



**Lokmanya Tilak Jankalyan Shikshan Sanstha's**  
**PRIYADARSHINI BHAGWATI COLLEGE OF ENGINEERING**  
Harpur Nagar, Umred Road (Near Bada Tajbagh), Nagpur-24  
(Approved by AICTE, New Delhi, Govt. of Maharashtra  
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## TO WHOMSOEVER IT MAY CONCERN

This is certified that Number of research papers published per teacher in the Journals notified on UGC care list during the last five years.

Year	2022	2021	2020	2019	2018
Number of Research papers	18	9	12	11	2
<b>Total</b>					<b>52</b>

**Certified Document from page No.1 to 15**

**Principal**



### 3.3.1 Number of research papers published per teacher in the Journals notified on UGC care list during the last five years.

For the Year 2020				
Sr. No	Title of paper	Name of the author/s	Name of journal	Is it listed in UGC Care list
1	Modern Aspect on Deflorination of Water: Adsorption	A.V.Bhambhurkar, R.N.Patil,	Design Engineering	Scopus Index
2	“A New Dynamic Mathematical Modeling Approach of Zero Waste Management System”	A.V.Bhambhurkar, R.N.Patil,	Turkish Journal of Computer and Mathematics Education,	Scopus Index
3	Utilisation of agro waste in the development of fired clay bricks – a review	Arti M. Sorte, Ajay N. Burile,	Int. J. Environment and Waste Management,	Scopus Index
4	Existence of $1/\sqrt{2}$ [y+z] -type plane gravitational waves in Bimetric Relativity	Dr.(Mrs.) S. R. Suple	Vidyabharati International Interdisciplinary Research Journal	UGC Care
5	Effect of heat treatment on the behaviour of teak wood adherends bonded joints.	Mr.S.G.Ghugal	Applied Adhesion Science	Springer (SCI)
6	Europium Doped TiO <sub>2</sub> -Heterostructure for photodegradation of Dyes.	Mr.S.G.Ghugal	Material Science inc.Nanomaterials & polymers.	wiley (SCI)
7	Green manufacturing index applicability, an approach to acquire industrial gain	Prof. K.D.Ganvir	Journal of Physics	Scopus Index
8	Generation of electric energy converted into fuel cell for operating grass cutter mechanism	Prof. K.D.Ganvir	Journal of Physics	Scopus Index



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9	Arrangement and performance analytics of elements of vibration testing machine for taper roller bearing,	Prof. K.D.Ganvir	Journal of Physics	Scopus Index
10	No Suspension, No Differential 4 - WD Vehicle Analytics to Reduce Adverse Environmental Impacts.	Prof. S. P. Daf	Solid state technology	Scopus Index
11	Design & Validation of Feeding Mechanism for Porous Raw Material: A Case Study in Chemical Processing Company	Prof.S.P.Gurway	IOP Conference Series: Materials Science and Engineering	Scopus Index
12	Optimization of Operational Method to Improve Sustainable Energy Efficiency of Auxiliaries in a CFBC Coal Fired Boiler	Prof. M.R.Moroliya	Solid State Technology, USA	Scopus Index

**Principal**

## A Modern Aspect on Defluoridation of Water: Adsorption

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**Abstract:** Fluoride contamination in water is one of the major organic concerns. Defluoridation technique is changed for expulsion of fluoride contamination from water. Several methodologies have been made to improve drinking water. Adsorption is one of the procedures, which is similarly stronger and have more tendencies. Notwithstanding, as of late, a colossal evaluation has been done on growing new adsorbents by impregnation of straightforwardness permeable solids with created materials for better defluoridation execution. Impregnation is one of the persuading surface change technique completed to gather the high adsorption limit. Subsequently, the basic target of this evaluation is to survey the various adsorbents, the impregnating prepared experts, introductory focus, part of the adsorbent and to investigate the different impregnation methods used to improve the adsorption farthest reaches of the adsorbent.

