INDEX

3.3.2: Number of Books and Chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during 2019-20

Sl. No.	Name of the teacher	Title of the book/chapters published	Title of the paper	Title of the proceedings of the conference	Name of the conference	Year of publication	Page No.
1	Panduga Veena, Priya Gajjal	NA	Tribo-Parametric Influence in wear of dry sliding bearing material	ICMESD 2020	Inetrnational Conference on Mechanical Engineering for Sustainable Development - 2020	2019-20	1
2	N H Dhanaji, P S Gajjal	NA	Wear inside PGT of CNC bending machine during meshing due to line contact	ICMESD 2020	Inetrnational Conference on Mechanical Engineering for Sustainable Development - 2020	2019-20	2

3	D G Sorathiya, C S Dharankar	NA	Analysis of pendulum motion for harmonic base excitation	ICMESD 2020	Inetrnational Conference on Mechanical Engineering for Sustainable Development - 2020	2019-20	3
4	S K Joshi, M R Phate	NA	Analysis and optimixation pf a pitman arm	ICMESD 2020	Inetrnational Conference on Mechanical Engineering for Sustainable Development - 2020	2019-20	4
5	D Sahu, M R Phate	NA	Analysis of vibration impact on human arm using simulink based approch	ICMESD 2020	Inetrnational Conference on Mechanical Engineering for Sustainable Development - 2020	2019-20	5
6	P S Kamble, M R Phate	NA	Design and development of test rig for testing human vibratory model	ICMESD 2020	Inetrnational Conference on Mechanical Engineering for Sustainable Development - 2020	2019-20	6
7	Suyog Bhale, M R Phate	NA	Design and development of lower limb exoskeleton for rahabilitation	ICMESD 2020	Inetrnational Conference on Mechanical Engineering for Sustainable Development - 2020	2019-20	7

8	P M Yerolekar, C S Choudhaary	NA	Investigation of process prameters of deep drawn square cup for automotive applications	ICMESD 2020	Inetrnational Conference on Mechanical Engineering for Sustainable Development - 2020	2019-20	8
9	Saurabh Bedre, M P Bauskar	NA	Challenges and opportunities in composite railway sleepers	ICMESD 2020	Inetrnational Conference on Mechanical Engineering for Sustainable Development - 2020	2019-20	9
10	K P Kale, B D Bachchhav	NA	Tribological evaluation of nonasbestos brake pad materials	ICMESD 2020	Inetrnational Conference on Mechanical Engineering for Sustainable Development - 2020	2019-20	10
11	P S Kathamore, B D Bachchhav	NA	A Bio-based lubricant selection approach using Complex Proportional Assessment method	ICMESD 2020	International Conference on Mechanical Engineering For sustainable Development 2020	2019-20	11

12	Dr D Y Dhande	NA	Design and development of A multiple control enabled vaccum cleaning and wiping robot	ICMESD 2020	International Conference on Mechanical Engineering For sustainable Development 2020	2019-20	12
13	Dr D Y Dhande	NA	Effect of Free Stream Turbulence on Aerodynamic Performance of Wind Turbine Airfoil NACA 4415	ICMESD 2020	International Conference on Mechanical Engineering For sustainable Development 2020	2019-20	13
14	Dr D Y Dhande	NA	Blade Number Effects on the Performance of INSEAN E779A Marine Propeller in Cavitating Flow	ICMESD 2020	International Conference on Mechanical Engineering For sustainable Development 2020	2019-20	14
15	S R Patil, S T Chavan	NA	Experimental performance analysis of centrifugal blower for different impeller diameters	ICMESD 2020	Inetrnational Conference on Mechanical Engineering for Sustainable Development - 2020	2019-20	15

16	S R Patil, S T Chavan	NA	Experimental investigation of modified inlet duct on centrifugal blower performance	ICRADM 2020	International Virtual Conference on Recent Advancements in Design and Manufacturing	2019-20	16
17	M P Bauskar	NA	Implementation of lean management to sustain Quality and productivity in the office and the manufacturing Environment	ICRADM 2020	International Virtual Conference on Recent Advancements in Design and Manufacturing	2019-20	17
18	A V Waghmare , Ashok Pise	NA	Numerical modeling of latent heat storage for solar thermal application	ICRADM 2020	International Virtual Conference on Recent Advancements in Design and Manufacturing	2019-20	18
19	S V Chaitanya, D N Katkoria	NA	EGR Strategies for BSVI Norms to Reduce Nox in heavy Duty Natural Gas Engine	ICRADM 2020	International Virtual Conference on Recent Advancements in Design and Manufacturing	2019-20	19
20	P S Aglawe	NA	Deformity correction methods for fracture bone alignment : an overview	ICRADM 2020	International Virtual Conference on Recent Advancements in	2019-20	20

					Design and Manufacturing		
21	Dr.S.V. Athawale	Software Testing : 180+ Most Frequently asked Interview Questions with Answers	Nil	nil	nil	2019-20	21
22	Dr.S.V. Athawale	Technical Interview Programs For Core and Advance Java	Nil	nil	nil	2019-20	22
23	Dr.S.V. Athawale	Python Interview Questions with Answers	Nil	nil	nil	2019-20	23
24	Dr.S.V. Athawale	Robotic Process Automation	Nil	nil	nil	2019-20	24
25	Dr.S.V. Athawale	7 Ways To Create Your Own Success	Nil	nil	nil	2019-20	25
26	Sandip Chaudhari	Electric Power Transmission And Distribution	NA	NA	NA	2019-20	26
27	Sandip Chaudhari	Maintenance of Electrical Equipment	NA	NA	NA	2019-20	28
28	Sandip Chaudhari	Electrical Estimating And Contracting	NA	NA	NA	2019-20	30
29	Sandip Chaudhari	Utilization of Electrical Energy	NA	NA	NA	2019-20	32
30	Sandip Chaudhari	Power System –II	NA	NA	NA	2019-20	34
31	Sandip Chaudhari	Illumination Engineering	NA	NA	NA	2019-20	36
32	Sandip Chaudhari	Illumination Engineering	NA	NA	NA	2019-20	38

33	Sandip Chaudhari	High Voltage Engineering	NA	NA	NA	2019-20	40
34	Sandip Chaudhari	Drives and Control	NA	NA	NA	2019-20	42
35	Sandip Chaudhari	Industrial Drives and Control	NA	NA	NA	2019-20	44
36	Sandip Chaudhari	Utilization of Electrical Energy	NA	NA	NA	2019-20	46
37	Sandip Chaudhari	Electrical Substation Practices	NA	NA	NA	2019-20	48
38	Dr A B Patil	Coefficient estimates for a new subclass of meromorphic bi-univalent functions defined by Al-Oboudi differential operator Title of the Book - Advanced Mathematics Theory and Applications	NA	NA	NA	2019-20	50
39	Vishal Godase, Ashok Pise & Avinash Waghmare	NA	Development of the Latent Heat Storage System Using Phase Change Material with Insertion of Helical Fins to Improve Heat Transfer Rate	Advances in Electromechanical Technologies Select Proceedings of TEMT 2019	TEMT: International Conference on Emerging Trends in Electromechanical Technologies & Management	2019-20	51
40	K. N. Hendre & B. D. Bachchhav	Advances in Intelligent Systems and Computing	Screening of Organic Brake Pad Materials Using MADM Technique	Advanced Engineering Optimization Through Intelligent Techniques Select Proceedings of AEOTIT 2018	AEOTIT: International Conference on Advanced Engineering Optimization Through Intelligent Techniques	2019-20	52

41	Dr D Y Dhande	NA	Experimental analysis of Hydrodynamic Journal Bearing	IJERT: NTASU 2020, Vol. 9, issue 3	Technical Advancements for Social Upliftments, TASU2020	2019-20	53
42	S. V. Chaitanya & A. K. Jeevanantham	ICRRM 2019 – System Reliability, Quality Control, Safety, Maintenance and Management	A New Approach to Control Assembly Variation in Selective Assembly Using Hierarchical Clustering	ICRRM 2019 – System Reliability, Quality Control, Safety, Maintenance and Management Applications to Civil, Mechanical and Chemical Engineering	ICRRM: International Conference on Reliability, Risk Maintenance and Engineering Management	2019-20	54
43	G B Narkhede, Satish Chinchanikar, S S Vadgeri and B S Rathod	IOP Conference Series: Materials Science and Engineering	Comparative evaluation of machining performance of inconel 625 under dry and cryogenic cutting conditions	IOP Conference Series: Materials Science and Engineering	2nd International Conference on Emerging trends in Manufacturing, Engines and Modelling (ICEMEM -2019) 23-24 December 2019, Mumbai, India	2019-20	55
44	D S Bormane, R B Kakkeri	NA	Role of surface electromyography in detection of temporomandibular joint disorders : An Overview	Proceedings of Research for a 67th International Conference Tokyo	NA	2019-20	56

45	A D Ratnaparkhi, D S Bormane	NA	Evaluation of rough set and fuzzy rough set models with application to multi attribute decision making	IEEE	NA	2019-20	57
46	D S Bormane	NA	Development of Algorithm for extraction of fetal from maternal ECG on benchmark database and Prototype development for Acquisition	IEEE	4th International Conference on Computing Methodologies and Communication	2019-20	58
47	S N Ohatkar, D S Bormane	LNEE	Bio-Inspired AI Optimization Techniques to Evaluate Data Rate and Minimize Interference in Cognitive Cellular Network	ICDSMLA 2019	Proceedings of the 1st International Conference on Data Science, Machine Learning and Application	2019-20	59
48	R Ritkarkar, D S Bormane	NA	HOG Based gesture to voice conversion system for Indian sign language using Rasberry Pi	NCIET2020	Online National Conference in Innovation in Engineering and Techmology 2020	2019-20	63

49	Vedant Digraskar, B A Patil	NA	HIntelligent Agriculture System with Crop Selection Using IOT	NCIET2021	Online National Conference in Innovation in Engineering and Techmology 2021	2019-20	64
50	Ajinkya Gaddimme, D G Bhalke	NA	Text To Speech Synthesis In Celebrity's Voice	NCIET2022	Online National Conference in Innovation in Engineering and Techmology 2022	2019-20	65
51	Ingale Prafulla, Kirtimalini Chaudhari	NA	Distressed Positioning System Based on LoRa	NCIET2023	Online National Conference in Innovation in Engineering and Techmology 2023	2019-20	66
52	A N Katariya, Ankita Gupta	NA	Voice to Indian Sign Language conversion for hearing impaired people	NCIET2024	Online National Conference in Innovation in Engineering and Techmology 2024	2019-20	67
53	P S Patil, N P Mawale	NA	Water Level Monitoring and Leakage Detection System using LoRa	NCIET2025	Online National Conference in Innovation in Engineering and Techmology 2025	2019-20	68

54	Sanket Chavan, S P Bhosale	NA	Drone Surveillance System	NCIET2026	Online National Conference in Innovation in Engineering and Techmology 2026	2019-20	69
55	Mahesg Ghate, V V Deshmukh	NA	Accident Detection and Monitoring Using Black Box	NCIET2027	Online National Conference in Innovation in Engineering and Techmology 2027	2019-20	70
56	Shruti Palsutkar, V S Navale	NA	Design of Human Hand Prosthesis	NCIET2028	Online National Conference in Innovation in Engineering and Techmology 2028	2019-20	71
57	Shruti Palsutkar, V S Navale	NA	Restaurant Waiter Robot	NCIET2029	Online National Conference in Innovation in Engineering and Techmology 2029	2019-20	72
58	Shruti Palsutkar, V S Navale	NA	Treatment of Greywater By Using Activated Carbon	NCIET2030	Online National Conference in Innovation in Engineering and Techmology 2030	2019-20	73
59	Amar Mahalankar, Y P Lad	NA	Electrical Bus Wireless Charging System	NCIET2032	Online National Conference in Innovation in Engineering and Techmology 2032	2019-20	74

60	S A Takalkar, D S Bormane	NA	Pesticide Spraying Quad Copter	NCIET2033	Online National Conference in Innovation in Engineering and Techmology 2033	2019-20	75
61	Pranali Jadhav, S B Dhekale	NA	IoT based Monitoring & Mapping of Absentee Visualization on the Shop-floor	NCIET2034	Online National Conference in Innovation in Engineering and Techmology 2034	2019-20	76
62	Rohan K , A Y Kazi	NA	Accident Detection and Reporting System	NCIET2035	Online National Conference in Innovation in Engineering and Techmology 2035	2019-20	77

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International Conference on Mechanical Engineering for Sustainable Development-2020
Organized by Mechanical EnggDept, AISSMSCOE, Pune, Maharashtra, India (17-18 Feb 2020)

Tibo-Parametric Influence on Wear of Dry Sliding Bearing Material

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Abstract

Bearings are the significant components which play very vital role in any machine or mechanism. Therefore, tribological study of bearing materials is the most important concern which will give the proper material selection idea. For experiment purpose, the plain Iron-based bearing material and with addition of 3% and 5% MoS_2 were used. The various methods show tribological analysis of different materials, but to prove the geometrical as well as the kinematical behaviour of the material, the dry bearing test setup used. The present study highlights the effect of process parameters on the wear. The behaviour of wear was analyzed experimentally and graphically. Taguchi Method, one of the Design of Experiment (DOE) techniques, was used to analyze the wear with the help of orthogonal array (OA). The Minitab17® statistical tool was used to analyze Taguchi technique. The statistical problem solving techniques helped to find out dependencies of process parameters and the wear of bearing material. The goodness of fit have also been analysed with the Chi-Square technique. The results were analysed with the help of contour plots which shows the area of application of respective bearing material.

Keywords: *Dry bearings, Wear, Taguchi, ANNOVA, Contour plots*

1. Introduction

Material optimization is the basic need for any kind of manufacturing. The durability and fatigue life of the component totally depends on the material properties. Therefore, material selection seems to be most important concern in order to achieve greater service life of the component. Friction, wear and lubrication are the properties which have to be analyze functionally, economically and ecologically as well. Bearings are one of the most important components which gives the smooth motion to machine elements which are in relative motion. Therefore, material optimization for bearing materials have to be prioritize firstly.

There are certain application areas where the temperature limits the lubrication property but is necessary to achieve smooth motion or in a reactive environment. Maintenance and contamination of lubricants also restrict its use in an application. The use of dry bearings has been increased in recent years. The bearing material itself acts as a lubricant during application. Two main requirements for the dry bearing material have to be fulfilled. Firstly, it must sustain constant as well as variable loading conditions without significant distortion or loss in strength. Secondly, it must have a lower coefficient of friction and wear and must withstand critical temperature conditions (14).

Various kinds of literature show the thorough study of material selection for dry bearings. The brief knowledge of proper material selection and design is explained in 'Engineering Materials: Properties and Selection' by Kenneth G. Budinski and Michael K. Budinski (2009). Properties of metals, non metals and polymer based materials and their selection criteria nicely explained in this book. The brief survey of materials and factors affecting performance was studied and discussed their applications by Lancaster, 1973. This research highlights polymer-based dry bearing material and their properties in order to implement it in respective application areas (14). The coating of Polyurethane (PU) polymer on Babbitt substrate was prepared and examined with respect to real conditions by Dongya Zhang et. al., 2015. The improvement in tribological properties of bare Babbitt material was observed during the analysis (3). A micro and nano crystalline

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Wear inside PGT of CNC Bending Machine during Meshing due to Line Contact

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Dr. P. S. Gajjal[B]
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Abstract-- *In this research article, the gear mating process of PGT system inside of CNC bending Machine is examined in order to estimate the rate of wear for EN24 Material. As planetary gear system is able to transmit high torque and provide high performance along with high reduction ratio. It is widely used in many applications. Meshing is considered on the Sun and planet gear only. Experiments are performed on a cylinder-on-disk machine with varying loads from 80 N to 100 N. The time duration for which experiments are performed is of 5 & 10 min at 1250 rpm. The results show that the frictional coefficient changes with time and normal load. From tests it found that that the frictional coefficient increases as rubbing time increases and after that remain unchanged for a remaining time period. It is also observed that wear and the frictional coefficient also increases as normal load increases on EN24 materials. Test to measure wear was carried out for EN 24 material by rubbing cylinders on EN-31 disk.*

Keywords - CNC Bending Machine, Planetary Gear box, Gear Meshing, Cylinder-on-disc machine, Frictional Coefficient, Rate of Wear.

Nomenclature — b = half width of contact
P = contact pressure
F = applied force
L = length of contct region
v = 0.3 = poissions ratio
E = 210 Gpa = Youngs Modulus
z = vertical compressed length at point of contact
σ = principal compressive stress
τ = principle shear stress
R = radius of gear at the point of contact
τ_{li} = shear stress of lubricant
μ = dynamic viscosity of lubricant in N-sec/mm^2
n = rotation speed of gear or disc in RPM
du = angular velocity
h = lubricant film thickness
f = Coefficient of friction
W = frictional force
μ = Kinematic viscosity (mm^2 / sec)
ρ = density of oil (kg/ mm^3)
t = time in second

I. INTRODUCTION

Computer numerically controlled (CNC) pipe bending is a process of manufacturing pipes in desired shapes. Which is carried out by bending metal pipe of the same diameter and having a varying length? These machines maily uses planetory gear box as it provides hign torque which is used for the bending of pipes. CNC pipe bending machines as shown in Fig 1, can bend metal pipes from just a few mm in length to sections many meters long on the largest industrial machines. As shown in fig 2 a planetary gear transmission also known as epicyclic gear train box made up of two gears mounted one on another in such a manner that the center of planet gear rotate around the center of the sun gear.

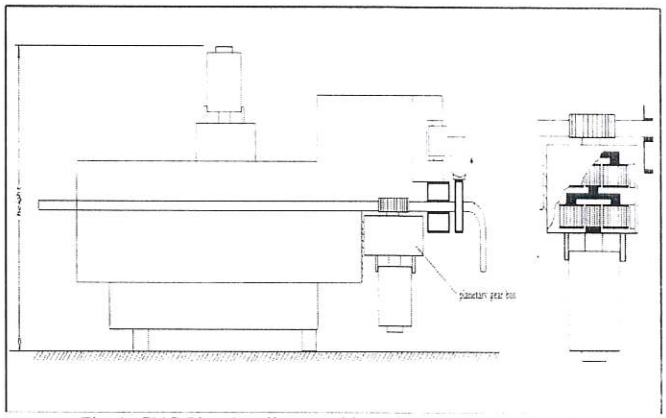

Fig. 1. CNC Pipe Bending Machine with Planetary gear box

As shown in fig 2 a planetary gear transmission also known as epicyclic gear train box made up of two gears mounted one on another in such a manner that the center of planet gear rotate around the center of the sun gear. An arm acts as connectors between the centers of sun and planet gear and rotates to carry planet gear, around the sun gear. The planet meshes with sun gears so that their pitch-circles roll without slip. A point on the pitch circle of the planet gear traces an epicycloid curve. In this simplified case, the sun gear is fixed and the planetary gear(s) roll around the sun gear, it can be changed as per the requirement of output power. During the process of power transmission at least two gear mesh together as shown in Fig. 3 and transmit forces from one gear to another. The teeth on the two meshing gears all have the same shape.

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Analysis of Pendulum Motion for Harmonic Base Excitation

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Abstract:Many engineering applications need crane systems to transfer the payload which in turn uses pendulum system as primary working system. It often experiences swaying movement of payload during the transfer in horizontal direction as well as vertical direction. From a practical perspective, this paper focuses on the behavior of base excitation on the pendulum during various cases in vertical direction and the graphical data obtained through MATLAB programming for various situations are compared. Larger excitation amplitudes and larger frequencies give specific behavior in pendulum oscillation. Some of these variables can be used to damp the vibration created in pendulum system which is very helpful in practical engineering applications and other chaotic variables can be identified by analytic data derived with help of MATLAB.

Keywords: Base excitation, Cranes, Load lifting, MATLAB, Pendulum.

I. INTRODUCTION

There has been a constant demand for the overhead cranes for long time as they have capability to transfer heavy loads as per the requirement in various industries. But there is vibrational issuerelated with the systemwhile transfer of load takes place. Sometimes it can lead to the failure of the system or the load which is not desirable and costly as well as time consuming [1].

Many researchers have done work in controlling the swaying movement of load during the horizontal transfer with different kind of strategies. Some of them depend on input shaping such zero vibration, zero vibration and derivative, extra intensive, etc. shapers to control the vibration. Many new input shaping techniques such as model reference command shaping and modified input shaping are also applied for the purpose of controlling the movement during the horizontal travel [2-7].

