



**Rayat Shikshan Sanstha's
Karmaveer Bhaurao Patil College of Engineering, Satara**

Criterion 3 – Research, Innovations and Extension

Key Indicator – 3.3 Research Publications and Awards

3.3.5 Number of books and chapters in edited volumes / books published, and papers in national/international conference-proceedings per teacher during the last five years

Name of the teacher	Title of the paper	Name of the conference	National / international	Year of publication	ISBN number of the proceeding	Name of the publisher	Page No.
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Dr.Anand Tapase, et.al	Review and assessment of flexible pavement	GEOCHINA 2018	International	2018	ISBN 978-3-319-96240-5	Springer, Cham	10-12
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Dr.Anand Tapase, et.al	Shelarwadi Rural water supply scheme	NCRTET 18	National	2018		NCRTET	17-17
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Dr.Anand Tapase, et.al	A State-of-the Art Review of different conditions influencing the behavioral aspects of flexible pavement	GEOMEAST 2017	International	2017	ISBN 978-3-319-61908-8	Springer, Cham	21-24
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Dr.Anand Tapase, et.al	Performance Evaluation of Flexible Pavement Using the Finite Element Method	GEOCHINA 2016	International	2016	ISBN 978-0-7844-8009-0	ASCE	29-31
Dr. Anand Tapase, et.al	Utilization of e-waste and polymer modified bitumen in flexible pavement	ICER-14	International	2014	ISSN-0973-6921	G.SEED, JERAD	32-32
Dr. Anand Tapase, et.al	Consumption of electronic waste in quality enhancement of road	ICER-14	International	2014	ISSN-0973-6921	G.SEED, JERAD	33-33
Dr.Anand Tapase, et.al	Investigation of Behavioral Aspects of Flexible Pavement under Various Conditions by Finite Element Method.	IACMAG, China	International	2013	ISBN 978-3-642-32813-8	Springer, Berlin, Heidelberg	34-36
Dr. Anand Tapase, et.al	Performance Evaluation of Polymer modified bitumen in flexible pavement	ICER-13	International	2013	ISSN-0973-6921	G.SEED, JERAD	37-37



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WJvdM Steyn · Irina Holleran
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Pavement Materials and Associated Geotechnical Aspects of Civil Infrastructures

Proceedings of the 5th GeoChina International
Conference 2018 – Civil Infrastructures
Confronting Severe Weathers and Climate
Changes: From Failure to Sustainability, held
on July 23 to 25, 2018 in HangZhou, China

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ISSN 2366-3405

ISSN 2366-3413 (electronic)

Sustainable Civil Infrastructures

ISBN 978-3-319-95758-6

ISBN 978-3-319-95759-3 (eBook)

<https://doi.org/10.1007/978-3-319-95759-3>

Library of Congress Control Number: 2018948645

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A Cost-Effective Approach Towards Road Construction—Kondave a Case Study

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Abstract. The planning, design, and construction of roads in India are depended on the local traffic requirements and the recommended design traffic in terms of a cumulative number of standard axles. The roads are getting deteriorated in the form of potholes, fatigue cracking, rutting deformation as a number of heavy, overloaded, high tyre pressure vehicles are using the ordinary/village roads which are affecting the riding comfort of vehicles resulting into fatal injuries to road users. Investigations in India and abroad have revealed that the abundantly available waste materials like fly ash, rubber, waste plastic, e-waste, etc. which are creating disposal problem can be effectively used in road construction. A small village Kondave on the State Highway 141 joining the Satara district to the world famous hill station Mahabaleshwar on Sahyadri ranges was considered as a case study. The tremendously increasing visitors using this route are throwing used plastic carry bags, bottles, etc. on a large scale creating its disposal problem in front of local people. The present work deals with the assessment of the generation of plastic waste in the village along with to check its suitability in road construction. In the initial stage, the available plastic waste from the village was collected, segregated, recycled and grinded. To check its suitability in road construction a thorough experimental investigation was carried out using a Marshall Stability procedure. The mix were prepared as per SP-98-2013 for a dry process wherein the poor locally available aggregates are coated with waste plastic and as per SP-53-2010 for a wet process wherein the bitumen is modified with its partial replacement. The results reveal that the Marshall Stability value of poor conventional materials can be improved by the application of 7% optimum waste plastic. The application of waste plastic in the road not only mitigates the disposal problem but shown positive improvements in strength and other governing parameters including viscosity. So, instead of using a higher bituminous mix in the top layer for limiting the top-down cracking and bottom-up cracking modified bitumen is a cost-effective alternative. Check on construction cost is achieved, as the poor locally available materials are made in use due to the application of waste plastic. Hence, such type of cost-effective approach for the construction of roads along with eco-friendly disposal of plastic waste can be used to mitigate the early deterioration of roads.

Keywords: Flexible pavement · Cost effective



Wissem Frikha · Shima Kawamura
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New Developments in Soil Characterization and Soil Stability

Proceedings of the 5th GeoChina International
Conference 2018 – Civil Infrastructures
Confronting Severe Weathers and Climate
Changes: From Failure to Sustainability, held
on July 23 to 25, 2018 in HangZhou, China



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ISSN 2366-3405 ISSN 2366-3413 (electronic)

Sustainable Civil Infrastructures

ISBN 978-3-319-95755-5 ISBN 978-3-319-95756-2 (eBook)

<https://doi.org/10.1007/978-3-319-95756-2>

Library of Congress Control Number: 2018948647

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Printed on acid-free paper

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Performance Evaluation of Low Volume Rural Roads- A State-of-the-Art Review

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Abstract. The paper provides a state of the art review of performance evaluation of low volume rural roads. Low volume roads are designed based on empirical approach and past experience. The main factors which influence the behavior of a road are tyre pressure and loading intensities, surface and sub-surface temperature, environmental conditions, thickness combinations of different layers, material properties, seepage etc. Consequently, the existing pavement design procedures and analytical procedures are discussed and questioned. Low volume rural roads are not meant for overloaded heavy vehicles, hence are getting deteriorated much earlier than its design life. Secondly, due to the absence of timely maintenance and budgetary provisions for maintenance, problems are increasing resulting in increased number of road fatalities. A combined result of different real conditions in the field affecting the performance of low volume rural roads needs to be studied comprehensively. This paper attempts to study the various methodologies adopted for predicting the behavior of rural roads for heavy traffic and environmental conditions. Also, the importance of the application of finite element method for predicting the behavior of rural roads is showcased. Therefore, it is discussed in details about the need for using an analytical tool like finite element method which will improve the possibility to strengthen the road by the application of a variety of material and thickness combinations for low volume roads.

Keywords: Low volume roads · Finite element method

1 Introduction

In India, low volume roads (LVRs) cover 75% of the overall road system of the nation and are defined as a road, which is negotiable during all weathers, except at major river crossings (MoRTH 2010). It is a commonly observed problem wherein to avoid toll booths and its fees, many vehicles prefer the parallel running low volume roads. Due to such overloaded conditions, the design life of low volume road get affected and hence



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Honghua Zhao
Editors

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Proceedings of the 5th GeoChina International
Conference 2018 – Civil Infrastructures
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ISSN 2366-3405 ISSN 2366-3413 (electronic)
Sustainable Civil Infrastructures

ISBN 978-3-319-95644-2 ISBN 978-3-319-95645-9 (eBook)
<https://doi.org/10.1007/978-3-319-95645-9>

Library of Congress Control Number: 2018948650

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Review and Analysis on Using the Analytical Approaches for Predicting the Pavement Performance

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Abstract. The complex characteristics of the present day in pavement system are making the available design procedure impractical for recurring tasks. It is seen the pavement deteriorates not only due to the combined effects of traffic loading and environmental conditions but also its failure takes place due to deficiencies construction, materials, and maintenance. Predicting pavement performance before its actual execution is possible with the help of analytical tools once they are validated. The paper provides a state of the art review of different analytical approaches implemented for the analysis of pavements and evaluating its performance. From the available literature, it should be noted that the ANN and FEM approaches can be realistically applied which do not require a formulation or function of the solution. Such tool will accommodate not only the thickness design but will assist the decision makers in finding optimum strategies for providing, evaluating and maintaining pavements in a serviceable condition for the longer duration. In this connection, it should be noted that the application of artificial neural network (ANN) and finite element method (FEM) will help in predicting the performance of different design sections for new pavement construction as well as for the maintenance operations in the form of overlay design. Performance prediction prior to actual construction will help to set the maintenance budget at the network level by assigning most cost-effective strategy at the project level.

1 Introduction

The root causes of the poor performing pavements or earlier deterioration of roads in the form of potholes, undulations, fatigue cracking depends on the local factors and may differ to the pavement to pavement. Finding an empirical solution for its maintenance may result again in its premature failure or the solution may be highly not realistic for the particular condition. A number of researchers including Tapase and Ranadive (2016, 2017) have already reported that earlier deterioration of roads and its time-consuming rehabilitation/maintenance operation are the direct or indirect cause behind an increase in road fatalities at around 3% compared to a preceding year in



4

Sustainable Civil Infrastructures

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Sonny Kim
Anand Tapase *Editors*

Advancements on Sustainable Civil Infrastructures

Proceedings of the 5th GeoChina International
Conference 2018 – Civil Infrastructures
Confronting Severe Weathers and Climate
Changes: From Failure to Sustainability, held
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Engineering
Satara, India

ISSN 2366-3405
Sustainable Civil Infrastructures

ISSN 2366-3413 (electronic)

ISBN 978-3-319-96240-5

ISBN 978-3-319-96241-2 (eBook)

<https://doi.org/10.1007/978-3-319-96241-2>

Library of Congress Control Number: 2018948644

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Review and Assessment of Flexible Pavement

Sabir S. Sayyed¹, R. P. Patil², Anand Tapase³, A. C. Attar⁴,
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Abstract. The failure of flexible pavement is termed in a cumulative number of standard axles required to cause a pavement to rut up to a depth of 20 mm or the number of standard axles required to exceed fatigue cracking beyond 20% of the pavement surface area as per the Indian code of practice. This study illustrates the effectiveness of finite element analysis in considering a practical design approach for achieving the optimum pavement section subjected to loading. From the obtained results, it is noticed that the value of horizontal tensile strain increases at each trial increase in temperature, showing the adverse effect of a rise in temperature on the life of the pavement. When the stiffer binder is used considering the decrement in temperature of the underneath layer, a drastic increase in the value of tensile strain is noticed which is at much higher side than the allowable limits. The observed value indicates that the selected combination will give rise to fatigue cracking. When the increment in temperature is considered then the reduction in the value of tensile strain even up to 35% is noticed. From the analysis, it is concluded that the use of too soft bituminous mix results in lowering the structural ability of the pavement at high temperatures and too hard bituminous mixes would become brittle at low temperatures resulting in cracking under loading.

Keywords: FEM · Flexible pavement

1 Introduction

The current design procedures for flexible pavements are based on past knowledge and in situ tests data like American Association of State Highway Official's (AASHO) Road Test. Chandak et al. (2018) observed that the basic categories on which the current flexible pavement design methods are dependent are limiting shear failure methods, empirical methods, regression methods, limiting deflection methods. The inconvenience of an empirical approach like CBR method of design is that the result is dependent on material, environmental and loading conditions. Limiting shear failure

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D. Chen et al. (eds.), *Advancements on Sustainable Civil Infrastructures*,
Sustainable Civil Infrastructures, https://doi.org/10.1007/978-3-319-96241-2_12

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Kun Zhang · Rongqiao Xu
Shih-Huang Chen
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Testing and Characterization of Asphalt Materials and Pavement Structures

Proceedings of the 5th GeoChina International
Conference 2018 – Civil Infrastructures
Confronting Severe Weathers and Climate
Changes: From Failure to Sustainability, held
on July 23 to 25, 2018 in HangZhou, China



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Zhejiang University
Hangzhou, China

ISSN 2366-3405 ISSN 2366-3413 (electronic)
Sustainable Civil Infrastructures
ISBN 978-3-319-95788-3 ISBN 978-3-319-95789-0 (eBook)
<https://doi.org/10.1007/978-3-319-95789-0>

Library of Congress Control Number: 2018948638

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Practical Pavement Design Approach Subjected to Seepage Conditions

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Abstract. The water seeps through the base and subgrade which results in a decrease in the life of the pavement by a reduction in modulus of underneath layers. Accurate analysis of water seepage through soil is essential to achieve a more durable design of pavement. A present-day system demands an application of analytical tool which will enhance the scope to find the unknown nodal values along with governing parameters like seepage pressures and gradients. In this connection, the advantages of the versatile finite element technique over the other available methods for seepage analysis holds a bright promise. This study illustrates the effectiveness of finite element analysis of two-dimensional steady-state seepage fields with the confined flow boundaries in considering a practical design approach for achieving the optimum pavement section subjected to seepage conditions. In the analysis, it is assumed that the energy supplied to the soil mass is entirely dissipated due to the seepage through the mass, which provides the basis for the formulation of the set of governing equations. The solution gives the unknown nodal discharge. It is noticed that the discharge at the nodes representing the inflow into the medium is positive, and is negative for the nodes representing the outflow from the medium. Such type of analysis proves beneficial for deriving useful design charts/procedures by correlating the obtained data from analysis with the actual field condition.

1 Introduction

Development of any country depends on its road network which contributes in exchanging the social, cultural, economic and industrial activities; on other hands the increasing traffic along with overloaded vehicles, actual field conditions are responsible for early development of distress symptoms like raveling, undulations, rutting, cracking, bleeding and potholing in bituminous layer (Ranadive and Tapase 2013; Tapase and Ranadive 2017). The water seeps through the base and subgrade which results in the decrease in the life of the pavement by a reduction in modulus of underneath layers. Accurate analysis of water seepage through soil is essential to achieve a more durable design of pavement. With a view to finding the unknown nodal values along with governing parameters in the present work, two-dimensional steady-state seepage





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in

National Conference on "Recent Trends in Engineering & Technology 2018"

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Dr. Anand Tapase.

Has Presented Paper, Titled

Use of plastic in Construction of flexible pavements

in

National Conference on "Recent Trends in Engineering & Technology 2018"

held on 20th & 21st Feb 2018.