**Keywords:** Fluoride, Defluoridation, Impregnation

### 1. Introduction

Fluoride in drinking water is one of critical hotspots for fluoride introduction to generally open. For example, in the south of Brazil, artesian-well waters from rock rich in calcium and silicon contain 5–2 mg/L of fluoride (APHA, 2018). Similarly in some ordinary water systems over immense areas in Asia, America and Europe, the fluoride center goes from 0.01 to 3 mg/L in new water and 1–35 mg/L in ground water (C.M. Vivek Vardhan et al., 2016). According to the World Health Organization, the ideal fluoride level in drinking water for general incredible prosperity is some place in the scope of 0.5 and 1.5 mg/L (Girish, 2018).

Irrational affirmation of fluoride prompts dental and skeletal fluorosis (Maheshwari, R.C. et al., 2006). High levels of fluoride center in ground water are impacting an enormous number



# A New Dynamic Mathematical Modeling Approach of Zero Waste Management System

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**Abstract**Dr. Paul Palmer coined the phrase "zero waste" in 1973 to describe the complete removal of municipal solid waste (MSW) from landfills. Through a literature study and an interactive survey method, the conceptual basis and procedures employed in 25 cities throughout the world. The Battle Environment Evaluation System was used to study and analyse certain essential key issues involved in the present zero waste management system (BEES). The Delphi Technique was commonly utilised in this study to evaluate the present municipal solid waste management system (MSWMS) of the study area. The value of Environmental Quality (EQ) determined for the area under study's existing MSWM system was found to be 238; however, the ideal value for a good rating of an existing MSWM system should be 521. Various conclusions were drawn based on the facts and findings, including the development of innovative product design, a focus on the Solid Liquid Resource Management Centre (SLRMC), the Domestic Composting System (DCS), the design of optimal collection and transportation routes, the development of transfer stations, the implementation of the 3R principles, and the monitoring of the MSWM system at various stages. A model for zero-waste management has also been created and presented.

**Keywords:** Zero waste Technique and Management system, environmental quality (EQ) & Environmental Impact Unit (EIU), Parameter Important Unit (PIU), Delphi Technique (DT), Solid Liquid Resource Management Centre (SLRMC), Domestic Composting System (DCS), Battle Environment Evaluation System (BEES).

## 1. Introduction

Zero waste is a euphemism for "zero waste." It is not an absolute concept. It's a philosophical notion that encourages rethinking the resourced life cycle so that all products can be reused. Zero waste focuses on systematically designing and managing goods and processes to avoid and eliminate wastes and materials, as well as conserving and recovering all resources from the waste stream. [2]

Because waste is a societal problem that we have created, we will have to use social engineering as well as modern technology to eliminate it. In reality, zero waste management (ZWM) emphasises society's desire to reduce resource usage or consumption by maximising the [8] Rs: repurposing, recycling, repairing, redesigning, regenerating, reducing, remanufacturing, and reselling of things. [3, 4]

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## Utilisation of agro waste in the development of fired clay bricks – a review

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**Abstract:** Bricks are one of the most basic building materials used in construction field. To overcome the environmental issues related to pollution and energy problems, it is necessary to find out alternative material to replace clay in brick development. It is also required to reuse and recycle the products at the end of their lives. Use of agricultural waste as an alternative raw material in the manufacturing of fired clay bricks is attracting attention due to sustainability issues. This paper reviews the investigations carried out by various researchers on the use of agricultural residue as a partial replacement in the manufacturing of fired clay bricks. This study also emphasises on the economical value of utilisation of agricultural waste into useful products. The basic aim of this study is to review the various possibilities of utilisation of waste materials for the production of fired clay bricks in particular.

**Keywords:** agro bricks; agricultural waste; clay bricks; compressive strength; ecofriendly; fired bricks; oat husk; rice husk; sustainable; sugarcane bagasse ash.

**Reference** to this paper should be made as follows: Sorte, A.M., Burile, A.N., Chaudhari, A.R. and Haldar, A. (2020) 'Utilisation of agro waste in the development of fired clay bricks – a review', *Int. J. Environment and Waste Management*, Vol. 26, No. 4, pp.531–550.