But there is only small amount of work done on the control of vibration during vertical movement of load i.e. lifting and lowering of load. A simple pendulum system can be imagined to see how it acts for the external base excitation on the payload of pendulum system. By studying different types of behavior, we can implement new strategies for the control of vibration occurred in pendulum system [8].

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II. PENDULUM WITH BASE EXCITATION IN VERTICAL DIRECTION

A. Dynamics of Pendulum with change in Length

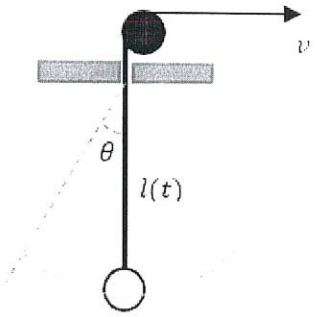

Fig. 1. Pendulum with change in length with time

If pendulum considered to have initial length l_0, mass m, when we give deflection θ_0, it shows motion with change in amplitude and equation of motion can be represented by considering equilibrium along Tangential directionas shown in fig. 1 which gives:

$$ml^2\ddot{\theta} + mg\sin\theta + 2\dot{l}\dot{\theta}ml = 0 \quad (1)$$

Equation (1) represents equation of motion of undamped free vibration of simple pendulum with change in length with respect to time where $\dot{l}$ is change in length with respect to time and $\dot{\theta}$ and $\ddot{\theta}$ are angular speed and angular acceleration. The derivation is done theoretically with equilibrium as well as momentum method.

B. Base excitation in Pendulum

If there is base excitation in system, then it will directly affect the length of pendulum which is shown in (2). So the length of pendulum system can be represented as:

$$l(t) = l_0 + l_a \sin wt \quad (2)$$

Where l_a is amplitude of base excitation and w is excitation frequency in radian.

III. MATLAB SIMULATION

Simulation of base excited pendulum with different cases was done using MATLAB programming and graphs were achieved for different cases. Here the excitation amplitude and frequency are taken different for different cases for comparison purpose. Also initial length is $l_0 = 1m$, angular displacement is $\theta_0 = \frac{\pi}{6}$ which gives natural frequency of pendulum $w_n = 3.1321$ rad/s.

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Analysis & Optimization of A PitmanArm

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Abstract:*Nowaday'sincreasesinvehicledemand at a lower rate are necessity of vehicle manufacture. Expectation in terms of durability, efficiency and cost is raising exponentially by customers. Over designed componentsinvehicleleadstoincreaseweightandreduced efficiency. Pitman arm used to steer vehicle can be redesigned and modified for achieving less weight andthus cost. Existing pitman arm component available in market willbereverseengineeredandCADmodelledusingCATIA V5 software. Finite element Discretization & Analysis will be carried out using Ansys package. FEA will help in finding out high factor of safety locations in component andalsodefiningareawhichcanbemodified.Newproduct will be manufactured based on optimized dimensions. Comparative analysis will be done between experimental and FEA results. Conclusion and future scope will be suggested.*

Keywords *: Ansys, Finite element analysis, Pitman arm, Simulation.*

I. INTRODUCTION

The **Pitman arm** is a steering component in an automobile or truck. As a linkage attached to the steeringbox (see recirculating ball) sector shaft, it converts the angular motion of the sector shaft into the linear motion neededtosteerthewheels.Thearmissupportedbythesector shaft and supports the drag link or centre link with a balljoint.Ittransmitsthemotionitreceivesfromthesteeringbox intothedrag(orcentre)link,causingittomoveleftorrightto turn the wheels in the appropriate direction. The idler arm is attachedbetweentheoppositesideofthecentrelinkfromthe Pitman arm and the vehicle's frame to hold the centre ordrag link at the proper height. A worn ball joint can cause play in thesteering,andmaygetworseovertime.Thepitmanarmis also called steering arm, it is a linkage which is attached at one side to the steering box (through sector shaft) at the bottomofthesteeringwheelshaftandontheothersidetothe track rod which is attached at the other end to the idler arm. Whenthesteeringwheelisturnedleftorright,awormgearat the bottom of the steering shaft turns a set of teeth. That actionmovesagearthatactivatesthepitmanarm,causingthe steering linkage to move thewheels.

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II. OBJECTIVES

- To study and perform static analysis on pitman arm under steeringload.
- To propose an optimized model which will have better or same performance and reducedweight.
- CAD modelling of PitmanArm.
- Analysis of Pitman Arm against following parameters:
  1. TotalDeformation
  2. Von Mises Stress
  3. Equivalent elasticstrain
  4. Factor ofSafety
- Experimental Testing on PitmanArm.
- Comparative Analysis between Experimental results for existing & optimizeddesign.
- Conclusion & Futurescope.

III. LITERATURESURVEY

A. Optimal Structural Design of Vehicle Components Using Topology, Design and Optimization

Ali Riza Yildiz, Uludag University,Bursa, Turkey

Topological approach is used by the authors to potimize the product considering the effects of different parameters on structural model. Based on the optimization results, paper concludes that structural optimization gives unique design & reduces cost & time.

B. Optimal design of vehicle components usingtopology design &optimization

Ali Riza Yildiz, Necmettin Kaya & Ferruh

Authors of the paper have optimized the engine mount bracket against its structural parameters & shares the results obtained on the basis of testing the same product against its fatiguelife.Paperalsoconcludesthatintegrationoftopology, shape & fatigue analysis has to be done to get effective results.

C. Structural optimization of automotive chassis: theory, set up, design

Marco Cavazzuti and Luca Splendi

Paper explains different structural optimization methods & their siginificance in mechanical design to promote innovation in industry. Paper concludes that topology & topometry optimizes the component

D. Optimal Vehicle Structural Design forWeight Reduction using Iterative Finite ElementAnalysis

Steven Tebby

Inthispaper,theplatethicknessisdeterminedbydividingthe vehicle structure into number of substructures & then by usingtheoptimizationprocess.Heretheoptimizationisdone

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Analysis of Vibration Impact on Human Arm Using Simulink Based Approach

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Abstract: *The machine generates some vibration when it's working mode. It's vindicated that such vibration can be effectively transmitted to the human hand cause unfavorable effects. The objective is to investigate the vibrationtransmissibilityfromthehand-arm.Someinjuries causedduetomechanicalvibrationtransmittedtoahuman hand while driving a vehicle or operating the heavy machine. To investigate the biodynamic model and biodynamic response in the 6 degrees of freedom of human arm system. This model is based on the second-order of the Mass-Spring-Damper system. This study presents the biomechanicalmodelconsideringthemasses,stiffness,and damping of the fingers, palm, forearm, and upper arm of the human arm and corresponding to find the different modesofvibrationonit.Tostudypossiblewaystominimize the health hazards on hand due to anti-vibration materials by using isolator and gloves. These results had been discussed the view point of the vibration response behavior of arm that presented in the Matlab-Simulink. Matlab-Simulink based on this model to determine the effect of vibration transmissibility from driving a vehicle handle or operating machines handletool.*

Keywords : Anti-vibration materials, Biodynamic of hand-arm vibration, Ergonomics, Hand-arm model.

I. INTRODUCTION

Nowadays, in daily life, the human arm is exposed to different mechanical vibrations that occur during traveling through vehicles or heavy handling machinery. These segments are to be taken estimation the vibration transmission distributes in the fingers, palm, forearm, and upper arm structure of the hand, when holding a handle. The major part of the component is upper joint member of the musculoskeletal disorders (MSD) and remains major occupational diseases for further life. The vibration distributed in various substructures of the human arm system exposed. In this study, 6 degrees of freedom (DOF) of the hand arm system (HAS) to made the mechanical model. To investigate the biodynamic response (BR) characteristics of the hand arm system. The human arm system model with isolator and gloves to be used simulated in Matlab-Simulink software. To determine the transmissibility of vibration values at different segments of the hand arm system.

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II. BIOMECHANICALMODELOFTHEHUMAN ARM

A. Modeling of the Gloved Hand–ArmSystem

Briefly,theproposedsixdegreesoffreedom(DOF)model are shown in Fig.1 is employed in the present to fully characterize of the biodynamic responses of the hand -arm system. This study used the methodology reported for identifying the model parameters.

This equation of motions for the 6-degrees of freedom model. Mass properties of the arms, (M_1) is the mass of shoulder and a part of the upper-arm body; (M_2) is the mass of fore-arm; (M_3) is the mass of palm; (M_4)is the mass of fingerscontactskinwithgloves,and(M_5andM_6)isthemass ofglovesandisolator.Similarly,(K_1andC_1)arethestiffness and damping coefficient between trunk and upper-arm; (K_2 andC_2)arethestiffnessanddampingcoefficientbetweenthe upper-arm and fore-arm;(K_3 and C_3) are the stiffness and damping coefficient between the fore-arm and palm; (K_4 and C_4) are the stiffness and damping coefficient between the palm and fingers; (K_5 and C_5) are the stiffness and damping coefficient between the fingers and gloved; The glove material between the isolator and glove-hand interface is represented by its lumped stiffness and damping coefficient (K_6 and C_6).

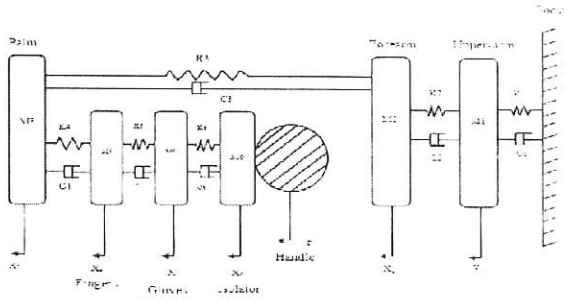

Fig. 1.Hand grip posture and the 6-DOF model of the hand-arm system with isolator and gloved.

Following inequality constraints were imposed on the glove model parameters.

$M_1,M_2,M_3,M_4,M_5,M_6;K_1,K_2,K_3,K_4,K_5,K_6;C_1,C_2,C_3,C_4,C_5,C_6 \geq 0$,

$M_1 < 15$ kg (A part of upper-arm)
$M_2 < 10$ kg (A part of fore-arm)
$M_3 < 350$ g (Palm contact skin)
$M_4 < 300$ g (All fingers)
$M_5 < 250$ g (Gloves)
$M_6 < 150$ g (Isolator)

B. Calculation the Vibration TransmitsResponses

The biodynamic response has expressed in terms of vibration transmissibility (VT) for the hand arm system.

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Design and Development of Test Rig for Testing Human Vibratory Model

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Abstract*: We human come in contact with many mechanical applications where we get to meet very high level mechanical vibrations, especially people who drive heavy duty vehicles like tractors, trucks, construction vehicles etc. Human body vibration is a phenomenon affecting millions of workers in the world. In vibration human body is unified and complex active dynamic system. Many harmful side effects of the vibration can be both physiological and neurological which in many cases lead to permanent injury or disagreeable feelings giving rise to discomfort or exasperation result in impaired performance and health means.The test rig will include a multi degree freedom (Four Degree Of Freedom) vibratory lumped parameter model which is to investigate biodynamic response such as Seat To Head Transmissiblity (STHT), Driving Point Mechanical Impedence (DPMI) and Apperent Mass (APMS) of different masses & stiffness to the analysis of vibrations impact on different parts of human body while driving a vehicle in sitting posture, and ultimately to find out the effects of mechanical vibrations on the human body in accordance with the human anthropometric data.

***Keywords* : Vibration, Lumped parameter model, Huamn Anthropometry, Biodynamic responses-STHT, DPMI, APMS.**

I. INTRODUCTION

Humans are most sensitive to whole body vibration under low-frequency excitation in seated posture. It is also well known that the spine may be fractured when subjected to strong vertical acceleration. In addition, the transmission of vibration to the human body may reduce comfort, or even have an adverse effect on health. If the vibration is very severe, for example in a vehicle on a dirt track, injuries on seated occupants and drivers may become a problem. There have been multiple research about the vibrations of human body for sitting posture. A vibration is a periodic motion of the particles of an elastic body or medium in alternately opposite directions from the position of equilibrium when that equilibrium has been disturbed. These vibrations affect the human comfort while driving and various problems depending on the subjects like human gender, human age, human posture, human anthropometric data, magnitude of vibration (amplitude and frequency).

The human body is a very sophisticated dynamic system whose mechanical properties vary from moment to moment and from one individual to another. Lumped-parameter models consider the human body as several concentrated masses interconnected by springs and dampers. This type of model is simple to analyze and easy to validate with experiments. The human body model is useful to stimulate human response in which different body parts are considered as a lumped mass system. The parameters included in the study are driving point mechanical impedance (DPMI), apparent mass (APMS), seat to head transmissibility (STHT) functions. These parameters are evaluated through a MATLAB program formed by human anthropometric data. These parameters can help to evaluate the vibrations to human body and how much particular element is affected by the vibration.

Wael Abbas et al.[1] has performed the experimentation and measure for seated subjects with feet supported and hands held in a driving position. Variations in the seated posture, backrest angle, and nature and amplitude of the vibration excitation are introduced within a prescribed range of likely conditions to illustrate their influence on the driving-point mechanical impedance of seated vehicle drivers. Within the 0.75-10 Hz frequency range and for excitation amplitudes maintained below 4m/s2, a four-degree-of-freedom linear driver model is proposed for which the parameters are estimated to satisfy both the measured driving-point mechanical impedance and the seat-to-head transmissibility characteristics defined from a synthesis of published data for subjects seated erect without backrest support.

M. J. Griffin et al.[2] he has study the nonlinearity in their biodynamic responses and quantify the response in directions other than the direction of excitation. Twelve males were exposed to random vertical vibration in the frequency range 0.25–25Hz at four vibration magnitudes (0.125, 0.25, 0.625, and 1.25ms). The subjects sat in four sitting postures having varying foot heights so as to produce conflicting thigh contact with the seat (feet hanging, feet supported with maximum thigh contact, feet supported with average thigh contact, and feet supported with least thigh contact). Forces were measured in the vertical, fore-and-aft, and lateral directions on the seat and in the vertical course at the footrest.

Martin G.R.et al.[3] has explore the effects of vibration magnitude and intended periodic muscle activity on the apparent mass resonance frequency with vertical random vibration in the frequency range 0.5–20 Hz. Each of 14 subjects was exposed to 14 combinations of two vibration magnitudes (0.25 and 2.0ms-2) in seven sitting conditions: two without voluntary periodic faction, and five with voluntary periodic faction. Three conditions with voluntary periodic faction appreciably reduced the difference in

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Design and Development Lower Limb Exoskeleton for Rehabilitation

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Abstract: ***Duringthedecaderesearcherhavefocusedonthe development of lower exoskeleton for increasing power for military and medical assistance. This paper consists of proposed designing and development of lower limb exoskeleton for rehabilitations. The rehabilitation is care that can help you get back, keep or improve abilities that you need for daily life. The designed exoskeleton is weight carryingfunctionwhichreducethepowerandsizeofmotor andreducethecostofsystem.Thematheticalcalculation is done by using MKC model which help to finding the acceleration, velocity and displacement of lower limb exoskeleton. The design of exoskeleton made with the low costsothatitcaneasilyaffordableovercurrentexoskeleton in the market. The sensor is used to actuate the motors in theexoskeletonanditwillcontrolbyusingmicrocontroller.***

Keywords: **Exoskeleton, Lower Limb, Rehabilitation, Low Cost, Inertial Measurement Unit**

I. INTRODUCTION

High complexity and cost have hindered the research from applying the exoskeleton in rehabilitation which actuallyhelpsthemankindofanexoskeletontoassistuserin walking which focus on the lower limb. The existing exoskeleton are widely concentrated on the military usage whiletheonesavailableformedicalpurposearecomplexand costly. The design of exoskeleton is used to carry the weight function of the exoskeleton to support the forward motion function of exoskeleton which reduces the power and sizeof motors so that it will reduce the overall weight, cost of the exoskeleton. Blocking of the motion at knee joint by using pneumaticcylinderatthekneejoint.Thepneumaticcylinder isactuatedattheminimumbendangleofknee.Theminimum value of bending angle of knee joint is depends on the walking style of the human. The mechanism of the exoskeleton features the human body to seat and rest the human body weight at the moment of blocking at knee joint. The mechanical structure of each leg has six degrees of freedom:fouratthehip,oneatthekneeandoneattheankle. Exoskeleton legs are attached to subject legs using flexible cuffs. The operation of all actuators depends on the amount of pressure felt by the feet pressure sensors and knee angle sensor. The sensor readings depend on actual posture of the subject and can be classified in three distinct cases: subject standsononeleg,subjectstandsstillonbothlegsandsubject standsonbothlegsbuttransititsweightfromonelegtoother.

Later Simu-linking model made to take output from MKC model at low cost so that it can be offered-able.

A. ProblemStatement-

Now a day's military person carrying heavy backpacks and weaponry, because of that load is on lower limb of body. This cause quickly takes over, diminishing the limits of the human lower limb. These are problems is faced by the military person every day.

B. Objective-

a) To create a soft and lightweight model that helps increase amountofweightahumancaneasilycarrywhilelessenergy and increase theirendurance
b) Make MKC model to find the acceleration velocity and displacement.
c) Making of Simulinkmodel.

II. DESIGN OF LOWER LIMBEXOSKELETON

The exoskeletons are designed to provide strength in gait and to transport heavy loads. There are also designs for assisting people with disorders in motion or elderly people. The rehabilitation of gait is greatest challenges now days for thehumananditwillbeincreasingthediseasesmotionofthe legs.Theroboticexoskeletonisdeviceismadetoovercomes the problems lower limb of human body. To overcome this problemthevarioustypeofexoskeletonismadeaccordingto their function ofperformance.
Figure 1 shows two wearable lower limb exoskeletons.The exoskeleton is device that enhance the physical capabilities ofusersandlatterthatisassignedtothehuman.Thedevice isactsparallel to thebothrightandleftlegsofhumanbody to carry weightequally.

The exoskeleton in medical field used for rehabilitation therapies to overcome problem of patients like lower limb paralysis, knee joint problem and spinal cord injury caused due to hemiplegia.
The design of the exoskeleton should be light in weight so that the paralysis patients can easily adopt it and increase the strength of paralysis patients. While making the exoskeleton there are survival point should be understanding and that are discussed in the feature of lower limb exoskeleton so it can be help to make exoskeleton light in weight and cost efficient.

A. Lower limb exoskeletonfeatures

Exoskeleton are the mechanical device is used to support the human lower body anatomy for the movement of lower body and increasing the strength of human. To make exoskeleton lighter and cost effective the following feature should be considered will making design of the exoskeleton:

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Investigation of process parameters of deep drawn square cup for automotive applications

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Abstract-

Deep drawing is one of the extensively used sheet metal forming process in industries for mass production of cup shaped components in a very short time. In this paper, effect of the most significant parameters in sheet metal forming process of a square cup, such as punch and dies radius, coefficient of friction and Blank holding force, is well analyzed optimizing this parameter, array is made by Taguchi method thereby followed simulation in Autoform software, then trials have been taken on lower, medium and higher levels. Experimental results obtained are validated by explicit nonlinear behavior of sheet metal forming process utilizing the FEA software. Formability was investigated by drawing EDD 1079 sheet in terms of forming limit strains.

Keywords: Deep drawing, Square cup, FLD

I. INTRODUCTION

Metal forming is a complicated process to understand and operate. It involves many parameters that are strongly interdependent. A wide range of products from body panels, fenders, and wing parts to consumer products like kitchen sinks, cans, and boxes are made with precision through different operations on a plane blank.

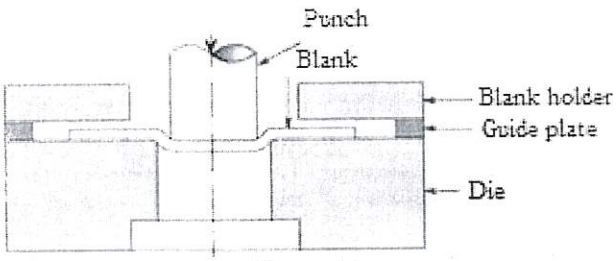

Figure : (a)

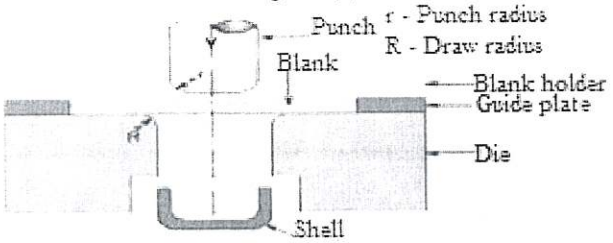

Figure : (b)

Fig.1 Deep draw process

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The forming process involves rigid tooling, draw punches, a blank holder, and a female die. The blank is generally kept over the die and pushed by the draw punch into the die. Radially pressure is applied on the blank holder to control the flow of material. Simultaneous compression–tension can be observed in the radial and circumferential direction. Accurate control of material can avoid dominance of compression. resulting in wrinkling. Materials with higher strength to weight ratios are being used in forming parts of missiles, aircraft, automobile industries. Design in sheet metal forming is an art rather than a science in small-scale industries as it depends on the operator's knowledge, experience, and intuition.

