COLLEGE OF ENGINEERING, PUNE

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DEPARTMENT OF PRODUCTION ENGINEERING AND INDUSTRIAL MANAGEMENT

M. Tech. Production (Manufacturing Engineering & Automation)

Project Abstracts

Department of Production Engineering & Industrial Management
College of Engineering, Pune

S. Y. M. Tech. Production (Manufacturing Engineering & Automation) [2013-2014]
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16.	121223017	Hiray Girish	Prof. S.M. Patil	Tribological Behaviour Of Materials In Multi-Directional Sliding Using Bi-Directional Pin-On-Plate Reciprocating Sliding Tribometer.
17.	121223018	Khairnar Prashant	Prof. Rajiv B	Performance Analysis Of Near Dry Edm On Tungsten Carbide By Using Copper And Brass Electrode

STUDY AND COMPARISON OF TRIBOLOGICAL BEHAVIOUR OF MATERIALS UNDER STATIC AND DYNAMIC LOADING ON DIFFERENT TRIBOMETER

Mr. Baswade Tirupati Devidasrao (121223001), Prof. B. U. Sonawane

Tribology is newly evolved part of engineering even though the question of friction, lubrication and wear was reasonably understood by our ancestors even beginning of history. Tribometer is basic instrument to study the tribological behaviour of materials. A tribometer is an instrument that measures tribological quantities, such as coefficient of friction, friction force, and wear volume, between two surfaces in contact. Different Tribometer are available to study the tribological behaviour of material under various types of loading such as static load, impact load and vibrations. The various contact condition are observed like Pin-on disk, Pin-on drum, Pin-on-ring, Reciprocating, Multi-directional reciprocating etc. It has been found that no work has been carried out to study the tribological behaviour of material under dynamically loaded reciprocating tribometer (variable amplitude and frequency) i.e. in both directions (X and Y) simultaneously.

This work is of a strikingly new method to study the tribological behaviour of material under dynamic loading reciprocating condition for which experimental setup has been designed and manufactured. It also compares the wear rate of material under different experimental setup and conditions.

The setup is further modification made to the existing Multi-directional tribometer which is useful to test the tribological behaviour of material under static loading. A D.C. with speed controller and dynamic loading unit is attached to the pre-existing setup. With the help of setup tribological study can be carried out on materials primarily polymer under different parameters such as sliding velocity, contact pressure, reciprocating amplitude, reciprocating frequency and sliding time.

Nowadays polymers are widely used because of their self lubricating properties and wide variety of applications especially in medical field where polymers have emerged as an alternative for the traditionally used metal based or alloy based material. This is just because of their

advantages like service life etc. Hence it have become necessary to study multi direction tribological behaviour of materials under different type of loading condition.

The work had been carried out in two ways:

1. Delrin is tested under Multi-directional sliding tribometer and obtained results are verified by using data analysis method.
2. Delrin/POM-polyacetal material using not only novel dynamically loaded multi-directional tribometer but also using pre available tribometer like pin on disc, reciprocating tribometer under dry condition is studied. The parameters considered are:

    1. Sliding Velocity
    2. Contact Pressure
    3. Sliding time
    4. Dynamic loading frequency.

All these parameters are kept constant at their three point i.e. maximum (+1), minimum (-1), mean (0) throughout the whole experimentation process in order to get good results and comparison of wear which is measured by the mass loss method.

ANALYSIS OF MICRO-DRILLING ON CERAMICS BY POWDER MIXED ELECTROCHEMICAL DISCHARGE MACHINING PROCESS (PMECDM)

Mr. Deomali Manoj (121223002), Prof. M.R. Dhanvijay

Electrochemical discharge machining is a recent technique in the field of nonconventional machining to machine electrically non-conducting materials like glass, quartz, ceramics etc using the electrochemical discharge phenomenon. If a voltage is applied to an electrochemical cell, beyond the critical voltage then discharge initiates between one tool of the electrodes and the surrounding electrolyte, which is termed here'electrochemical discharge' it is an advanced hybrid machining process comprising the techniques of electrochemical machining (ECM) and electro discharge machining (EDM). .Materials with high hardness, brittleness, strength and electrical insulation, which are difficult-to-cut, can be machined by Electro-Chemical Discharge Machining (ECDM). A new method has been investigated to improve ECDM process by use ofPowder mixed electrolyte. Precise control of the spark generations in ECDM process has been a challenging problem. In Electrical Discharge Machining (EDM) process, which is thermal erosion machining process using spark energy similar to the ECDM, powder mixed EDM (PM-EDM) fluids have been used to improve machining characteristics. Considering the similarity of the ECDM process compared to EDM where electrical sparks are utilized; powder-mixed electrolyte is introduced to create similar effects. This work aims towards possibility of improving the material removal rate (MRR) and reduction of diametric over cut (DOC) by adding Graphite powder to the electrolyte. A mechanism that combines discharge, chemical etching and abrasive cutting is studied.

