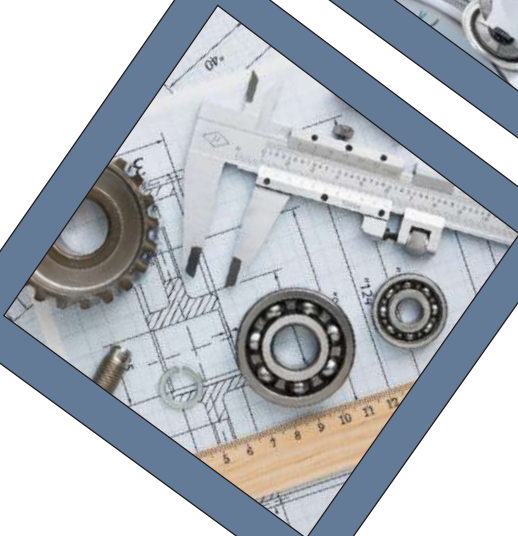


DEPARTMENT OF MECHANICAL ENGINEERING



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**GANGA INSTITUTE OF TECHNOLOGY
AND MANAGEMENT, KABLANA**





GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT

DEPARTMENT OF MECHANICAL ENGINEERING

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DIRECTOR'S MESSAGE



DR. AMAN AGGARWAL

GITAM, KABLANA

“

‘Mech G Connect’ (ME newsletter), vol.2 is a testament to the collaborative spirit and passion of faculty and students of Mechanical Engineering Department. We aim to foster a strong sense of belonging, connecting students, faculty, and alumni on a common platform. I extend my gratitude to the editorial team and all contributors for their dedication in making this newsletter possible. I encourage all readers to engage with the enriching content and stay connected with our ever-evolving community. Wishing you an enjoyable read and looking forward to the continued growth and success of ‘Mech G Connect’.

”

HOD'S MESSAGE



MR. VIVEK

GITAM, KABLANA

“

I am thrilled to announce the release of our Departmental Newsletter, “MECH G CONNECT.” This publication showcase our achievements and student accomplishments. I extend my gratitude to the Newsletter Committee for their hard work and contributors for enriching the content. The newsletter will be a continuous project, welcoming your future contributions. Congratulations to all for making this newsletter a reality!

”

VISION MISSION OF INSTITUTE

VISION

GITAM aims to be an outstanding Institute in India through academic excellence in the field of Technology and Management to fulfill the need of the Industry and serve the society.

MISSION

- To Provide healthy environment to our students as well as faculty members.
- To achieve excellence in technical education
- To promote holistic development of students through interaction with alumni, academia, Industry and expert lectures.
- To attract nurture and retain the best faculty and technical manpower.
- To promote research and development Initiatives.
- To contribute to the society by inculcating professional ethics in the students.

DEPARTMENT OF MECHANICAL ENGINEERING

VISION

“To become a center of excellence in the field of Mechanical Engineering, committed to address societal challenges and evolving needs of industry.”

MISSION

- To achieve excellence in mechanical engineering by providing outcome-based education in a healthy learning environment.
- To enhance the student’s technical and entrepreneurial skills by providing advanced learning facilities and co-curricular activities.
- To inculcate professional ethics, leadership qualities, and moral and social values among students through interaction with alumni and experts from industry and academia.
- To encourage students to research and innovate through project works, workshops, conferences, training sessions, etc.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

- ⇒ **PO-1 Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- ⇒ **PO-2 Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- ⇒ **PO-3 Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- ⇒ **PO-4 Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- ⇒ **PO-5 Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitation.
- ⇒ **PO-6 The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- ⇒ **PO-7 Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- ⇒ **PO-8 Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- ⇒ **PO-9 Individual and Teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

- **PO-10 Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO-11 Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply the set to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.
- **PO-12 Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PEO (PROGRAMME EDUCATIONAL OUTCOMES)

The students will be able to:

- **PEO-1** To produce competent Mechanical Engineers, capable of applying the knowledge of contemporary Science and Technology, to meet the challenges in Mechanical and allied Engineering fields.
- **PEO-2** To prepare the Mechanical Engineering graduates to work in diverse fields in different capacities involving individual and teamwork.
- **PEO-3** To inculcate among the students a sense of ethics, morality, creativity, leadership, teamwork, and professionalism.
- **PEO-4** To instill in the students, the ability to take up innovative research projects and to conduct investigations of complex Mechanical Engineering problems using research-based methods.