II. PROCESS PARAMETERS

Process parameters were considered for design of setup for drawing of square cup is as follows.

A) Blank Shape

The solutions for improvement in draw ability of square cups can be improvement in the material properties of sheet metal. Knowledge of the process and material variable are required to minimize the defects and optimize the process blank shape is one of the important to parameter in deep drawing process have the quality of deep drawn product, thickness distribution (casting), forming limits, minimizing the defects can be improved by having blank shape optimum. also material cost of product reduced when proper selection blank shape.

B) Press Tonnage

The tonnage of a pressure to the force that the press ram is able to exert safely. The tonnage of hydraulic presses is the piston area multiplied by the oil pressure in the cylinder.

The tonnage is varied by changing the oil pressure. The tonnage of mechanical presses is determined by the size of the bearings for the crankshaft or eccentric & is approximately equal to the shear strength of the crankshaft metal multiplied by the area of the crankshaft bearings. The tonnage of mechanical press is always given when the slide is near the bottom of its stroke because it is greatest at this point.

C) Stroke

The stroke of press is the reciprocating motion of a slide, usually specified as the number of the motion. The stroke is constant on a mechanical press but adjustable on a hydraulic press.

D) Press Capacity

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Challenges and Opportunities in Composite Railway Sleepers

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***Abstract*:-**

The Composite railway sleepers have a large scope but still have limited applications in rail track system. Railway Sleepers, or railroad ties, are one of the major components of the entire railways network and are very critical to its existence in a way that it clamps together the rails and avoid slippage, while maintaining the entire alignment. The paper reviews about the recent developments on the composite Railway sleepers and the limitations which limits its scope. It compares the failures of different types of sleepers and how some of the failures overcomed with the composite sleepers. The Composite Railway Sleepers made of thermoplastics are of low cost and limited strength but can be recycled while, thermosets have higher strength but are not recyclable. It also gives the overview of the challenges faced and overcomed by using composite railway sleeper. Moreover, constrained knowledge on the lifelong performance of the new and alternative materials limits theirapplication.

Introduction:

The conventional materials which were used were having a limited life [1]. Timber was the earliest material used and have been installed worldwide [2-4]. They are adaptable and have excellent dynamic, electrical and sound-insulating properties. Around the 1880s, due to the scarcity of timber and the sensitivity to its use, steel railway sleepers were introduced as an alternative to timber [5]. During the last few decades, the railway industry has focused on a cement-based concrete rather than timber and steel sleepers. Mono-block prestressed concrete sleepers are now used in heavy haul and high-speed rail track constructions throughout the world. Due to the heavy weights, their transportation costs are significantly higher, they are difficult to handle and require expensiveand extensive equipment for installation [6]. All the difficulties have motivated researchers to find an effective alternative sleeper technologies for railway industry. Main objectives of composite Railway sleepers are such as they are ideal for ballasted railroad tracks like in turnouts and crossing, Elasticity of the composites provides good damping and reduce wear and having minimum weight, they have life span more than 50 years which makes them good investment with low life cycle costs. The global market for composites is rapidly increasing because of the many advantages including high strength-to weight ratio, excellent resistance against corrosion, moisture and insects, and thermal and electrical non-conductivity [7]. This material can be engineered according to the specific requirements of railway sleepers [8]. Therefore, the composite railway sleepers can be a perfect alternative for existing concretesleepers.

Failures of conventional sleepers:-

1. **Timber**

Sleeper:- Fungal decay:-

Fungal decay is considered as the predominant mode of timber sleeper failure (Fig. 1). During rainy seasons the sleeper can absorb moisture that makes fungi reactive [9][10].

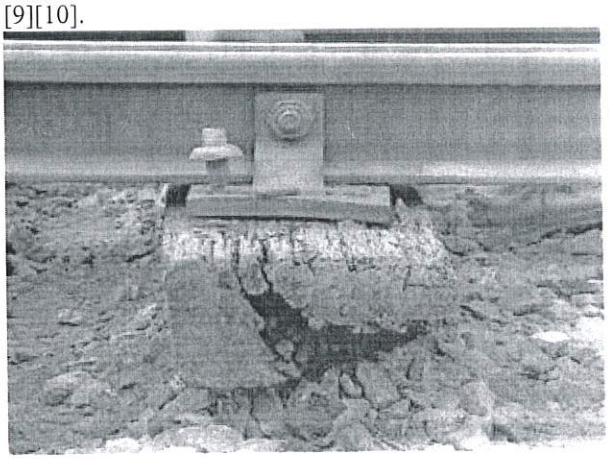

Fig. 1:- Fungal Decay of Timber Sleepers.

End splitting:-Splitting at the end of timber sleeper arises when the sleeper is subjected to large transverse shear loading [10].

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Tribological Evaluation of Non-asbestos Brake Pad Materials

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Abstract: An asbestos is being banned worldwide due to its carcinogenic nature and potential health hazardousness. There is need to replace asbestos friction materials having comparable physical, mechanical and tribological properties. The aim of paper is to evaluate frictional and wear characteristics of non-asbestos brake pad material. A friction material viz: CL-3003 made up of high amount of organic and inorganic fine brass fibres with synthetic nitrile butadiene rubber, were manufactured using hot press compression mould and machined to a sample size. In order to evaluate friction and wear characteristics pin-on-disc test set-up was used. Coefficient of friction and wear were evaluated at different conditions of temperature, sliding velocity, pressure, Sliding distance. Experiments, based on Taguchi's analysis technique, were performed using L_9 orthogonal array. On the basis of experimental results and S/N ratio analysis, ranking of the parameters have been done. Further detailed studies can be extended under simulative test conditions to evaluate optimum stopping distance.

Keywords:Asbestos Free, Friction, Wear, Pin-on-Disc, Taguchi Method, Friction Materials.

I. INTRODUCTION

A brake pad/lining is the most important element of the automotive disc brake system. Brake linings are the sacrificial wearing elements and the primary determinants of frictional behavior, therefore brake pad materials should maintain a controlled friction coefficient, minimum wear and good thermal conductivity. The friction material usually composed of binders, reinforcements, friction modifiers and fillers; however their composition keep changing with applications. Asbestos based friction materials have been used since long, however presently being banned because of its health hazards. A lot of research is being endorsed in developing non-asbestos brake pad materials having equally good mechanical, thermal and tribological properties [1-4, 17-18]. Development of non asbestos friction materials have been carried out [5-8]. The performance characteristics and properties such as wear rate, flame resistance, thermal conductivity, friction coefficient, compressive strength and hardness of newly developed friction materials and its comparison with other commercial brake pad materials and were measured using simulative test conditions and typical pin-on-disc set up [7-11, 17-18]. Verma et. al. [12] observed manifestation of friction bands produced during braking operations, area covered by the friction layer on brake disc surface, its relation with temperature variation and morphological changes. Hendre and Bachchhav [13-14] grade critical properties for a selection of brake pad materials amongst all possible alternatives by using Analytic Hierarchy Process (AHP) and MADM techniques. They found that friction coefficient, wear and thermal conductivity are most predominant properties specially for any kind of braking operation. However, the analysis primarily was based on qualitative attributes only. This kind of analysis may be helpful for the purpose of screening the preliminary performance of alternative brake pad materials. Mahmud et. al. [15] found an effect of contact pressure and sliding speed on tribo-charachteristics of an activated carbon-epoxy composite derived from agro-waste under dry sliding conditions.

This paper highlights the investigation of frictional and wears characteristics of organic and inorganic fine brass fibres with synthetic nitrile butadiene rubber material (viz: CL-3003) in order to render it a commercial material for brake pad application through experimental investigations using Taguchi method.

II. MATERIALS AND METHODS

Friction material was procured from CO-EFF friction bands pvt ltd. India, under the trade name CL-3003 having density 1.90 g/cm3, compressive strength 190 N/mm2 and transverse bending strength 85 N/mm2. CL-3003 is made up of non-asbestos based friction material with extremely high amount of organic and inorganic reinforcing fibre system including fine brass fibres, non-ferrous, organic binding system by special synthetic rubber modified resins plus NBR (Nitrile Butadiene Rubber) rubber which was compression moulded in a heavy duty press, at elevated temperature

In order to depict elemental analysis brake friction material sample were crushed into the fine powder for energy dispersive spectroscopy (EDS) and scanning electron microscopy (SEM). Further investigations were done using Thermogravimetry analysis (TGA). The elemental composition, as measured by EDS is reported in Table 1. Major elements found are C (Carbon), Si (Silicon), Ba (Barium), Sb (Antimony). It also includes elemental properties of Ca (Calcium) and Mo (Molybdenum).

Figure 1 shows EDS spectrum and elemental composition of the CL-3003 material. SEM images at 2000 x magnification are shown in Fig. 2. It shows elemental raw Si and its inter metallic compounds.

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A Bio-based lubricant selection approach using Complex Proportional Assessment method

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Abstract: *An appropriate selection of lubricants for metal cutting applications in a manufacturing environment is a very significant and challenging assignment due to their undesirable effect on the environment and safety aspects. Also, the government has tightened the rules and regulations for public concern. Chemical-based mineral oils are toxic in nature whichis very harmful to environmental concern. Manufacturing industries are looking for ecofriendly vegetable based oil lubricantsasasubstituteformetalcuttingapplications.Inpresent work, fourteen alternatives as vegetable based oil and their nine relevant attributes such as oxidation stability, viscosity index, flash point, pour point, availability, anti-wear, extreme pressure properties, coefficient of friction and cost were considered for assessment. In this work, Researchers present a logical methodology to select suitable vegetable based oil using a novel multiple attribute decision making (MADM) method i.e. Complex Proportional Assessment (COPRAS) method and AHP were used for the relative significant weight of attribute. However, the ranking of vegetable based oil is determined by examining utility degree.*

Keywords: *Analytical Hierarchy Process (AHP), Complex Proportional Assessment Method (COPRAS), Multiple Attribute Decision Making Technique (MADM), Vegetable Oil (VB)*

I. INTRODUCTION

Oil which is originally produced from the plant is used for a food based purpose. Plant oils are not only eco-friendly but also give an extensive variety of fatty acids structure with various applications [1]. Besides of edible oil applications, now a day's demand for plant oil is going to increase day by day for industrial applications such as lubricants, biofuels, soaps, cosmetics, detergents, ink, paints etc. The importance of fatty acids in industrial applications such as metal cutting lubricant is gaining more attention to research. This Plant oil produces fatty acids with a different structure that highlights the physico and chemical properties of oil which make them very useful for wide applications [2].

Machining process consumes some natural sources for metal cutting and generates intensive heat due to interaction between tool and workpiece surface. It happens mainly because of too much shearing causing friction and plastic deformation. This heat at tool interface can reduce the performance of machining, service life of product and disturbing surface quality of the product. In case of the environmental performance of metal cutting lubricant, some are found to be toxic and non-biodegradable in nature [3, 5]. The natural consumption of resources and wastage generation after cutting with mineral based oil lubricant is very difficult to biodegrade. Such generated waste can cause skin diseases to the operators working on them. So in this case, the sustainability of metal cutting becomes a huge question.

Various researchers have been carried out investigation for formulation and tribo-chemical properties of vegetable based oils in metal cutting applications [6-14]. The Formulationofvegetablebasedoillubricantsisachallenging task [4]. Appropriate selection of vegetable based oil lubricant can minimize the temperature, cutting forces and friction during a metal cutting operation. This can as well improvethesurfacefinishofcomponent,toollife,production cost and also save energy resources [5]. From the literature survey,ithasbeenfoundthatmostoftheresearchersreferred experimental methods to find out appropriate metal cutting lubricant for the desired application. While there are some researchers used scientific-based mathematical models or Multi-attribute decision making application for evaluation of suitablealternativebutstill,thereisaneedtohirethesimple, compensatory and efficient mathematical methodology to select appropriate vegetable based oil for the formulation of lubricant in metal cuttingoperation.

In the present work, Researchers made an attempt to explore the applicability and competency of a novelMultiple Attribute Decision Making Technique (MADM), i.e. Complex Proportional Assessment (COPRAS) method for the selection of appropriate base oil in the metal cutting application.

II. COMPLEX PROPORTIONALASSESMENT METHOD

COPRAS method is a scientific-based Multi-attribute decision making (MADM) approach which was developed by Zavadskas for a manufacturing environment. In the COPRAS method, the ranking of alternatives is evaluated using maximum and minimum indexes and utility degree of each alternative. Figure 1 shows the process of a complex proportional assessment method.

However, researchers had mainly emphasized quantitative attributes and qualitative attributes had not effectively considered.

A. Formulation of DecisionMatrix

For the preparation of decision matrix required input values for objective weights were taken from open literature and variousinvestigationscarriedoutbyresearchersonvegetable based oil [3–20]. Attributes are divided into two type's i.e. beneficial attribute and non-beneficial attribute which contain higher value and lower value respectively. InPresent work, VI, FP, PP, OS and WL belong to thebeneficial

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Design and Development of a Multiple Control Enabled Vacuum Cleaning and Wiping Robot

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Abstract: ***A theoretical framework for the design and development of a vacuum cleaning and wiping robot that has multiple modes of control i.e. both manual and automatic has been presented in this paper. In the automatic mode, the working of the robot would be completely automatic with no human intervention. The robot would navigate through the cleaning area/room along a path that is generalised for different types of areas of cleaning. Moreover, it will identify the obstacles coming in its path and will take actions after identifying the position of the obstacles. A lot of time being used up in the household cleaning process, which is generally considered to be unproductive, led to the idea and need of this prototype. Moreover by this robot, we not only aim to reduce this time spending, but also aim to save the human energy that is spent during the cleaning procedures. So as to achieve complete cleaning process the robot would include both vacuum cleaning mechanism as well as the wiping mechanism. A combination of several mechanical components would be controlled by the harmonious working of several switches. These switches would be controlled suitably when needed, by the microcontroller which will incorporate a suitable logical algorithm. The microcontroller will rely on the data achieved from different sensors as well as the logic incorporated, to perform suitable tasks, whenever needed.***

Keywords **:cleaning robot, automatic, vacuum cleaning, ultrasonic etc.**

I. INTRODUCTION

Cleaning in the domestic areas and households in generally considered as a tedious task [1]. Cleaning is mostly accomplished manually in these fronts. A good amount of time as well as manpower (energy) is needed which could be used to financially better and economical tasks [2, 3]. Thus due to this, a prototype of a robot that could accomplish the cleaning tasks in households, consumer, office environments, hotels, restaurants, etc. has been developed. Moreover, fully automatic and semi-automatic machines present in the market are of high cost ranges and having heavy weights. So, keeping the focus on weight as well as cost, they are not affordable to all such as organization committee of hotels, hospitals, hostels. Thus, there is need to design and develop a floor cleaning machine which is multi use and cost effective [2]. It must be capable of vacuum cleaning as well as mopping, simultaneously [3]. As ubiquitous computing technology is expected to become very small and relatively cheap in the future, a large no of electronic chip controlled electronic components can be readily deployed [4].

A vacuum cleaner, a device that uses an air pump to create a partial vacuum to suck up dust and dirt, usually from the floor. The dirt is then collected by either a dust bag or a cyclone for disposal [5]. Wiping is the process where a fabric is used to clean the floor surface using water and soap by rubbing the fabric on the floor. In present days, robotic cleaners have taken a huge amount of attention in robotics research due to their effectiveness in helping humans in floor cleaning applications at homes, hotels, restaurants, offices, hospitals, shops, warehouses and colleges etc. Basically, robotic cleaners are primarily classified on their cleaning technique like floor mopping, dry vacuum cleaning, sweeping etc. [6]. Some products are based on the ability of obstacle avoidance using different kinds of sensors while some utilize laser mapping technique. All cleaning and operating mechanism of robotic floor cleaners have their own advantages and disadvantages. For example, robots having mapping ability are relatively faster, and energy efficient but

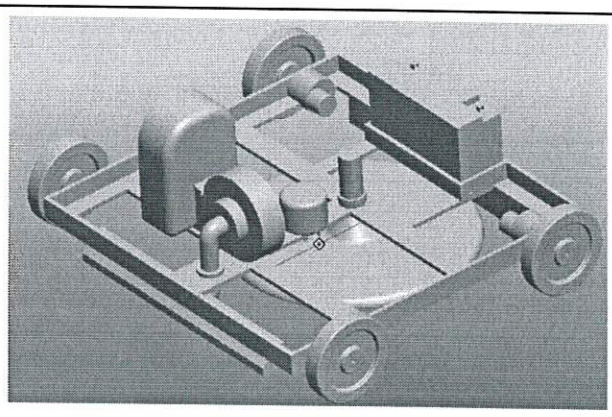

Figure 1: CAD Model of the Robot

are not cost effective, while obstacle avoidance based robots are relatively less time consuming and less energy efficient due to the random cleaning they do. The main objective of this work is to provide a substantial solution to the problem of manufacturing robotic cleaner utilizing local resources while keeping it economically viable and efficient in cleaning.

Several different ways of control were thought upon for the robot. Controlling the robot with a remote was our first thought. Although this control type would result in the

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EffectofFreeStreamTurbulenceonAerodynamic Performance ofWindTurbineAirfoil NACA 4415

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Abstract. The aerodynamic performance of wind turbine airfoils is an important foundation for the aerodynamic design and the performance analysis of the wind turbine. The purpose of the study reported herein was to obtain the effect of the free stream turbulence intensity on the aerodynamic performance of wind turbine airfoil NACA 4415, by using a two-dimensional numerical method. The study was performed by varying the turbulence intensity from 0.1% to 10% at fReynoldsnumberof 216,000, and by changing the angle of attack from -4 to 24 degrees. The airfoil has a chord length of 0.153 m. The finite volume method was used in this study, and the aerodynamic performance of the airfoil was analysed. The lift and drag coefficient of the airfoil were discussed and validated. Itwasfoundthat The freestreamturbulenceintensitycanreducethevalues of C_D, C_D, $C_P$and C_L/C_D, while The freestreamturbulenceintensitydoes not significantlyaffectthewake area behindtheairfoil. The decrease in airfoilefficiencyobservedwascausedbydisruptionoftheboundary layer flowwhichresulted in a decrease in the total pressurecoefficientontheairfoilsurface. The intensityofturbuencecanattenuatethethicknessoftheboundary layer, whichresults in a decrease in shearstressonthesurfaceoftheairfoil. Itisconcudedthatthefreestreamturbulence has a significanteffectonairfoilperformance, wheretheeffectcanincreaseordecreasetheperformance

1. Introduction

Windis a renewableenergythatiscurrentlywidelyusedtogenerateelectricity, replacing non-renewableenergysources. Apartfrombeingmoreenvironmentallyfriendly, thecostofutilizingrenewableenergyisrecentlyincreasinglycompetingwithfossilenergy. Basedon Energy Outlook 2019 data [1], thecostofproducingelectricityforcoal-firedpowerplantsis 0.12-0.13 USD / kWh, whileforonshoreandoffshorewindpowerrespectively are 0.037 and 0.106 USD / kWh. The solar cellandthermalpowerplants are 0.038 and 0.165 USD/kWh respectively. Thesecosts are basedonpricelevelizedenergycosts (LCE). Itincludesinitialcapital, returnoninvestment, continuousoperation, fuel, andmaintenance, as well as thetimerequiredtobuild a plantanditsexpectedlifetime as well as thecarboncaptureandsequestration (CCS). Itcanbeseenthatforonshorepowerplants, renewableenergygenerationcostsmuchcheaperthancoal. The data alsoshowsthat, foroffshoreapplications, thecostforwindenergyismuchlowercomparedto solar energy. Therefore, theuseofwindenergyisverypotentialtocontinuetobedeveloped.