According to the present experimental study, the most effective values for machining parameters have been considered as 65V machining voltage,0.64 duty factor,50 concentration of electrolyte at 50 wt % and concentration of graphite powder at 4 wt % .it has been observed that low diametric overcut is obtain at low voltage and duty factor ,moderate electrolyte concentration and powder concentration. The maximum MRR obtain is 0.85 mg/min and minimum DOC is 0.6145 mm.

CHARACHTERISATION AND OPTIMIZATION OF ELECTROSPUN POLYACRYLONITRILE (PAN) AND POLYVINYLIDENE FLUORIDE (PVDF) NANOFIBRES

Mr. Ankit Choudhary (121223003), Prof. B.B. Ahuja

The recent advancements in the field of technology have led to miniaturization of the object and devices; the whole new emphasis being on creating compact and lighter, equipments and devices, to improve not only the portability but also to reduce the overall energy consumptions. Development of the Nanofibers and their increased use in variety of applications is a step in this direction. They can be produced by different methods such as rawing, phase separation, template synthesis and Electrospinning. Of all these methods electrospinning the most prevalent method is widely used industrially because of its relatively low cost, simplicity and high rate of production. Nanofibers find applications in areas such as healthcare, defence, energy applications, biotechnology and environmental engineering. In the present work, an attempt is made to make nanofibers of Polyacrylonitrile (PAN) and Polyvinylidene fluoride (PVDF) in solvent dimethyl formamide (DMF). The objective being to prepare the nanofibers of minimum diameter, by controlling the parameters i.e. electric field (i.e. voltage power supply), flow rate (i.e. supply of the solution from the spinneret) and distance between the spinneret and collector which are considered to be the most influencing parameters as seen from the work of earlier authors. The nanofibers obtained from PAN can be used to derive Carbon nanofibers having electrical conductivity and can be used for energy devices because of their light weight and high surface area; PVDF nanofibers have shown piezoelectric properties and may be used for energy harvesting applications. Scanning electron microscope (SEM) is used to study the diameter and surface morphology of the Nanofibers of PAN and PVDF and hence establish the most optimized set of parameters which will help produce fibers with minimum diameter in a commercial manner.

OPTIMIZATION OF EDM PARAMETERS FOR MACHINING AL - 30%SiC COMPOSITE

Mr. Yogesh Chaudhary (121223004), Prof. Rajiv B.

Demand for Al-Sic composite has been growing rapidly due to its excellent mechanical properties like Discontinuous fiber and particle reinforced MMC are low cost MMC that provide higher strength and stiffness and better dimensional stability over the corresponding unreinforced alloys. Small additions of reinforcement (Vr = 30%) moderately increase the base alloy strength and stiffness. They also increase the wear resistance and contribute toward the difficulty in machining these materials.

These MMC's are use for sport equipments, automobile engine parts (pistons, cylinder liners, brake drums), missile guidance parts, etc. Al-SiC composite is a difficult to machine owing to its excellent strength and hardness at elevated temperature. Among the several non-conventional machining processes, electrical discharge machining is the best alternative for machining of Al-Sic composite. Efficient machining of Al- Sic composite is a challenging task since it involves large number of parameters. In present work, experimental investigation was carried to determine the EDM parameters on the machining performance of the Al-Sic composite. The work was carried out on Al – 30%SiC metal matrix composite. Response surface regression analysis, which is a collection of mathematical and experimental techniques, was utilized to obtain the experimental data. The behaviour of the system is explained by the second order polynomial regression model also called a linear model., Experiments were conducted to investigate and co relate the three input parameters, pulse on time, gap voltage and peak current for four output performance characteristics i.e. surface roughness, material removal rate and electrode wear rate, radial over cut. A mathematical equation was derived to predict the performance. Response surface, contour plots was use to analyze the performance. Multi response Optimization of the machining parameters was made by grey relational analysis and principle component analysis.

A STUDY ON INVENTORY MANAGEMENTFOR ASSEMBLY PARTS, TOOLS & CYLINDER HEAD LINE BALANCING STUDY IN CUMMINS INDIA LTD

Mr. Vineela Yerraguntla (121223005), Prof. (Mrs.) Neela R.Rajhans

Forecasting & Inventory control for varying demand has been a major problem in the manufacturing and supply environment. By integrating accurate demand forecasting with inventory management, replenishment inventories can be scheduled to arrive just in time to replenish the product destined to run out first, while at the same time balancing out the inventory supply of all products to make their inventories more proportional, and thereby closer to achieving the primary goal.