**Biographical notes:** Arti. M. Sorte has passed her BE in Civil Engineering from RTMNU, Nagpur. She completed her MTech in Environmental Engineering from RTMNU, Nagpur. Currently she is working as an Assistant Professor at the Department of Civil Engineering, Priyadarshini Bhagwati College of Engineering, Nagpur, RTMNU, Maharashtra, India (440009). She is also register for PhD. Her fields of interest are environmental engineering, waste materials and their productive uses. She has a teaching experience of ten years. She has published five papers in international journals and two in international conferences. She is a member of professional bodies like Indian Society of Technical Education (ISTE), IAENG, IRED, STAMI.

EXISTENCE OF  $\frac{1}{\sqrt{2}}(y+z)$  -TYPE PLANE GRAVITATIONAL WAVES IN BIMETRIC

## RELATIVITY

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## ABSTRACT

In this paper,  $Z = \frac{1}{\sqrt{2}}(y+z)$  - type plane gravitational wave is studied with source Cosmic Cloud Strings in Rosen's Bimetric theory of relativity. It is shown that there is nil contribution of Cosmic Cloud String in this theory. Only vacuum model can be constructed.

**Keywords:** Plane gravitational waves, Cosmic cloud strings, Bimetric Relativity.

**AMS Code-83C05** (General relativity)

## Introduction

The general theory of relativity is one of the most beautiful structures in all theoretical physics. In an attempt to get rid of the singularities, appear in the Einstein's General Theory of Relativity (GR), Rosen[8-9] has proposed a modified theory of gravitation within the framework of general relativity, which is called Bimetric Theory of Relativity (BR). In this theory, he has proposed a new formulation of the general relativity by introducing a background Euclidean metric tensor  $\gamma_{ij}$  in addition to the usual Riemannian metric tensor  $g_{ij}$  at each point of the four dimensional space-time. With the flat background metric,  $\gamma_{ij}$  the physical content of the theory is the same as that of the general relativity.

Thus, now the corresponding two line elements in a coordinate system  $x^i$  are –

$$ds^2 = g_{ij} dx^i dx^j \quad (1.1)$$

$$d\sigma^2 = \gamma_{ij} dx^i dx^j \quad (1.2)$$

Where  $ds$  is the interval between two neighboring events as measured by means of a clock and a measuring rod. The interval  $d\sigma$  is an abstract or geometrical quantity not

directly measurable. One can regard it as describing the geometry that would exist if no matter were present. H. Takeno [5] propounded a rigorous discussion of plane gravitational waves, defined various terms by formulating a meaningful mathematical version and obtained numerous results.

Using definition of plane wave, we will use here,  $Z = \frac{1}{\sqrt{2}}(y+z)$  type plane gravitational waves by using the line elements,

$$ds^2 = -A(dx^2 + dy^2) - C(dz^2 - dt^2) \quad (1.3)$$

The theory of plane gravitational waves have been studied by many investigators, H. Takeno [6]; S. N. Pandey [15]; I. Goldman [7]; R. H. Gowdy [11]; H. Bondi, et al. [4]; C. G. Torre [2]; P. A. Hogan [10]; Deo and Ronghe [1]; Deo and Suple [12], [13], [14] and they obtained the solutions.


In continuation of this, we will study  $Z = \frac{1}{\sqrt{2}}(y+z)$  type plane gravitational wave with Cosmic cloud string and will observe the result in the context of Bimetric Theory of Relativity.

RESEARCH

Open Access

# Effects of heat treatment on the behavior of teak wood adherends bonded joints



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article

## Abstract

The main aim of this work is to investigate the effect of heat treatment on the teak wood adherend bonded joints. Indian teak wood samples were kept in an oven at 150 °C for 2 h for the heat treatment process. The surface roughness values of the wood adherend before and after the heat treatment process were measured using a surface profilometer. Wettability of un-treated and heat-treated teak wood samples was determined with the contact angle measurements by using the sessile drop method. Single strap joints with un-treated and heat treated wood specimens were tested at ambient temperature. The results show that, there is a clear dependency observed in between the heat treatment and the surface roughness of the wood adherends. Wettability of teak wood adherend surface is degraded after the heat treatment process. An adverse effect of heat treatment of wood adherend on the bonding strength was observed, but the surface roughness was improved.