PSO (PROGRAMME SPECIFIC OUTCOMES)

The students will be able to:

- **PSO-1** Solve the real life problems by integrating design, thermal and manufacturing areas of Mechanical Engineering.
- **PSO-2** Adapt to rapid changes in the field of Mechanical Engineering and excel in a multidisciplinary work environment.

ABOUT MECHANICAL ENGINEERING

The Department of Mechanical Engineering was established in 2010 with the aim to provide the best knowledge and environment to ensure complete success in whatever field the students choose. This Department is one of the key strength of the Institute. It is making very sincere efforts to produce excellent Mechanical Engineering graduates to meet the present day needs of organizations and the Industry. The experienced and dedicated faculties along with its excellent facilities provide the necessary resources to keep the students updated with the latest industrial trends. The department has created state-of-the-art infrastructure in terms of Workshops, Laboratories and other facilities.

PROGRAMME	DURATION	INTAKE
B.TECH MECHANICAL ENGINEERING	4 YEARS	120
B.TECH MECHANICAL ENGINEERING (LEET)	3 YEARS	12
M.TECH MACHINE DESIGN	2 YEARS	12
M.TECH MANUFACTURING AND AUTOMATION	2 YEARS	18

ABOUT ME MANUFACTURING COMPANY



INDUSTRIAL VISIT AT "VITA MILK PLANT, ROHTAK"

Objective: Purpose of visit was to provide an opportunity to the students to have real insight of milk manufacturing processes and experience the working environment of the production unit. So that students will be able to compare their theoretical knowledge with the practical one.



ABOUT VITA MILK PLANT: Vita Milk Plant is one of the largest integrated milk products manufacturers in India. The Haryana Dairy Development Cooperative Federation Ltd. (HDDCF) is engaged in procurement and processing of milk and manufacturing of milk products under the famous market brand "Vita". A range of Vita Products is including Pasteurized Full Cream Milk, Standard Milk, Toned Milk, Double Toned Milk, A2 Cow Milk in pouches Ghee, Table Butter, Paneer, Sterilized Flavoured Milk, Mithi lassi, Namkeen lassi, Chhach, Dahi, Kheer, Rabri, Milk Cake, Kaju Pinni, Besan Laddu, Khoya Burfi, Mango Drink, Ice Cream, etc. which are being manufactured and sold by approx. 250 no. of milk and milk products distributor, Institutions, Defense Units, Districts Jails & 420 no. of milk booth network. In future we are going to install more booths in Haryana/Chandigarh to provide good quality liquid milk & milk products to the general public. Vita products are manufactured from milk procured from Village Level Dairy Cooperative Societies and processed at our own Milk Plants which are ISO 9001:2008 & ISO 22000:2005 and HACCP certified. Vita milk products are known for their quality and good taste not only in Haryana but throughout the entire Northern Region. The sale of Vita products also contributes to the economic upliftment and welfare of farmers of Haryana who provide us milk through the village level milk cooperative societies.

To provide ghee, cattle feed, mineral mixture & seeds etc. to village level milk cooperative societies for further sale to producer members. These standard products cover a very wide range of industries viz. Milk sectors, dairy products sectors etc.



Outcomes:

- Students gained practical knowledge of the design and manufacturing process of various sheet metal and tubular parts of electrical vehicles.
- Students observed and learnt to apply quality control measures and inspection methods in EV component manufacturing.
- Students interacted with the workshop supervisor to learn all the basics of manufacturing processes and modern tools.
- Students explored potential career paths in manufacturing, quality control, research and development, and other related fields.

CONCLUSION: This industrial visit will benefit the students in terms of learning working culture & various machining processes involved in making different types of dairy products. During the plant visit, students enthusiastically interacted with the workshop supervisor to learn all the basics of manufacturing processes and cleared their doubts. Overall it was nice and fruitful to visit the company.