This paper compares the forecasted inventory of four methods for assembly parts. The simple exponential smoothing (SES), Browns double smoothening (BDS), Croston's method & Holts procedure values are compared with on hand quantity (OHQ). Also identified the top contributors from ABC analysis and compared the current inventory cost of the A level components with the forecasted inventory. On the other hand tool inventory study also conducted. It is been observed that many of the tool items are just holdup in system with strategic inventory as label for more than 2 years. Using ABC & XYZ analysis critical stock been identified and calculated the new ordering quantity based on traditional economic ordering technique (EOQ). Secondly cylinder head line balancing also studied and identified the bottlenecks of the current machining line. By understanding the future requirement and difference between the cylinder head types, a new proposal have been projected to reduce the overall cycle time & to improve the productivity.

DEVELOPMENT OF SUB-ASSEMBLY STATION FOR THE MANUFACTURING OF PRESSURIZED FUEL SYSTEM

Mr. Mayuresh Thorat (121223006), Prof. (Mrs.) Arati Mulay

Generating the optimal production schedule for an assembly line, which will balance the workload at all the production stages, is a difficult task considering a variety of practical constraints. Varying customer demand is an important factor to be considered designing an assembly line. In order to respond to varying customer demand, many companies are attempting to make their production system more flexible/agile or adaptable to change. Due to the volatile nature of market, companies cannot afford to build new assembly line for new products or to new variants of same model. Emphasis is on mixed model assembly line development and balancing. Due to change in some parts or components it is necessary to increase the station or work load among the stations. Also some Sub-Assembly station is needed to balance the process flow. This project consists of creating a sub assembly station for a change in parts to be assembled in basic model. Along with design of resources and tools for sub-assembly process. Assembly line balancing with creation of model that improves the throughput of assembly line while reducing non value- added activities, cycle time. This will facilitate stabilized workload among and across the Sub-assembly station and other station and effectively balance the production schedule at all production stages.

ANALYSIS OF SURFACE FINISH AND CUTTING FORCE COMPONENTS IN DRY AND CRYOGENIC TURNING OF AISI A2 TOOL STEEL

Mr. Pathak Abhyudaya (121223007), Prof. P. D. Pantawane

This experimental study was conducted to determine the effects of Cryogenic and dry machining processes on surface roughness and cutting force generation in finish turning of AISI A2 Tool Steel using Cubic boron nitride (CBN) inserts and tungsten carbide inserts. AISI A2 tool steel is generally used for the machine tool parts, blades, punches and forging dies. Combined effects of three cutting parameters, namely cutting speed, feed rate and depth of cut, on the outputs-surface roughness and cutting force components, are explored by analysis of variance (ANOVA). Optimal cutting conditions for each performance level are established. The relationship between the results shows how much surface roughness is mainly influenced by cutting speed and feed rate. The depth of cut exhibits maximum influence on cutting force components as compared to the feed rate and cutting speed. Also use of cryogenic cooling improves surface finish and also results in low force components generation as compared to dry turning.

PARAMETRIC ANALYSIS OF DRILLING PROCESS ON AISI D2 MATERIAL USING COATED TOOLS

Mr. Kamble Udaykuma (121223008), Prof. P. D. Pantawane

Tool life is dependent on speed, feed and material used. Because of vastly different speeds at which high-speed machining can be done and variety of materials, that can be machined decides the tool life. Drilling process which is most efficient and economical way of producing the holes in the sheet material has been experimentally investigated in this work. The material selected for this experimentation is AISI D2 steel which is commonly available and is used in many applications. The process is carried out with the standard Tungsten Carbide Drill tools with different coatings viz. TiN, TiAlN and AlCrN which are available commercially. Drilling of AISI D2 and that too in dry condition is difficult. The main focus of this work is to study and analyze force and torque during the process as well as analyze the effect of tool coating, rotational speed and feed on surface roughness, circularity and cylindricity. It is an attempt to improve the quality and reliability of the drilling process by proper selection and optimization of process parameters. The force and torque during the process are measured by Kistler Dynamometer. The surface finish of the drilled holes is measured by Mitutoyo Surface Roughness Tester. The circularity & cylindricity is measured on Brown & Sharp make CMM. The experiments are carried out using the Taguchi method and data is collected. The data analysis has been carried out using the statistical tools viz. Taguchi method, ANOVA and Regression to establish the relationships between responses and the process parameters. The optimization of the response variables has been done by Grey Analysis.