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Paper - 02
Same Book

Advancement in the Design and Performance of Sustainable Asphalt Pavements

Proceedings of the 1st GeoMEast International
Congress and Exhibition, Egypt 2017
on Sustainable Civil Infrastructures



Editor
Louay Mohammad
Louisiana State University
Baton Rouge, LA
USA

ISSN 2366-3405 ISSN 2366-3413 (electronic)
Sustainable Civil Infrastructures
ISBN 978-3-319-61907-1 ISBN 978-3-319-61908-8 (eBook)
DOI 10.1007/978-3-319-61908-8

Library of Congress Control Number: 2017946469

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A State-of-the-Art Review of Different Conditions Influencing the Behavioral Aspects of Flexible Pavement

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Abstract. The paper provides a state-of-the-art review of different conditions influencing the behavioral aspects of flexible pavement. The conditions which influence the pavement behavior are loading intensities and tyre pressure intensity, environmental conditions, surface and subsurface temperature, seepage, thickness combinations of different component layers, material properties, etc. Current pavement design and analytical procedures are discussed and questioned. The life of the road is theoretically designed for repetition of standard axle load, wherein, negligence in consideration of overloaded vehicles and high tyre inflation pressures even up to 1 MPa is noticed. The latest developments in the design and analytical procedures of pavements are highlighted. An overview of finite element modeling efforts involving different aspects is also presented. A combined effect of various actual conditions in the field affecting the pavement performance needs to be studied in details, therefore, there is a demand for an application of analytical tool which can accommodate the details of the complex system. In this connection, it should be noted that the versatile finite element solution technique holds a bright promise. Therefore, it is proposed to discuss at length the application of the finite element method towards the design of the flexible pavements.

Keywords: Flexible pavement · Finite element analysis

1 Introduction

Direct or indirect application of empirical relationship is the backbone of current pavement design procedures which are based on long-term experience and field tests such as AASHO Road Test [27, 34]. A good pavement design is one that provides the expected performance with appropriate economic consideration. The material characterisation of different pavement layers and traffic loading are the primary inputs into the mechanistic model. These approaches are reasonably accurate for design purposes in early years but the scenario has been changing due to rapid change in axle load and its

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L. Mohammad (ed.), *Advancement in the Design and Performance of Sustainable*

Asphalt Pavements, Sustainable Civil Infrastructures, DOI 10.1007/978-3-319-61908-8_22



Louay Mohammad
Editor

Paper-01
Same Book

Advancement in the Design and Performance of Sustainable Asphalt Pavements

Proceedings of the 1st GeoMEast International
Congress and Exhibition, Egypt 2017
on Sustainable Civil Infrastructures

 Springer



Editor
Louay Mohammad
Louisiana State University
Baton Rouge, LA
USA

ISSN 2366-3405 ISSN 2366-3413 (electronic)
Sustainable Civil Infrastructures
ISBN 978-3-319-61907-1 ISBN 978-3-319-61908-8 (eBook)
DOI 10.1007/978-3-319-61908-8

Library of Congress Control Number: 2017946469

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Predicting Performance of Flexible Pavement Using Finite Element Method

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Abstract. The modern vehicles having very high loads and high tyre inflation pressures are the outcome of improvements in the automobile segment. The combined effect of higher tyre pressure and excessive loading leads to premature failure of roads in the form of potholes, cracking, etc. which has drastically brought down the life of a road. One of the major cause that contributes to road accidents is deteriorated condition of roads in terms of cracking, potholes and uneven surface due to rutting. This research documents the use of finite element analysis by treating tyre-pavement interaction as an axisymmetric two-dimensional problem. For predicting performance of flexible pavement which is subjected to different inflation pressures, loading conditions, variation in thickness and material properties of different layers in the flexible pavement, modeling is done using a developed program in FORTRAN. From the analysis, it is observed that the value of ϵ_t at bottom of BL increases by 215.33% and 254.48% by an overloading in standard axle load by 2 times and 2.5 times respectively. Also, a noticeable increase of around 252.95% and 336.40% in ϵ_v at top of subgrade is seen due to overloading the standard axle load by 2 times and 2.5 times respectively. It is noticed that the damage caused to a pavement by an overloaded axle load of around 2 times or 2.5 times the standard axle load is much more than the damage by the standard axle load. From the analysis, it is noticed that the pavement starts deteriorating earlier as the overloaded vehicles are consuming the designed life of the pavement, so from the present work, it is concluded that the pavement should be designed considering the uncontrollable overloading of the vehicles instead of relying on the standard or legal limits.

1 Introduction

The ongoing decade (2011–2020) is termed as the decade of action for road safety by the World Health Organization (WHO). The report titled ‘Saving millions of lives’ published by WHO highlighted that road traffic crashes take the lives of nearly 1.3 million people globally every year, and injure 20–50 million more. Road accidents are resulting into the cause behind the major loss of lives in developing nations like India. According to the provisional data released by the government of India, the total number of road fatalities stood at 146,000 in 2015. Compared to 2014, which saw 141,526 road accident deaths, the number in 2015 has increased by around 3%. The Road Transport and Safety Bill are brought by the Ministry of Road Transport and Highways (MoRTH) to strengthen road safety as well as improve ease of transport across the country [10].

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L. Mohammad (ed.), *Advancement in the Design and Performance of Sustainable Asphalt Pavements*, Sustainable Civil Infrastructures, DOI 10.1007/978-3-319-61908-8_11



GEOTECHNICAL SPECIAL PUBLICATION NO. 266

GEO-CHINA 2016

*MATERIAL, DESIGN, CONSTRUCTION, MAINTENANCE,
AND TESTING OF PAVEMENT*

SELECTED PAPERS FROM THE PROCEEDINGS OF THE FOURTH
GEO-CHINA INTERNATIONAL CONFERENCE

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Shandong, China

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Published by the American Society of Civil Engineers



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1801 Alexander Bell Drive
Reston, Virginia, 20191-4382
www.asce.org/publications | ascelibrary.org

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Errata: Errata, if any, can be found at <http://dx.doi.org/10.1061/9780784480090>

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ISBN 978-0-7844-8009-0 (PDF)

Manufactured in the United States of America.



Performance Evaluation of Flexible Pavement Using the Finite Element Method

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Abstract: In the design of flexible pavements, tensile strain, compressive strains and its effect on rutting and fatigue are critical parameters. The developed computer program after validation with reported case histories is used to calculate the horizontal tensile strain at the bottom of the bituminous layer (BL) and the vertical compressive strain at the top of the subgrade. These computed strains are incorporated in the fatigue and rutting criteria recommended in Indian Road Congress (IRC: 37-2012) to estimate the pavement life for various hypothetical conditions. Tensile strain at the bottom of BL and compressive strain on top of the subgrade decreases with an increase in the thickness of BL, which results in increase of fatigue and rutting lives. An increase in thickness of the base layer and the increase in its elastic modulus reduces the damage due to rutting, while it has less effect on damage due to fatigue. Such type of analysis proves beneficial for designing a pavement, keeping equilibrium between fatigue and rutting lives. In this paper, using a two dimensional axisymmetric finite element model, above mentioned critical parameters is examined by varying the thickness and material properties of different layers in flexible pavement.

INTRODUCTION

Performance of flexible pavement under various layer thicknesses and material properties is different, but due to the direct or indirect application of empirical approach in design procedure the current practice for design of thickness does not prove to be economical [2,4,10]. The relationship between design inputs and pavement failure is applied through experience, experimentation or a combination of both, which is limited to a certain set of environmental and material conditions [2, 4]. A good pavement design is one that provides the expected performance with appropriate economic consideration, so, here the need arises to find an economical alternative in the form of analytical tool which can accommodate the details of the complex pavement system [9].

Application of such enhanced analytical tool can prove to be beneficial to predict the performance of pavement without actual construction or even by surpassing the expensive and time consuming laboratory or in situ tests, for various thicknesses and material properties of different component layers instead of relying on CBR values. In this connection, the application of the versatile finite element method (FEM) towards the design of flexible pavement holds a perfect assurance. As FEM is not constrained to two dimensional axisymmetric conditions, if required FEA can be





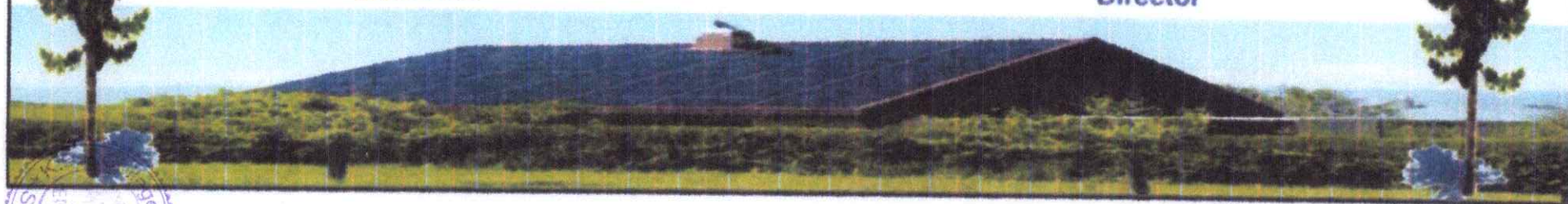
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Advances and New Applications

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ISSN 1866-8755

e-ISSN 1866-8763

ISBN 978-3-642-32813-8

e-ISBN 978-3-642-32814-5

DOI 10.1007/978-3-642-32814-5

Springer Heidelberg New York Dordrecht London

Library of Congress Control Number: 2012945326

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Investigation of Behavioral Aspects of Flexible Pavement under Various Conditions by Finite Element Method

M.S. Ranadive* and A.B. Tapase

College of Engineering, Pune, K.B.P. College of Engineering & Poly., Satara, India
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Summary. Basic aim of this paper is to develop a tailor made program for design and analysis of flexible pavements using finite element method which will enhance the scope to use variety of combinations of materials, conditions, and various parameters which correlates with the actual conditions on the field. The conditions which affect the flexible pavement are variation of wheel loading, temperature, seepage, varying thickness, etc. Both positive and negative change in temperature during day time and night time as well as due to seasonal changes will be considered. The water seeps through sub grade which results in decrease in life of pavement by reduction in sub grade modulus. The effect of water table will be studied on swelling and shrinkage property of sub grade. Similarly performance of pavement will be checked by varying thicknesses of asphalt concrete, and base layers. The capillary water held in pores of concrete pavement may cause failure of pavement by freezing and thawing action. The effect of wheel loading cannot be neglected as severe pavement damage is because of higher axle loads. However from the past studies and through the recommendations of the AASHTO code of practice the actual wheel load and their combinations could be shortlisted.

The complex characteristic of the present day systems therefore demands an application of analytical tool which can accommodate the details of the complex system. In this connection it should be noted that the versatile finite element solution technique holds a bright promise. Therefore it is proposed to discuss at length the application of the finite element method towards design of the flexible pavements.

Keywords: Flexible pavement, parameters, finite element method.

1 Introduction

Pavement design involves many uncertainties, variabilities and approximations regarding material properties, traffic loads, sub grade strength, seepage, drainage conditions, construction procedures, and climatic factors [7]. A good design is one that provides the expected performance with appropriate economic consideration.

* Corresponding author.





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Review and Analysis on Using the Analytical Approaches for Predicting the Pavement Performance

Rajashree Tapase¹, Dilip Aldar², and Anand Tapase²(✉)

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Abstract. The complex characteristics of the present day in pavement system are making the available design procedure impractical for recurring tasks. It is seen the pavement deteriorates not only due to the combined effects of traffic loading and environmental conditions but also its failure takes place due to deficiencies construction, materials, and maintenance. Predicting pavement performance before its actual execution is possible with the help of analytical tools once they are validated. The paper provides a state of the art review of different analytical approaches implemented for the analysis of pavements and evaluating its performance. From the available literature, it should be noted that the ANN and FEM approaches can be realistically applied which do not require a formulation or function of the solution. Such tool will accommodate not only the thickness design but will assist the decision makers in finding optimum strategies for providing, evaluating and maintaining pavements in a serviceable condition for the longer duration. In this connection, it should be noted that the application of artificial neural network (ANN) and finite element method (FEM) will help in predicting the performance of different design sections for new pavement construction as well as for the maintenance operations in the form of overlay design. Performance prediction prior to actual construction will help to set the maintenance budget at the network level by assigning most cost-effective strategy at the project level.

1 Introduction

The root causes of the poor performing pavements or earlier deterioration of roads in the form of potholes, undulations, fatigue cracking depends on the local factors and may differ to the pavement to pavement. Finding an empirical solution for its maintenance may result again in its premature failure or the solution may be highly not realistic for the particular condition. A number of researchers including Tapase and Ranadive (2016, 2017) have already reported that earlier deterioration of roads and its time-consuming rehabilitation/maintenance operation are the direct or indirect cause behind an increase in road fatalities at around 3% compared to a preceding year in





Review and Analysis on Using the Analytical Approaches for Predicting the Pavement Performance

Rajashree Tapase¹, Dilip Aldar², and Anand Tapase²✉

¹ Annasaheb Dange College of Engineering and Technology, Ashta, Maharashtra, India

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Dilip_aldar@rediffmail.com, tapaseanand@gmail.com

Abstract. The complex characteristics of the present day in pavement system are making the available design procedure impractical for recurring tasks. It is seen the pavement deteriorates not only due to the combined effects of traffic loading and environmental conditions but also its failure takes place due to deficiencies construction, materials, and maintenance. Predicting pavement performance before its actual execution is possible with the help of analytical tools once they are validated. The paper provides a state of the art review of different analytical approaches implemented for the analysis of pavements and evaluating its performance. From the available literature, it should be noted that the ANN and FEM approaches can be realistically applied which do not require a formulation or function of the solution. Such tool will accommodate not only the thickness design but will assist the decision makers in finding optimum strategies for providing, evaluating and maintaining pavements in a serviceable condition for the longer duration. In this connection, it should be noted that the application of artificial neural network (ANN) and finite element method (FEM) will help in predicting the performance of different design sections for new pavement construction as well as for the maintenance operations in the form of overlay design. Performance prediction prior to actual construction will help to set the maintenance budget at the network level by assigning most cost-effective strategy at the project level.