**Keywords:** Heat treatment, Surface roughness, Teak wood, Adhesive bond strength, Wettability

## Introduction

Nowadays, scientific communities and industries are looking for alternative materials to the synthetic composites and metals, as these materials are non-degradable, limited in quantity, hazardous to nature and costly [1, 2]. Hence many researchers are attracted towards natural materials (e.g. wood) for various applications, such as construction, furniture, decorative products, sports items and many others. Wood is one of the most important materials and widely used since the old era, as it is easily available, eco-friendly, light weight and low cost among many more benefits compared to others [3, 4]. However, the hygroscopicity of wood is the major disadvantage which limits the usage of wood for many applications. There are different processes by which the hygroscopicity of wood can be reduced and many studies have been carried out in the literature on different processes [5, 6].

Heat treatment is the oldest and simplest method by which wood hygroscopicity can be effectively decreased. In addition, the dimensional stability, biological resistance and durability of the wood can also be improved [7–9]. It was showed that the heat treatment of wood not only reduced the hygroscopicity but also caused physical changes in the wood such as surface modification, which can significantly affect the adhesive bond



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## Materials Science inc. Nanomaterials &amp; Polymers

Europium Doped  $\text{TiO}_2\text{-Ta}_2\text{O}_5$  Heterostructure for Photodegradation of DyesSachin G. Ghugal<sup>+, [a]</sup>, Devthade Vidyasagar<sup>+, [a]</sup>, Sandip G. Ghugal,<sup>[b]</sup> Ashok G. Shende,<sup>[a]</sup> Ms. Toshali Bhoyar,<sup>[a]</sup> and Suresh S. Umare<sup>\*[a]</sup>

A europium doped  $\text{TiO}_2\text{-Ta}_2\text{O}_5$  mixed oxide heterostructure prepared by wet impregnation method shows improved visible light absorption than the anatase  $\text{TiO}_2$  and undoped  $\text{TiO}_2\text{-Ta}_2\text{O}_5$  heterostructure. The structural analysis suggested the presence of mixed  $\text{TiO}_2$  and the orthorhombic  $\text{Ta}_2\text{O}_5$  phase. The photoactivity of Eu-doped  $\text{TiO}_2\text{-Ta}_2\text{O}_5$  composites assessed towards the degradation of a model indigo carmine (IC) dye revealed high photodegradation activity than the individual metal oxides. The combination of efficient photo-excitons separation and enhanced visible-light absorption are corroborated factors responsible for the upgraded photocatalytic activity. Importantly, the prepared heterostructure found to be photostable and active for six repetitive recycles.

earth materials are attractive candidates as they possess higher photostability, reduced light scattering, narrow emission spectra, significant emissive stoke shifts, and long luminescence lifetimes, which are vital for photocatalytic applications.<sup>[4]</sup> For instance, europium (III) ions yield red photoluminescence with narrow atomic emission profiles when doped into inorganic lattices. As titania possesses high transparency to visible light makes it suitable host material for  $\text{Eu}^{3+}$  doping.<sup>[5]</sup>  $\text{Eu}^{3+}$  owns the property of producing a sharp emission band in the visible region due to the  ${}^5\text{D}_0\text{-}{}^7\text{F}_i$  ( $i=0, 1, 2, 3, 4$ ) transitions.<sup>[6]</sup> The present work investigates the photophysical and photocatalytic behavior of europium doped  $\text{TiO}_2/\text{Ta}_2\text{O}_5$  heterostructure for the degradation of indigo carmine (IC) dye.

## 1. Introduction

Titania ( $\text{TiO}_2$ ) is one of the promising materials in the field of photocatalysis owing to its unique physicochemical properties such as low-cost, non-toxicity, photostability, and biocompatibility.<sup>[1]</sup> However, a large electronic band gap ( $\sim 3.2$  eV, anatase), need for UV-light excitation, and a high rate of recombination are the fundamental limitations for  $\text{TiO}_2$ . To transpose the demerits of  $\text{TiO}_2$ , a variety of modification strategies were implemented in titania synthesis, such as doping with a metal, non-metal or multi-doping, use of composite semiconductors, and dye sensitization of  $\text{TiO}_2$ .<sup>[2]</sup> Coupling of  $\text{TiO}_2$  with another oxide having a suitable band edge position is a promising way to suppress the recombination effect. Moreover, doped heterostructure design can increase the rate of photo-excitons separation, improve light absorption, and minimize recombination.<sup>[3]</sup> In this context, rare-