One ofthewindturbineperformanceindicatorisefficiencyorperformancecoefficient (Cp). Thisindicatorisstronglyinfluencedbythedesignofwindturbinesandenvironmentalconditions. In designingwindturbineblades, theimportantparameters are windspeeddistributionandturbulenceintensity [2]. The effectofwindspeedonpowerandpressurecoefficeint (C_P) has long beenunderstood. However, theinfluenceoftheintensityofturbulenceonthetwo parameter indicatorsisstillbeingstudiedtoday. Wind speed turbulence intensity (TI) is crucial for wind turbine structure design andaerodynamic loads calculation. Ren [3] comparedthe effectofactual turbulence intensity with the Normal Turbulence Model defined by IEC standard. The analysis of turbulence intensity based on wind speed data in onshore windfarms. The resultsshow that the Normal Turbulence Model overestimates the turbulence intensity. Bardal [4] studied the effect of turbulence intensity on power curves and annual energy production (AEP). The range of turbulence conditions experienced at thewindturbinesite has a significant influence on the power curveand calculated AEP. Using the zero turbulence power curve method thedifference in calculated AEP is reduced by 50% compared to using traditional power curves.

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Blade Number Effects on the Performance of INSEAN E779A Marine Propeller in Cavitating Flow

Nazaruddin Sinaga, D. Y. Dhande, Hizkia Lie Kusnadi

Abstract: ***Thrust Coefficient, Torque Coefficient, and Efficiency are keys performance characteristics of a propeller. They can be negatively affected by the presence of cavitating flow. Previous numerical studies have shown that cavitating flow can both damage and lower the performance of a marine propeller. The present paper proposes solution and prediction of cavitating flow of INSEAN E779A marine propeller by increasing the number of blades of propeller. The cavitating flow simulations are run with 4 different rotational and inlet speeds with the fully turbulent standard k-ε model and Schnerr-Sauer cavitation model. Predictions, measurements, and calculations of the propeller performance characteristics are presented in this paper. It is concluded that with increasing number of blades the performances of the propeller are increased while the cavitation area is decreased, but with increasing rotational speed the cavitation are more likely to occur.***

Keywords : **blade number, cavitation, INSEAN E779A, marine propeller, numerical method.**

I. INTRODUCTION

Propeller is one of the vital and most important components in a marine vehicle, e.g: boat, ship, etc. Its significance is in producing the marine propulsion or thrust for a marine vehicle. Goutam, Maruf, and Hasan defined marine propulsion as "the mechanism or system used to generate thrust to move a ship or boat across water [1]."

There are many factors that can adversely affect the marine propulsion, cavitation phenomenon is one of them. Franc and Michel [2] defined cavitation as: "the evaporation of a liquid when its pressure decreases below its saturation pressure." This implies that when a propeller runs at high angular velocity, the local pressure of water decreases significantly. When the local pressure of water drops below the liquid's vapor pressure, the water boiling will occur, hence we call it cavitation [3]. This phenomenon can be easily depicted with the water phase diagram. The phase diagram of water shows if water is in its gaseous, liquid, or solid state depending on temperature and pressure. The horizontal axis of the diagram represents temperature when its vertical axis shows pressure. The vapor pressure curve is part of a phase diagram. It indicates at which pressures and temperatures water evaporates from liquid to vapor or condenses from vapor to liquid. At a constant pressure of 1 Bar absolute, water in its solid state which is ice melts to liquid water at a temperature of 0o C. Keeping the pressure constant at 1 Bar absolute, liquid water evaporates when the temperature is increased above 100oC. Evaporation of water is not only possible when the temperature is increased when the pressure is held constant. The other possibility is to keep the temperature constant and reduce the pressure below the vapor pressure. Water can evaporate and also condensate at temperatures below 100oC. At atmospheric pressure which is 101325 Pa, water boils at 100oC. However, as the local pressure of water decrease, so does the boiling temperature of water.

Cavitation will drive the rapid formation and collapse of vapor bubbles within liquid water. Oftentimes the collapse of vapor bubbles are violent and explosive. This phenomenon will produce noise and even damage to the propeller blades. Numerical studies of propeller's cavitating flow have been deployed to predict the cavitation area and inception, and also the propeller performance characteristics [2]. Cavitation area is the area on the propeller's blade in which cavitation locally and mainly occur. Whereas the cavitation inception is defined as taking place when nuclei, due to being subjected to reduced pressure, reach a critical size and grow explosively. Salvatore et al. [4] used the perturbation methods to demonstrate the lifting-line theory. Kinnas and Young [5] used the 'PROPCAV' method employing BEM for the numerical prediction of fully submerged super-cavitating propellers along with experimental measurements [2]. Mohamed M, et al.[2] presented the numerical prediction of sheet cavitation on marine propeller INSEAN E779A using transition sensitive turbulence model. Pereira, et al. [6] ran the experimental study of propeller under the cavitating uniform inflow. Numerical cavitation method based on Reynolds Averaged Navier-Stokes (RANS) models also have been developed to deal with viscous flows [2].

From the explained brief literature above, it is shown that many researchers have contributed to the numerical prediction of propeller cavitating flow. Among those previously investigated studies, not yet fully investigated is the effect of number of blades on propeller performance characteristics and its cavitation patter. This study will employ the CFD simulation

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Experimental Performance Analysis of Centrifugal Blower for Different Impeller Diameters

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Abstract: **Centrifugal blower is used to deliver the air or gas with an appreciable rise in pressure against the flow resistance. It plays an important role in various industries for air-conditioning systems, furnaces, and dust or fume extraction systems. The backward inclined blade centrifugal blower was considered for study and analysis. The inlet and outlet diameters are varied simultaneously and their effect on the performance of centrifugal blower was analysed experimentally. The results showed the variation in impeller diameters have large effects on the performance of centrifugal blower. Performance parameters flow rate, total pressure and shaft power increases when impeller diameters are increased and decreases when they are decreased. The efficiency of blower increases when impeller diameters are decrease and vice versa.**
Keywords: **Centrifugal Blower, Impeller,Inlet Diameter, Outlet Diameter.**

I. INTRODUCTION

Centrifugal blower uses for the continuous flow of air or gas that industrial blower generate, including combustion, ventilation, particulate transport, exhaust, cooling, air-cleaning, and drying as per applications. Centrifugal blower has several advantages over other blower types because of their wide operating ranges and high speed capabilities. The radial difference between enlarged impeller and original impeller should be within 100 mm, if the outlet diameter of impeller is increased by 5 % and 10 % respectively all the performance parameters increased while efficiency decreases. [1] Pressure developed inside the impeller is not uniform and increases from suction to outlet duct when impeller diameters are varied. Large impeller gives the more pressure fluctuation at a monitoring point near the tongue.[2] The irregular blade spacing of impeller will have the same characteristics implies that alteration in blade spacing do not alter the operating characteristics.

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Decreasing the impeller outlet diameter will give better efficiency, higher pressure and homogeneous flow field as compared to the other geometrical change in impeller. Pressure fluctuations are higher for larger impeller diameters. [3] Patil et *al.* studied the effect of volute tongue clearance changes on the performance parameter of the centrifugal blower by numerical and experimental analysis. For numerical and experimental investigation four types of casing with a variation of 6%, 8%, 10% and 12.5% in volute tongue clearance were used. The back flow at the region near the volute tongue is reduced drastically, which cause the total pressure and efficiency to increase. The results clarify that the performance parameters increase with decrease clearance. [4] As the diffusion of flow is highly complex in centrifugal blower operation, it is necessary to design and develop the geometry of impeller and casing to reduce the flow losses significantly. The performance of centrifugal blower is mainly on the design parameters of impeller, by changing some geometrical characteristics of the centrifugal impeller blower has more efficiency.[5] Jayapragasan. C.N et *al.* made the study on the optimization of the alternative blower of travelling cleaner of radial type using CFD. The experiments were carried out for different fan outlet diameters which were 170 mm, 180 mm, 190 mm and 200 mm while the different fan blade angles were 60°, 70°, 80° and 90° and finally the different number of blades being 6, 8, 10 and 12. The Taguchi orthogonal array method has been implemented and optimum design was found.[6] TahsinEngin et al. designed and fabricated three semi-open centrifugal fan impellers using ceramic materials to provide high resistance to temperature. Results show that use of simple impeller geometries of ceramic materials were less sensitive to the varying tip clearance. Variables affecting performance due to tip clearance found to be impeller specific speed, blade exit angle. [7] O. P. Singh et *al.* investigated the effect of the geometric parameters of a

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Experimental investigation of modified inlet duct on centrifugal blower performance

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Abstract: An experiments was conducted, to understand the results of modified inlet duct, on the performance of a centrifugal blower. The inlet ducts was modified, first by using straighteners in the form of circular tubes and another using hub distorter. In the first modified centrifugal blower, 19 circular tubes with a 24 mm diameter of each tube are used. In other modified centrifugal blower, hub distorter is used in the inlet duct. The block area in the case of hub distorter is 25% of the open area of the inlet duct. The experimental study was conducted on three types of blowers, blower with an open inlet duct, blower with a straightener in the inlet duct and blower with hub distorter in inlet duct. According to IS: 4894-1987, experimental setup was developed and experimentation was performed. The results shows that, the inlet modification effects on performance characterises of the centrifugal blower. The results indicate that, the flow rate is maximum in case of open inlet duct centrifugal blower as compared to both modified inlet duct centrifugal blowers. The total pressure is more in both modified centrifugal blowers as compared with open inlet duct centrifugal blower. The shaft power required is less in the case of both modified centrifugal blowers. In the comparison of modified centrifugal blowers, blower with straighteners in the inlet duct shows improved performance as compared to blower with hub distorter in the inlet duct.

Keywords: Centrifugal Blower; Hub Distorter; Inlet Duct; Straightener.

XFEM analysis of the 3D isotropic crack plate using ABAQUS

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Abstract: The present work is analyzed the effect of an edge crack and inclined center crack of the 3D isotropic plate under tensile loading by various numerical examples using Abaqus software. The basic formulation is based on the extended finite element method (XFEM) and Abaqus software is used to analyze the various crack problems. The effect of various crack length and various inclined crack angles on Stress Intensity Factor (SIF), Vom Misses stress and displacement are also investigated. The presented work would be useful for enhancing the use of Abaqus software to analyze the various fracture analysis problems of cracked structures under various conditions.

Keywords: XFEM, SIF, Abaqus, Edge Crack.

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Implementation Of Lean Management To Sustai Quality And Productivity In The Office And Th Manufacturing Environment

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ABSTRACT

This paper tell us about the Lean Management techniques to be applied in industry on production floor, The uses of it in other industrial divisions as well. On the same page it clarifies the chances of implementation in industries such as Public sector Administration, Medical Management and IT services. It Explore how the different principles of Lean Management are transmitted to the service sectors and what changes will come by this process. In conclusion the article describes and compares different ways of Lean education in various sectors and finally the best teaching practice with regard to practice is suggested and proposed.

The objective of this paper is to review journal articles on Lean management. The changes will be observe on production floor or offices in terms of improvements or reduction of non-value added activities.

KEYWORDS – Lean Management, Continuous Improvement.

I. INTRODUCTION

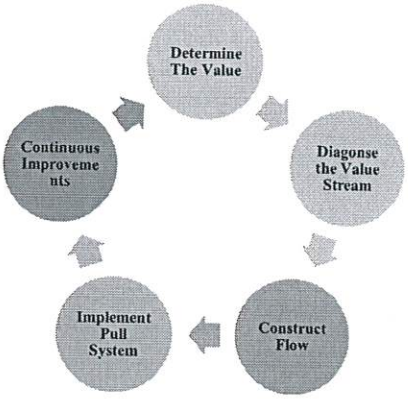
Lean management is not a set of defined methods, tools, or practices. It would be more accurately defined as a management philosophy, a long-term approach that systematically seeks to improve processes and products through incremental changes. We all heard of the Lean management concept and its growing popularity in the business world. Today the Industries of different sector are constantly in search of solutions which meets their goals.

Lean provides a basis for operational excellence by standardizing processes and creating a culture of continuous improvement by monitoring, proactively maintaining equipment and empowering employees. Actually, there is no surprise that Lean management is now widespread across industries [3-4]. Thanks to its core values and positive impact on companies' overall performance, the Lean concept appears to be a universal management tool. You can apply the concept of Lean in any business or production process, from manufacturing to marketing and software development. This is why the two main pillars of the Lean methodology are:

Respect for people & Continuous improvements-

Lean management in Manufacturing is about the elimination of waste or activities which add no value to process. Elimination of such waste cuts the complications & cost of projects.

Implementing Lean Management removes eight types of wastes. So implementation in Manufacturing sector includes Overproduction, Inventory, Waiting, Motion, Over-processing, Transport, Defects and Talent [1]. It typically improves Process Breakdowns, Quality of Performance, Space Requirement, Customer Satisfaction and Higher efficiencies. For Implementing Lean we need group of people or team, after you have prepared your team for the change we need to take specific lean activities to apply each of the 5 principles of lean.



II. LITRATURE REVIEW

Lean Management includes a set of highly effective Continuous Improvement Methodology and Tools focused on reducing waste while improving material and Information flow, Reducing defects and Variation which includes a system needed to improve Business. The Implementation of Lean Management cause to supports company's goals, results in the improvements of customer satisfaction & operating cost, sustain quality and productivity in the Manufacturing Environment. By application of Lean

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NUMERICAL MODELING OF LATENT HEAT STORAGE FOR SOLAR THERMAL APPLICATION

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ABSTRACT:

Latent heat storage (LHS) using phase change material (PCM) is proposed to achieve high storage density. Quantitative information on heat transfer and melting/solidification processes are required for proper designing of thermal energy storage (TES) systems. The poor thermal conductivity of PCM drastically affects thermal performance. Purpose of this research is to investigate performance enhancement of LHS unit suitable to a solar water heater applications. Numerical model is developed for charging and discharging modes of LHS to explore the thermal characteristics of PCM. Thermal behavior and performance during charging and discharging processes are discussed in comparison with plain LHS. Numerical results are validated withexperimental.

Keywords:LHS, PCM, Numerical Analysis, Heat Transfer, Charging, Discharging

1. INTRODUCTION

This paper describes melting and solidification processes in LHS system using numerical technique. Study focused on understanding the thermal performance of LHS system. The study is realized using a CFD model that takes into account of the phase change phenomenon by means of the enthalpy method. Thermal enhancement through fins in the base PCM is considered. Thermal behavior of the LHS unit with the addition of fins is numerically analyzed. Finally validates simulated results with experimental results. Validation is done for concentric cylinder LHS and LHS with axial fins. Both charging (melting) and discharging (solidification) processes are presented. Validation is done for temperature distribution of PCM for both melting and solidification processes.

This section builds on previous studies to update the literature related to PCMs, heat transfer, performance enhancement and their modeling, simulation, analysis with various applications carried by Verma et al. [2008], Dutil et al. [2011], Liu et al. [2013], Rathod and Banerjee [2011].Numerical review is concentrated on cylindricalgeometry.

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EGR Strategies for BSVI Norms to Reduce NOx in Heavy Duty Natural Gas Engine

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ABSTRACT: The emission standards were tightened, more advanced management methods were applied that enclosed modifications in engine design and equipment, management of engine parameters and use of exhaust after treatment devices. Reduction of toxic substances emission from combustion engines will be achieved by primary (inside engine) measure and secondary (outside engine) measures. To fulfill the specified demand, the alternative fuels utilized in petrol and diesel engines have become the topics of interest nowadays. For this reason, natural gas is employed as an alternative fuel. This paper analyses the impacts of the application of an exhaust gas recirculation (EGR) system on the performance and emissions of port injection, turbocharged inline four cylinder 4 stroke natural gas heavy duty engine with exhaust gas recirculation. Engine performance and emissions will be evaluated for different load and EGR settings. The results were compared with the engine operating with its original configuration without the EGR system.

Keywords: CNG, EGR, NO_X, SCR, WHTC

I. INTRODUCTION

Nowadays, the world is facing serious problem of the air pollution with the increase in population and its increasing demand of the energy. To meet the required demand, the alternative fuels used in gasoline and diesel engines are becoming the subjects of interest today. Most of the concerns are driven by two factors first is various new laws pertaining to clean air and second is energy independence from petroleum based fuel. Natural gas, observed as green fuel, has emerged as an answer to depleting fossil fuel resources further as deteriorating urban air quality drawback. There are 3 types of gas: liquefied gas (LNG) liquefied petroleum gas (LPG) and compressed natural gas (CNG). Each LNG and CNG are supported alkane series [1-5].

Exhaust gases coming back from burning engine contains oxides of carbon (COx), oxides of gas (NOx), unburnt organic compound, oxides of sulphur (SOx), carbon particles, etc. that are terribly venturous and produces dangerous impact on atmosphere. With current technology it's inconceivable to develop such an engine that creates terribly less amount of emission [6-9]. To cut back these harmful gases, they need to be reduced among the cylinder or treated after exhaust. EGR is often used to scale back quantity of NOx in S.I. engines in addition to C.I. engines [10-14].

Production of nitrogen oxide is function of combustion temperature, highest close to stoichiometric condition wherever temperature is at peak value. Most NOx emission happens at slightly close to lean condition, wherever the combustion temperature is high and excess chemical element is accessible to react with nitrogen. Therefore, easiest way to cut back NOxemission is to lower the temperature of combustion chamber. For this, EGR is used [15-18]. Heavy duty CNG engines and vehicles, like buses, were normally mass produced in the mid-2000s. Until EURO-V emission regulation, lean burn fossil fuel engines were wide used as a result of those area unit favourable for fuel economy and thermal sturdiness [19-20]. Until now, the lean burn natural gas engine has been able to cope with EURO-V emission rules while not requiring pricy after-treatment systems.

However, in keeping with the most recent technology trend, once the EURO-VI emission laws were issued, the combustion methodology for large gas engines is step by step changing from lean combustion to a stoichiometric air fuel ratio [21]. In the case of gas

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Deformity correction methods for fracture bone alignment :an overview

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***Abstract*— Taylor spatial frame is currently being used for correcting bone deformities (especially knee joint bones).This frame is based on basics of Stewart platform & helps to achieve the success in the treatment without doing direct surgical treatment on bone joints.**

This can be fitted externally to two different bones, of which deformity is to be corrected. Based on the sequence of screw motion/turns, two plates are made parallel in the end & it will assure correction in deformity.

The objective is to provide a cost-effective solution in orthopedic surgical treatments in rural areas also to improve the accuracy of the correction in the present scenario.

The current paper focuses on the brief study of various methods used for deformity correction for automatic bone alignment.

***Keywords*— Stewart platform, Taylor spatial frame, bone deformity, Ilizarov technique, orthopedic surgical treatments**

I. INTRODUCTION

The Stewart platform mechanism mainly referred to as *hexapod*, is a parallel kinematic structure that can be used as a basis for controlled motion with 6 degrees of freedom (d.o.f.), such as manufacturing processes and precise manipulative tasks. The mechanism itself consists of a stationary platform (base platform, the base) and mobile platform that are connected via six struts mounted on universal joints. The struts have an in-built mechanism that allows changing the length of each individual strut. The desired position and orientation of the mobile platform is achieved by combining the lengths of the six struts, transforming the six transitional d.o.f. into three positional and three orientation ones. The lengths of the struts cannot, of course, be changed independently, but only in such a fashion that the hexapod construction allows.

Parallel manipulators have received an increasing attention in the past two decades due to their inherent advantages over their conventional sequential counterparts. These include, among others, more robust mechanical structure and higher base frequencies. The strength – mass ratio is also in favor of parallel manipulators, which allows for relatively large workloads. While the positioning error in serial mechanisms is accumulated through a series of links, this is not the case with parallel manipulators, which are consequently capable of performing very precise tasks. On the other hand, these mechanisms have a relatively small workspace, limited with maximum strut lengths and angle values at the joints, as well as their dimensions.