STUDY AND ANALYSIS OF METALLISED ELECTRODE FABRICATED WITH FDM- RAPID PROTOTYPING TECHNIQUE FOR ELECTRO DISCHARGE MACHINING (EDM)

Mr. Fefar Savan (121223009), Prof. J. S. Karajagikar

Electro discharge machining (EDM) is a non-traditional process for the manufacturing of complex or hard material parts that are difficult to machine by traditional machining processes. During EDM, the electrode shape is mirrored in the work piece. Hence, instead of the machining problems, the process of electrode manufacturing becomes critical. With the emerging demands of complex structures and shapes, high accuracy and shorter lead-time are the biggest challenges of present day manufacturing environment. Rapid tooling (RT) technique by rapid prototyping (RP) process has the potential to overcome the problem of conventional methods of tool manufacturing. In the present work, Fused Deposition Modelling (FDM) process of rapid prototyping is employed to develop the electrode for electro discharge machining. The electrode manufactured by FDM process is of ABS material which is then metalized by electroless copper coating in order to use it in electro discharge machining. Experimental investigations and analysis are carried out in order to evaluate the newly developed electrode. Study and analysis of the output parameters such as Material removal rate (MRR), tool wear rate (TWR) and surface finish(Ra) based on the input parameters discharge current, discharge time, and voltage are carried out. A Box-Behnken Design (BBD) of Response Surface Methodology (RSM) is used to collect experimental data and develop empirical models relating responses and input parameters. Genetic algorithm (GA), an efficient search technique, is used to obtain the optimal setting for desired responses.

PERFORMANCE EVALUATION OF INJECTION SYSTEM IN HIGH PRESSURE DIE CASTING PROCESS

Mr. Daund Chaitanya Anil (121223010), Prof. M. D. Jaybhaye

A high pressure die casting technology of nonferrous metals and their alloys is one of the latest ones used in foundry industry. Cold chamber high pressure die casting, (HPDC), is an important commercial process for the production of complex shape aluminium and other alloy castings.

The role of plunger- shot sleeve system in cold chamber HPDC process is to push molten aluminium from the pour end of shot sleeve into the die. In the ideal world the plunger tip system will interact seamlessly with the shot sleeve allowing for rapid and efficient casting process to take place to give high Piston-sleeve system life with zero defect casting. In the real world thermal dynamics comes into play to make casting process a little trickier, pouring molten aluminium and then forcing it through the sleeve into the die causes temperature variation along the sleeve. Temperature gradients cause warping and oval shaping of the sleeve, resulting in gaps or interference with the plunger tip- ultimately resulting in flashes or blow by. Lack of dimensional stability between the plunger tip and the sleeve results in excessive wear, reduced operating life and reduced efficiency to give low quality casting.

This work analyzes important parameters affecting cast iron piston life in high pressure die casting method. An attempt has been made to obtain optimal settings of the die casting parameters, in order to yield the optimum piston life. The process parameters considered were: clearance value (between shot sleeve and plunger tip), flow rate, type of lubricant used and the shot sleeve size. The effects of the selected process parameters on the piston life and subsequent optimal settings of the parameters have been accomplished using full factorial method and optimization using TOPSIS. The result indicates that the selected parameters significantly affect the piston life of die casting process.

The different casting arrangements are used and investigation is carried out mainly using Copper and Cast Iron piston system. And the study is carried out using dimension, manufacturing method, composition, Physical and chemical properties, operational analysis and its effectiveness

of Piston–Sleeve system. And ideal arrangement and methodology is suggested which increases the piston-sleeve life with high quality casting output at optimal cost.

EXPERIMENTAL INVESTIGATION OF HARD TURNING OPERATION BY USING PCBN INSERT

Mr. Patil Prashant (121223011), Prof. M.R. Dhanvijay

Hard turning is becoming more popular for machining hardened steels as it has several benefits over grinding. The hard turning process is defined as machining steel with hardness greater than 45 HRC. PCBN is the dominant tool material for hard turning applications due to its high hardness, high wear resistance, and high thermal stability. The temperature generated in hard turning is substantially higher when compared to conventional machining as the cutting speeds employed in hard turning are higher and dry cutting environment is usually employed. Furthermore, the stresses acting on the tool in hard turning are larger as the work piece material has higher mechanical strength. Compared to grinding operations, hard turning has higher material removal rates, the possibility of greater process flexibility and lower energy consumption. There are several issues, which should be understood and dealt with, to achieve successful performance of the process. The project objective is to establish a correlation between cutting parameters such as cutting speed, feed rate and depth of cut with machining force, Temperature and surface roughness on work piece. The temperature generated during hard turning is dependent on the edge preparation and machining parameters. The PCBN inserts with chamfer edge profile of 25 degree x 0.15mm is used for turning. It is found that, the use of lower feed value, lower depth of cut with the cutting speed 135 and 180 m/min ensures minimum cutting forces, surface roughness and temperature.

DESIGN AND ANALYSIS OF VIBRATION ASSISTED GASBAG POLISHING TECHNIQUE

Mr. Khapre Ketan (121223012), Prof. B. B. Ahuja

Polishing processes are mainly concerned with surface finish. This study is concerned with the effect of various parameters on surface finish in Vibration assisted Gasbag Polishing Process.