## 2. Results and discussion

XRD pattern of pristine  $\text{TiO}_2$  shows planes corresponding to the anatase phase (JCPDS file No. 73-1764), and  $\text{Ta}_2\text{O}_5$  showed orthorhombic structure (JCPDS file No. 01-071-0639). The composite samples displayed reflections of both anatase  $\text{TiO}_2$ , and orthorhombic  $\text{Ta}_2\text{O}_5$  (Figure S1). The planes of europium oxide were not visible in both Eu-doped  $\text{TiO}_2$  and 0.5Eu90Ti-Ta samples suggesting the absence of the Eu-based oxide impurity phase (Figure 1a). The ionic radius of  $\text{Eu}^{3+}$  (95 pm) is higher than that of  $\text{Ti}^{4+}$  (68 pm); therefore, it is likely that the surface doping of  $\text{TiO}_2$  may take place.<sup>[8]</sup> Further peaks corresponding to doped-metallic europium was not detected in the 0.5Eu90Ti-Ta, which is possibly due to the lower concentration of europium. Raman spectrum of pure  $\text{TiO}_2$  shown characteristic anatase six Raman active vibrational bands at 144, 197, 396, 400, 516, and 638  $\text{cm}^{-1}$  matching to the  $\text{A}_{1g}$ ,  $\text{2B}_{1g}$ , and  $\text{3E}_g$  modes, respectively (Figure 1b).<sup>[9]</sup> A slight shift in the  $\text{E}_g$  Raman mode of 0.5Eu90Ti-Ta is due to the doping effect of europium. The Raman bands between 100 and 450  $\text{cm}^{-1}$  are associated with the O-Ta-O bending vibrations in  $\text{TaO}_6$  octahedra, while those between 450 and 900  $\text{cm}^{-1}$  mainly related to the various Ta-O stretching vibrations of edge shared polyhedral distortion.<sup>[10]</sup> The UV-Visible absorbance spectrum of 0.5Eu-TiO<sub>2</sub> and 0.5Eu90Ti-Ta samples exhibit improved absorption in the visible region than the pure  $\text{TiO}_2$ . In contrast,  $\text{Ta}_2\text{O}_5$  shown maximum absorption in the UV region owing to its wide electronic band gap (Figure 1c). The band gap energy of doped composites is estimated by the Kubelka-Munk (K-M) function, and the band gaps of  $\text{Ta}_2\text{O}_5$  and  $\text{TiO}_2$  were calculated as 3.89 and 3.24 eV. While the band gap values of 0.5Eu-TiO<sub>2</sub> and 0.5Eu90Ti-Ta were 3.16 and 3.12 eV,


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# Green Manufacturing Index Applicability, An Approach to Acquire Industrial Gain.

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**Abstract:** The paper focuses on the requirement of fitness of lean and green concept utilization in an industry. Manufacturing plays the most prominent role in the development of economy of any country. The base of green manufacturing is its preference for sustainability and economical benefits. The main agenda of Green Manufacturing deals with conserving natural wealth for future generation and recycling of material by improvements in production process, it traverse the estimation and involvement of its index .Green constitutes bionomical durability and includes various attributes such as recycling from scrap and waste, pollution of land water and air, usage of energy and prescription. Green Growth is the effective and proper utilization of resources available by nature, reduction of pollution and impact of environment and strong towards bad effects, focusing on global durability and endangered into profitable from efficient, clean and pliant growth. Green assembling is a framework that incorporates item and procedure configuration issues with issues of assembling, arranging and control in such a way as to recognize, measure, test and deal with the progression of natural waste with the objective of diminishing and eventually limiting ecological effect while likewise attempting to expand asset effectiveness. The primary target of this exploration work is meant to examine viability of Green assembling. The strategy has been planned by sub ordering the machining rehearses dependent on their impediments, financial and ecological effects on keep up an economical assembling standard for businesses. The proposed strategy would be pertinent to any assembling procedure in industry. The intension is to minimise the gap of involvement of lean and green approach to contribute crucially as regarding expandable manufacturing.