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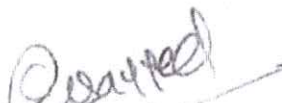
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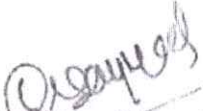
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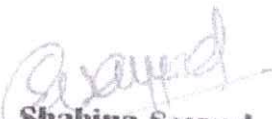
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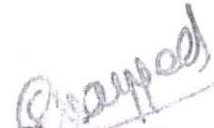
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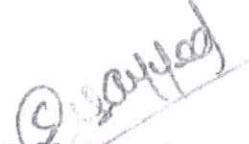
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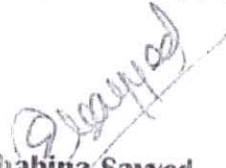
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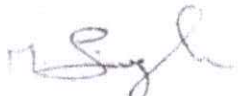


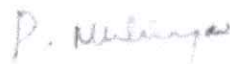
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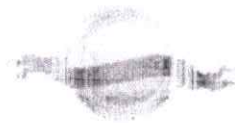
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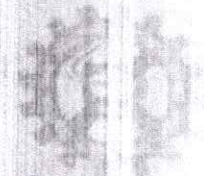


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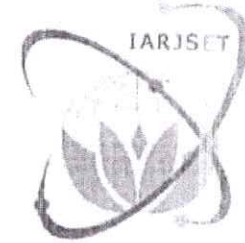


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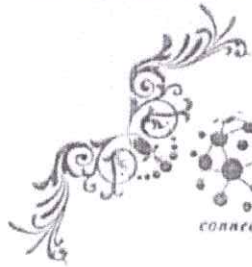
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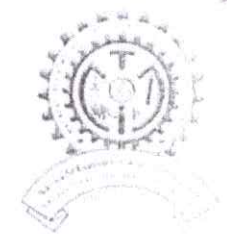
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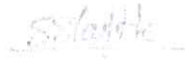
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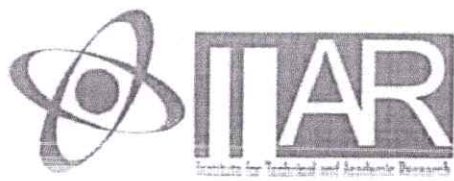


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International Conference on Emerging Trends in Engineering and Technology

Pune, 07th August'2016

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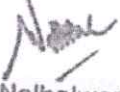



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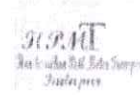
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S. B. Patil College of Engineering, Indapur, Pune

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Convener, ICST-2K14

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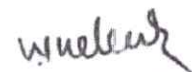
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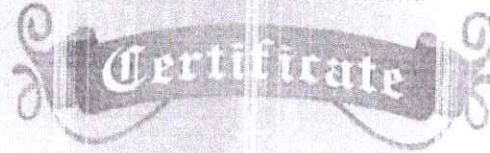
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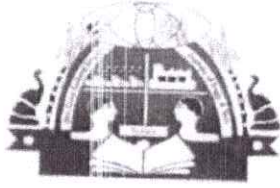
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She / ~~He~~ has presented a paper on Real Time Home Monitoring
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Paper Presentation / Contribution

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Authored by Prof. R. T. Patil
in two days International Conference held in Jawaharlal Nehru University (J.N.U), New Delhi..

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Estimation algo. for smart Antenna.
at 2nd International Conference on Emerging Trends in Engineering (ICETEE-2013) held
on 22 & 23 Feb. 2013 at Dr. J. J. Magdum College of Engineering Jaysingpur (Dist. Kolhapur)
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His/Her paper is also published in IOSR Journal of Electronics & Communication Engineering.

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Dr. Prakash R. Mutgi



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Title: Real-Time Home Monitoring & Control System Based on Ethernet.

Prof. (Dr) Arjun P. Ghatule
Director

NC³IT 2013



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Performance Evaluation of Cutting Parameters for Surface Roughness & Power Consumption in Turning of 904L Stainless Steel Using Vegetable Oil Based Cutting Fluids



Rushikesh P. Waydande and Dayanand A. Ghatge

1 Introduction

In recent years, new extremely corrosion-resistant austenitic stainless steels have entered the market place. They are commonly used to fabricate chemical and food processing equipment [1]. 904L stainless steel finds its application in oil refinery components, pulp and paper processing industries, seawater cooling devices as well as in gas scrubbing plants. It is also amongst the "difficult to cut" material and the difficulties such as poor surface finish and high tool wear are common. [2] In order to overcome these difficulties, castor oil and soyabean oil are used [3]. It is found that soyabean oil extended the surface finish for machining at taken cutting speed. In this Paper, this study becomes necessary to understand the theory behind the performance of vegetable oils during the machining of 904L stainless steel material [4].

1.1 Cutting Fluids

Cutting fluids are employed in the machining method with the aim to boost the characteristics of the work piece-tool-chip system. Cutting fluids improve the potency of machining in terms of increased tool life, improved surface finish, reduced cutting force [5]. For applications where a metalworking fluid with good lubricating properties is required, a non-water-miscible fluid could also be counseled. The use of conventional petroleum-based cutting fluid is doubtless

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K. Antony and J. P. Davim (eds.), *Advanced Manufacturing and Materials Science*,
Lecture Notes on Multidisciplinary Industrial Engineering,
https://doi.org/10.1007/978-3-319-76276-0_32

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Studies on Process Parameter of Laser Beam Welding by Taguchi Method

Vivek R Chavan¹, Dayanand A Ghatge^{2*}

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Abstract - In the present study, laser welding of two dissimilar metals of copper and stainless steel (304 Grade) were joined by lap joint welding. The relationship produced to calculate weld quality of the laser beam welding of two different metals by welding parameters like laser power, thickness of material and beam diameter. The analysis of laser welding operation was done for the various combination of welding process parameters. The Taguchi's L9 orthogonal array was utilized to perform the experiments for measuring the effect of welding process parameters on determining responses. From the experimental results, it is noticed that as laser power goes on increasing weld strength increases and similarly from thickness size 0.4 to 0.6 mm weld strength goes on increasing. The maximum weld strength of 311 N was obtained at power 70% and thickness 0.6 mm which are highest values of process parameters.

Keywords: Laser Welding, Laser Power, Beam Diameter, Thickness of Material, Weld Strength

1. INTRODUCTION

Laser Beam welding is fusion welding process, where lasers generates intense beam of coherent light that can directed precisely to heat, melt or vaporize the selected area of any type of material. Laser beam having small heat affected zones as well as Weld lines may be as narrow. Tensile strength of the weld joint is always more than base metal. Laser welding produces a very narrow heat affected zone with low stress and small welding in perfection in the base metal. Laser beam welding does not allow any air gaps especially between small parts. The maximum air gap should be less than ten percent of the thinnest component [4]. Shield gas is required for laser welding to protect from the outer atmospheric gas contacts which affects the weld bead [7]. Laser beam welding is one of the special welding techniques to join metals through the heating effect of a concentrated beam of coherent monochromatic light known as LASER.

An inert gas, such as helium or argon is used to protect the weld bead from contamination and oxidation [1]. Laser Beam Welding is a flexible process, which is capable of welding dissimilar materials like Ferrous and Nonferrous [8]. In laser beam welding the speed of welding is proportional to supply of power as well as type and thickness of the

work-pieces. [2]. In Laser Beam Welding the size of the weld is larger and the depth of penetration is thinner. In Laser Beam Welding keyhole is form due to narrow, deeply penetrating vapour cavity or local vaporization. The keyhole is enclosed by a thin layer of melted material. The thin layer of melted material is maintained by balance between vapour pressure and hydrostatic pressure [3].

It is very difficult to join dissimilar material combination due to physical and chemical properties of metals. The high power density and low energy input of laser provides solution to a sum of problems commonly met with conventional joining methods. Expensive materials with specific properties can be used in acute positions, with less expensive alloys being in supporting roles [6]. Joints between austenitic stainless steel and carbon or low-alloy ferritic steel are required in many sectors of industry, to satisfy performance and economic criteria.

In the co-generation industry, the use of low-alloy carbon steels for high pressure piping becomes unusable in locations where the temperature exceeds 6000 C, due to insufficient strength and oxidation resistance. The use of stainless steel in the entire construction is often uneconomical. Copper and aluminium joints are between solar collector radiators. Copper and steel is most used in power and co-generation plant due to their high thermal conductivity and stiffness (SS for corrosion resistance). Copper and stainless steel are used in manufacturing of solar panels [5].

2. EXPERIMENTATION

2.1 Workpiece Material

The stainless steel and Copper are used for the experimentation. The chemical analysis was carried out and the composition obtained is shown in Table 1 and Table 2 for the 304 stainless steel & copper material.

Table 1 Chemical Composition of 304 Stainless Steel

%C	%Mn	%Si	%P	%S
0.19	0.04	0.26	0.06	0.05



Analysis of Optimized Roller Burnishing Parameters Using ANSYS



Priyanka S. Yadav and Dayanand A. Ghatge

1 Introduction

Burnishing process is a superficial plastic deformation process which is used to improve surface integrity properties by producing fine grain size in the surface region of various materials. Burnishing is a cold working process, in which the material is displaced from peaks to valleys of the surface profile by planetary motion of a tool over the bored or turned surface. Due to the compressive force applied by the tool over the work piece, compressive stresses are developed over the workpiece surface. Compressive stresses can be also over the work piece surface by processes like laser shot peening, shock peening, etc. but the stresses were found to be reduced when introduced to heat. This thermal relaxation of compressive stresses makes the component life shorter and the performance of work-piece reduces. Thus, burnishing was introduced as a process that could impart thermally unvarying surface compressive stresses [1].

2 Development of Compressive Stresses Over the Work Piece Surface

In roller burnishing, a hard roller is pressed against a rotating cylindrical work piece and parallel to the axis of work piece. The pressure of tool is thus applied over the surface of the work piece. This creates stress over the surface of the work piece. When

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K. Antony and J. P. Davim (eds.), *Advanced Manufacturing and Materials Science*,
Lecture Notes on Multidisciplinary Industrial Engineering,
https://doi.org/10.1007/978-3-319-76276-0_6

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Performance Evaluation of Cutting Parameters for Surface Roughness & Power Consumption in Turning of 904L Stainless Steel Using Vegetable Oil Based Cutting Fluids



Rushikesh P. Waydande and Dayanand A. Ghatge

1 Introduction

In recent years, new extremely corrosion-resistant austenitic stainless steels have entered the market place. They are commonly used to fabricate chemical and food processing equipment [1]. 904L stainless steel finds its application in oil refinery components, pulp and paper processing industries, seawater cooling devices as well as in gas scrubbing plants. It is also amongst the "difficult to cut" material and the difficulties such as poor surface finish and high tool wear are common. [2] In order to overcome these difficulties, castor oil and soyabean oil are used [3]. It is found that soyabean oil extended the surface finish for machining at taken cutting speed. In this Paper, this study becomes necessary to understand the theory behind the performance of vegetable oils during the machining of 904L stainless steel material [4].

1.1 Cutting Fluids

Cutting fluids are employed in the machining method with the aim to boost the characteristics of the work piece-tool-chip system. Cutting fluids improve the potency of machining in terms of increased tool life, improved surface finish, reduced cutting force [5]. For applications where a metalworking fluid with good lubricating properties is required, a non-water-miscible fluid could also be counseled. The use of conventional petroleum-based cutting fluid is doubtless

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K. Antony and J. P. Davim (eds.), *Advanced Manufacturing and Materials Science*,
Lecture Notes on Multidisciplinary Industrial Engineering,
https://doi.org/10.1007/978-3-319-76276-0_32

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Basics of Lasing Process

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Abstract— The industries always face many problems in manufacturing component due to various reasons. Manufacturing processes are very complex processes governed by number of process parameters which have adverse effect on a number of process performance characteristics. In real manufacturing environment in most cases more than one process performance characteristic have to be considered when selecting suitable manufacturing process conditions. Lasers are used for many purposes. On mild steel, stainless steel and aluminium plates the laser cutting process is highly accurate, yields excellent cut quality, has a very small kerf width and small heat affect zone, and makes it possible to cut very intricate shapes and small holes. Before study of laser cutting process we have to know the phenomenon behind laser creation to control the laser cutting processes. This paper describes the phenomenon of lasing process based on photoelectric effect.

Keywords—Photoelectric effect, process parameters, lasing process, kerf width, heat affected zone.

I. INTRODUCTION

Laser cutting process:

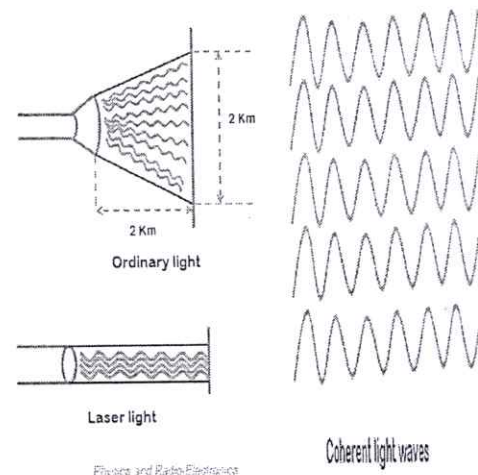
Laser cutting is a manufacturing process which can eliminate the need for machining on many engineering jobs by saving money on manufacturing costs.

Laser is acronym for the phenomenon called light amplification by stimulated emission of radiation. The Phenomenon was first developed by Albert Einstein. However, the first Laser was made possible only in 1960 by Maiman. Since then the Laser has seen developments.

Laser is a device that transforms light of various frequencies into a chromatic radiation in a visible, Infrared and ultraviolet regions with all the waves in phase capable of mobilizing immense heat and power when focused at close range.

There are three main properties of laser which make it different from other light sources. Laser light can deposit a great deal of energy within a very small area

1. Monochromacity: Laser light is monochromatic means it has one wavelength (colour). While ordinary white light is a combination of many different wavelengths (colours).
2. Directional: Laser emits light that is highly directional. Laser light emitted as a relatively narrow beam in a specific direction. Ordinary light, such as sun light, light of candle is emitted in many directions away from the source.
3. Coherence: The light from a laser is coherent means the wavelengths of the laser light are in phase in space and time while ordinary light source has no definite phase in space and time.
4. High Intensity: In Laser light energy concentrated in small region of space with small wavelength but greater intensity. Ordinary light spreads uniformly in all directions and form spherical wave fronts around it.



Physics and Radio-Electronics

Fig 1. Directionality and Coherence



Reduction of Non Value Added Time and Productivity Improvement in Shell Moulding Process

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Abstract—

In today's world any process or method should not be only effective or not only be efficient i.e. it should be both effective and efficient. Firstly this paper aims to provide changes made in process of sand coating and shell moulding to achieve reduction in Cycle time, Cost, Ergonomics issues, Wastage, Motion losses.