In the present work, Vibration Mechanism is designed to study and analyze effect of various parameters such as Vibration Frequency(0-16.66Hz), Rotating speed of tool(580-1140rpm) and pressure inside the Gasbag(0.5-1.5bar); in what sense they affect the Surface roughness and Machining Depth. The silicon carbide of 15μm size and iron powder are used as abrasives. The experiments are carried out on 45×45 mm work piece of thickness 5 mm of the M.S. materials. Surface finish achieved by using soft gasbag tool and abrasive powder.

Taguchi orthogonal array L27 method is used to carry out the experiments. And Statistical methods are used to establish the relationships between responses and the process parameters.

STUDY OF TRIBOLOGICAL BEHAVIOUR OF MATERIALS UNDER MULTIDIRECTIONS SLIDING CONTACTS

Mr. Tatar Anket (121223013), Prof. B. U. Sonawane

Various experimental setups are available to study the tribological behaviour of material under various types of loading such as static load, impact load and vibrations. The various contact condition are observed like Pin-on disk, Pin-on drum, Pin-on-ring, Reciprocating etc. It has been found that no work has been carried out to study the tribological behaviour of material under multi-directions sliding contact.

This work is endeavour of a completely novel method to study the tribological behaviour of material under multi-directions sliding contact. An experimental setup is designed and manufactured.

Using the new developed setup experiments can be carried out to study the tribological behaviour of UHMWPE by considering the factors such as Sliding Velocity, Contact pressure, Reciprocating amplitude, Reciprocating frequency and sliding time etc.

DESIGN AND DEVELOPMENT OF AN ASSEMBLY LINE TO MERGE A NEW PRODUCT- UP-GRADATION OF KV LINE TO SUIT Q60 ENGINE

Mr. Deepak Modani (121223014), Prof. (Mrs.) N. R. Rajhans

Cummins India Ltd. is one of the leading manufacturers of diesel engines with various assembly lines assembling different models. Assembly facility redesign and modifications at one of its line is done to introduce an engine model of different line. This involves capacity analysis, layout planning and redesign of line in which another model is going to merge and line balancing for efficient flow of material.

This project defines methodology of distributing work elements of a product to an assembly line with capacity constraints and validating it for through simulation model. For this, a new line layout is proposed with help of layout design and planning and then the simulation model used to test the capability of line to meet various demand of both products.

So this study employed Pro-Model package as a tool, using the model to compare the performance measures of line in terms of % utilization, production rate with old layout of product and to determine ability of line to meet due date. The verification and validation stages were performed before running the scenarios. The model runs monthly production and then the capacity constraint resources defined by % utilization.

EXPERIMENTAL INVESTIGATION OF EFFECT OF TOOL GEOMETRY ON WELD STRENGTH OF AA 6082 ALLOYS

Mr. Gorde Sumit (121223016), Prof. S.U. Ghunage

The effects of tool geometry on friction stir spot welding properties of Aluminium 6082 sheets were studied. Three different tool pin geometries with varying RPM, Depth and Dwell time were used for friction stir spot welding. All the welding operations were done at the room temperature. Lap-shear tensile tests were carried out to find the weld shear strength .From the experiments the effect of tool geometry on friction stir spot weld formation and weld strength were determined. The optimum tool geometry for 1.5 thick Aluminium 6082 sheets was determined. The Hexagonal pin gave the biggest and the Triangular pin gave the lowest lap-shear fracture load.

TRIBOLOGICAL BEHAVIOUR OF MATERIALS IN MULTI-DIRECTIONAL SLIDING USING BI-DIRECTIONAL PIN-ON-PLATE RECIPROCATING SLIDING TRIBOMETER

Mr. Hiray Girish (121223017), Prof. S.M. Patil

When looking at total-joint replacement the major concern is the wear being applied. Wear is responsible for a range of negative consequences such as fracturing of the material, ultra high molecular weight polyethylene (UHMWPE), the body reacting to debris due to wear, and possibly replacement. Therefore our objective is to study the properties of ultra high molecular weight polyethylene in order gain a better understanding of wear. There will be several different approaches taken in order to achieve our objective. One approach is to determine how the direction of wear being applied affects the strength of ultra high molecular weight polyethylene, the material used in total-joint replacement. Hypothetically, when wear is applied in the same direction as the molecular chains our material becomes stronger and wear retarded. The opposite takes place in the other directions.

Polymers are emerging as viable alternative products to metal-based and alloy based products in many common and advanced engineering applications. The application areas are myriad where polymers are effectively used. In this work the Wear behaviour of Ultra High Molecular Weight Polyethylene (UHMWPE) material using novel BI-DIRECTIONAL PIN-ON-PLATE RECIPROCATING SLIDING TRIBOMETER. Under dry condition is studied. The parameters such as normal load/pressure, Sliding velocity, Reciprocating amplitude, Reciprocating frequency, and sliding time are considered.