However, the main difficulty with parallel manipulators is the complexity of controlling their movement. The problem of inverse kinematics for hexapod parallel manipulators can be defined as finding the strut lengths needed to position the mobile platform in a certain position with desired orientation. The solution to this problem is indeed not at all complex and can be computed in a very short time. Furthermore, the computation of length for each strut can be carried away independently in parallel, which can additionally speed up the process. This procedure is used to guide the mobile platform in controlling its movement. The forward kinematics of a

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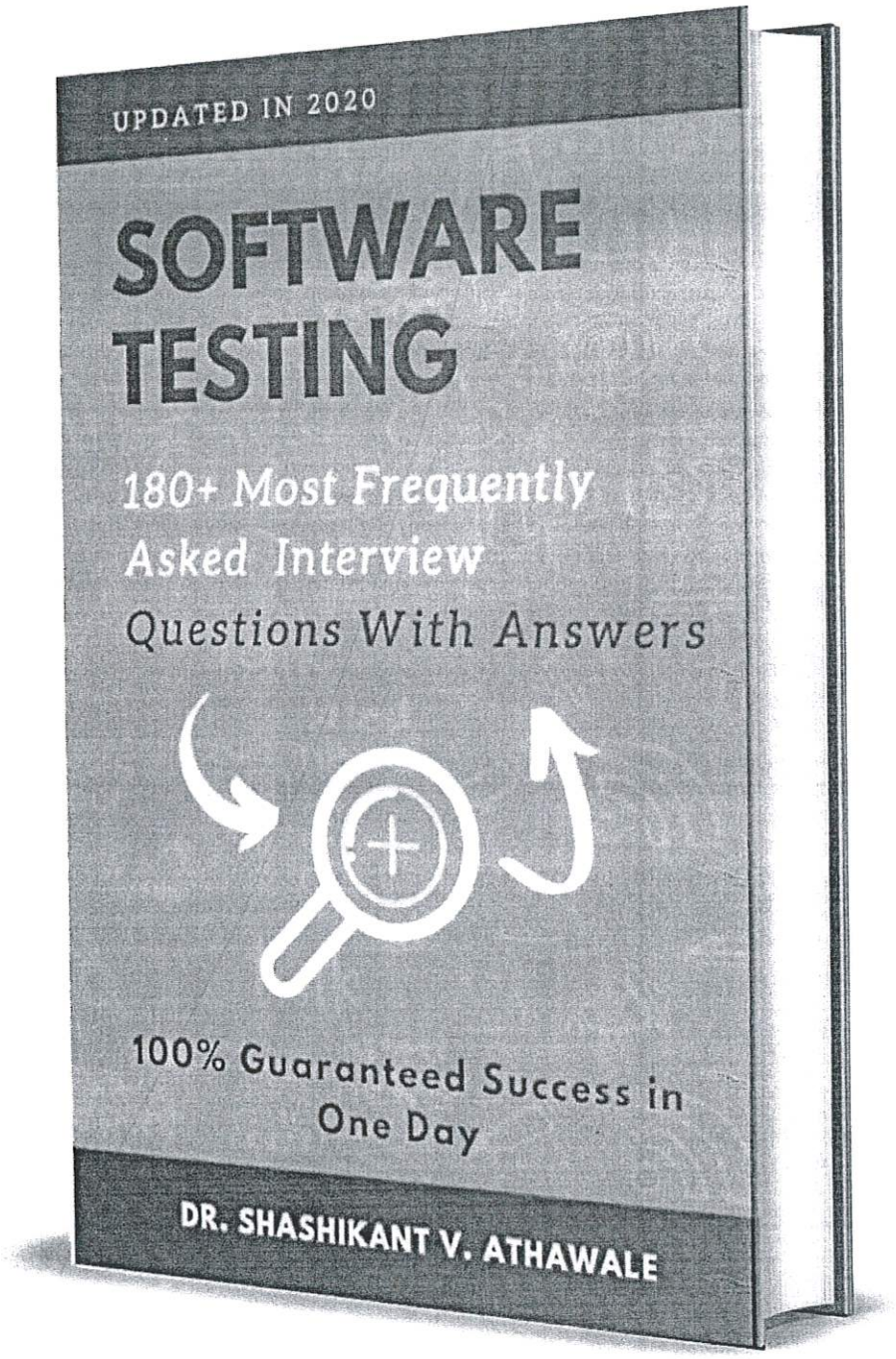

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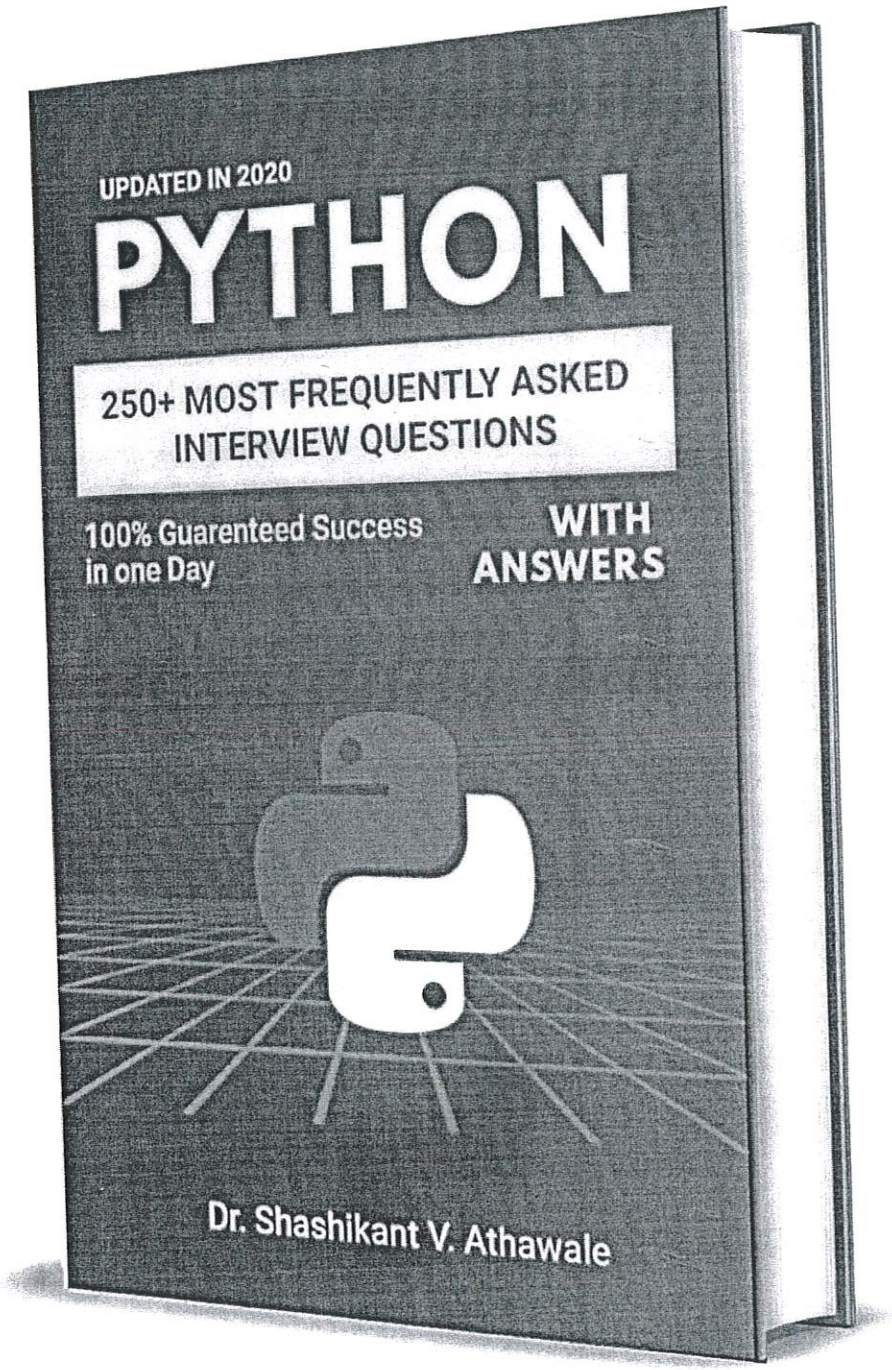

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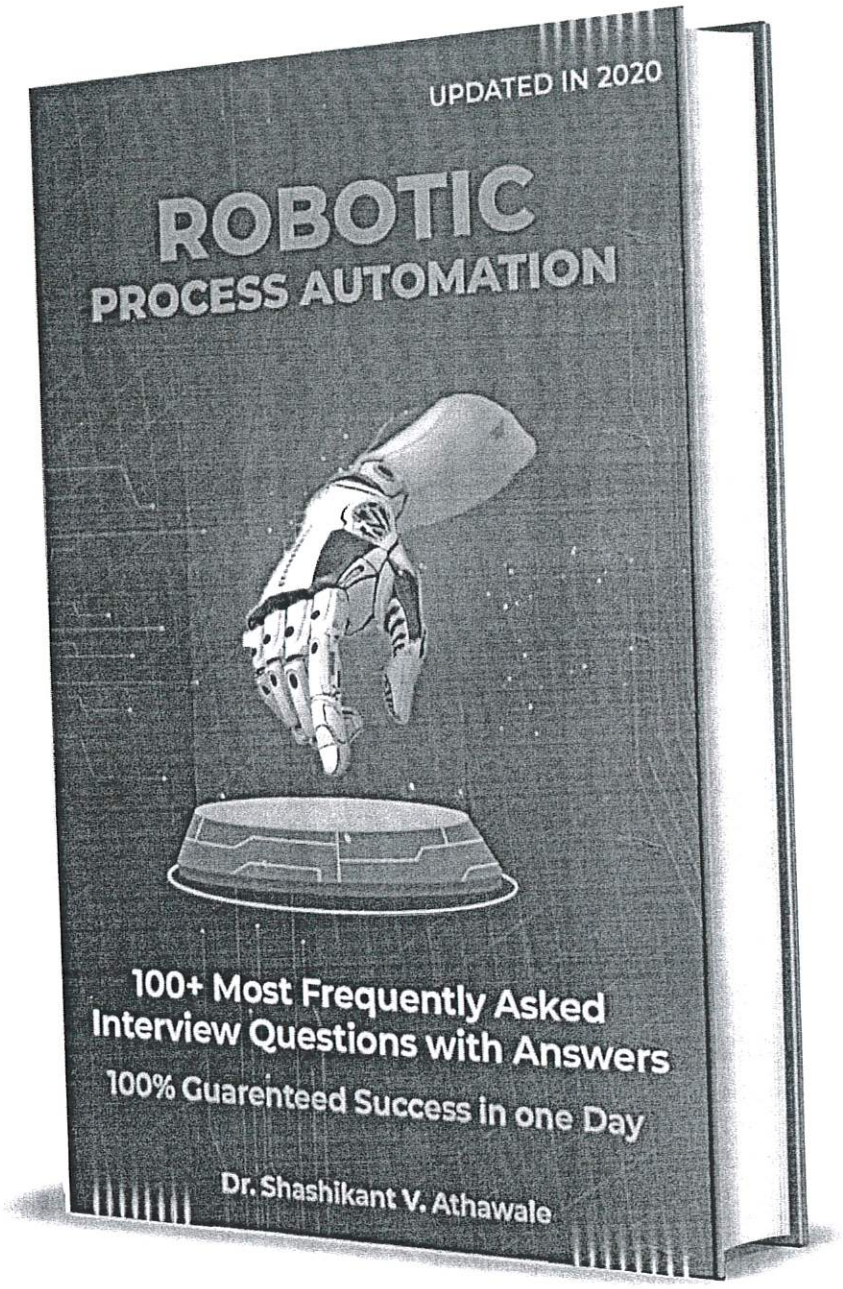

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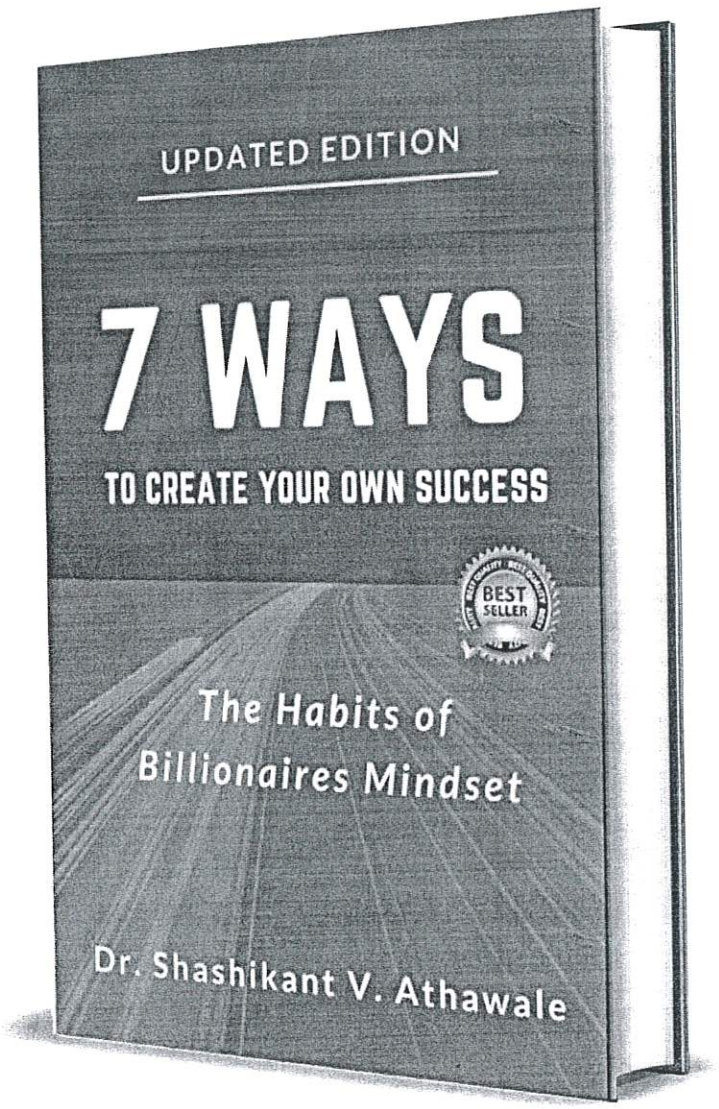

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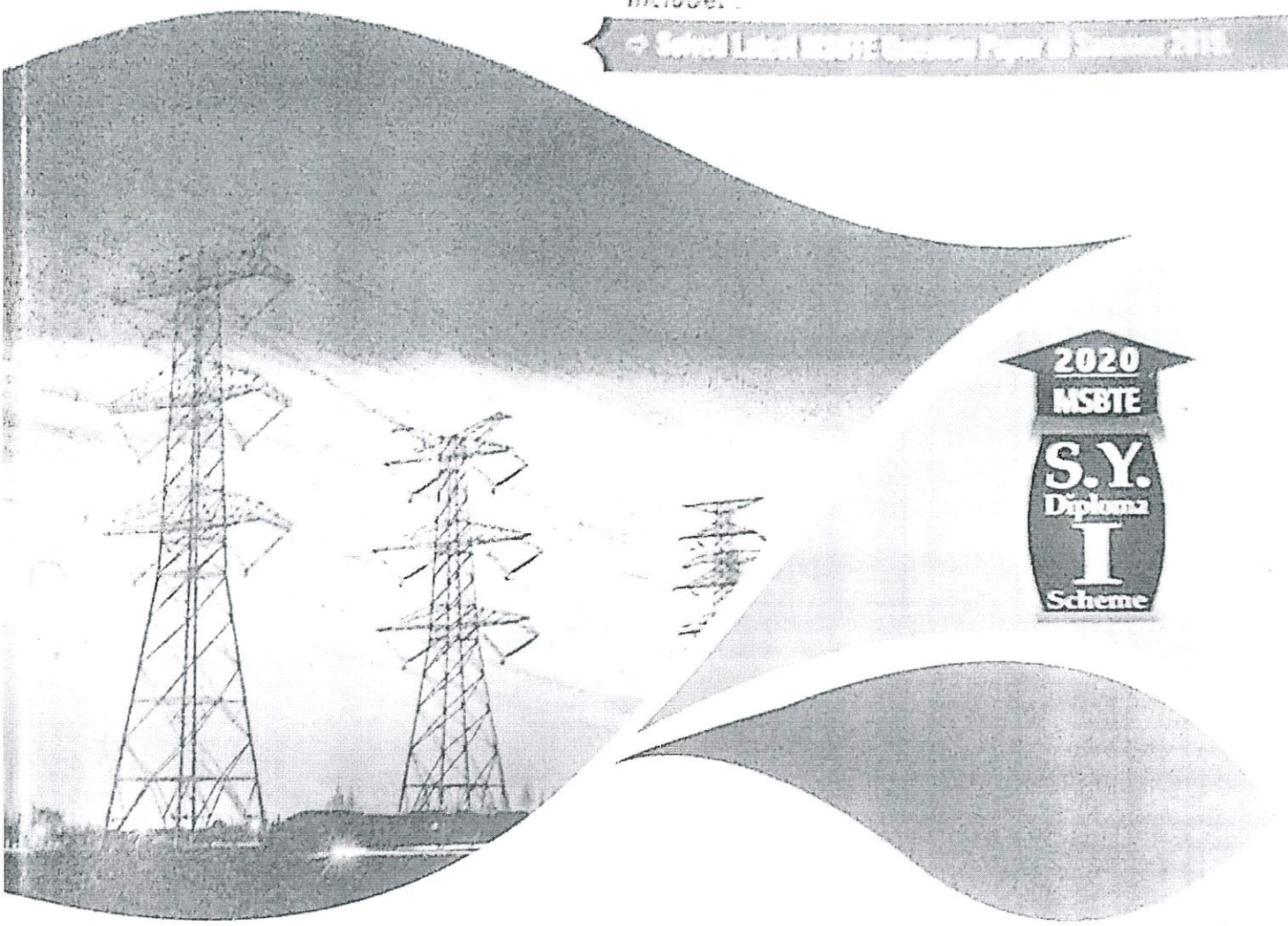

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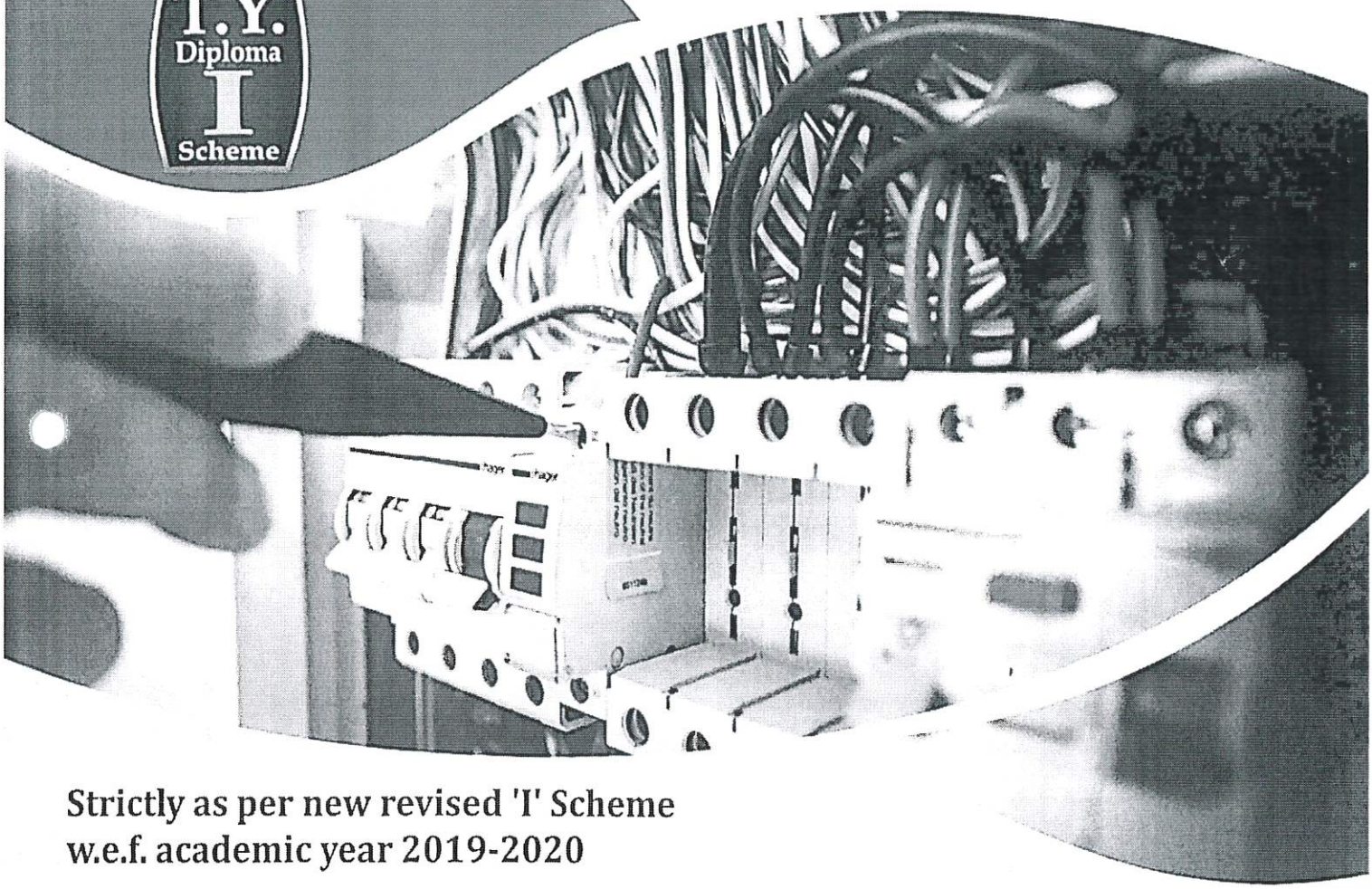