Again for achieving those objectives various methods and techniques were analyzed, learnt and surveyed like Value Stream Mapping (VSM) then DMAIC, Lean, Kaizen, 5 WHY's under head of process mapping.

Keywords— *Productivity, Sand coating, Ergonomics, DMAIC, Waste control.*

1. INTRODUCTION -

In today's world, there is huge race in between medium size companies for being good and then better by others. To survive in the race and not to be knocked out by others. This can be achieved by increasing productivity of the company. Those companies must have to manufacture their products of good quality and optimized quantity within permissible limits in least cost as much as possible.

For achieving this all we should have long term approach. It has been observed that lean approach is not a short term approach, it's long term philosophy[3]. Siddharth Industry is shell mould manufacturing industry. It has two unit. First unit of sand coating and second of shell molding machine section. Siddharth Industries basically manufacturer of shell moulds as a supportive plant for Mutha Founder Pvt. Ltd. Satara.

In this paper we are going to illustrate productivity improvement in sand coating section. The plant having 45 tonne capacity but they are producing only 20 tonne per day. So we used different methods and techniques to improve productivity which are discussed and mentioned in methodology, results and validation. Productivity improvement of sand coating process achieved by increasing efficiency, decreasing ergonomics issues maintaining synchronize flow of material without backtracking.

2. LITERATURE SURVEY -

Various researches worked on DMAIC approach is described in below paragraphs.

Sumit Sehgal[1] pointed that many small and medium size industries are using DMAIC approach solving productivity issues i.e. DMAIC approach can be applied for any small scale industry to eliminate the trouble related with output and required input.

Mayank Dev Singh[2] argued that industries are facing different problem such as in proper plant layout, material, handling problem, manual process, ergonomic issues. Those problems can be solved by proper implementation of VSM.

Kashif Mahmood[3] concluded that there is great connection between lean and productivity parameter of company such as quality, cost, flexibility, dispatch, reliability and delivery time. Those factor affect workforce's welfare, driving force motivation, influence and strengthen them all.



Study of Pressure Sensitive Paint (PSP) Methods- A Review

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Abstract — The Pressure Sensitive Paint (PSP) is one of most effective pressure measurement techniques for both simple and complex surfaces. Their principle is that the luminescence of the PSP decreases with increasing oxygen partial pressure and hence with increasing local static pressure. A converge based on the luminescent lifetime and conventional intensity method, was applied along with a temperature-reimbursed binary paint. Two CCD cameras and pulsed LEDs are used to explore these techniques. On contrary to the intensity method, the lifetime method did not show a notable sensitivity to paint temperature or thickness. Results by the lifetime method proved more complicated to process due to the low signal intensities as a consequence of the short exposures. The performance could notably be improved by giving up resolution and by receipting camera pixels. The temporal response of the PSP showed a fair agreement with a fast-response pressure transducer. The lifetime approach offers clear advantages compared to the intensity method, however it is more demanding in terms of equipment. There also some issues regarding influence of temperature and humidity on the effectiveness of PSP. Paint preparation also has effect on the calibration process. There is literature available regarding this technique, which is studied in this review paper.

Keywords— Pressure Sensitive Paint (PSP), luminescence pressure measurement, temperature, pressure transducer

I. INTRODUCTION

PSP is one the techniques primarily used in the wind tunnel testing of various aerodynamic setups. It has huge applications in aeronautics, aerodynamics and fluid mechanics. It is useful in case of high speed flows where pressure distribution changes very fast with change in flow speed. According to Ford engineers, "A new way of

measuring the external air pressures exerted on automobiles "Pressure Sensitive Paint (PSP)" is faster and easier than pressure ports or computational fluid dynamics". Computational Fluid Dynamics (CFD) and pressure ports are two common pressure measurement methods. The use of pressure ports is probably the first of the pressure measurement techniques ever utilized in wind tunnels. Ford employed this technique on their cars, specifically the windows, in which they would remove the glass, replace it with a metal plate or plexiglass, and drill approximately 120 pressure ports. CFD simulations are performed by creating virtual grids of a model's surface and calculating the pressure distribution along the grid. However, Ford engineers say, "Generating results from an average size grid might take days".^[10]

II. WORKING PRINCIPLE OF PSP

PSP is composed of luminescent molecules dispersed in oxygen permeable, polymer binder. As shown in figure 1 when PSP is exposed to ultraviolet light, the luminescent molecules are reach excited and higher energy state. From this state there are three ways to decay discharging light, transferring energy to the polymer binder as heat, or colliding oxygen molecules at the surface of PSP. The luminescent molecules react with oxygen which causes collision with oxygen molecules and release of light at the same time. The amount of light emitted is inversely proportional to the amount of available oxygen molecules at the surface of PSP. Since collisions with oxygen molecules occur most frequently when the PSP is under a lot of pressure, the amount of light emitted



Study and observation of fused deposition modeling (FDM) process parameters for PC-ABS material

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Abstract- Fused Deposition Modeling (FDM) is one of the type of Three Dimensional (3D) printing process, used for fabrication of 3D prototypes or functional parts. FDM is widely used 3D printing technique for different industrial application to manufacture 3D complex part of thermoplastic and metal material. 3D printing is a type of Additive manufacturing (AM) process, in this process parts are fabricated by layer by layer, it also known as Rapid Prototyping (RP). RP processes are integration of computer and 3D printing machine. In that virtual 3D modeling is done using different Computer Aided Design (CAD) designing software then this model used for RP of physical model in machine. FDM process fabricates parts by layered deposition of continuous filament material from bottom to top of the part. FDM process able to manufacture the part with less wastage of material, reduced build time and with required mechanical properties. This paper shows FDM process parameters to improve dimensional accuracy of PC-ABS material.

Keywords- Additive Manufacturing; Fused Deposition Manufacturing; Materials, Optimization methods

I. INTRODUCTION

Nowdays, the increased competition to manufacture product according to customer requirements with less time and cost. For that 3D printing processes are more useful. 3D printing is rapid prototyping technique used to quickly fabricate any complex shape prototypes or functional parts. RP is also known as Additive Manufacturing (AM) process.

A. Rapid Prototyping (RP)

RP processes were introduced in early of 1986's. RP is a type of additive manufacturing process, in these processes part is fabricated by addition of material in number of layers from bottom to top of the part with the help of 3D CAD data. 3D printing processes have main four types and these four types have different manufacturing processes related to them and raw material form. These four types include Stereolithography (SLA), Selective Laser Sintering (SLS), Fused Deposition Modeling (FDM) and Laminated Object Manufacturing (LOM) [1]. In these processes, FDM technique is more suitable in manufacturing of product than other processes. FDM machine requires less space, less complexity in manufacturing and less overall manufacturing cost.

B. Fused Deposition Modeling (FDM)

At the start of 1990's, FDM RP process was developed by Stratasys. After 2000's, the use of FDM RP machine was increased in industries for production of parts, but at that time cost of machine was more so it was used only in large scale industries. Now, after the development in FDM machine, there was first low cost FDM machine was developed in 2008 for production of functional parts. In FDM process the raw material was available in a filament form for thermoplastic materials and for metal in wire form. The availability of filament was in a range of diameter from 1.75mm to 3mm and nozzle diameter of FDM extruder ranges from 0.10mm to 0.70mm [2]. The cost of printer increases with increase in number of extruder. The Efficiency



A Study of Wood Turning Lathe with Attachment of Profile Cutting

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Abstract- Wood turning is a form of wood working it's used to create wooden objects on a lathe. The main aim to make some modification in traditional wood turning lathe by using lathe mechanism in which we have used 1/12 HP, 9000 RPM electric motor, cast iron metal profile of desired shape, spring operated tool feeding mechanism inside the tool post (10 kg,), HSS single point cutting tool to remove layers of wood workpiece, two rollers of ASTM A36 material of 250 MPa strength as guide bars of 25 mm diameter and 350 mm length and lead screw of 16 mm diameter and 350 mm length for longitudinal moment of tool post.

Keywords— ASTM A36, HP, RPM, HSS, Lead screw, Guide Bars, Tool Post.

I. INTRODUCTION

Wood turning is a form of wood working it's used to create wooden objects on a lathe. Wood turning differs from most other forms of woodworking in that the wood is moving while a stationary tool is used to cut and shape it. Many intricate shapes and designs can be made by turning wood .In our project we have made combination of lathe machine metal profile same shape as that of shape required on the final workpiece and tool post having tool with spring of low carbon steel to achieve proper force on tool. By using this method we can get precise and accurate shape because there is no any human interference and as modification we can also make the longitudinal movement of tool post automatic. By avoiding use of no of tools and simple mechanism we can avoid human error and get more faster work.



Fig. 1 Wood Turning Operation

In normal wood turning lathes the workpiece is mounted in between two centers one is live center and another one is dead center the where drive is given to the headstock using motor and different size of pulleys with belt with different speed ratios as per the requirement of operation. Then different shapes of tools are used to make different types of grooves and cuts which are circular in nature the operator has to apply the tool across the rotating workpiece with some force to remove metal from the workpiece. The project work carries used of single point cutting tool of HSS material inside the tool post with spring which provide sufficient tension or compression over the tool by changing the speed of lathe the various types of cuts are carried out over the workpiece where no need of very trained operator to do this initial things. Then the tool post having follower like shape at its front side which slide over the cast iron metal profile and produce same curvature profile or shaped object. As in this case the metal profile is same for each and every product with negligible amount of wear each shape produced is identical with other with same dimensions, also we can change the product by changing the metal profile placed in front of tool post and over the base. The longitudinal movement to the tool post is given by using the lead screw which is paced in between two guide rollers which are provided to carry the weight of tool post with sufficient amount of strength it have also the surface of it is properly mechanized and polished to void the frictional loss during motion .The lead screw provided with threads over it converts its rotary motion into the linear motion of tool post with definite amount per revolution of lead screw In lathe turning, wood workpiece is fixed between two points. The spur center digs into the wood and is powered by a motor. The other, a hard center or a have center may be a point or set of point.

II. BASIC COMPONENTS

A. Base

The base of the machine is its basic structure. It is usually just a frame holding together the basic components. It either has legs or is made to sit on a table of sorts. The critical part of the base of the lathe is that which provides a reference surface for the other components to ride. The reference surface is usually a set of machined surfaces, called ways, separated by a slot. Sometimes the reference is



A Study of Alternative Fuels for Vehicle Electricity used in Hybrid Electric Vehicle -A Review

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Abstract- The present paper introduces a study of different methods for a performance analysis of the hybrid electric vehicles and alternative fuels available for energy sources. This method takes into consideration a set of parameters that influence the system performance. It is based on modelling and hardware in the different Loop approach. The value added is given by the accuracy of the model that is part of the simulation together with the presented performance analysis methods. The efficiency of the different methods is tested through a series of simulation results for different techniques. The motivation of the research is given by the fact that the automotive sector is in a continuous change, and in the last years the trend is towards electric vehicles. The advantage of these methods is that the systems performance can be validated to a large extent from an early stage. By using advanced methods for hybride vehicles of developing hybrid and electric vehicles at higher quality standards, faster and with a better cost.

Keywords— Alternative fuels, Hybrid electric vehicle, Internal combustion engine, Hybrid vehicle, Green house gas, Plug-in hybrid electric vehicles

I. INTRODUCTION

A hybrid electric vehicle (HEV) is a type of hybrid vehicle that combinations a conventional internal combustion engine (ICE) system with an electric propulsion system. The presence of the electric powertrain is intended to achieve either better fuel economy than a conventional vehicle or better performance. There is a variety of HEV types and the degree to which each functions as an electric vehicle (EV) also varies.

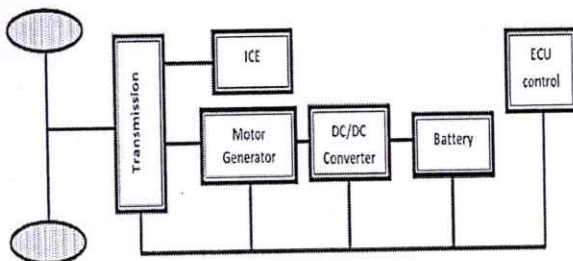


Fig. 1 Hybrid Vehicle Architecture [6]

The most common form of HEV is the hybrid electric car, although hybrid electric trucks and buses also exist. Modern HEVs Make use of efficiency improving technologies such as regenerative brakes which convert the vehicles kinetic energy to electric energy to charge the battery. Some verities of HEV use their internal combustion engine to generate electricity by spinning an electrical generator to either recharge their batteries or directly power the electric drive motor [5]. This combination is known as motor generator. Most of HEVs reduce idle emissions by shutting down the ICE at idle and restarting it when needed. This is known as a start stop system. A hybrid electric produces less emissions from car, since HEVs gasoline engine is usually smaller than a comparably sized gasoline car, can be geared to run at maximum efficiency and further improve fuel economy. Alternative fuels are in production or under production development for use in alternative fuel vehicles and advanced technology vehicles[3]. The different sectors of vehicles fleets are the primary users of these fuel and vehicles but consumers are increasingly interested in them. Using alternative fuels and advanced vehicles instead of conventional fuels and vehicles helps the development in power sources.

II. LITERATURE REVIEW

K. C. Prajapati et.al.[1] studies about hybrid vehicles that increase in usage of oil & gas there is a problem like global warming, climate change . Due to this reasons automotive companies have started doing research on hybrid technology. In this paper they discussed hybrid solar vehicles, hybrid electric vehicles & plug-in hybrid electric vehicles. A hybrid electric vehicles combines a conventional internal combustion engine propulsion system with electric propulsion system. HEV are classified as series hybrid, parallel hybrid, series-parallel hybrid & complex hybrid. A hybrid solar vehicles is an integration of vehicle & photovoltaic panels. It is also classified as series hybrid, parallel hybrid, series-parallel hybrid & complex hybrid. Series hybrid technology is more efficient. Plug-in hybrid technology is similar to the hybrid electric vehicle but it has a larger battery that is charged both by vehicle's gasoline engine & from plugging into a standard 110/230V electric

A Study on Centerless Cylindrical Grinding Process to Influence the Parameters of Grinding-A Review

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Abstract- Centerless grinding technique offers a major contribution to the industries. The prominent challenge is that faced is to manufacture a component with better surface integrity at reduced time, leading to increased production rate and improved profit. It is very important to select proper combination of the machining parameters to obtaining better surface texture. The modern enterprises concentrate on higher production rate and admired quality of product. The objective of this work is to study and examine various machining parameters of centerless cylindrical grinding process like regulating wheel angle, regulating wheel speed, depth of cut over different output parameters. Also aim of this paper deals with study special centerless grinding using relevant various methods so changes occurs during grinding operation has been observed with respect to performance and quality parameters.