Different types of experimental setups are available to study the tribological behaviour of material under static load,. The various contact condition are observed like Pin-on disk, Pin-on drum, Pin-on-ring, pin-on-Reciprocating plate etc. It has been found that no work has been carried out to study the tribological behaviour (i.e. effect of static load on wear) of material under Bi-Directional Pin-On-Plate Reciprocating Sliding Tribometer with variable amplitude and frequency of reciprocation.

This work is endeavour of a completely novel method to study the tribological behaviour of material under Bi-Directional Pin-On-Plate Reciprocating Sliding Tribometer. An experimental setup has been designed and manufactured.

The setup consist of X and Y reciprocating plates, vertical arm holding the specimen with static loading this novel experimental setup, experiments can be carried out to study the tribological behaviour of materials by considering the factors such as Sliding Velocity, Applied pressure, variable simultaneous X and Y reciprocating direction amplitude and frequency and sliding time. Wear is measured by using weight loss.

For Design of Experiment (DoE) one set of experiment are carried out by using Two Level of Factorial Design Static: By keeping the reciprocating amplitude constant and considering the parameters such as sliding velocity, sliding distance and Load/ Applied pressure

The results are analyzed by Analysis of Variance (ANOVA) to find out the correlation between the above process parameters and wear. It is observed that wear of UHMWPE increases with increase in normal load, sliding distance. The wear is calculated by weight loss method.

PERFORMANCE ANALYSIS OF NEAR DRY EDM ON TUNGSTEN CARBIDE BY USING COPPER AND BRASS ELECTRODE

Mr. Khairnar Prashant (121223018), Prof. Rajiv B.

This project investigates the near dry electrical discharge machining (EDM) process. Near dry EDM is an environment-friendly modification of the oil EDM process. It uses liquid–gas mixture as the two phase dielectric fluid. Tungsten carbide (WC-10%Co) is an important tool and die material mostly because of its high melting point, high degree of hardness and good wear resistance over a wide range of temperatures. Experiments were performed on Tungsten carbide work piece by using copper and brass electrode as both have thermal and electrical conductivity.

In this presented work, we studied the influence of Duty cycle, Current and Voltage on Material removal rate (MRR) and Tool wear rate. Response surface methodology (Central Composite Design) is used to carry out the experiments. Statistical methods are used to estimate relation between output parameters i.e. MRR and TWR and input parameters i.e. duty cycle, current and voltage. Regression analysis and Analysis of variance is carried out with the help of Design Expert 8 software and optimization of input parameters is carried out by using Grey relational analysis (GRA) and Principal component analysis (PCA).

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1.	121323001	Bonde Rajesh Yuvaraj	Prof. M. D. Jaybhaye	Tribological Behaviour Of DU Polymer Bearing
2.	121323002	Borade Nitin Anandrao	Prof. M. D. Jaybhaye	Experimental Investigation Of Dry Polymer Journal Bearing
3.	121323003	Chavan Akash Arun	Prof. Mrs. N.R. Rajhans	Application Of Lean Manufacturing In Boiler Manufacturing Plant Of Thermax India Pvt.Ltd
4.	121323004	Ghevade Ranjeet Tanaji	Prof. J. S. Karajagikar	Heated Ferrography Analysis (HFA) And Fault Tree Analysis (FTA) For A Machine Tool Gearbox
5.	121323005	Hiwale Sagar Santosh	Prof. M. R. Dhanvijay	Effect Of Sic Powder On Al2O3 Ceramics For Enhancing The Performance Of Electrochemical Discharge Process By Using Hollow Cylindrical Tool
6.	121323006	Kale Yogesh Suhas	Prof. B.U. Sonawane	Overall Productivity Improvement Of Component X In HPDC.
7.	121323008	Kulkarni Siddhesh Suhas	Prof. B.U. Sonawane	Implementation Of Lean Manufacturing By Using Value Stream Mapping
8.	121323009	Kulkarni Vishvesh Bhuvanesh	Prof. S. U. Ghunage	Resistance Spot Welding Of SS304 And AISI 1050, Parameter Optimization Based On Analysis Of Tensile Test, Microstructure And Hardness Of Weldment
9.	121323010	Narwade Priyanka Anand	Prof. B. B. Ahuja	Design And Analysis Of 2D-Vibration Assisted Gasbag Polishing Technique"
10.	121323011	Patil Sandesh Narahari	Prof. Mrs. A.V. Mulay	Development Of Experimental Setup Of Metal Rapid Prototyping Machine Using Selective Laser Sintering
11.	121323013	Pawar Pranay Prem	Prof. S. M. Patil	Tribological Behavior Of Materials In Multi-Directional Sliding Using Bi-Directional Pin-On-Plate Reciprocating Under Dynamic Loading
12.	121323014	Pise Dhananjay Dattatray	Prof. B. B. Ahuja	Study Of Process Parameters Affecting The Diameter And Morphology Of Electrospun Polyvinylidenefluoride (PVDF) Nanofibers And Analysis Of Their Piezoelectric Properties

