.

Sensor networks have the following unique characteristics and constraints:

- (i) Dense node deployment
- (ii) Battery powered sensor nodes
- (iii) Severe energy, computation and storage constraints
- (iv) Self configurable
- (v) Unreliable sensor nodes
- (vi) Frequent topology change
- (vii) No global identification
- (viii) Many to one traffic pattern




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Implementation of Three Phase Earth Leakage Circuit Breaker

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Abstract- In any electrical system, protection is the most important requirement to secure both human lives and application from the damage. The THREE PHASE EARTH LEAKAGE CIRCUIT BREAKER (ELCB) is a design which could be implemented in three phase electrical environment to provide protection to user as well as equipment against any earth leakage fault. In three phase circuit all current carrying conductors must be sensed. An Earth-leakage circuit breaker (ELCB) is a safety device used in electrical installations with high Earth impedance to prevent shock. It detects small stray voltages on the metal enclosures of electrical equipment, and interrupts the circuit if a dangerous voltage is detected. Once widely used, more recent installations instead use residual current circuit breakers which instead detect leakage current directly.

Index terms- Earth leakage circuit breaker, Residual circuit breaker.

I. INTRODUCTION

The operation of ELCB systems occurs by gauging the current balance between the outgoing and incoming currents by the use of current sensor. This system has the capacity to identify and indicate errors in case of any variation in the current between the neutral conductor and line conductor. Both the supply current and return current are expected to total to zero, if not the current may be leaking to somewhere else (to ground/earth, or additional circuit, etc.). the system of ELCB has been designed to avoid electrocution through the detection of any leaking current, capable of being far lesser (normally 5 to 30 mill amperes) than the currents required in the operation of conventional fuses or circuit breakers (several amperes). Residential Current Device (RCDs) are expected to function within 25-40 milliseconds, prior having the heart driven by the

electric shock into ventricular fibrillation, which remains the leading cause of death via electric shock.

II. EARTH LEAKAGE CIRCUIT BREAKER

This is a category of devices, which are used to protect instruments, circuits and operators, while Earth leakage voltage operated devices (VO-ELCB), detecting a voltage rise between installation metalwork, and an external electrode. These have now been replaced by current sensing devices (RCD/RCCB). In modern literature voltage sensing devices are called ELCB or VOELCB and current sensing devices are called RCCB or RCD.

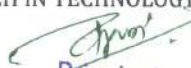
Voltage sensing ELCBs were first introduced about sixty years ago. Current sensing ELCBs were first introduced about forty years ago. For many years, the voltage operated ELCB and the differential current operated ELCB were both referred to as ELCBs because it was a simpler name to remember. But the use of a common name for two different devices gave rise to considerable confusion in the electrical industry. If any current leaks from any electrical installation, there must be any insulation failure in the electrical circuit, it must be properly detected and prevented otherwise there may be a high chance of electrical shock if anyone touches the installation. An earth leakage circuit breaker does it efficiently. Means it detects the earth leakage current and makes the power supply off by opening the associated circuit breaker. There are two types of earth leakage circuit breaker:

1. Voltage ELCB
2. Current ELCB

Voltage Earth Leakage Circuit Breaker

The working principle of voltage ELCB is quite simple. One terminal of the relay coil is connected to




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Cosmological model admitting conformal motion

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Abstract. In general theory of relativity cosmological model of spherically symmetric string cloud has been investigated with respect to electromagnetic field. In present work conformal motion of one parametric group was used to obtain Einstein field equations solution.

Keywords: Cosmological model; conformal motion.