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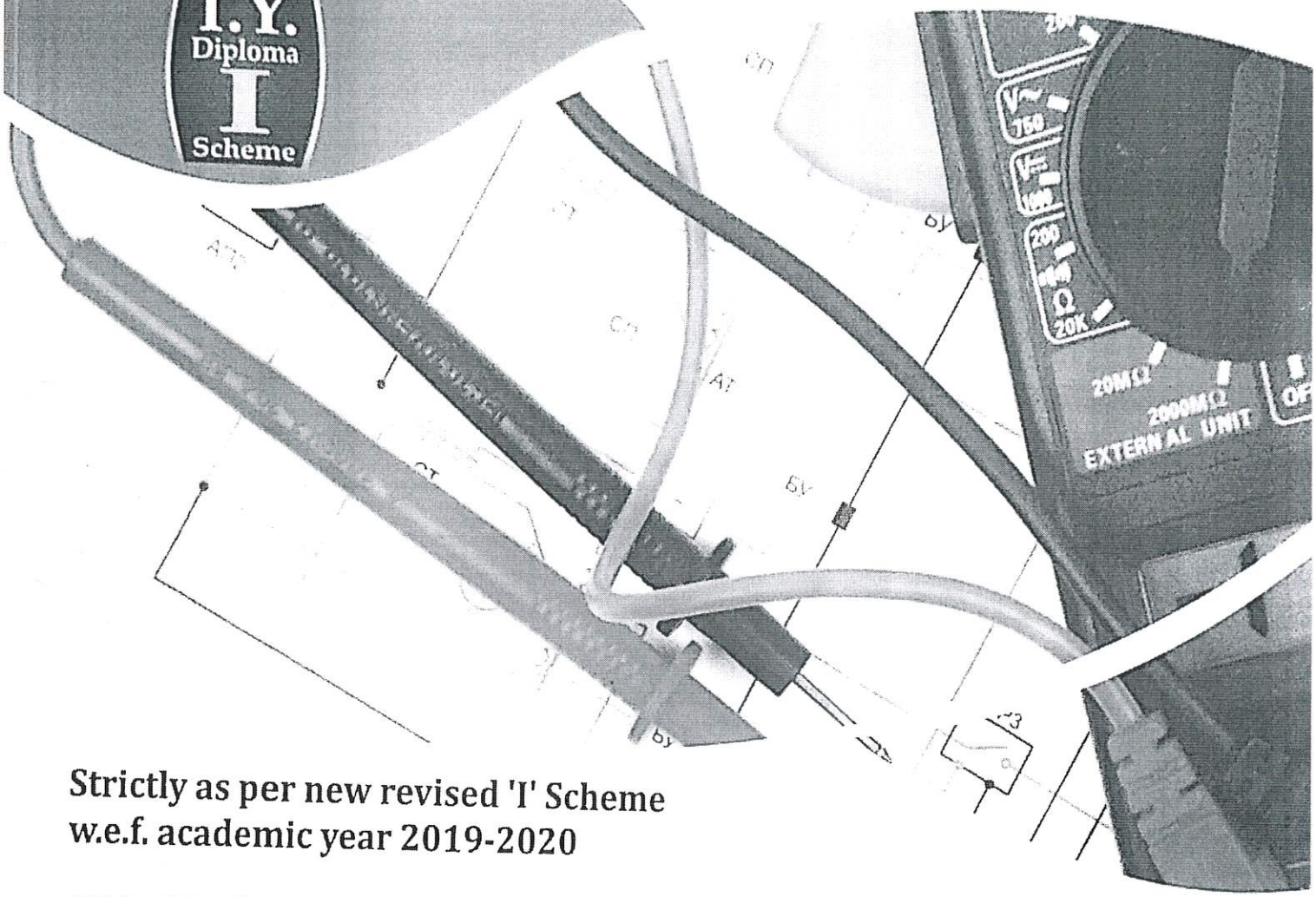

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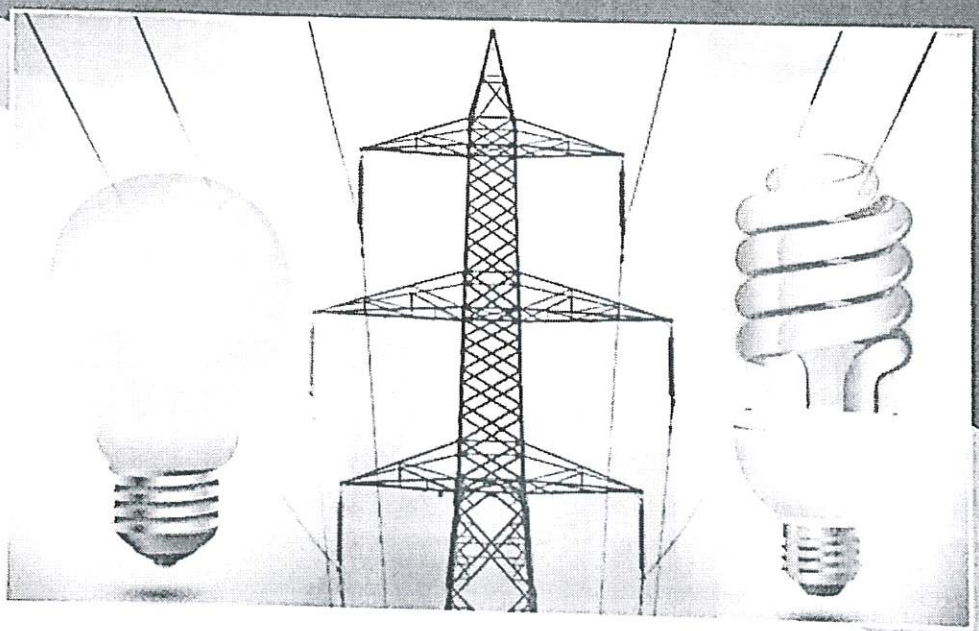

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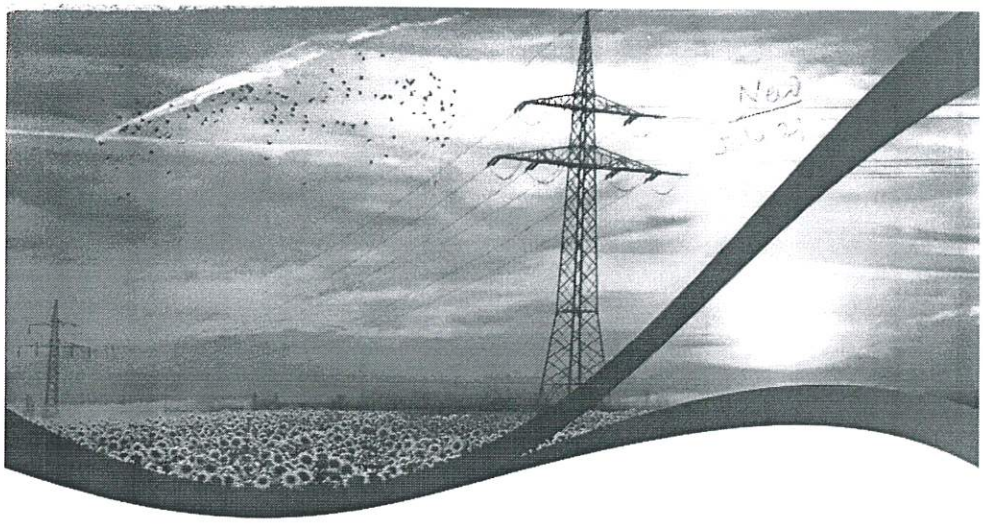

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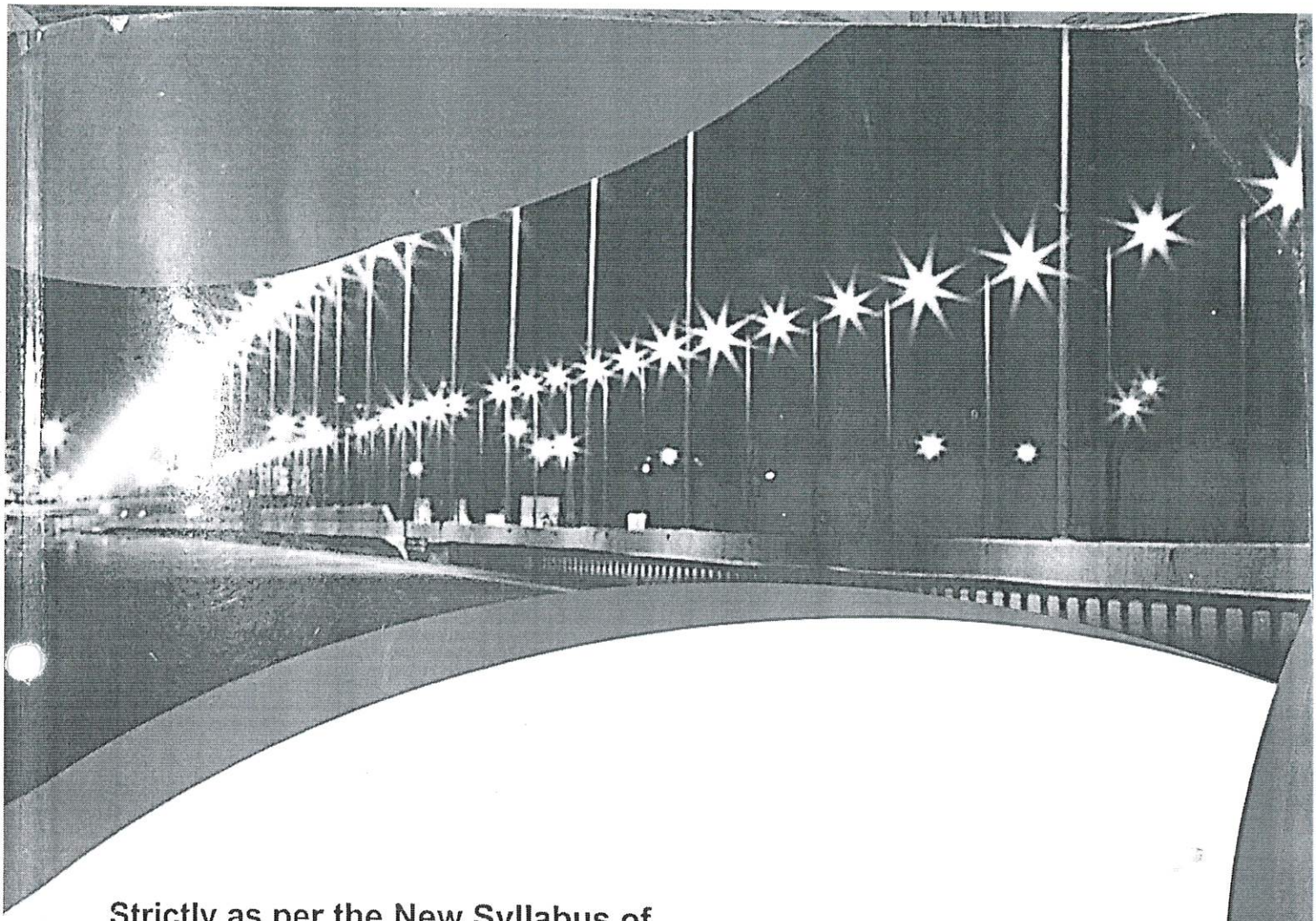

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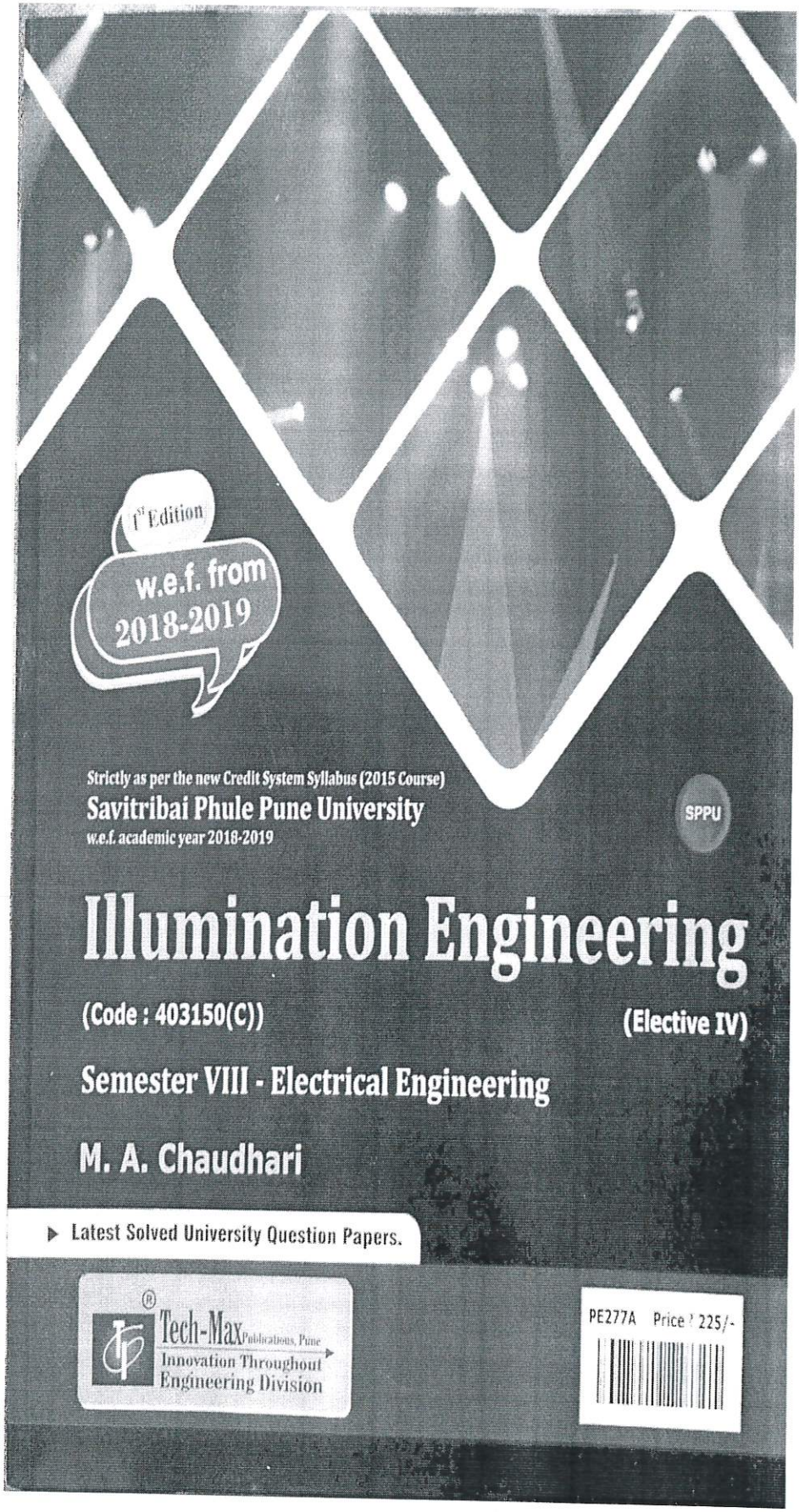

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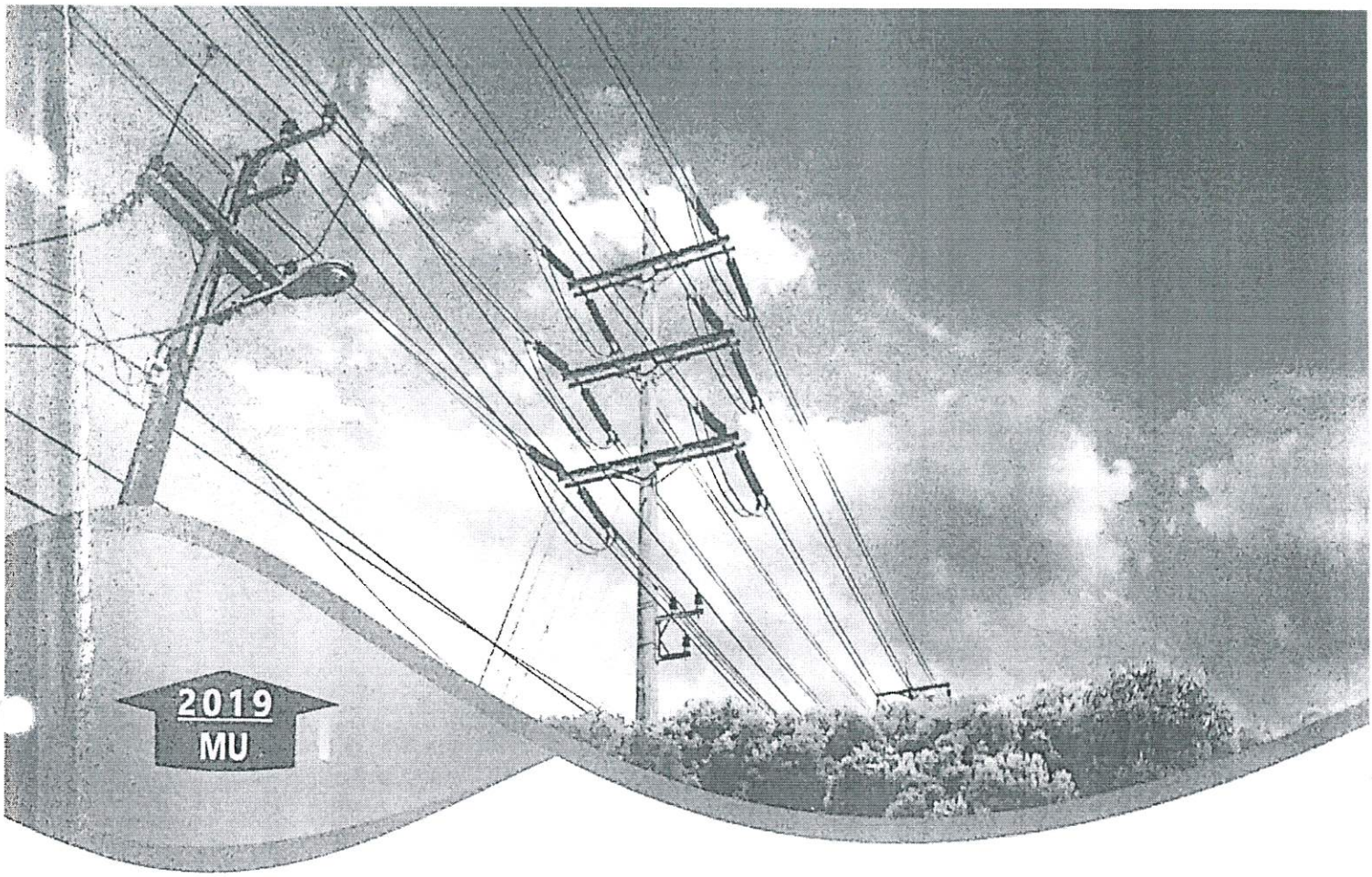