## 1. Introduction

Now a day's Power of flexibly request are the issues looked by assembling ventures. Significant number of decades numerous industrialists are continually consistently searching for an elective alternative to find some kind of harmony among activity and ecological execution. Additionally, the expansion in worldwide rivalry among the assembling business has driven the makers to extend and hotspot for elective approaches to improve another way to enhance green Manufacturing. For future advancement, it plays significant role. The interest of manufacturing would be expanded in future and



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# Generation of Electric Energy Converted Into Fuel Cell for Operating Grass Cutter Mechanism.

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**Abstract:** The research intends the need for an alternative source of energy based on fuel cell. The purpose of the work is to generate electricity from hydrogen fuel cell using H<sub>2</sub> gas. The stored energy in form of fuel cell can be further used to operate the automatic grass cutter. The hydrogen, oxygen fuel cell formed from electric energy storage can be obtained by combining aluminium and water. H<sub>2</sub> has the highest energy density from all common fuels by weight so that's why it can be one of the promising substitute energy sources. The hydrogen must be incorporated in a small, less heavy system so that unnecessary weight of the device should be avoided. For cutting the grass, manually handled devices are commonly used, efforts required are more. Also, the old grass cutters are getting obsolete and requires replacement by automatic one, where system will work for guidance and obstacle detection using battery as power source. In these days' problems like pollution, power cut problem etc. appearing. To deal with such trouble and the help of technology device can be made, which can do its function without stimulating any harmful exhaust, the project will be operated by generating an energy, which can perform operation by using the renewable source of energy like alternate hydrogen fuel. Hence an attempt has been made by combining aluminium and water into some usable form which can absolutely be an alternative for various power generating fuels.

## 1. Introduction

At the latest, a significant attentiveness can be seen towards fuel cell technology, as it can be one of the most eminent prime mover, also frequency of climate alterations and different environmental impacts, need for an alternative power sources have increased enormously. Less thermal processes, noiseless operating feature, less weight and relatively greater efficiency tends to make Proton exchange membrane fuel cell as a coming energy resource for stationary usage. The need for power is tremendously increasing due to high level technology incorporation. In addition to cut down the dependency on the fossil fuel and discover sources of power which should be environmental friendly, can results in extensive search for energy sources and alternative fuels and substitute findings. For the



## An Arrangement and Performance Analytics of Elements of Vibration Testing Machine for Taper Roller Bearing

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**Abstract:** The paper addresses the need for automation in production line. A detailed evaluation of various components required for converting a manual bearing vibration testing machine to an automatic one is carried out. Function and Description of each component is studied. The components include conveyor belts, laser Doppler vibro meter, pneumatic system, mechanical probe, timing and control sensors, speed control system, data analysis and storage unit. A method of selecting each component for automatic vibration testing machine is offered. Based on the structure of automated machine the initial set of alternate variants is defined and a formal model of automatic vibration testing machine is developed. Design of conveyor belt, linear drives, pneumatic system, isolation pad, PLC and HMI system is discussed below. Analysis of supporting structure of Vibration Testing Machine is done using ANSYS 18.1 and results are shown.

### 1. Introduction

The MVU 150A is capable to measure the bearing described above (except HUB-units) and even more. Additional to the standard axial loading unit, it can be equipped with a radial loading unit. For that also cylindrical roller bearings can be tested. The MVU works with vertical high-precision hydrodynamic testing spindle. The driving unit is mechanically separated from the machine frame for an optimum vibration isolation. The thrust test loads and the radial test loads are applied by using the pneumatic loading unit. The evaluation of the noise and the vibrations and the corresponding classification of the test pieces are also carried out via the measuring electronics. Normally the three standard frequency bands are measured, within these bands the tolerance limits are freely programmable and/or are available after calling the appropriate bearing type. Evaluation criteria according to customers' requirements are possible. Frequency spectrum and detailed analysis of the spectrum is also used to go into depth with the locations and causes of the bearing vibrations. The applicable measurement outcomes are documented and also statistically compressed via a printer. The





# Solid State Technology

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## No Suspension, No Differential 4 - WD Vehicle Analytics To Reduce Adverse Environmental Impacts.