Keywords— Cylindrical grinding, Centerless grinding, End-feed, In-feed, Grey relational analysis, Quality parameter.

I. INTRODUCTION

The centerless grinding is a machining process that uses abrasive cutting to remove material from a workpiece centerless grinding differs from centered grinding operations in that there is no spindle or fixture is used to locate and secure the workpiece. The workpiece is secured between two rotary grinding wheels and the speed of their rotation relative to each other determines the rate of material removed from the workpiece.

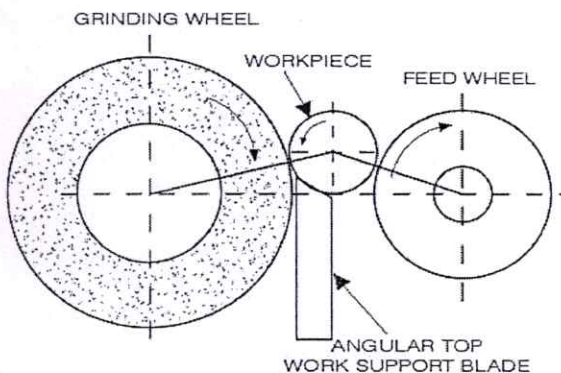


Fig. 1 Centerless Cylindrical Grinding Operation [5]

The centerless grinding is used in preference to other grinding processes for operations where many parts must be processed in short time. In the manufacturing industries for better machining productivity and high accuracy of cylindrical competent such as bearing race ways, silicon ingots, pin gauges and catheters centerless grinding operation has extensively carried out. Centerless grinding is divided in three types and those are end-feed, in-feed and through feed centerless grinding [2]. The processes like grinding, polishing and buffing surface texture of the machined product. A specialized centerless grinder are available commercially, one is with regulating wheel and other with surface grinder and they are different from each other in character how the workpiece supported and how the workpiece rotational speed is controlled during grinding operation. By considering production cost and quality of the two types of centerless grinders are highly suitable for small variety and large volume production [8]. The centerless grinder is special purpose machine and relatively costly, putting it at disadvantage of large variety and small volume production. The demand for centerless grinding has increased. It approaches to the automation which reduces use of energy of workers, production cost, keeps consistency in quality of product and also improves the productivity.

II. LITERATURE REVIEW

V. Radhakrishnan et.al. [1] studied centerless grinding process with variable stiffness of regulating wheel it covered the mechanism of the roundness generation, dynamics of the process and roll of process variables on quality of product the stiffness of regulating wheel plays an important role for the quality of the ground part compliant regulating wheel Improves the finish rigid wheel significantly improves the form of the ground part but not the finish in this paper simulation done for understanding the role of regulating wheel stiffness on the roundness of the part for achieving excellent quality in grinding form and finish. The variables of stiffness on the roundness of the part have confirmed in this condition the regulating wheel has been designed and fabricated for this work. It is concluded that roundness readings where normalized by comparing all results that stiffer the regulating wheel to achieve better roundness in shorter duration. By using right stiffness for



A Study of Different Methods for Minimizing Chatter in Milling Machining Process-A Review

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Abstract- In a milling machining process machining vibration are occurs called as chatter. The chatter corresponds to relative movement between workpiece and cutting tool. This vibrations result in waves on the machined surface. The prediction of chatter vibrations between the cutter and workpiece is important as a guide to machine tool uses for an optimal result. It is a self excited vibration that occurs during machining operation and become a common limitation to productivity and quality of product. The chatter problem existing different methods developed to ensure stable cutting into use the lobbing effect. The objective of this paper is to study different methods to minimize the chatter in milling operation, also to study mathematical models which make possible to simulate machining vibration quite accurately. Also to study different analytical methods, this obtained the stability lobes for a milling machine to predict the occurrence of chatter vibration.

Keywords— Milling machine, Chatter, Chatter vibration, Stability analysis, Frequency response function.

I. INTRODUCTION

The milling is the most common form of machining, a material process which can create a variety of feature on a part by cutting away the unwanted material. The milling process requires a milling machine workpiece, fixture and

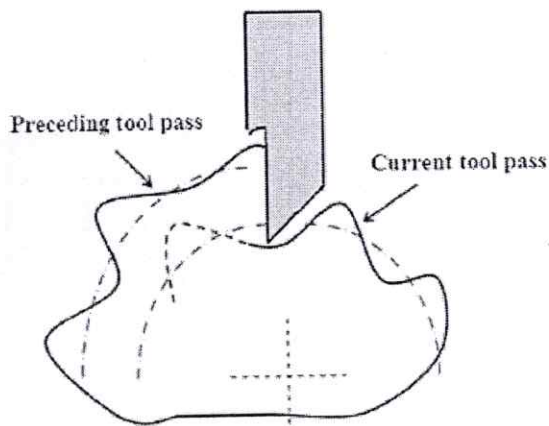


Fig. 1 Chatter Instability Caused during Operation [3]

cutter. The workpiece is a piece of pre-shaped material that secured to the fixture. Machining vibration called chatter correspond to the relative movement between the workpiece and the cutting tool. The milling operation is a cutting process by using rotating cutter with one or more teeth. It is an important feature is that the action of each cutting edge intermittent and cuts less than half of the cutter revolution producing varying but periodic chip thickness and impact when the edge touches the workpiece [8]. The vibrations results in waves on the machined surface. This affects typical machining process. The chatter stability prediction appreciated during many machining operations in modern automotive and different industrial area. To accurately predict the stability of lobe diagram is very important to avoid machining chatter and improve the productivity. The regenerative effect is based on the fact that the tool cuts a surface during the revolution. The cutting forces varies as well as chip thickness, leading to the time delay.

II. LITERATURE REVIEW

J. S. Sexton et. al. [1] did work on stability analysis of single point machining with varying spindle speed. A stability analysis was presented which give means spindle rotation speed and degree of modulation the limiting width of cut for chatter free cutting. The machine tool was represented by the simple mass spring damper system. The analysis indicates that the modest increase in usable width of cut was given by using spindle speed modulation. It is found that the method of spindle speed variations shown to increase stability for single point cutting. This increase in stability is modest and not unconditional, since some conditions speed variations reduced stability. The analysis indicates a source of large errors if harmonics of the periodic solution are to be ignored. It can readily be extended to deal with multi degree of freedom model of the machine tool and multi tooth cutter.

A. Iglesias et. al. [2] studied analytical methods for chatter analysis in milling operations with one dominant mode. An accurate prediction of chatter is complex problem in field, so present work focused on self excited vibrations which can spoil the surface of the part and causes a large reduction in tool life. In proposed work new analytical formulae are proposed related to the parameter domains of



Operation Sequence Dependent Part Family Formation for Reconfigurable Manufacturing System (RMS)



Rutuja Krishnat Shivads and Martand Tamanacharya Telsang

1 Introduction

Today's manufactures face progressively challenges earlier than because of highly impulsive market changes and hence there are large fluctuations in product demand. To be to be competitive, it is mandatory for companies to design manufacturing systems to produce high quality products at low cost which responding to market changes in an economical way. RMS should be designed in such that it can be rapidly and cost effectively reconfigured to the exact capacity to meet a new market demand. Dedicated manufacturing system (DMS) are beneficial for high volume and low variety production while, Flexible manufacturing system (FMS) economical for large diversity of parts and low production volumes. FMSs are unable to provide robustness of DMS and can have excessive functionality. FMSs build using of inadequate system software and advancement of user specified software is very expensive. Due to development in computers optics, a control, processing i.e. advancement in technologies today's most capable system becomes incapable after short life. Koren et al. suggested RMS as solution to tackle changing market demands. RMS should be designed in such that it can be rapidly and cost effectively reconfigured to the exact capacity to meet a new market demand. Researchers at the NSF Engineering research centre for RMS (ERC/RMS) start addressing system scalability since 1990s, and issued patent that deals with strategies to change production capacity in RMS [8]. RMS can be defined as: "Reconfigurable Manufacturing Systems are designed at the outset for rapid change in structure, also in hardware and software components, in order to quickly adjust

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© Springer International Publishing AG, part of Springer Nature 2018
K. Antony and J. P. Davim (eds.), *Advanced Manufacturing and Materials Science*,
Lecture Notes on Multidisciplinary Industrial Engineering,
https://doi.org/10.1007/978-3-319-76276-0_41

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Design Of Semiautomic Workbench For Horizontal Drilling Machine

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Abstract—To be competitive manufacturing organizations should produce product with high quality and high productivity. It is necessary to improve the working condition to have a productive environment in the industry. In this paper the design of semiautomatic pneumatic operated workbench for horizontal drilling machine is presented. The workbench is design with objective of increase the accuracy of drill and productivity. This is a special purpose workbench. The design drawn by using Autocad2007

Keywords—semiautomatic workbench, pneumatic, horizontal drilling machine, productivity.

I. INTRODUCTION

Semiautomatic workbench is designed for one furniture item manufacturing company. The main problem of the company is maximum production time, so its affect profit of industry. Maximum time consuming processes are drilling and cutting.

To overcome this problem the semiautomatic workbench which is pneumatically operated is designed to increase production rate. For designing literature study is done related with manufacturing process, manufacturing technique, types of machinery or jig and fixture is required to get maximum production. Also the overall Manufacturing process of company is studied. [1][3][5].

II. DRAWING OF WORKBENCH

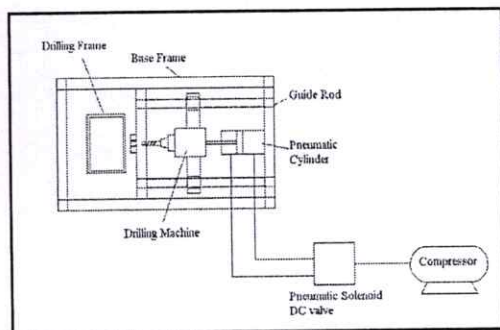


Fig. no.1 Drawing of workbench

The drawing of Workbench is shown in Fig.1 .Two steady block having two drills are connected on base frame . The fixed rods are inserted in that drills. Drilling machine is attached to sliding support. Which move with the help of pneumatic cylinder that connected to frame. Solenoid DC valve is connected to pneumatic cylinder that actuates the cylinder. Compressor is connected to DC valve.

III. DESIGN OF WORKBENCH

The design of workbench is done by using software AutoCAD 2007. All dimensions in mm. Fig .2 to Fig .13 shows the AutoCAD 2D and 3D drawings.

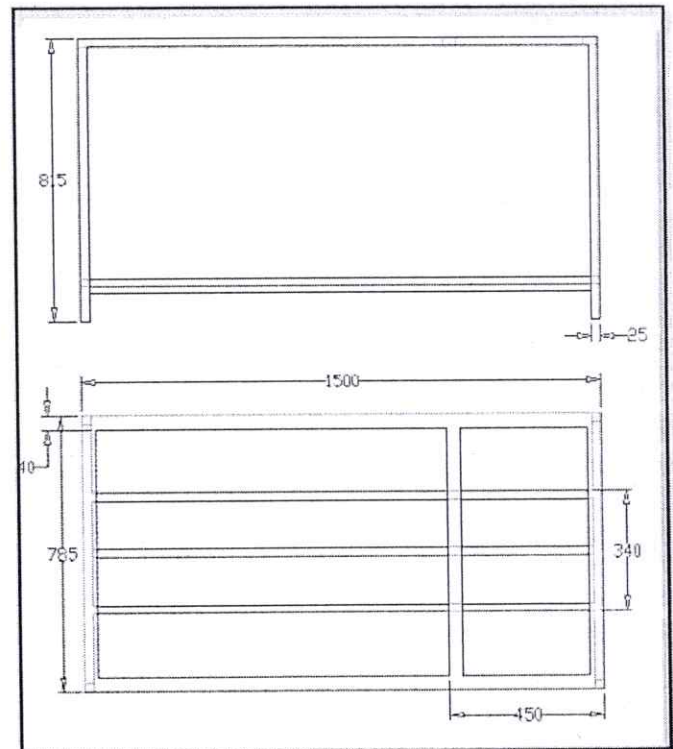


Fig.2 Component 1(base frame) 2D drawing



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Abstract- In a milling machining process machining vibration are occurs called as chatter. The chatter corresponds to relative movement between workpiece and cutting tool. This vibrations result in waves on the machined surface. The prediction of chatter vibrations between the cutter and workpiece is important as a guide to machine tool uses for an optimal result. It is a self excited vibration that occurs during machining operation and become a common limitation to productivity and quality of product. The chatter problem existing different methods developed to ensure stable cutting into use the lobbing effect. The objective of this paper is to study different methods to minimize the chatter in milling operation, also to study mathematical models which make possible to simulate machining vibration quite accurately. Also to study different analytical methods, this obtained the stability lobes for a milling machine to predict the occurrence of chatter vibration.

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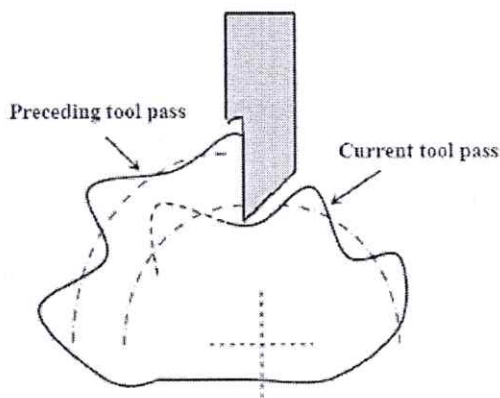


Fig. 1 Chatter Instability Caused during Operation [3]

cutter. The workpiece is a piece of pre-shaped material that secured to the fixture. Machining vibration called chatter correspond to the relative movement between the workpiece and the cutting tool. The milling operation is a cutting process by using rotating cutter with one or more teeth. It is an important feature is that the action of each cutting edge intermittent and cuts less than half of the cutter revolution producing varying but periodic chip thickness and impact when the edge touches the workpiece [8]. The vibrations results in waves on the machined surface. This affects typical machining process. The chatter stability prediction appreciated during many machining operations in modern automotive and different industrial area. To accurately predict the stability of lobe diagram is very important to avoid machining chatter and improve the productivity. The regenerative effect is based on the fact that the tool cuts a surface during the revolution. The cutting forces varies as well as chip thickness, leading to the time delay.