INDUSTRIAL VISIT AT “TATA MOTORS, BAHADURGARH”

Objective: The visit was organized by the college in M/s Tata Motors to provide basic knowledge of operation and experience the working environment of the automobile service station. So that students are capable enough to correlate theoretical knowledge with practical knowledge.



About Tata Motors, Bahadurgarh: Tata Authorized Service Centre in Bahadurgarh stands as a beacon of automotive care, catering to the needs of Tata passenger vehicle owners with precision and commitment. The service center offers a comprehensive range of services, from routine maintenance to complex repairs, leveraging state-of-the-art equipment and skilled technicians. Their expertise extends across all Tata vehicle models, ensuring every customer receives tailored solutions. Genuine Tata parts and meticulous attention to detail characterize every service, guaranteeing optimal performance and longevity for each vehicle. Stringent quality control measures are in place to uphold Tata's renowned standards.

Customer satisfaction is at the core of the service center's philosophy. With a focus on transparency, timeliness, and effective communication, they strive to exceed customer expectations at every interaction. Feedback mechanisms ensure continuous improvement and a customer-centric approach. Embracing innovation, the service center incorporates cutting-edge technologies to streamline processes and enhance service delivery. From diagnostic tools to digital service records, they leverage technology to provide a seamless experience for customers. In line with Tata's commitment to sustainability, the service center adopts eco-friendly practices and adheres to environmental regulations. Waste management initiatives and energy-efficient operations underscore their dedication to minimizing environmental impact.

Beyond servicing vehicles, the center actively engages with the local community through various initiatives. From road safety awareness campaigns to skill development programs, they contribute to the well-being of Bahadurgarh and its residents.



Outcomes:

- Students gained hands-on experience observing and sometimes participating in real-world automotive maintenance and repair tasks, deepening their practical understanding of mechanical systems and procedures.
- Students gain insights into industry-standard practices, safety protocols.
- Students interacted with the workshop supervisor to learn all the basics of manufacturing processes and modern tools.
- Students explored potential career paths in manufacturing, quality control, research and development, and other related fields.

CONCLUSION: The students gained knowledge of the workplace culture in an automobile service station for passenger vehicles as a result of this industrial visit. The fundamental processes used in service, maintenance and repair of vehicles are understood by the students. Students passionately engaged with the engineer during the plant tour to learn all the fundamentals of the relevant processes and to get their questions answered. Overall, visiting Tata motors was pleasant, educational, and beneficial.

INDUSTRIAL VISIT AT “TATA MOTORS, BAHADURGARH”

Objective: Purpose of visit was to provide an opportunity to the students to have real insight of manufacturing processes and experience the working environment of the production unit. So that students will be able to compare their theoretical knowledge with the practical one.



ABOUT PARLE BISCUITS PVT. LTD.: Parle Products has been India's largest manufacturer of biscuits and confectionery, for almost 90 years. Makers of the world's largest selling biscuit, Parle-G, and a host of other very popular brands, the Parle name symbolizes quality, nutrition and great taste. With a reach spanning even the remotest villages of India, the company has definitely come a very long way since its inception.

Many of the Parle products - biscuits or confectioneries, are market leaders in their category and have won acclaim at the Monde Selection, since 1971. With a 43% share of the total biscuit market and a 15% share of the total confectionary market in India, Parle has grown to become a multi-million-dollar company. While to consumers it's a beacon of faith and trust, competitors look upon Parle as an example of marketing brilliance.



Outcomes:

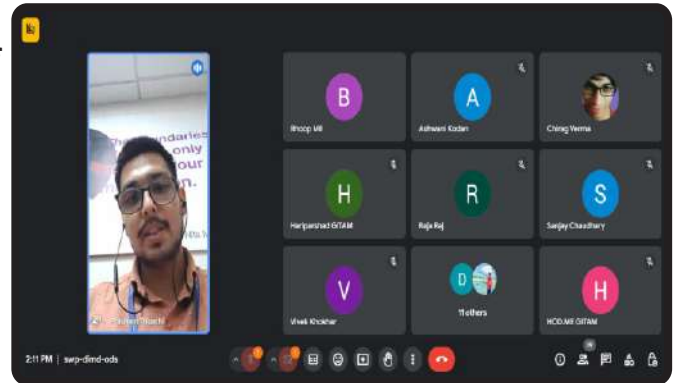
- Enhanced understanding of theoretical concepts through practical application.
- Development of critical thinking skills by analyzing industry practices and processes.
- Development of soft skills including communication and teamwork.
- Promotion of lifelong learning by instilling a sense of curiosity and inquiry
- Preparation for the challenges of the professional world, fostering confidence and resilience.