A.D.Anjekar , K.D.Ganvir , S.P.Daf

### Abstract

As we all know that technology has immensely improved, development is on its highest peak with some specific disadvantages, adversely affecting mainly three elements of nature i.e environmental aspect, social aspect and economical aspect. also, implementation of certain techniques has been made to reduce harmful effects. An attempt has been made for such a design which will definitely reduce the harmful emission, as we all know, Now days another area where the technological improvement is taking its hike is automotive sector .This can be viable by creation of new attributes .The National Karting competition is the one of the mode which give provision for doing innovations for Participants. The Go-kart definition itself indicates that it is suspensionless with no differential. They are usually raced on scaled down tracks, but are sometimes driven as entertainment or as a hobby by non-professionals. This research deals with the Design and Analysis of Chassis for the Go Kart. In this, Car the chassis is most prominent component. It forms the

# Design & Validation of Feeding Mechanism for Porous Raw Material: A Case Study in Chemical Processing Company

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**Abstract.** With the growing revolution in technology, quality is always being considered a major point of concern and developing countries like India where number of small and medium enterprises are working contributing for major part of employment, these quality concern need to be focussed. The present work involves the case study which has been conducted in one of small scale industry dealing with chemical processing, in Nagpur. The objective is to find out the solution for one of the problem discussed by production manager of the company. The problem is related to feeding of raw material into the processing plant which have been done manually and cause of quality issue and serious work hazard. So we have suggested a design of setup of feeding mechanism for pouring the raw material. While designing, first the survey has been conducted where it was found that different types of hoppers are available in market based in different size and shape. The hopper which we supposed to design should fulfil the requirement of the manager and all the technicalities. In order to do so we have studies number of design parameter and formulate the design procedure for each and every aspect right from calculation of mass flow rate, hopper angle, exit rate, wall friction angle, design of bevel gear, different force acting on hopper surface. The design of the hopper and the complete setup for the pouring resin is carried out by considering only porous raw material. So, comprehensive approach for designing the hopper as a solution have been done and proposed to company. Similarly the design is being validated using ANSYS software package.

## 1. Introduction

The case company named, RSA Industries Pvt. Ltd. Is located in, M.I.D.C. Hingna industrial estate, Nagpur-440028, who deals with production of chemicals used in textile industries. The products are water soluble polyester resin, carboxylate polyester resin for powder paint, low molecular weight water soluble polyesters and fatty acid esters and surfactant formulations. The company is having total 70+employees including R&D team, having turnover of 36 crores per annum. As discussed with production manager the company presently facing with the issue of increased work processing time and work hazard for which, as a solution the company want a well-designed hopper for pouring the resin into the processing plant of chemical i.e chemical reactor.

Designing a hopper involve number of decision parameter right from material properties to peat, rock, flour—no matter which material you process, the proposed hopper should move it to the feeder at required flow rate with maintaining the quality of same.



# Solid State Technology

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## Optimization of Operational Method to improve sustainable Energy Efficiency of Auxiliaries in a CFBC coal fired Boiler- Energy Audit of Existing System

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### Abstract

The research paper provides details of the hot water heating system for power consumption such as feed pump, feed pump motor, control valves etc; also, details related to the test of the existing system power using the 3-element mode method to control the drum level. Includes details about the various energy test equipment used during the power test to measure the various parameters such as flow, head, power speed, temperature and vibration. This study was conducted with the help of 2 boiler and turbine engineers and 3 operators where there is an inch switch. During the study of the parameter various parameters were collected and specifications were collected and the calculation was based on brake strength and pressure separation. In order to calculate it is important that one situation is sometimes created under the circumstances of each task. In cases of full volume, the drum pressure is usually kg/cm<sup>2</sup> above the maximum pressure. This means that when the total smoke load maximum pressure is ninety kg/cm<sup>2</sup>, then the corresponding drum pressure will be 100 kg/cm<sup>2</sup>. Therefore, while competitive calculations always create the assurance that the pressure to feed the feed in an economic rest area or feed supply center is much greater than the high pressure of the boiler drum flexibility for safe operation.

**Keywords**-Energy audit, Boiler Feed pump, Boiler auxiliary, Differential pressure, Drum level control

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