II. LITERATURE REVIEW

J. S. Sexton et. al. [1] did work on stability analysis of single point machining with varying spindle speed. A stability analysis was presented which give means spindle rotation speed and degree of modulation the limiting width of cut for chatter free cutting. The machine tool was represented by the simple mass spring damper system. The analysis indicates that the modest increase in usable width of cut was given by using spindle speed modulation. It is found that the method of spindle speed variations shown to increase stability for single point cutting. This increase stability for single point cutting. This increase in stability is modest and not unconditional, since some conditions speed variations reduced stability. The analysis indicates a source of large errors if harmonics of the periodic solution are to be ignored. It can readily be extended to deal with multi degree of freedom model of the machine tool and multi tooth cutter.

A. Iglesias et. al. [2] studied analytical methods for chatter analysis in milling operations with one dominant mode. An accurate prediction of chatter is complex problem in field, so present work focused on self excited vibrations which can spoil the surface of the part and causes a large reduction in tool life. In proposed work new analytical formulae are proposed related to the parameter domains of



Analysis of CNC Turning Process Parameters of EN353 Case Hardened Steel

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Abstract-Nowadays, quality and productivity are playing an important role in manufacturing market. Turning is a machining process in which the work piece is feeding against rotating cutter for removing unwanted or extra material in form of chips. In this process a number of cutting edges cutters are used to machine flat, curved or irregular surface. Surface roughness and material removal rate are important measures of product quality and production cost. In present work optimization of machining parameters of EN353 is carried out using CNC turning operation. Spindle speed, feed rate and depth of cut are taken as machining parameters whereas surface roughness (Ra), Material removal rate (MRR) and residual stresses are response parameters for experimental work. Taguchi optimization method is applied to determine an optimal surface roughness and material removal rate. The data was compiled into Minitab 17 for analysis using L₂₇ Orthogonal array. After conducting experiment it is optimized by mean ratio and analyzed by analysis of variance (ANOVA). The results are further confirmed by conducting confirmation of experiments. Analysis of residual stresses of two components which having minimum and maximum value of surface roughness.

Keywords-Turning, Taguchi, surface roughness, optimization, orthogonal array, ANOVA, residual stresses.

I. INTRODUCTION

Turning is one of the most common of metal cutting operations. In turning, a work piece is rotated about its axis as single-point cutting tools are fed into it, removing unwanted material and creating the desired part[1]. Turning can occur on both external and internal surfaces to produce an axially-symmetrical contoured part. Turning can be done manually, in a traditional form of lathe, which frequently requires continuous supervision by the operator or by using automated lathe which does not need continuous supervision. The capacity of a lathe is expressed in two dimensions. The maximum part diameter, or "swing," and the maximum part length, or "distance between centers"[2]. Today the most common type of such automation is CNC machines.

The turning operation and cutting tool itself influences the production of chips, which can be long and difficult to handle. Thus it is important to select tools that break chips before they get too long. Small chips are easily controlled and collected. Long stringy chips can snarl and cause work piece damage, among other problems[3]. The choice of cutting tool is also influenced by the tougher, harder alloy work pieces that are being turned. Common alloys and steels with hardness of up to 45 Rockwell C can be turned with standard carbide or coated-carbide cutting tools. However, hardened steel, stainless steel, and nickel super alloys may require alternative cutting tool insert materials, such as ceramics, polycrystalline diamond (PCD), or cubic boron nitride (CBN)[4]. Turning with a cutting edge made from one of these materials can eliminate the need for grinding or other secondary operations. Although they can be expensive, these cutting tools also last longer and cut metal faster, compensating for their cost.

II. Experimental Detail

1 Work piece Material

EN353, Work piece dimensions: 32 x 50 mm, Total specimen: 27, Hardness-270 BHN, Tensile Strength-551Mpa. Measured chemical composition is shown in Table 1.

Elements	Percentage
Carbon	0.186
Silicon	0.231
Manganese	0.809
Sulphure	0.009
Phosphorus	0.037
Chromium	0.916



Scabbing rejection of manifold 380

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Abstract—This paper is relates with casting defects like shrinkage, scabs, runner & riser defects which mainly occurs in manifold casting in foundry. The research on controlling the casting defects in foundry shop which comes in manifold 380 and these causes may results the reduction of quality of casting. Here we have studied minimize the casting defects using Taguchi's method through change in various parameters like as Compression Strength, Moisture, Permeability Number, Mould Hardness Number. These experiments were conducted based on standard acceptable and foundry men experience in this casting organization for casting of manifold 380 taken during controlling the parameters. First we collected the data as casting defects from Mutha Engineering Pvt. Ltd. Unit-3. Identify the major defects which are scab, cold shut and shrinkage. Complete this task we analyze the cause of this casting defects. So we conclude that there are four parameters responsible for these casting defects. 1 Compression Strength, 2 Moisture, 3 Mould Hardness Number 4 Permeability Number First we define the range of these parameters and then we perform the casting process at different trial and find that average percentage rejection is 23.27. Then we apply the Taguchi's method and use of MINITAB 17 software to find out the optimum solution. These optimum solutions were applied on casting process and the calculated the percentage rejection 0.96. Also by Modulus Calculations we are able to Re-Design the Gate to Control Metal fluidity, Turbulences in Molten stage of Metal which can withstand the Sand Permeability and Strength to eliminate the scabbing defects in Castings and find out the simulation results.

Keywords— Foundry Shop, scabbing defect, Taguchi's Method, Sand Casting, simulation results. Manifold 380

I. INTRODUCTION

Foundry suffers from weak quality and productivity due to a huge number of process parameters, lower automation and shortage of skilled workers. Defect free products are demanded in market but foundry finds to meet the requirements. In foundry we analyze the defects by nondestructive methods and apply its remedies carefully otherwise new defects occur. This is not an easy task. For example, when a gas porosity defect occurs at high pouring temperature and when we decrease the pouring temperature, it may occur cold shut defects. So casting is a very complex process. The success of a casting process depends greatly on the properties of the molding sand. These include 1. Compression Strength, 2 Moisture. 3. Mould Hardness Number 4. Permeability Number

II. LITERATURE REVIEW

V. Verma et. al. suggested that DMAIC approach is a business strategy used to improve business profitability and efficiency of all operation to meet customer needs and expectations. In the present research work, an attempt has been made to apply DMAIC (Define, Measure, analysis, improve, control) approach. The emphasis was laid down towards reduction in the defects (Blow holes, Misrun, scabbing, Slag inclusion, Rough surface) occurred in the sand castings by controlling the parameters with DMAIC technique. The results achieved shows that the rejection due to sand casting defects has been reduced from 6.98% to 3.10 %

N. Poulouse and E.George Suggested that the surface finish of a casting is dependent on the moulding process. The mould materials as well as the moulding variables apart from other factors not related to mould. The various factors are Poor treatment of sand, Use of different type of sand particles used in moulding, Accumulation of spend dead clay in the moulding sand, Use of badly compacted mould or cores due to Sand moisture not thoroughly mixed or not possessing sufficient flow ability in clay bounded sand moulding, Exceeding bench life of sand moulds or sand cores, Inadequate compaction of moulds or cores in normal moulding. Pouring temperature of the molten metal to be poured into the mould .These are some of the reasons for scab defects over castings.The impurities that present in the sand causes major defects in the castings, by that we have taken tests for sand. In the testing we found that clay amount is more present in the sand by that so many defects that we have found from this, and the testing of moisture. In the testing sand moisture content is more present in the sand. The company has a standard value for the moisture. But the tested results we got more amount of moisture content presented in the sand.

S.Kumar and J.Prakash suggested that the casting defects such as, Shrinkage, sand drop, sand blow holes, scabs, pinholes are minimized by using Taguchi optimization technique. The parameters considered are moisture content (%), green strength(g/), mould hardness, sand practical size(AFS).The Taguchi approach is used to capture the effect of signal to noise ratio of the experiments based on the orthogonal array used to find the optimum condition. The process parameters chosen for the sand casting are Compression Strength (g/cm^2), Moisture Content (%), Permeability Number, Mould Hardness Number for each





Optimization of Cylindrical Grinding Process- A Review

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Abstract: Grinding is the machining process which improves dimensional accuracy and improves surface quality. Cylindrical grinding is process of final finishing operation. During this review work input process parameters are cutting speed, feed rate, depth of cut, material hardness, grinding wheel speed, grain size, conditions used and to achieve optimize process parameters Taguchi optimization technique with L9,L18 array used for design of experiment. This study provides a review on optimization of machine parameters by different techniques.

Keywords: Grinding, Cylindrical grinding, Surface roughness, Material removal rate, Optimization, Taguchi.

I. INTRODUCTION

Grinding is machining process to improve surface quality and dimensional accuracy of the workpiece. Grinding is most widely used finishing process among all traditional process which is used in production. Grinding is a material removal process and surface generation process for shape and finish the component. From grinding process surface finish and precision obtained is very high. Grinding affects the product quality and assembly process. Grinding has been used for metallic materials such as hardened tool tungsten carbide, steel, ceramic material like silicon nitride, alumina, super alloys used in aerospace industry and zirconia. Grinding also is the fabrication process of several newer and lesser known materials like carbon, bulk amorphous metals, metallic foams, ceramic magnets, composite materials and intermetallics. With grinding these materials should be interested in effective cost of grinding process while maintaining required dimensional tolerance, surface characteristics and mechanical properties grinding process interface material removal by contact between grinding wheel and structural surface of the workpiece. Surface quality is main criterion in grinding process. Grinding is large and diverse area of tool making and manufacturing. It is better suited to the machining of hard materials. The material removal rate of the grinding process is much lower compared to the other machining process working with defined tool geometry.

Grinding process used to bring workpiece dimensions within very close tolerance after all the rough finishing and heat treatment operations have been carried out and also used for sharpening the carbide tool. Grinding machines are designed principally to finish parts having cylindrical, flat or internal surface. The kind of surface finish largely depends on the type of grinding machine, according to the quality of surface finish classified as rough grinder and precision grinder. The main purpose of rough grinder is to remove stock without any references to the accuracy of the results. Precision grinders produce good surface finish with high degree of accuracy.

Cylindrical grinding, internal grinding, surface grinding, tool and cutter grinding are the types of precision grinding process. In grinding cooling is preferable then lubricity as high amount heat developed due to high speed rotation of grinding wheel. Coolant improves tool life and surface finish.

II. CYLINDRICAL GRINDING

Cylindrical grinding is a type of machine used for grinding cylindrical surface, although tapered and simple formed surface also is ground. The cylindrical grinder work on a variety of shapes. The object must have control axis of rotation. The work is held rigidly in between the centre, in a chuck or in a suitable holding fixture. The work rotates in its axis and a revolving wheel is fed against it. Cylindrical grinding machine are of two types centre type and Centreless type. In centre type of machine work piece is usually held between two dead centres and rotated by a dog and driver on the face plate. The work may also rotate about its own axis in a chuck. The rotating grinding wheel is to be fed towards the work for successive cuts.

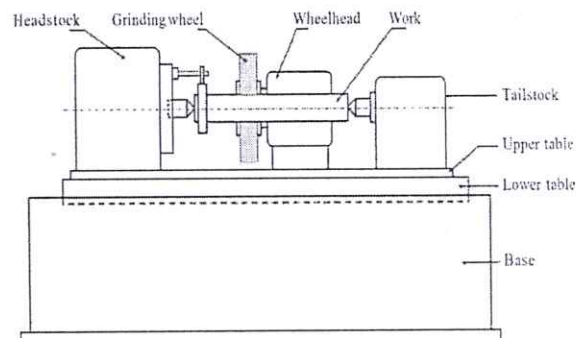


Fig.1 Cylindrical grinding machine

The depth of cut is determined by the feed of the wheel or workpiece. In Centreless type of machine Centreless





Use of Shearing Operation for MS Bar Cutting by Pneumatic Bar Cutting Machine

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Abstract: The bar cutting machine is used to cut mild steel bar by using shearing operation. Shearing operation uses punch and die. A punch (or moving blade) is used to push the work piece against the die (or fixed blade), which is fixed. Usually the clearance between the two is 5 to 10% of the thickness of the material, but dependent on the material. Clearance is defined as the separation between the blades, measured at the point where the cutting action takes place and perpendicular to the direction of blade movement. This causes the material to experience highly localized shear stresses between the punch and die. The material will then fail when the punch has moved 15 to 60% the thickness of the material, because the shear stresses are greater than the shear strength of the material and the remainder of the material is torn. Two distinct sections can be seen on a sheared work piece, the first part being plastic deformation and the second being fractured. Because of normal in homogeneities in materials and inconsistencies in clearance between the punch and die, the shearing action does not occur in a uniform manner. The fracture will begin at the weakest point and progress to the next weakest point until the entire work piece has been sheared.

Keywords: Shearing operation, punch, die, cutting edge, pneumatic equipments.

I. INTRODUCTION

Shearing, also known as die cutting, is a process which cuts stock without the formation of chips or the use of burning or melting. Strictly speaking, if the cutting blades are straight the process is called shearing; if the cutting blades are curved then they are shearing-type operations. When the stress reaches beyond the ultimate strength of the material, the fracture starts from both the sides of plate along the cutting edges of both die and the illustrated a complete shearing operation. The most commonly sheared materials are punch, and as the punch continuous to descend; the fractures meet at the centre of plate. The metal is now completely severed from the sheet metal and drops out through the die opening. The fig.1

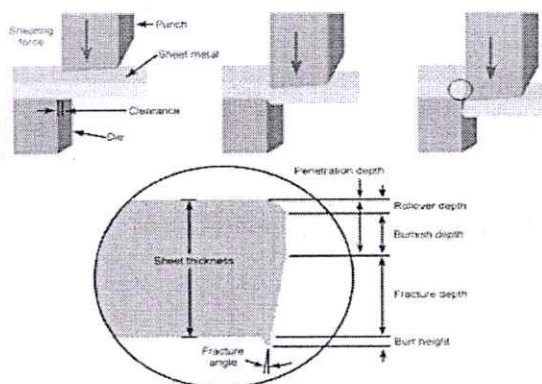


Fig.1 Principle of shear cutting

in the form of sheet metal or Plates; however rods can also be sheared. Shearing-type operations include: blanking, piercing, roll slitting, and trimming. It is used in metal working and also with paper and plastics. A punch (or

moving blade) is used to push the work piece against the die (or fixed blade), which is fixed.