Sr. No.	MIS No.	Student	Guide	Dissertation Title
13.	121323015	Sabale Vishal Dattatray	Prof. P. D. Pantawane	Experimental Investigation And Optimization Of Cutting Parameters In Cryogenic Machining Of Inconel 625
14.	121323016	Shastri Renu Kiran	Prof. M. N. Shaikh	Effect Of Cryogenic Treatment On Electrodes And Process Parameters In Near Dry Electric Discharge Machining (NDEDM)
15.	121323017	Shetake Shubhangi Sakharam	Prof. B. Rajiv	A Comparative Study Of Dry And Wet Machining Of Titanium Alloy Ti-6Al-4V And Inconel 718 Using Carbide Coated Tool
16.	121323018	Shukla Saurabh Bhaskar	Prof. P. D. Pantawane	Experimental Investigation Of Friction Stir Welded Aluminium 6061 To SPCC Steel Using Carbide Tool

TRIBOLOGICAL BEHAVIOUR OF DU POLYMER BEARING

Mr. Rajesh Y. Bonde (121323001), Prof. M. D. Jaybhaye

A kind of polytetrafluoroethylene (PTFE) based multilayer self-lubricating composite material, made of steel backing, a sintered porous bronze middle layer and a surface layer consisting of a mixture of PTFE and Pb powders was prepared. The friction and wear properties of the PTFE composite sliding against stainless steel are studied. In this study, the effect of sliding distance, sliding velocity and contact pressure on friction and wear of PTFE composite have been investigated and evaluated. The effect on temperature at the contact interface is also studied. Dry Bearing Friction test rig with a steel axis rotating on a sliding bearing is used. The friction coefficient is determined by measuring the friction torque during testing. The wear is determined by weight loss of the PTFE composite bearing after each test. As test bearing being mounted on the shaft and enclosed in support bush, simulated analysis of friction & wear of bearings can be performed and results give closeness to the true values of frictional force and wear of bearing.

EXPERIMENTAL INVESTIGATION OF POLYMER DRY JOURNAL BEARING

Mr. Nitin A. Borade (121323002), Prof. M. D. Jaybhaye.

Polymer based materials are widely used due to their good corrosion resistance, self lubrication& wear resistance properties at low speeds. High performance engineering polymers offer desired properties for journal bearings and give good tribological results. In this study, the effect of sliding distance, sliding velocity and contact pressure on friction and wear of polymer based bearings manufactured from "Pure Polytetrafluoroethylene (PTFE)" & it's composite of "20% Bronze filled PTFE and 20% graphite filled PTFE" have been investigated and evaluated. The effect on temperature at the contact interface is also studied. Most of laboratory investigations are done on "test rigs" like pin-on-disc or pin-on-ring. But bearings have special geometrical and kinematical characteristics. The friction & wear results of the sample materials used on these setups are then related to the actual conditions which may not depict true performance of the bearings. Hence to overcome this drawback, 'Dry Bearing Test Rig' is used which gives friction & wear analysis by simulating the conditions in actual practice, i.e. test bearing being mounted on the shaft and enclosed in support bush. Hence simulated analysis of friction & wear of bearings can be performed and results give closeness to the true values of frictional force and wear of bearing.

APPLICATION OF LEAN MANUFACTURING IN BOILER MANUFACTURING PLANT OF THERMAX INDIA PVT. LTD

Mr. Akash A. Chavan (121323003), Prof. Mrs. N. R. Rajhans

These all changes will improve almost 20% improvement in through put tiManufacturing industry especially Auto Component Manufacturing firms are undergoing tremendous pressure due to global competition & Q , C , D (Quality , Cost & Delivery). The survival of the fittest is the rule of existence of such organizations. Hence Change in every aspect of management has become essential. To achieve change to improve business performance, various tools & techniques were developed.

Organizations like Toyota, Motorola, GE, HP and many other tried in various ways to improve the Top & Bottom line making use of these techniques. Many organizations were confused as to which technique will suit them for improving. Two important strategies relevant in this scenario, which Jim Collins specifies in his book "Try a lot of Stuff & Keep what works" & "Preserve the Core & Stimulate progress "The Author attempts here to apply the techniques simultaneously for improving the throughput time of boiler plant. The aim to leverage the positive aspects of both the techniques for optimum benefit, Value Stream Mapping – a technique developed by Japanese organizations is useful in identifying the waste in the Business Processes. This is a gemba activity (On site activity) what actually happens is seen and improvements are planned through Kaizen. The other western technique – MOST, Maynard Operation Sequencing Technique – is a technique which identifies operating losses related to human movements, ergonomics & fatigue to improve per person productivity. The Authors view is application of these two techniques will help improving the machining lines performance in the holistic way.