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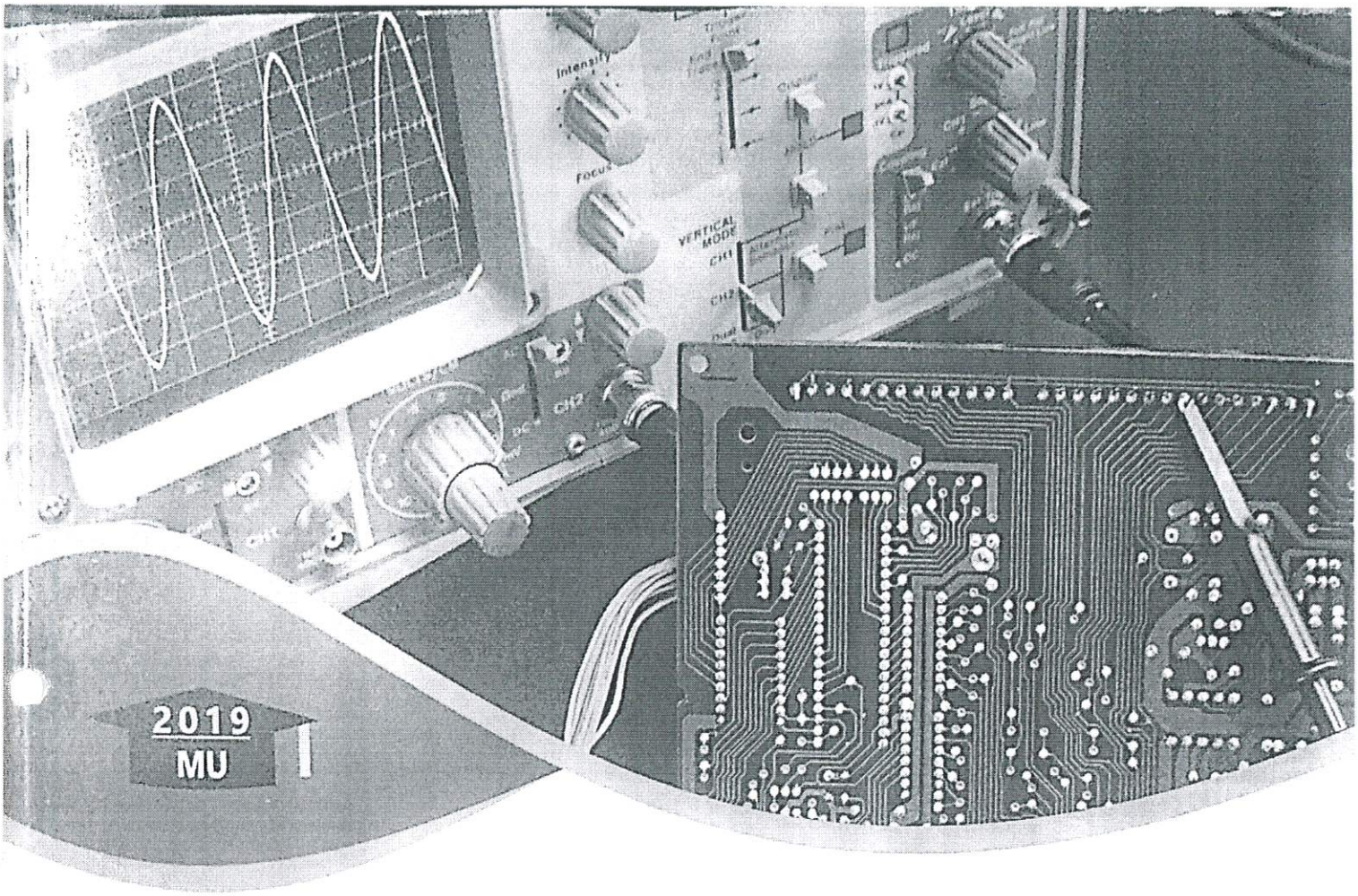

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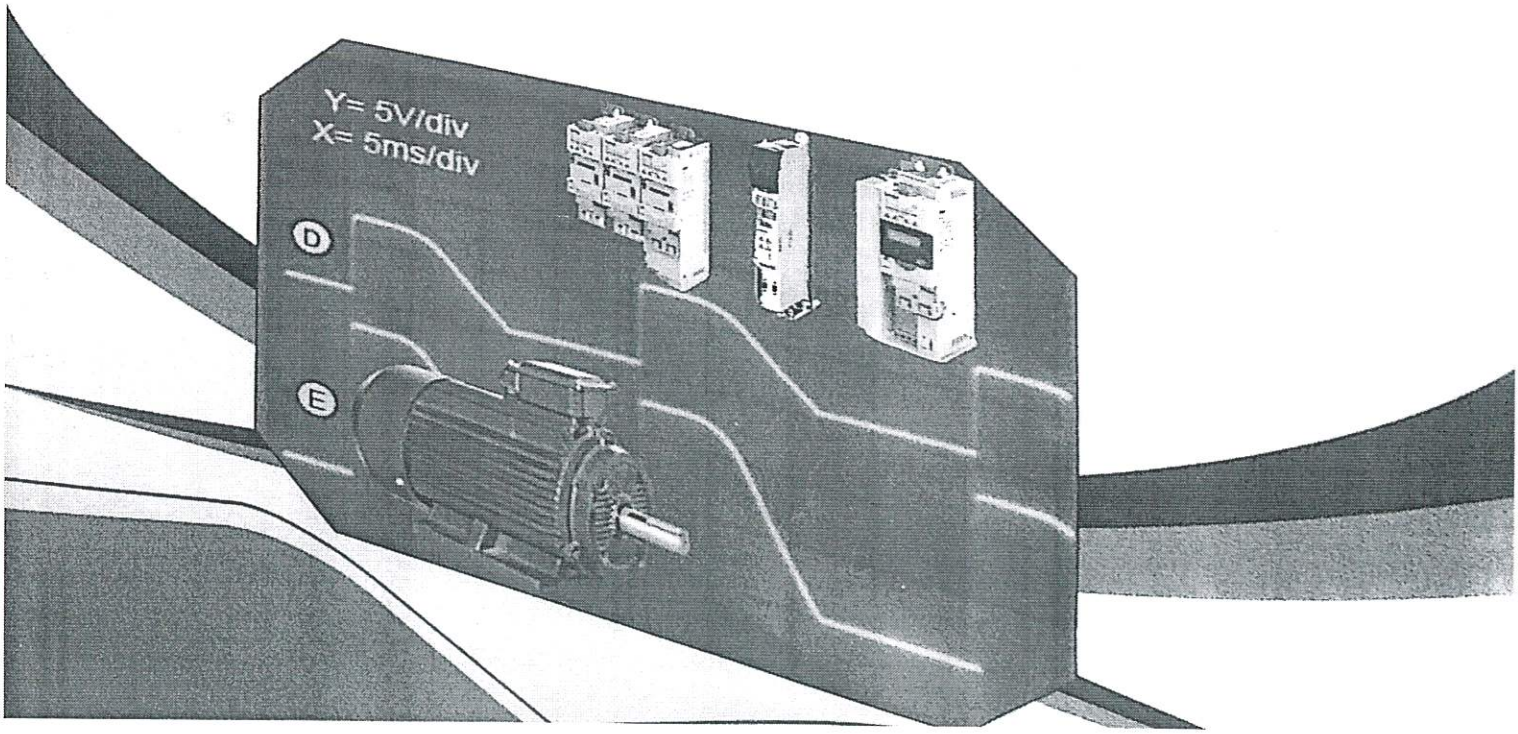

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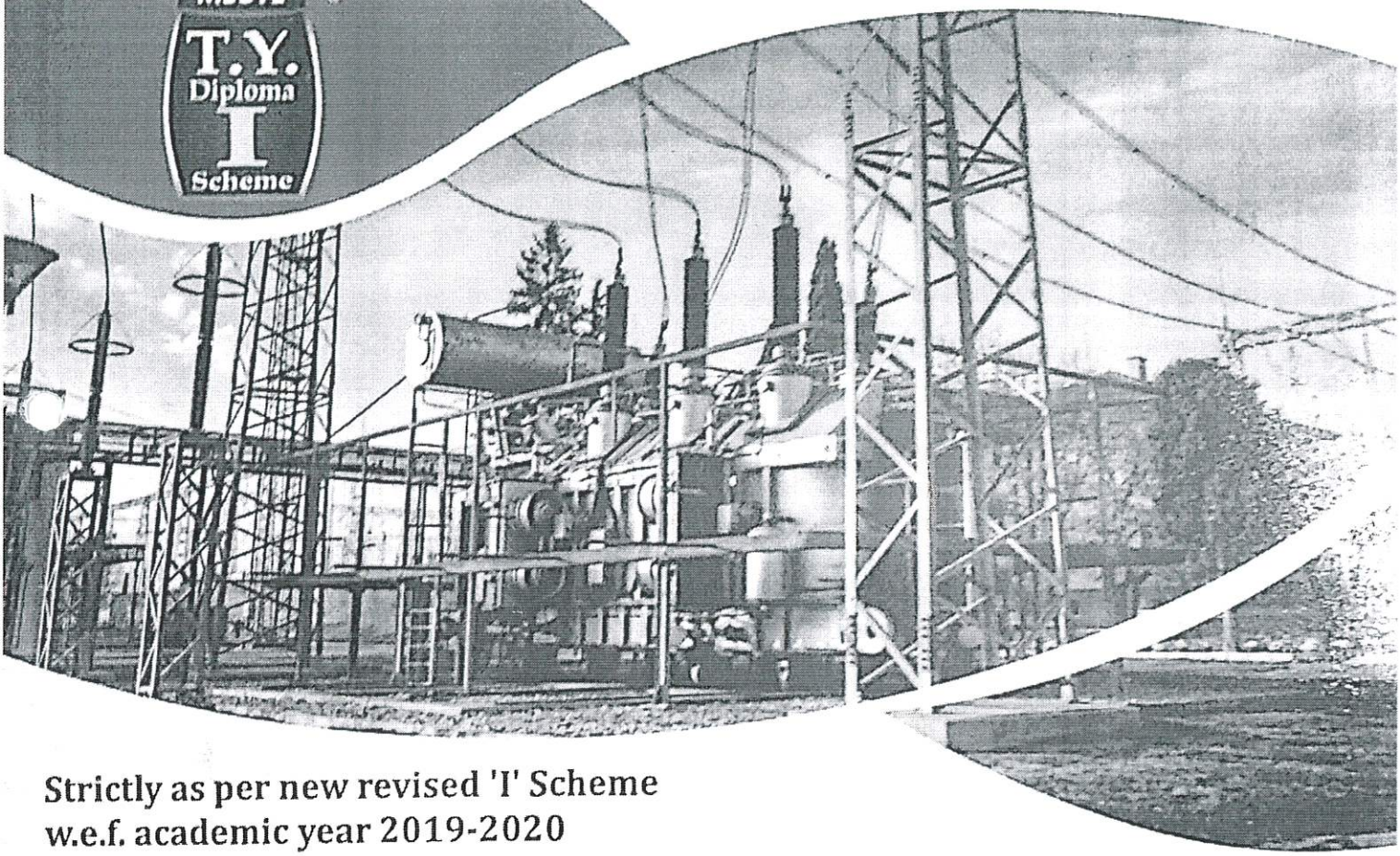

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ELECTRICAL SUB-STATION PRACTICES

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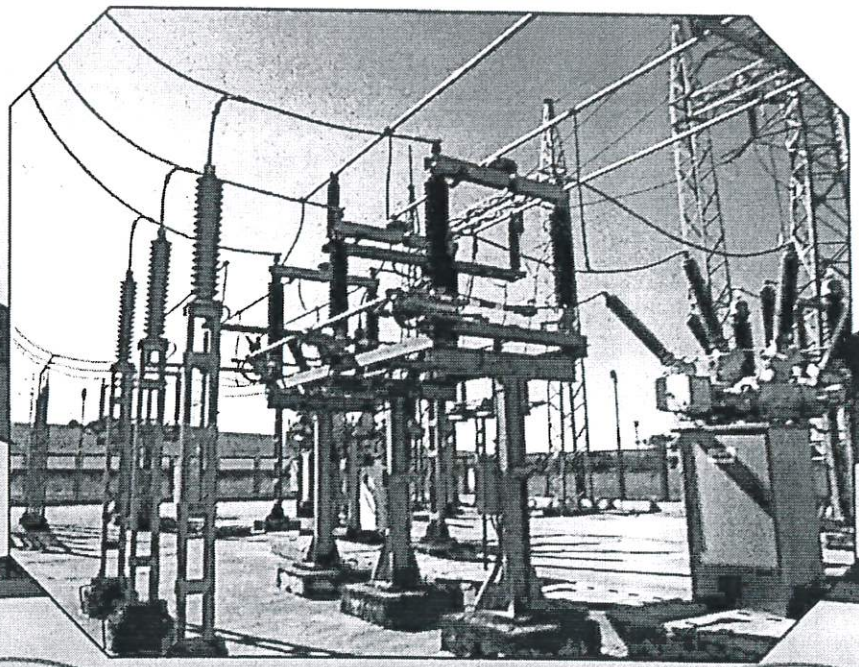

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CHAPTER-25

Coefficient Estimates for a New Subclass of Meromorphic Bi-Univalent Functions Defined by Al-Oboudi Differential Operator

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Abstract: In the present investigation, we define a new subclass of meromorphic bi-univalent function class Σ' of complex order $\gamma \in \mathbb{C} \setminus \{0\}$, using Al-Oboudi differential operator and obtain the estimates for the coefficients $|b_0|$ and $|b_1|$. Further we point out several known consequences of our result.

AMS subject classification: 30C45, 30C50, 30C80.
Keywords: Analytic function, Meromorphic function, Bi-univalent function, Subordination, Coefficient estimate, Al-Oboudi differential operator.

1. INTRODUCTION

Let $\mathcal{A}$ denote the class of all normalized functions of the form

$$f(z) = z + \sum_{k=2}^{\infty} a_k z^k \qquad (1..1)$$

which are analytic in the open unit disk,

$$\mathbb{U} = \{z : z \in \mathbb{C}, |z| < 1\}.$$

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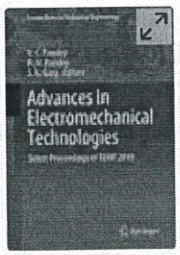

Advances in Electromechanical Technologies pp 843–853

Development of the Latent Heat Storage System Using Phase Change Material with Insertion of Helical Fins to Improve Heat Transfer Rate

Vishal Godase, Ashok Pise & Avinash Waghmare

Conference paper | First Online: 25 September 2020

827 Accesses

Part of the Lecture Notes in Mechanical Engineering book series (LNME)

Abstract

The phase change materials are having capability to store the latent as well as the sensible form of heat. These materials are having poor rates of heat transfer during solid to liquid phase transformation and vice versa. It happens because of poor thermal conductivity of phase change materials. For improving rate of heat transfer, the fins with helical design are introduced in the phase change material.

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Advanced Engineering Optimization Through Intelligent Techniques pp 451–461

Screening of Organic Brake Pad Materials Using MADM Technique

K. N. Hendre & B. D. Bachchhav

Conference paper | First Online: 10 July 2019

743 Accesses | **2** Citations

Part of the Advances in Intelligent Systems and Computing book series (AISC,volume 949)

Abstract

Asbestos friction materials are found to be harmful to human health and are being replaced. A research is being carried out in developing non-asbestos-based brake pad materials. Considerable efforts are being made in testing and evaluation of various tribological, metallurgical, mechanical and thermal properties of such materials. However, selection of novel brake pad material that meets all requirements becomes a complex task. In this

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Experimental Analysis of Hydrodynamic Journal Bearing

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Abstract- **Hydrodynamic journal bearings are widely used due to their high load carrying capacity and good damping properties. Journal bearings have been widely used in rotating machinery. The bearing carries higher loads which reduces film thickness and also increase temperature of bearing due to fluid film temperature increment. The pressure distribution is important in both load capacity estimations (static performance) and dynamic analysis. We can analyze the pressure of fluid film and total deformation of hydrodynamic journal bearing by Fluid Structure Interaction technique. This paper describes FSI technique with optimization. Keywords: static performance, fluid interaction technique**

I. INTRODUCTION

Hydrodynamic journal bearing is defined as a mechanical element which supports high load due to wedge shape geometry formed during the relative motion between journal and bearing surface. Hydrodynamic journal bearing is widely used due to its high load carrying capacity and good damping properties [1]. The major problem with hydrodynamic bearing is failure of fluid film during the operation. This may cause metal to metal contact between journal and bearing surface. This leads to wear and friction which overheats the surfaces [6]. Hence the power loss increases. In this paper FSI technique has been used to predict the performance characteristics of a hydrodynamic journal bearing.[2] Three dimensional studies have been done to predict pressure distribution along journal surface [3]. The FSI technique can give accurate pressure distribution. The fluent and static structural modules are coupled to generate actual load on shaft and baring inner surface [4]. The optimization technique also used to get optimum results so that bearing can be modified so as to get better results.[7]

II. OPERATING CONDITIONS

The fig.1 shows the fluid film of bearing and oil inlet at upper side of fluid film. The material used for bearing is Aluminum.

Table I
Operating Conditions

Bearing Diameter	85
Bearing Length	60
Journal Diameter	50mm
Radial Clearance	0.3µm
Rotation Speed	4500rpm
Lubricant viscosity	0.0277 Pa. s
Lubricant density	860 Kg/m^3

III. MODEL AND MESHING

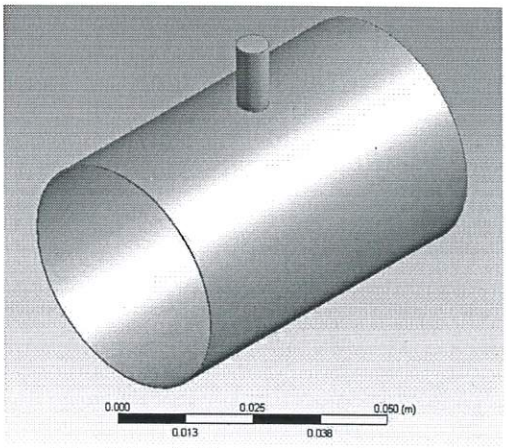

Fig. 1 Fluid Film Geometry in Ansys

The journal has given random offset origin while modeling the geometry. The origin of journal is considered as parameter(X and Y position of origin). The eccentricity and attitude angles also added in parameter set as input with random values. A relation between journal origin, eccentricity and attitude angle is made so that at end of solution we can get value of eccentricity and attitude angle.The meshing of fluid film is done in fluent meshing.

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International Conference on Reliability, Risk Maintenance and Engineering Management

ICRRM 2019: **ICRRM 2019 – System Reliability, Quality Control, Safety, Maintenance and Management** pp 213–222

A New Approach to Control Assembly Variation in Selective Assembly Using Hierarchical Clustering

S. V. Chaitanya & A. K. Jeevanantham

Conference paper | First Online: 14 June 2019

768 Accesses

Abstract

Complex assembly constitutes more than two parts. Tolerances assigned to individual components decide precision of assembly. Clearance and variation resulted in assembly decides precision of assembly and affect performance during working of assembly. During high precision mechanical assemblies, many parts become surplus due to more variation on component tolerances. Then, selective assembly is only solution to control the

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Comparative evaluation of machining performance of inconel 625 under dry and cryogenic cutting conditions

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Abstract. Hast alloys, wasp alloys and tool steels are the most commonly used materials in nuclear engineering and aerospace industries. However, these materials are considered to be "Difficult to machine" which attracted several researchers to work in this domain with a view to obtain optimum machining performance. The present work explored the comparative evaluation of machining performance of Inconel 625 under dry and cryogenic cutting conditions from an industrial perspective with emphasis on cutting forces, tool-chip interface temperature, surface finish and tool life. Turning experiments which were planned using the orthogonal array of L27were carried out using Tungsten carbide Al2O3 coated inserts varying the cutting speed, feed and depth of cut. Cutting forces generated during turning at varying cutting conditions were measured using three axis lathe tool dynamometer. It was found the combination of speed of 200 m/min, feed value of 0.04 mm/rev and depth of cut value of 0.2 mm gives the optimum cutting forces with superior surface finish and low tool chip interface temperature in dry cutting condition. Again for same combination of cutting parameters were tested with cryogenic coolant Liquid Nitrogen (LN2) and it was observed that cutting forces reduced up to 30%, surface roughness improved by 31.37% and temperature reduced by 71.67%.

Keywords: *Cutting forces, Cutting temperature, Cryogenic coolant, Dry turning, Inconel 625, Surface finish.*

1. Introduction

In today's competitive market and with the advancement in the technology, it becomes very much imperative to manufacture better quality products at low cost and that too in minimum time. However, still today it's a challenge to economically machine difficult-to-cut materials. Hast alloys, wasp alloys and tool steels are the most commonly used materials in nuclear engineering and aerospace industries. However, these materials are considered to be "Difficult to machine" which attracted several researchers to work in this domain with a view to obtain optimum machining performance.

Enterprises can achieve maximum revenue by manufacturing excellent quality product at lower cost by optimizing cutting parameters. The quality of surface finish is commonly used as index of product quality and it is also critical in functional behavior of the components like machine tool parts, dies etc. The optimum performance from the turning process is possible only when all the control parameters like speed, feed, depth of cut and coolant which affect the process are selected properly and with prior investigation. This in turn demands the study and analysis of the process parameters and finding out the combination of optimal cutting parameters in order to improve the performance of turning process and to reduce the cost while achieving the required geometrical tolerance.

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ROLE OF SURFACE ELECTROMYOGRAPHY IN DETECTION OF TEMPOROMANDIBULAR JOINT DISORDERS: AN OVERVIEW

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Abstract - Temporomandibular joint disorders (TMD) has been estimated to be present in approximately 25% of the population. However, still its etiology and progression are poorly understood. Moreover, treatment options are limited and large number of young population is affected by this disorder. Also, in numerous cases of TMD malpositioning of the TMJ disc, termed "internal derangement" is also common. Also, temporomandibular disorders (TMDs) are characterized by symptoms like pain in the masticatory muscles and temporomandibular joint (TMJ), headache, disturbances in jaw movements, and sounds in the joints while opening and closing the mouth.The most commonly used non invasivediagnostic method for the diagnosis of temporomandibular disorders (TMDs) is surface electromyography (SEMG). The present review is aimed to discuss importance, advantages of SEMG in temporomandibular joint disorders.