II. MATERIALS USED FOR THE PUNCH AND DIE

A. HCHCr-

HCHCr Material also known as High Carbon High Chromium Steel or simply as D2, it is created by vacuum process. This is developed by raising the steel temperature to a high degree and then letting it cool suddenly. Due to its immovability during processing, very thin parts are also manufactured. In spite of not being classified as stainless steel, this has many properties similar to stainless steel like the following:

- Economic, Good Hardness High wear resistance
- Stainless steel properties
- Thin manufactured parts
- High abrasive wear applications
- Edge holding properties
- Accurate dimensions

Thread rolling dies, Hobs, Cold extrusion tools and dies, Punches, Draw plates and dies, Cutters, Measuring tools, Pressure casting moulds, Blanking, Reamer, Finishing rolls for tyre mills. This type of steel has high dimensional stability with added wear resistance coupled with excellent edge holding qualities.

TABLE I Typical analysis of (HCHCr) in %

Steel Type	High Carbon High Chromium Die steel
Qualitv	HCHC





Performance Improvement of Roller Burnishing Process— A Review

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Abstract: This paper presents a review on performance improvement of roller burnishing process. Roller burnishing is a surface finishing process which is economical as compared to other surface finishing process. Roller burnishing along with good quality surface finish also gives improved surface properties. The process parameters mostly considered are burnishing speed, feed rate, number of passes and depth of penetration. Roller burnishing does not require any special arrangement for the process and can be easily carried out on a conventional lathe machine also.

Keywords: Burnishing, depth of penetration, feed rate, speed, surface hardness, surface roughness.

I. INTRODUCTION

Machining is the process of material removal in order to get the component into desired shape and size. The properties of machined components have gained a large importance. The properties such as surface finish, surface hardness, wear resistance, corrosion resistance, etc are to be considered. The surface finishing operations such as honing, lapping, grinding, etc can be replaced by burnishing process as the other processes exert tensile force on the component which reduces life of component due to fatigue, tension, etc. Thus, compressive stresses are found beneficial over tensile stresses on component surface. Compressive stresses can also be produced by processes other than burnishing which are shot peening, laser shock peening, etc. But these stresses were found to be relaxed when exposed to heat. This thermal relaxation of compressive stresses shortens the component life and reduces its performance. So burnishing came up as a process that could impart compressive stresses that remain unaffected also in thermal variations.

II. BURNISHING PROCESS

Burnishing could be a surface finishing method that involves no chip formation. In conjunction with giving finer surface finish it additionally enhances surface properties like hardness, wear resistance, fatigue life, corrosion resistance, etc. Roller Burnishing will facilitate users eliminate secondary operations for substantial time and price savings, whereas at an equivalent time rising the standard of their product. Roller burnishing could be a technique of manufacturing associate degree accurately sized, finely finished and densely compacted surface that resists wear. Hardened and extremely smooth steel rollers are brought into pressure contact with a softer work piece, as shown in figure 1. As the pressure increases beyond the yield point of the work piece material, the surface is plastically unshaped by cold-flowing of submerged material.

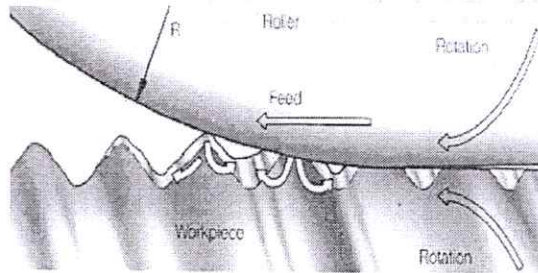


Fig. 1 Roller burnishing process [14]

III. ADVANTAGES OF ROLLER BURNISHING

- Roller burnishing is a quicker, cleaner, a lot of effective and a lot economical methodology of sizing and finishing elements to required specifications.
- Fantastic mirror like surface.
- Consistent dimensional tolerance and repeatability.
- Single pass operation offers terribly less cycle time.
- Will increase the surface hardness of parts.
- Reduces reworks and rejections. [15]

IV. APPLICATIONS

Roller burnishing has long been used on a large type of automotive and significant instrumentation parts (construction, agricultural, mining so on) as well as piston and rod bores, brake system parts, transmission elements and converter bulbs. Burnishing tools are also widely applied in non-automotive applications for a range of benefits; to give higher and longer lasting seal surfaces; to enhance wear life; to cut back friction and noise levels in running parts and to boost cosmetic look. Examples embody valves, pistons of hydraulic or gas cylinders, field and garden instrumentation parts, shafts for pumps, shafts running in bushings, bearing bores, and plumbing fixtures. [15]



Parametric Evaluation of Melting Practice on Induction Furnace to Improve Efficiency and System Productivity of CI and SGI Foundry- A Review

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Abstract: We provide some recommendations for the productivity improvement. Due to non-availability of the proper instrumentation the effect of the ill practices cannot be precisely judged. If this is properly measured, the percentage of productivity improvement in steel melting Induction Furnace can be calculated. The review is carried out from the literature in the various journals and manuals. The aim of this paper is to study the overall performance of induction furnace and to suggest the method to improve melt rate with optimum use of electricity. This paper mainly put attention on induction furnace as these are main consumer of electricity in foundry. In case of induction furnace efficiency is sensitive to many controllable features lie in operational practices, coil height; charge mix, furnace utilization etc. So with the help of recommendation, it is easy to find out the ways to lower the specific energy consumption in this furnace. So, in this paper we are trying to develop certain relationship between input and output parameters to improve the Whole process.

Keywords: Induction Furnace, Molten metal, Productivity, Melt rate, Energy Consumption.

I. INTRODUCTION

The development of Induction Furnaces starts as far back as Michael Faraday, who discovered the principle of electromagnetic induction. However it was not until the late 1870's when De Ferranti, in Europe began experiments on Induction furnaces. In 1890, Edward Allen Colby patented an induction furnace for melting metals. The first practical usage was in Gysinng, Sweden, by Kjellin in 1900 and was similar to the Colby furnace with the primary closest to the core. The first steel made in an induction furnace in the United States was in 1907 in a Colby furnace near Philadelphia. The first induction furnace for three-phase application was built in Germany in 1906 by Rochling-Rodenhauser. The two basic designs of induction furnaces, the core type or channel furnace and the coreless, are certainly not new to the industry. The channel furnace is useful for small foundries with special

requirements for large castings, especially if off-shift melting is practiced. It is widely used for duplexing operations and installations where production requirements demand a safe cushion of readily available molten metal. The coreless induction furnace is used when a quick melt of one alloy is desirable, or it is necessary to vary alloys frequently. The coreless furnace may be completely emptied and restarted easily [1]. Induction furnaces have increased capacity to where modern high-power-density induction furnaces are competing successfully with cupola melting (Fig.1).

II. METHODOLOGY STUDY OF INDUCTION FURNACE - A REVIEW

The working of induction furnaces is based on the principle of electromagnetic induction and basic concept is same as that of a transformer but with a concept is same as that of a transformer but with, a single turn short circuited secondary winding. The charge to be heated and melted forms the secondary while the hollow water cooled copper coils excited by the A. C. supply from the primary. In the core type furnaces, in order to maintain the electric path there must always be a sufficient molten metal the furnace. This is called the molten heel. In the core less induction furnaces, the primary coils surround a refractory crucible in which the charge to be melted is put. The eddy currents induced by the primary winding generate heat in the charge. Since there is no core, a large current is required to

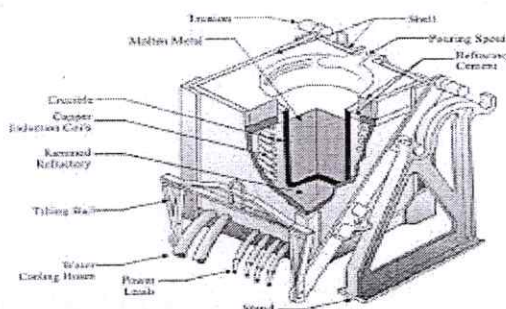


Fig.1: Schematic of induction furnace [1]

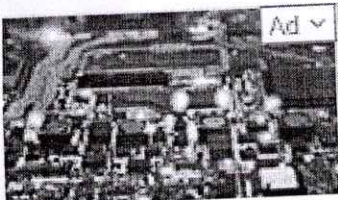




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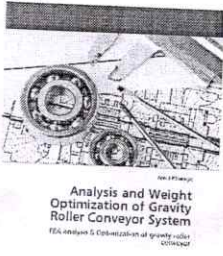
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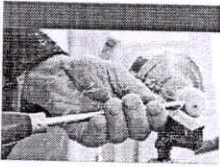
Book Details:

ISBN-13: 978-3-659-96886-0
 ISBN-10: 3659968862
 EAN: 9783659968860
 Book language: English
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Book Details:

ISBN-13: 978-3-659-96889-1

ISBN-10: 3659968897

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Value Stream Mapping From Dock to Stock At Engine Manufacturing Plant



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Book Details:

ISBN-13: 978-3-659-94359-1

ISBN-10: 3659943592

EAN: 9783659943591

Book language: English

By (author) : Jayant Nalawade

Number of pages: 84

Published on: 2016-08-26

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RESPONSE SURFACE METHODOLOGY AND GENETIC ALGORITHM: AN APPROACH FOR PROCESS PARAMETER OPTIMIZATION IN TURNING

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Abstract— The enhancement of productivity in manufacturing processes effects on the acceleration of the design and evolution in modern cutting tools. There is non-linear nature of metal cutting and the intricate connection to deformation, surface roughness along with time elapsed and power consumed. In this case a complete knowledge of the mechanics of metal cutting is still meager. So concentrating on that topic is great deal of recent exploration, which deals with high speed machining, and has been the main objective of the Mechanical Engineering in modern trend. The input parameters include cutting speed, feed rate and depth of cut which are cutting operations. Meanwhile in turning process, these parameters are found having greater impact on responses like surface roughness, power consumption and machining time which are output results. Hence there is a need to optimize the system parameters. So use of combined optimization techniques gives the best suitable values. This paper presents a review and gives optimization technique which is combined use of RSM and Genetic algorithm in turning.

Keywords— Optimization, RSM, Genetic Algorithm.

I. INTRODUCTION

Turning operation is crucial in machine industries where work-piece is rotated along its axis and cut in form of chips by cutting tools with considering cutting parameters, for instance speed, feed, depth of cut. Despite of that it is difficult even to skilled operator to carry out the job with optimum parameters which avail better characteristics and excellent qualities. For the record optimization is the best suite technique to draw optimum values which reveals to accomplished optimum scenario of economy, performance hence overall profit.

The turning operation is controlled by cutting and the geometry parameters. The cutting parameters include cutting speed, feed rate and depth of cut. Hence there is a need to optimize the process parameters. The objective is study to find out optimization of the process for minimization of surface roughness, power consumption and machining time for turning. Design of Experiments (DOE) will be adopted and optimize combination of process parameter chosen using response surface methodology. Optimization of the process parameters using Genetic Algorithm optimization.

The RSM and genetic algorithm are the tools to measure the performance and calculate most suitable optimistic values.

II. LITERATURE SURVEY

In this work literature survey is done on various turning and optimization papers.

M.A. Amrana, et al (2013), analysed by using RSM for the minimum surface roughness measured for the hole was 1.06 Micrometer at combination of 2000 rpm spindle speed, 78 mm/min feed rate and 2.5 mm drill diameter. While the maximum surface roughness of 2.59 micrometer was measured at the combination of 250 rpm spindle speed, 153 mm/min feed rate and 3.5 mm drill diameter. [1]

C. Ramudu et al, (2012), this study investigates the use of tool materials and process parameters for machining or selected parameter range and estimation of optimum performance characteristic using integration of Taguchi and RSM. [2]

Murthy B.R.N., et al., (2012), Full factorial Design of Experiments (DOE) has been adopted using RSM and the results indicate that spindle speed was the main contributing parameter for the variation in the thrust force and drill diameter is the main contributing factor for variation in torque. The optimum combination of process parameter settings has been found out using the integration of Taguchi method and Response Surface Methodology. [3]

S. Madhavan, S. Balasivanadha Prabu, (2012), For correlating the drilling parameters with respect to thrust force a second order response surface model has been developed. The developed model is significant at 95% confidence level, which shows that the developed model can be effectively used for drilling of CFRP composites within the range of the process parameters. Analysis of variance for the developed model revealed that the type of drill and the feed rate are the dominant factors that influence the thrust force. Thrust force recorded for HSS drill



PARAMETRIC EVALUATION OF DRILLING OPERATION OF MEDIUM CARBON STEEL USING RESPONSE SURFACE METHODOLOGY

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Abstract— To compete world-wide competition manufacturing firm has to be update with respect to science & technological field to transform their product output with excellent qualities with compatible prices. The enhancement of productivity in manufacturing processes effects on the acceleration of the design and evolution in modern cutting tools. Drilling is one of the economical process in which material is removed and create a hole in the vicinity as desired size. Drilling is frequently employed in industries owing to the need for component assembly in mechanical structures. As per the researchers report, the quality of the drilled hole strongly depends on the drilling parameters, tool material and tool geometry. Consider the drilling parameters during processing such as spindle speed, feed rate and tool angle applied on tool which consequently effects. So the prime motive is to optimize the process parameters which then results in terms of best solution. This optimizing combination to minimize the surface roughness, maximize the material removal rate and minimize the drilling time expectance along with maintaining quality of drilled hole by using standard RSM (Response surface Methodology) on medium carbon steel component. The purpose of this research is to study the effect of process parameters such as spindle speed, feed and drill point angles on surface roughness, operation time and material removal rate during the drilling of medium carbon steel part using carbide drill bit. Design of Experiments (DOE) will be adopted and the optimum combination of process parameter settings will be found out using the integration of Response Surface Methodology.