CONCLUSION: This industrial visit will benefit the students in terms of learning working culture & various machining processes involved in making different types of products. During the plant visit, students enthusiastically interacted with the workshop supervisor to learn all the basics of manufacturing processes and cleared their doubts. Overall it was nice and fruitful to visit the company.

ALUMNI TALKS

Objective: Alumni talk helps the student to better understand their curriculum and the use of curriculum during their job. Alumni talks become an eye opener for the students on how to enter a company after completion of their course and use their skill for better performance.

Mr. Prashant Tripathi was invited for Alumni Talk. He interacted with the students and gave career guidance regarding jobs in the mechanical engineering field.



EXTENSION ACTIVITY ON “DIGITAL PAYMENT AWARENESS PROGRAM”



An extension activity on Digital Payment Awareness Program was organized by “MECHFUSION” (Technical club of Mechanical Engineering Department) on 28.02.2024 at Saheed Ramesh Gulia Govt. Sr. Sec. School, Kheri Jat, Jhajjar. Knowledge about digital payments (i.e. what is digital payments, what are various modes of digital payments, benefits and losses) was shared with the students.



OBJECTIVES:-

- Raise awareness about the security measures in place for digital payments.
- Educate about common types of fraud in digital payments.
- Inform about rights and responsibilities when making digital payments.
- Highlight the environmental benefits of digital payments.
- Encourage more people to adopt digital payment methods by highlighting their convenience.

Outcomes :

- Become known to environmental benefits of digital payments
- Adapted to digital payment methods by highlighting their convenience.
- Become more adept at recognizing various types of fraud schemes prevalent in digital payments.
- Educated about common types of fraud in digital payments.
- Increased awareness to adopt a more vigilant approach when engaging in digital transactions.



RESEARCH AT MECHANICAL ENGINEERING

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Selection of performance parameter for optimisation of availability of industrial system using particle swarm optimisation

Ajay Kumar and Devender Singh Punia

Published Online: July 5, 2024 · pp 274-299 · <https://doi.org/10.1504/IJIE.2024.139782>

Abstract

Today automation has become the necessity of a highly reliable industrial system which leads to the use of highly complex systems. In the present paper the performance modelling of complex multi-state system of industrial system for optimisation of availability is analysed using particle swarm optimisation (PSO). The steady state analysis (SSA) and transient state analysis (TSA) is done using Markov mathematical modelling. The decision support system for the considered system for repair priority of subsystem is presented for increasing the availability of system. The selection of various failure and repair rate for maximisation of availability is done using PSO. It is observed that the results obtained by PSO are beneficial for deciding the optimised failure rate as well as repair rate for maximum availability of system thus the increase in availability and decrease in failure rates decrease the overall cost of production.

Keywords

availability, particle swarm optimisation, PSO, maintenance, decision support system, failure rate, repair rate, steady state analysis, SSA, transient state analysis, TSA

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RESEARCH ON THE PRACTICAL UTILISATION OF BUTANOL, ETHANOL AND DIESEL IN A COMPRESSION IGNITION ENGINE
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²Assistant Professor, Ganga Institute Of Technology & Management Kablana Bhajjar, India.