Keywords - Temporomandibular Joint Disorder (TMDs), temporomandibular joint (TMJ), surface electromyography, masticatory muscles

I. INTRODUCTION

Temporomandibular disorder (TMD) mainly involve set of musculoskeletal disorders which may affect the masticatory system(1). This disorder is highly prevalent in general population but females and young population are affected more (2). Further etiology of this disorder is not clearly understood as one or more factors have been reported to contribute towards its triggering or perpetuation (3). The multiple factors responsible for multifactorial etiology mainly include anatomic changes, macro trauma, microtrauma, occlusal unbalances, parafunctional habits and systemic conditions, such as emotional stress (4). So, for the purpose of diagnosis, an accurate medical history and standardized tests are kept as the standard reference point. Moreover, additional information is collected in the cases of TMD in addition to quantitative data by using electronic devices.

Electromyography is widely used diagnostic tool that allows an evaluation of muscle function by direct detection of their electrical potentials (5). This method has been widely used for the diagnosis of patients with general muscle disorders, neuromuscular diseases or diseases affecting neuromuscular performance (6-7). This method includes use of intramuscular needle electrodes for generation of quantitative intramuscular electromyography but the process is quite painful and complex. On the other hand, Surface electromyography (SEMG) is a non invasive technique that uses surface electrodes and detects superimposed motor unit action potentials from many fibers (8). This technique is a painless and innocuous method for evaluating muscle function that are helpful in TMD identification (9). Nevertheless, its application in the recognition of TMD remains disputable due to significant variability in the results described in the literature (10). However, a recent study evidenced accuracy of SMEG in the case of masticatory muscles when assessing TMD (11)

Recent literature reviews reported SMEG as not so accurate protocol in comparison to electromyography. However, observed low relevance and low impact of SMEG trials, could be due to summation of multiple variables like inadequate sample and control group selection, insufficient clinical conditions and incorrect use of equipment (12-13). On the other hand, if due precautions are taken into account, SMEG could be established as an efficient method to analyze the stomatognathic system, with good reproducibility and additional reference as reported in earlier clinical evaluations (14-15). These studies used SMEG to detect and analyze the electric activity of masticatory muscles (body of masseter and anterior temporal muscle bundle), being relatively easy to use and following the standards of the test. So, current literature supports use of SMEG for diagnosis of TMD especially in masticatory muscles. So, the prime objectives the present review is to establish SMEG as a method of choice for diagnosis of TMD in masticatory muscles.

II. AIM AND OBJECTIVES

Under this section, the objectives of the study to achieve the ultimate aim of the study will be highlighted. Following will be the objectives pertaining to the study:

- To introduce current prospects of diagnosis and treatment of Temporomandibular Joint Disorder
- To mention major limitations of the current methods in use in connection with Temporomandibular Joint Disorder
- To introduce surface electromyography and its importance

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Evaluation of Rough set and Fuzzy rough set models with application to multi-attribute decision making

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Abstract—**Uncertainty and randomness is inherent to real valued datasets. With the advent of fuzzy concepts, noise tolerant models are being studied by researchers nearly for a decade. Fuzzy sets and extended fuzzy sets are now widely used to represent the vague and ambiguous nature of datasets. The proposed work investigates the relationship between the output class and the optimal attribute subset on the basis of rules induced using rough sets, vaguely quantified rough sets, ordered weighted average fuzzy rough sets and fuzzy rough k-nearest neighbor model. Fuzzy rough sets and its extended models have been applied on bench mark databases. The novelty of the work lies in the application of these models on optimally generated subsets. The optimal generation of attributes is carried out using discernibility matrix based approach. This approach is also compared with the standard correlation and mutual information based approaches. The results indicate that fuzzy rough k-nearest neighbour approach combined with discernibility matrix based attribute generation outperforms other methods in terms of classification accuracy. Sensitivity analysis indicates the efficacy of the proposed model over traditional approaches.**

Keywords— fuzzy rough, optimal feature subset, discernibility matrix, sensitivity, accuracy

I. INTRODUCTION

With the increase in the size of datasets with respect to instances and features,development of automated techniques to generate relevant and nonredundant features have become inevitable.High dimensional datasets pose immense space and time complexity problems and are a curse to deal with in machine learning and pattern recognition domain [1-2]. Data interpretation and analysis gets simplified with the application of dimensionality reduction algorithms thereby reducing the training and testing time to improve prediction accuracy[3].Reduction in datasets can be done either by resampling or by reducing the number of features[4]. We primarily concentrate on the second technique for generating optimal datasets.Comprehensive study of feature subset selection process has been carried out by [5,6,7] to put forth the basic structure of feature subset selection models.This structure includes an evaluation function,search strategy,stopping criterion and a validation process to verify whether correct subset has been selected.Filter based methods include information theoretic approach[8,9], distance based methods[10,11,12,13] and correlation methods[14,15] to find the relevant features in the dataset whereas wrapper based evaluation involves the use of classifiers like neural networks,support vector machines,k-nearest neighbour or trees.High time complexity involved with use of wrapper methods however limits its application towards huge datasets.In this paper we have employed a novel hybrid procedure that involves attributes reduction followed by classification in fuzzy rough framework.

Human like decision making can be best expressed using linguistic data representation and if-then rules.But the real life datasets generally cannot be expressed using static and systematic rules to map the input pattern with respect to the classes.Fuzzy rule based induction algorithms could tackle the uncertainty and variability of the real time datasets[16,17,18].A model describing Fuzzy association rules for relational databases has been developed by [19-20].This model tends to find a pair of features described by a novel measure that evaluates the difference between observed and expected values of relations and finals finds the regularities and exceptions in the dataset.A similar approach for fuzzy decision trees has been carried out by [21].Rough set theory(RST) as described by [22] was a preliminary work that stated the significance of RST by creating approximate sets namely,lower and upper approximate sets,to describe imprecise information.Fuzzy explain the imprecise information by using grade of belongingness to the fuzzy sets of information.Fuzzy rough hybrid models thus look for minimal subsets of attributes to induce similar partition on the dataset as done by original set [23].Retaining relevant attributes and removal of superfluous attributes to generate dependency based optimal feature subset is the essence of fuzzy rough models.Such optimal subsets are termed as reducts in RST[24]. The proposed work thus deals with datasets which have high dimensionality,possess uncertainties and allows certain level of tolerance to imprecision.Fuzzy rough hybridization procedures and its mathematical foundation has been explained by [24-25] extensively with application to real time datasets using soft computing theory. Discernibility matrix generation to generate minimal subset of attributes has been studied by [26].This approach is suitable for small datasets. With increase in dimensionality of datasets, the order of the matrix and complexity involved in evaluation also increases. Hence the pros and cons of the approach are also compared with other attribute selection procedure given in literature.

The rest of paper is arranged as follows: Section 2 explains the preliminaries in Fuzzy rough set theory. Section 3 describes the Methodology and experimentation and implementation is described in Section 4.The last section, Section 5 concludes the paper.

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Development of Algorithm for Extraction of Fetal from Maternal ECG on Benchmark Database and Prototype Development for Acquisition

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Abstract:
Fetal ECG monitoring has become important as it helps to detect the abnormalities in child during pregnancy. The prior knowledge about the fetal health could help in reducing complications and maintaining good and healthy pregnancy. FECG is contaminated by many external factors so its extraction becomes little complicated. FECG is used to examine the structure and functioning of baby's heart. It helps us to identify and diagnose congenital heart defects before birth. The total nine months of pregnancy is divided into three trimesters. During each trimester, the fetus grows and develops to the next stage. A test will be done on each trimester to detect birth defects, identify correct some kinds of fetal problems that may affect child birth. This paper performs some research explorations on various techniques and algorithms used for the extraction of Fetal ECG from Maternal ECG.

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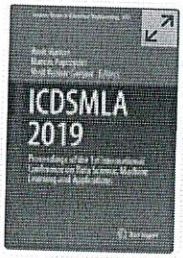

ICDSMLA 2019 pp 82–89

Bio-inspired AI Optimization Techniques to Evaluate Data Rate and Minimize Interference in Cognitive Cellular Network

Sharada N. Ohatkar & Dattatraya S. Bormane

Conference paper | First Online: 19 May 2020

49 Accesses

Part of the Lecture Notes in Electrical Engineering book series (LNEE,volume 601)

Abstract

The concept of Cognitive Cellular Network (CCN) resolves spectrum availability crises arising from increasing demand of data rate, which is restricted in cellular network. The traffic demand is growing extensively consequently allocating the channels optimally in CCN is the purpose of this work. The CCN accommodate cellular (primary) and cognitive (secondary) users. The cognitive users occupy the

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cellular band avoiding interference among them. The AI-heuristic techniques Bee colony Optimization (BCO) and Teaching learning based optimization (TLBO) is applied to find optimal solution to channel allocation in CCN. The data rate is evaluated after discovering the interference associated, to cope-up with network capacity. The obtained solution is found to be better than reported work.

Keywords

Cognitive cellular network (CCN)

Bee colony optimization (BCO)

Teaching learning based optimization (TLBO)

Channel allocation

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HOG based gesture to voice conversion system for Indian Sign Language using Raspberry Pi.

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Abstract—The hand gesture is one of the typical methods used in sign language. It is often very difficult for hearing-impaired people to communicate with the world. This project presents a solution that will not only automatically recognize the hand gestures but will also convert it into speech and text output so that an impaired person can easily communicate with normal people. The system consists of a camera attached to a computer that will take images of hand gestures, Histogram of Gradient feature extraction is used to recognize the hand gestures of the person. Based on the recognized hand gestures, the system will produce voice output. The goal of the project is to develop a new type of Human-Computer Interaction system to overcome the problems that users have been facing with the current system. A simple web camera is used to capture hand gesture images and recognize alphabets characters (A-Z) and numerals (0-9)using Histograms of Oriented Gradients (HOG) features. The purpose is to implement the algorithm of extracting Histogram of Gradient Orientation (HOG) features and these features are classified using a Support vector machine (SVM) classifier for identification of Indian Sign language (ISL). Hardware is developed using Raspberry Pi and Python Programming.

Keywords – Histogram Of Gradient (HOG), Support Vector Machine (SVM), Indian Sign language (ISL), Raspberry Pi.

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Intelligent Agriculture System with Crop Selection Using IOT

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Abstract—The hand gesture is one of the typical methods used in sign language. It is often very difficult for hearing-impaired people to communicate with the world. This project presents a solution that will not only automatically recognize the hand gestures but will also convert it into speech and text output so that an impaired person can easily communicate with normal people. The system consists of a camera attached to a computer that will take images of hand gestures, Histogram of Gradient feature extraction is used to recognize the hand gestures of the person. Based on the recognized hand gestures, the system will produce voice output. The goal of the project is to develop a new type of Human-Computer Interaction system to overcome the problems that users have been facing with the current system. A simple web camera is used to capture hand gesture images and recognize alphabets characters (A-Z) and numerals (0-9)using Histograms of Oriented Gradients (HOG) features. The purpose is to implement the algorithm of extracting Histogram of Gradient Orientation (HOG) features and these features are classified using a Support vector machine (SVM) classifier for identification of Indian Sign language (ISL). Hardware is developed using Raspberry Pi and Python Programming.

Keywords – Histogram Of Gradient (HOG), Support Vector Machine (SVM), Indian Sign language (ISL), Raspberry Pi.

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Text To Speech Synthesis In Celebrity's Voice

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Abstract—This paper is proposed for Text to speech synthesis, neural network architecture for speech synthesis directly from text in celebrity's voice. The system is composed of a recurrent sequence-tosequence feature prediction that maps character embeddings to mel-scale spectrograms, followed by a modified Wave-Net model acting as a Vocoder to synthesize time-domain waveforms from those spectrograms. In this project evaluation of the impact of Mel spectrograms as the conditioning input to Wave-Net instead of linguistic, duration, and F0 features. We further would be showing that using this compact acoustic intermediate representation allows for a significant reduction in the size of the Wave-Net architecture. Using this technique we are going to modulate the output of Vocoder according to the frequency and pitch of any celebrity's voice.

Keywords: Text-to-Speech(TTS)

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Distressed Positioning System Based on LoRa

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Abstract— Several new wireless technologies have been proposed to provide IoT sensors with long-range communication. LoRa has been investigated for long-range performance among these. Although LoRa shows good performance for long-range transmission, its radio signals can be attenuated over distance and the signals may be interfered with by buildings, trees, and other radio signal sources. A natural disaster is a major adverse event that results from the Earth's natural processes. A natural disaster can result in loss of life or damage to property and typically leaves some economic damage in its wake, which depends on the resilience of the affected population (recovery capacity) and on the available infrastructure. There are many methods for transmitting data through a widely dispersed internet network, but after the natural disaster, respondent sneed an efficient way to coordinate recovery efforts when access is lost. This paper creates a network of fast-deployed hotspots that can collect valuable information from vulnerable citizens. In this paper, a concentrator/gateway is designed using a LoRa module, Wi-Fi module, Raspberry Pi and RF Transceiver to handle large-scale public networks. A basic communication interface is created to achieve this.
Keywords—IoT, LoRa, LoRaWAN, long-range network, sensor data, data collection, beacon,

Voice to Indian Sign Language conversion for hearing impaired people

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Abstract—Sign language is a universal way of communication for challenged people with speaking and hearing limitations. Multiple mediums are accessible to translate or to acknowledge sign language and convert them to text. However, the text to signing conversion systems have been rarely developed; this is often thanks to the scarcity of any sign language dictionary. Our project aims at creating a system that consists of a module which initially transforms voice input to English text and which parses the sentence, then to which Indian sign language grammar rules are applied. This is done by eliminating stop words from the reordered sentence. Indian Sign Language does not sustain inflections of the word. Hence, stemming is applied to vary over the words to their root/stem class. All words of the sentence are then checked against the labels in the dictionary containing videos representing each of the words. The present systems are limited to only straight conversion of words into Indian Sign Language whereas the proposed system is innovative, as our system aims to rework these sentences into Indian sign language as per grammar in real domain.

Keywords — Indian Sign Language, Natural Language Processing, grammar rule

Water Level Monitoring and Leakage Detection System using LoRa

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Abstract— Rising global environmental issues and rapidly growing population demands massive need of water supply. These issues in-turn have made water conservation and water management an emergency aspect of human survival. Water level detection and leakage detection are paramount aspects of these issues. Therefore a system is required to adequately manage the water resource by tracking water level and to detect damage when there is a leak. The detection of water level will use 'State-Of-Art' VL53L1X technology and leak detection will use flow meter based on hall sensor. Data transmission will be through LoRa (Long Range) and real-time retrieving of data can be done using cloud server and various display units. LoRa provides increased coverage area with high accuracy in data transmission. The results show that proposed system works effectively in variant environmental conditional.

Keywords - Water level, leakage detection, distance sensor, VL53L1X, flow meter, hall sensor, Arduino, ESP8266, LoRaTM, LoRa gateway, Time of Flight(ToF).

Drone Surveillance System

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Abstract— Drones are unmanned aerial vehicles that are remotely controlled. They range in size from under one pound to several hundred pounds (Perlman 2016). This study discusses drones classified for consumer use which are identified as drones between 0.55 to 55 lbs by the Federal Aviation Administration (FAA). (2016e FAA). Considering that consumer drones have been available for purchase in greater numbers than ever before, no-fly zones law needs to be centrally coordinated (Perlman 2016). It can be achieved by developing a geodatabase and web-GIS map, which will allow the visualization of areas for drone use.

Keywords –Unmanned Aerial Vehicles (UAV), Global Positioning System(GPS), Federal Aviation Administration (FAA), etc.

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Accident Detection and Monitoring Using Black Box

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Design of Human Hand Prosthesis

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Abstract— Amputation is the removal of the limb due to trauma, medical illness or surgery. Prosthesis or transplantation is the only option for recovery of loss. The currently available prosthetic arm has limited functions and is cost prohibitive. This paper proposes the design of a cost-effective anthropomorphic prosthetic arm. In addition to the thumb roll, the design incorporates five individual fingers. The development of the prosthetic arm includes the microcontroller ATMEGA328 for finger movements.

Keywords: Amputation, Prosthetic.

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Restaurant Waiter Robot

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Treatment of Greywater By Using Activated Carbon

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Abstract— Amputation is the removal of the limb due to trauma, medical illness or surgery. Prosthesis or transplantation is the only option for recovery of loss. The currently available prosthetic arm has limited functions and is cost prohibitive. This paper proposes the design of a cost-effective anthropomorphic prosthetic arm. In addition to the thumb roll, the design incorporates five individual fingers. The development of the prosthetic arm includes the microcontroller ATMEGA328 for finger movements.

Keywords: Amputation, Prosthetic.

Electrical Bus Wireless Charging System

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Abstract— In our day to day life we seen the buses which releases the large amount of harmful gases like co2, and other gases. These gases increases air pollution as well as the large problem of global warming and people who travel in surrounding gets affected with these gases .Because of this the many diseases are occurred . And if we think more then we use the fuel to drive the bus that fuel is also the non-renewable source of energy which is limited and goes lesser day by day. So to look at all these problems we are making a bus which is fuel less means smart eco-friendly bus .This bus cannot use fuel it works on charging, wireless charging [1]. In this bus we are using the inductive charging principle to charge the bus. This bus saves the non-renewable energy source as well as reduces pollution by decreasing the emission of co2 in air .This buses cannot produces co2 or harmful gases in air. But if battery is about to die then in such situation we are using bypass for charging which is solar panel .If battery is not charged fully then in such case through solar panel battery is charged. But solar panel does not have capacity to charge battery fully, only inductive charging can charge the battery fully. We use LCD display to indicate the status of battery to driver as well as Depo unit. In this bus we use the system to verify the bus means to know that at what time bus is at which place?

Keywords: fuel less, Wireless power Transformation, non-renewable energy source, BRT bus, electric bus, etc.

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Pesticide Spraying Quad Copter

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Abstract— In Farming pesticide spraying plays the crucial role for the growth of plants. Growth of plantrefers to being in a good shape until being harvested. Quality of grains or anything being planted could be considered under quality of output product. It is challenging to spray the pesticide in large area within less or fixed amount of time by human being, as farmers have to face so many medical conditions during the spraying process as well as environmental conditions while executing these processes. Covering the large area in a short time period is the major and most priority requirement for farmer. This project represents the process of spraying pesticide with the help of electronics to help farmers in a short time period without any harm on the human body. The goal is to help farmers and plants, without any physical or chemical damage and complete the spraying process in short period of time.

Keywords – DJI NAZA(Dà-JiāngInnovationsNAZA), BLDC motor(Brushless DC Motor), ESC(Electronic Speed Controller),Lipo Battery(Lithium Polylmer Battery), UAV(Unmanned Aerial Vehicle), GPS(Global Positioning System), PWM(Pulse Width Modulation), PDB(Power Distribution Board)

IoT based Monitoring & Mapping of Absentee Visualization on the Shop-floor

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Abstract— In all the companies, attendance of the employee is taken after the employee enters the factory through their signature or biometrics which would consumes a lot of time. The main objective is if the attendance of the operators is taken even before they enter the premises, the supervisor gets to know if a particular employee is absent. This can be done by virtually connecting the finger-print sensor output to the cloud and so that the supervisor can access the cloud and get the information of the operators who have boarded the buses. The R-307 Finger-print sensor is used as the main input. The Raspberry Pi will process the data and the GSM will send the text message to the respective supervisors. The fingerprint sensor can determine the finger-print stored in the database with an average response time of 0.8 seconds.

Index Terms – Attendance System, Finger-print sensor, General Packet Radio Service (GPRS), Global System for Mobile Communication (GSM), Cloud Server.

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Accident Detection and Reporting System

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Abstract— The number of fatal and disabling road accident are increasing day by day and is a real public health challenge. Several times human lives will be lost in road collisions due to delayed medical assistance. Hence road accident deaths are more prominent. There are many accident prevention systems that can prevent accidents to some extent, but they have no means of communicating with relatives in the event of an accident. In this paper, the authors made an attempt to develop a car accident detection and communication system which will inform the relatives,

nearest hospitals and police along with the location of the accident as well as to prevent the accident ultrasonic sensor is used which will detect the obstacles (like vehicle) and reduce the speed of motor with the help of controller so less damage will appear.

Keywords-Atmega328, accelerometer, GSM,GPS, ultrasonic sensor

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