Keywords— Drilling, Optimization, Response Surface Methodology.

I. INTRODUCTION

Drilling is one of the important manufacturing operations that can be carried out on number of parts for assembly work. Drilling operation is essential for manufacturing industries like automobile industry, aerospace industry, medical and electrical related industries etc. Drilling is a frequently employed in industries owing to the need for component assembly in mechanical structures. Many researchers reported that the quality of the drilled surfaces depend strongly on the, drilling parameters, tool material and tool geometry. An inappropriate selection of these parameters can lead to material degradations, such as fiber pull-out, matrix cratering, thermal damage and delamination.

Now a day it is frequently used in automotive, aircraft and aerospace and dies or mold industries, home appliances, medical and electrical equipment industries. As a very important process in different process and manufacturing industry drilling process needs to be cost effective along with the assurance of the quality specifications within the experimental limit. Among various performance parameters for drilling process surface roughness, material removal rate, workpiece temperature tool wear etc are very much important in terms of the quality characteristics of the finished product. Among them surface roughness is of crucial importance due to its effect on some important mechanical properties of the material like fatigue behavior, corrosion resistance, creep life etc. Some other functional attributes of the material

such as friction, wear, heat transmission, light reflectivity, lubrication property, electrical conductivity etc are also affected by the surface roughness of the finished part. That's why the study and optimization of surface roughness in drilling has got research interest by the researchers.

The purpose of this research is to study the effect of process parameters such as spindle speed and feed, drill diameter, material thickness and drill point angles on surface roughness drilling time and material removal rate during the drilling of medium carbon steel. Design of Experiments (DOE) will be adopted and the optimum combination of process parameter settings will be found out using the Response Surface Methodology.

This study was motivated by a need for a study of forged steel crankshafts, which are the most commonly used manufacturing processes for an automotive crankshaft.

II. LITERATURE SURVEY

In this work literature survey is done on various turning and optimization papers.

Ma F, M.A. et.al 2013

Experimentation carried out on Glass-Fibre Reinforced Plastic. Parameters are Spindle Speed, Feed rate and Drill Diameter. Optimization of surface roughness carried out using RSM. The minimum surface roughness measured for the hole was 1.06 Micrometer at combination of 2000 rpm spindle



PERFORMANCE EVALUATION OF DIFFERENT TYPES OF CUTTING FLUIDS IN THE MACHINING OF HARDENED STEEL – A REVIEW

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Abstract— This paper presents a review on performance evaluation of different types of cutting fluids in the Machining of various hardened Steel Materials. Knowledge over the performance of vegetable oil based cutting fluids when applied to different work materials and operations is of vital importance in order to improve the efficiency of various conventional machining processes. This Efficiency can be measured, among other parameters, through cutting tool life and surface finish of work piece. In this Review, performances of various vegetable oil based cutting fluids are compared in terms of tool wear, force and surface roughness during various operations of various Hardened steel Material with various cutting tools.

Keywords— Cutting Fluids, Machining, Work Piece material, Tool Material.

I. INTRODUCTION

Cutting fluids are employed in machining to reduce friction, cool the work piece, and wash away the chips. With the application of cutting fluid, the tool wear reduces and machined surface quality improves. Often the cutting fluids also protect the machined surface from corrosion. They also minimize the cutting forces thus saving the energy. These advantages of using cutting fluids in machining are accompanied by a number of drawbacks. Sometimes the cutting fluid costs are more than twice the tool-related costs. Most of the cutting fluids possess the health hazard to the operator. Disposal of the used cutting fluid is also a major challenge.

In the recent past, there has been a general liking for dry machining. On the other hand, several researchers started exploring the application of minimal cutting fluid. In this Paper, a review on performance evaluation of different types of cutting fluids in the machining of hardened steel material is presented.

Cutting fluid (coolant) is any liquid or gas that is applied to the chip and/or cutting tool to improve cutting performance. A very few cutting operations are performed dry, i.e., without the application of cutting fluids. Generally, it is essential that cutting fluids be applied to all machining operations.

Cutting fluids have traditionally been used in machining operations to lubricate the chip-tool and tool-work piece interfaces, remove heat from the work piece and cutting zone, flush away chips from the cutting area, and inhibit corrosion. While each of these four functions can be employed as justification for cutting fluid usage, it is widely believed that the primary functions of a cutting fluid are lubrication and cooling. Seminal contributions to the technical literature in support of this belief are provided below.

II. LITERATURE REVIEW

M. Anthony Xavier, M. Adithan (2008) they determined the influence of cutting fluids on tool wear and surface roughness during turning of AISI 304 austenitic stainless steel. They performed turning operation by using AISI 304 work piece material. They used three different vegetable oil based cutting fluids: 1. Coconut Oil 2. Soluble Oil 3. Straight Cutting Oil. They concluded that feed rate affects surface roughness & cutting speed affects tool wear. Coconut oil is better cutting fluid than the conventional mineral oils in reducing the toolwear and surface roughness. [1]

Mohamed Handawi Saad Elmunafi, D. Kurniawan & M.Y. Noordin (2015) their study evaluates the performance of MQL using castor oil as cutting fluid & Results are compared with dry cutting. They found that using small amount of lubricant of 50 ml/h during the particular turning process produces better results compared to dry cutting, in terms of longer tool life. They come to know that machining under MQL seems to be limited by cutting temperature, because at high speed the effect of oil mist becomes evaporated. [2]

Patrick Adebisi Olusegun Adegbuyi, Ganiyu Lawal; Oluwatoyin Oluseye; Ganiyu Odunaiya (2010) they analysed the effect of cutting fluids on the mechanical properties of mild steel in a turning operation. Turning was done under dry condition and also using 3 coolants. They found that Palm kernel oil performed very well the specific functions of soluble oil as cutting fluid which includes good chip formation, reduction of heat generated and realization of a good surface finish. [3]

A. Hamdan, M. Fadzil, K.A. Abou-El-Hossein, M. Hamdi they presented the performance evaluation of



STUDY OF CAPILLARY TUBE FOR TRANSCRITICAL CO₂ SYSTEM

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ABSTRACT : A review of the literature on the flow of Carbon dioxide refrigerants through the straight capillary tubes of different flow configurations especially adiabatic and non adiabatic, has been discussed in this paper. The paper presents the experimental and numerical analysis of different categories. The paper provides information about the range of input parameters especially tube diameter, tube length, surface roughness. Other information includes type of refrigerants used, correlations proposed and methodology adopted in the analysis of flow through the capillary tubes of different geometries operating under adiabatic and non adiabatic flow conditions.

Keywords: CO₂, Transcritical cycle, Capillary tube, Adiabatic, Non adiabatic (diabatic)

1. INTRODUCTION

In recent years, the pursuit for environmentally friendly refrigerants has caused CFCs (chlorofluorocarbons) and HCFCs (hydro chlorofluorocarbons) refrigerants to gradually fade from use in the refrigeration industry. Research interests in this field turn to fluids with a low GWP (Global Warming Potential) and low Ozone Depleting potential (ODP), the global warming potential (GWP) is an index that relates the potency of a greenhouse gas to the CO₂ emission over a 100-year period. The Ozone Deflecting Potential (ODP) is an Deflecting Potency of substance compared to that of R-11 or R-12

Instead of continuing the search for new chemicals, there is an increasing interest in technology based on ecologically safe 'natural' refrigerants, i.e. fluids like water, air, noble gases, hydrocarbons, ammonia and carbon dioxide. Among these, carbon dioxide (CO₂, R-744) is the only non-flammable and non-toxic fluid that can also operate in a vapor compression cycle below 0 °C. In addition to its environmental advantages, the CO₂ has attractive thermal characteristics that make it a viable alternative refrigerant.

The commonly reported disadvantages of CO₂ were loss of capacity and low COP at high heat rejection temperature, and high expansion losses compared to other common refrigerants, CO₂ refrigerant has high operating pressure. Compared to conventional refrigerants, the most remarkable property of CO₂ is the low critical temperature of 31.1 °C. Vapor compression systems with CO₂ operating at normal refrigeration, heat pump and air-conditioning temperatures will therefore work close to and even partly above the critical pressure of 7.38 MPa. Heat rejection will in most cases take place at supercritical pressure, causing the pressure levels in the system to be high, and the cycle to be 'transcritical', [1,2] i.e. with subcritical low-side and supercritical high-side pressure as shown in figure 1.

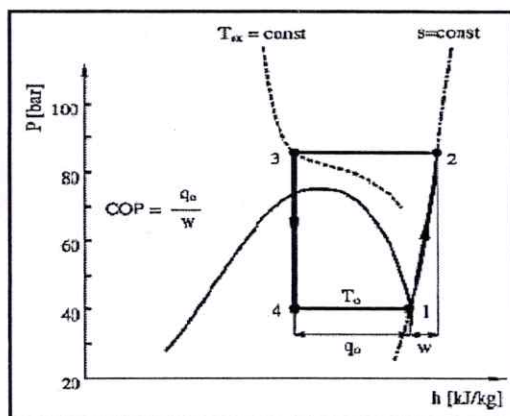


Figure 1. Transcritical cycle in the CO₂ pressure-enthalpy diagram [1, 2]



DESIGN AND DEVELOPMENT OF VERTICAL AXIS WIND TURBINE FOR GENERATION OF ELECTRICITY BY USING WIND ENERGY FROM RUNNING VEHICLES

¹ WAYDANDE RUSHIKESH PRAMOD, ² GHATGE DAYANAND ANANDA

^{1,2} Karmaveer Bhaurao Patil College of Engineering, Satara

ABSTRACT. Nowadays there is increase in the demand of electricity but the rate of production is much less than the demand. The motivation of our project is to generate electricity by using wind energy from running vehicles on highways. The vehicles running on highways generating more amounts of wind and this wind is used for the generation of electricity in our project. Also nowadays the percentage increase in the road accidents are happening due to the insufficient lightening on highways. This problem is overcome by using vertical axis wind turbine. This is a new idea of power generation. In our method the blades are designed in aerofoil shape and it is kept at the middle of the highways divider. The purpose of using divider is we can get wind from both directions. We can achieve higher force in the middle than the side of the road. And this blade is coupled with the generator and this generator will produce electricity. In our project we take wooden material for blades to achieve more efficiency.

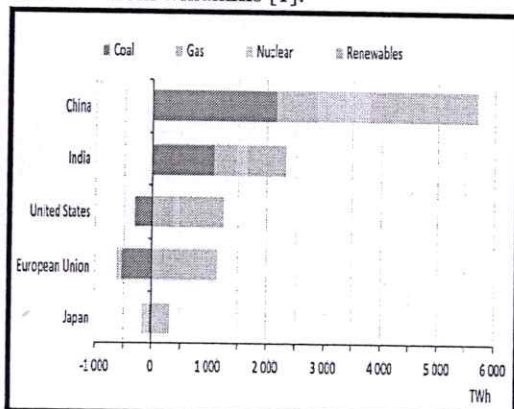
Keywords-Blades, Electricity, Generator, Highway, Wind Turbine, Wind

I) INTRODUCTION

If the efficiency of a wind turbine is increased, then more power can be generated thus decreasing the need for expensive power generators that cause pollution. This would also reduce the cost of power for the common people. The wind is freely available and Power can be generated and stored by a wind turbine with little or no pollution. The main objective of our project is to produce electricity by using the force of wind created by the running vehicle on highways. On highways the vehicle suffers a lot to travel in night time because of lightening problem. This problem can be overcome by using the vertical axis wind turbine. This is a new unique technique of power generation.

In this method the vertical axis turbine blade is designed in an aerofoil shape and it is kept at the middle of the highway divider by a series combination. The force in the middle portion is higher than the side of the road. This force will rotate the vertical turbine blade. And this blade is coupled with the generator and this generator will produce electricity. The main advantage of vertical axis wind turbine is it can generate power in all direction of wind flow. And the other advantages are the maintenance is less and the height of the tower is less. Also the wind is very much eco friendly and very compactable one. So we use this as a fuel in our project. It costs nothing & gives best output.

In 21st century the use of renewable sources which are eco friendly and less pollutant is must. The vertical axis wind turbine plays significant role in renewable energy sector. Wind energy is by far the fastest-growing renewable energy resource. Scientists estimate that, by the 21st Century, ten percent of the world's electricity will come from windmills [1].



Graph no1: Power Generation 2010 - 2013



DESIGN AND DEVELOPMENT OF VERTICAL AXIS WIND TURBINE FOR GENERATION OF ELECTRICITY BY USING WIND ENERGY FROM RUNNING VEHICLES

¹ WAYDANDE RUSHIKESH PRAMOD, ² GHATGE DAYANAND ANANDA

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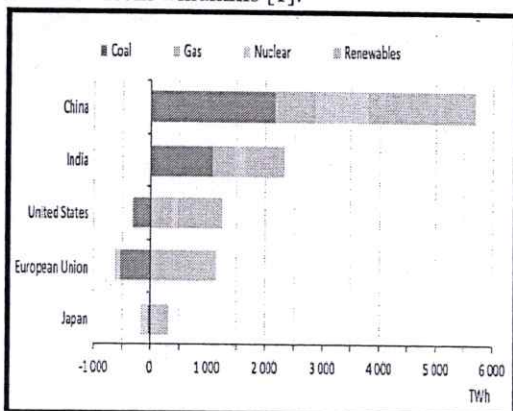
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D) INTRODUCTION

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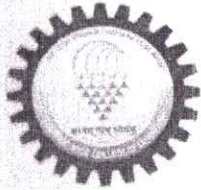
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Graph no1: Power Generation 2010 - 2013





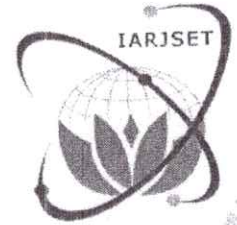
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
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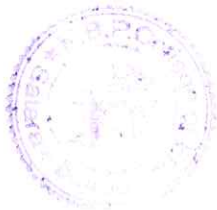
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Different Coatings - A Review in the National conference on
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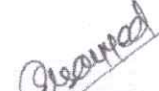
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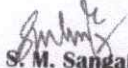
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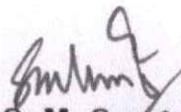
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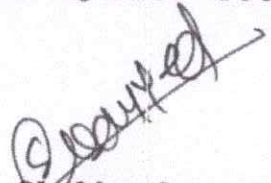
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