ABSTRACT
This paper examines the actual usage of butanol, Ethanol and Diesel is utilized as an energy source in an engine with compression ignition, with a specific focus on their Efforts, emitting characteristics, and fuel efficiency. The study is to investigate alternative potentially viable sources to decrease the environmental Resulting of diesel engines while Efforts accompanied by modes enhancement in efficiency and reduction in releases. The study also emphasises preserving or improving their Efforts. The study involves a sequence of Scientific tests executed on a compression ignition engine with a single cylinder. A range of fuel mixtures, such as pure diesel, diesel-butanol, diesel-ethanol, and various combinations of these three, underwent testing. Brakes thermal effectiveness, particular consumption of fuel, and output of power were quantified as key Effort measures. In addition, the emitting characteristics, such as CO, hydrocarbons, nitrogen oxides and particulate matter were investigate to assess the environmental consequences of each fuel mixture. The findings suggest that the addition of butanol and ethanol to diesel has a substantial influence on both the engine's Efficiency and ecological influence. Diesel-butanol mixtures exhibited enhanced Enhanced brake heat effectiveness and reduced releases of CO and HC in comparison to pure diesel. Butanol was shown to be more effective than ethanol mixes in improving fuel efficiency. The integration of diesel, butanol, and ethanol outperformed in a harmonious Efforts accompanied by modes enhancement in efficiency and reduction in releases. The study also emphasises the practical obstacles linked to the use of alcohol-based fuels in compression ignition engines, including fuel stability, corrosiveness, and the necessity for engine changes. Although there are limitations, butanol and ethanol have the potential to be competitive replacements to conventional diesel due to their ability to cut releases and improve Efforts. Ultimately, this study showcases that the utilization of butanol and ethanol, in suitable mixtures By utilizing diesel fuel, it is possible to recover the efficiency and diminish the releases of ignition systems with compression engine. These findings endorse the possibility of wider acceptance of alcohol-based fuels in diesel engines, hence promoting more sustainable and eco-friendly transportation. Future research should prioritise the optimisation of Combinations of fuels and the resolution of technical obstacles to enable the practical integration of these alternative fuels in the automobile sector.
Key Words: Compression Ignition Engine, Butanol Utilization, Ethanol Utilization, Diesel Fuel Alternative Fuels, Fuel Blending, Combustion Characteristics

1. INTRODUCTION
The current state of global energy is experiencing a substantial shift due to the pressing necessity of decreasing greenhouse gas emissions to address climate change. The transportation sector is a significant contributor to environmental pollution, primarily because it heavily depends on fossil fuels. Diesel engines, specifically, are extensively utilised for their efficacy and resilience, although they significantly contribute to air pollution and carbon dioxide emissions. The investigation of alternate fuels suitable for compression ignition (CI) engines, without requiring significant changes, is receiving growing attention in this particular context. Butanol and ethanol, which are both significant biofuels, have emerged as promising contenders for blending with diesel in order to produce more environmentally friendly fuel alternatives. The practical application of butanol and ethanol in compression ignition (CI) engines poses a complex research problem that involves engine performance, emission characteristics, and overall sustainability. Butanol, because to its superior energy content and improved miscibility with diesel in comparison to ethanol, has significant potential advantages. The features of this substance are more similar to regular diesel fuel, with a higher cetane number and reduced hygroscopicity. These characteristics have the potential to improve combustion efficiency and decrease engine wear. However, ethanol is known for its high oxygen content and good ability to prevent knocking in engines. As a result, it plays a key role in promoting cleaner combustion and reducing the amount of particulate matter released into the atmosphere. Integrating these biofuels with diesel could result in synergistic benefits that enhance the overall performance and environmental impact of compression ignition (CI) engines.

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Optimization of Grain Size and Hardness of AA-6082 after Deformation

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Abstract—In this research, An AA-6082 Billet underwent deformation through the Equal Channel Angular Pressing (ECAP) method. The study focused on three Speed & Repeated Passes parameters (Die angle, Plunger stroke and Repeated Passes). The aim was to analyze how these parameters influenced Hardness and Grain size changes. Mathematical equations were derived using response surface (RS) methodology to establish links between the selected input process parameters and the key responses, specifically grain size. Design of Experiment methodology was used for the purpose of explore the individual as well as the collective influences of the input parameters on the responses of the deformed specimens. By applying the developed models, an ideal combination of the investigated input parameters was pinpointed to maximize the desired outcomes.