1. Introduction

The string theory was developed [1, 2] after the big bang outburst. Phase transition play an important role for arrangement of topological constant imperfection such as domain walls [3, 4], domain wall motion [5, 6], strings and monopoles. String produce torque and stress energy which is similar phenomenon shown in gravitational field. Letelier et al. [7] obtain explanation of Einstein field equation for a cloud of string of various symmetries. String theory is important and broad that solve many important questions of fundamental physics and mathematics. The interaction and propagation of string with each other is briefly described by string theory. It is possible to unify known forces and particles using string theory. The magnetic field plays a vital role in cosmology, galactic and intergalactic spaces. Melvin et al. [8, 9] studied about matter which is in highly ionized state predict it responsible for expansion of universe. Herrera et al. [10] obtained solution for isotropic and anisotropic matter in framework of general relativity [11]. Yauz et al. [12, 13] have solved the Einstein field Equations through conformal motions space-times in the context of string by using one parameter group of conformal motions [14].

In the present work explanation of gravitational field equation for space-times is obtained by using conformal motions with respect to magnetic field.

The energy- momentum tensor of string implies as.

$$T_{ij} = \rho u_i u_j - \lambda x_i x_j + E_{ij} \quad (1)$$

Here ρ is the rest energy cloud string and λ is the string tensor density.



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Design Consideration of Material Handling Equipment for Ganga Iron and Steel Limited, Nagpur

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Abstract: In the last several years' material handling has become a new, complex, and rapidly evolving science. Material handling system (MHS) design has a direct influence on the logistics cost. This work is to locate and identifies the wasteful activities regarding the material handling, and to streamline the activities to reach a minimum of material handling. Most of industries are using EOT cranes for handling of material. In today's modern era, crane is very important material handling equipment in industry because of safety reliability, fast speed, economy etc. In this paper, discussed about design Consideration of material handling equipment for ganga iron and steel limited Nagpur. In the current material handling equipment, the life of the overhead crane as well as the cost of the material handling equipment is too important to stay in the competitive market of the industries. The cost of the material handling equipment is depending on the weight of the material. The performance of the material handling equipment will be done by the working on the optimization of the overhead crane used in the industries. Crane is a reliable component for lifting load in industries. Crane fails due to high friction in between wire rope and pulley. It leads to failure in gear box or it may increase power requirement of crane to lift loads. It is necessary for the crane to lift the load with minimum effort and minimum friction between the mating surfaces Based on the design calculations and analysis, a prototype crane was simulation, ncs, analysis.

I. INTRODUCTION

Any human activity involving materials need material handling. However, in the field of engineering and technology, the term material handling is used with reference to industrial activity. In any industry, be it big or small, involving manufacturing or construction type work, materials have to be handled as raw materials, intermediate goods or finished products from the point of receipt and storage of raw materials, through production processes and up to finished goods storage and dispatch points. Material handling as such is not a production process and hence do not add to the value of the product. It also costs money; therefore, it should be eliminated or at least reduced as much as possible. However, the important point in favors of material handling is that it helps production. Depending on the weight, volume and throughput of materials, mechanical handling of materials may become unavoidable. In many cases, mechanical handling reduces the cost of manual handling of materials, where such material handling is highly desirable. All these facts indicate that the type and extent of use of material handling should be carefully designed to suit the application and which becomes cost effective.

There are thousands of pieces of material handling devices. This equipment's vary from the most basic manual too to the most sophisticated computer-controlled material handling systems that can incorporate a wide range of other manufacturing and control functions. The efficient handling and storing of materials are vital to industry. In addition to raw materials, these operations provide a continuous flow of parts and assemblies through the workplace and ensure that materials are available when needed. Material handling equipment (MHE) is used for the movement and storage of material within a facility or at a site. Logistics is all about getting the right product to the right place at the right time to the right person for the least cost Material handling involves the movement of materials, in batches

or one item at a time within the plant. Material handling system provides transportation and storage of materials, components and assemblies. Material handling activities start with unloading of goods from delivery transportation, the goods then passed into storage, machining, assembly, testing, storage, packaging, and finally loading onto transport. Each of these stages of the process requires a slightly different design of handling equipment's. Expressed in simple language, Material handling is loading, moving and unloading of materials. To do it safely and economically, different types of tackles, gadgets and equipment's are used, when the material handling is referred to as mechanical handling of materials. Since primitive men discovered the use of wheels and levers, they have been moving materials mechanically. Material handling uses different equipment and mechanisms called Material Handling Equipment.




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