Keywords— Mathematical Modeling, Optimization, Mechanical Properties, ECAP

1. INTRODUCTION
Within the domain of materials science, the pursuit of understanding and enhancing mechanical properties is a constant endeavor [1]. This pursuit is particularly relevant in the study of aluminum alloys, given their widespread application in various industries due to their desirable balance of strength and lightweight characteristics [2]. Among these, the AA6082 aluminum alloy stands out as a prominent metal[3]. This study delves into a specialized deformation process known as ECAP, a widely acclaimed technique for its ability to improve the microstructure of ductile materials and subsequently enhance their specific mechanical attributes. ECAP is among the techniques categorized under Severe Plastic Deformation (SPD) [4]. The sample deformed by using ECAP can be used directly, which makes this technique unique [5]. The sample can be deformed by any of the four standard routes [6]. Numerous studies have been conducted for deforming samples with different routes [7][8]. Few

studies reported the comparison of routes [9]. Different routes provide different strains in the deformed sample [10]. Standard route C is selected for the present study. The primary goal of this study is to establish comprehensive mathematical correlations that illuminate the intricate relationship between various process parameters and the resulting hardness and grain size. These correlations, constructed through a rigorous analysis of experimental data, provide a quantitative framework for understanding how the identified parameters influence the alloy's mechanical properties. Such correlations not only contribute to our fundamental understanding of material deformation but also offer practical insights for designing and engineering aluminum alloy components with tailored mechanical attributes [11][2]. In this paper, a multidisciplinary approach that integrates experimental techniques, materials analysis, and mathematical modeling is utilized. Different experiments performed to develop a rigorous model. The validation of the Moreover, this study becomes a bridge between the gap generated in huge practical work and modeling. It is crucial to understand how input process parameters impact the intended novelty to the field of material science and opens avenues for optimizing the performance of aluminum alloy structures in automobiles, defence and marine industries.

II. EXPERIMENTATION
Cylindrical specimens are crafted using the readily available AA-6082 alloy. These solid samples are precisely machined to match the dimensions of the slots in the ECAP die, with a maximum length capability of 66mm and a diameter of approximately 13mm. The detailed composition of the chosen aluminum alloy (AA-6082) is found in Table 1.

TABLE I: Composition of AA-6082

Constituents	Si	Cu	Mg	Fe	Zn	Mn	Cr	Ti	Others	Aluminum
Weight %	0.79	0.38	0.80	0.42	0.20	0.54	0.26	0.018	0.382	96.210

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Development of a hybrid vibration isolator for better ride comfort and vehicle stability

Technical Paper | Published: 16 February 2024
Volume 46, article number 133, (2024) | Cite this article

 **Journal of the Brazilian Society of Mechanical Sciences and Engineering**
Aims and scope | Submit manuscript

Jitender Kumar & **Gian Bhushan**

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Abstract

Prolonged exposure of vehicle vibrations can cause poor vehicle stability, driver tiredness, ride discomfort, impair focus, and even increase the chance of an accident. Automotive suspension systems are a common way to make a ride more comfortable, protect the rider and vehicle from the harmful effects of vibration. Along with variable damping, the stiffness variability is also another important aspects for the comfortable ride and vehicle stability. With this motivation, the present research focuses on developing a hybrid semi-active vibration isolator that combines a four-parametric visco-elastic model and the conventional Bouc-Wen model to demonstrate the variable damping and stiffness characteristics. The half-car model, including the suspension system, is modeled

<https://link.springer.com/article/10.1007/s40430-024-04711-6> 1/16

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Availability optimisation of heat treatment process using particle swarm optimisation approach

Ajay Kumar and Devender Singh Punia
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Abstract

In this research paper a methodology is presented for prediction of performance parameters of a series parallel industrial system. The particle swarm optimisation (PSO) technique is used for evaluating the performance of industrial system and the Markov method is used for mathematical modelling. The mean time to failure is calculated to be 352 days and it is observed that after 30 days the reliability of the system became steady state which shows the bathtub behaviour. Using the PSO technique for maximising the system availability (SA) with ranges of performance parameters selected from the real industrial system, the different economical possible performance measures for maximum availability is predicted which are helpful for reduction in cost of production. From the performance analysis the optimised availability using PSO is estimated 94.25% whereas it is 93.60% using Markov method.

Keywords

availability, steady state analysis, SSA, particle swarm optimisation, PSO, reliability, transient state analysis, TSA

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