Both the techniques has potential in their own field to substantially improve & deliver results. Authors aim through this project is to improve the through put time, Process Ratio , improve line speed with optimum resources satisfying the Customer in terms of Quality , Cost & Delivery. During the project author identify current state map, generate ideas to eliminate waste and future state map was generated. MOST study was done on each process and actions were implemented. Layout change done, Kaizen were implemented.

Publication:

1. Mr. Akash A Chavan, Prof. (Mrs.)N.R. Rajhans, "Application of Value Stream Mapping in boiler manufacturing plant" in National Conference of modeling optimization and control (NCMOC-2015) Organized by Vishwakarma Institute of Technology Feb 3-4, 2015, PI-180.

HEATED FERROGRAPHY ANALYSIS (HFA) AND FAULT TREE ANALYSIS (FTA) FOR A MACHINE TOOL GEARBOX

Mr. Ranjeet T. Ghevade (121323004), Prof. J. S. Karajagikar

This experimental study emphasizes the importance of heated ferrography as a condition based maintenance strategy for a machine tool gearbox. Accurate condition monitoring methodologies are needed to effectively schedule maintenance downtime as well as to ensure the accomplishment of manufacturing, long-range commercial and military operations. Reconditioned gearbox of HMT Gildemeister Multi-spindle Automat AS3 is considered for this analysis. It includes gearbox oil monitoring for identifying presence of wear debris particles in lubrication oil- CUMIOIL 308.

Methodology adopted includes Direct Reading Ferrography which gives Wear Particle Concentration (WPC) and Wear Severity Index (WSI) for oil samples collected after intervals. Further Analytical Ferrography is carried for ferrogram making and microscopic analysis to check the composition and morphology of wear particles. After that heated ferrography is carried out at elevated temperatures like 450-600˚C, so the distinction of elements became easier, the colour of particles being more pronounced. In second part, Fault Tree of Automat gearbox is constructed to validate the results obtained from Heated Ferrography Analysis.

EFFECT OF SiC POWDER ON AL_2O_3 CERAMICS FOR ENHANCING THE PERFORMANCE OF ELECTROCHEMICAL DISCHARGE PROCESS BY USING HOLLOW CYLINDRICAL TOOL

Mr. Sagar S. Hiwale (121323005), Prof. M. R. Dhanvijay

Electrochemical discharge machining is a non-conventional machining technique to machine electrically non-conducting materials like glass, quartz, ceramics, and composites using the electrochemical discharge phenomenon. It is an advanced hybrid machining process comprising the techniques of electrochemical machining (ECM) and electro discharge machining (EDM). A new method has been investigated to improve ECDM process by use of powder mixed electrolyte. Precise control of the spark generations in ECDM process has been a challenging problem. In Electrical Discharge Machining (EDM) process, which is thermal erosion machining process using spark energy similar to the ECDM, powder-mixed EDM (PM-EDM) fluids have been used to improve machining characteristics. Considering the similarity of the ECDM process compared to EDM where electrical sparks are utilized, powder-mixed electrolyte is introduced to create similar effects. This work aims towards possibility of improving the material removal rate (MRR) and reduction of diametric over cut (DOC) by adding silicon carbide powder to the electrolyte. A mechanism that combines electrical discharge, chemical etching and abrasive cutting is studied. According to the present experimental study, the most effective values for machining parameters have been analyzed using the Taguchi S/N ratio analysis from the process parameter. The maximum MRR is obtained at duty factor and concentration of electrolyte and moderate level of applied voltage. Similarly the minimum DOC is obtain at low level of applied voltage and duty factor and moderate level of concentration of electrolyte and concentration of powder. Adding abrasive material to the electrolyte does not itself promote the local chemical etching. Hollow cylindrical tool improves the circularity.

OVERALL PRODUCTIVITY IMPROVEMENT OF COMPONENT X IN HPDC.

Mr. Yogesh S. Kale (121323006), Prof. B. U. Sonawane

The competition in current business world is marked by intense agitation and severe contention. This agitated situation has made organization to revitalize themselves by marching in different routes like cycle time reduction, single minute exchange of dies, TPM, TQM etc. to keep them competitive in market as well to accomplish their objective positively. Now a day's most of organization have taken established route- Lean to crush the competitions. This conditions has improved the lean management strategies like, improving value stream, reduce change over times, creating flow in manufacturing, leveling production based on demand; reducing capital investment etc. This concept has provided organization a major source of competitive advantage.

Jaya Hind Industries Limited is part of US$ 350 million (Rs. 3000 Crores) strong 'Firodia Group of Industries'.Jaya Hind has mastered the various manufacturing processes like High Pressure Die Casting, Gravity Die Casting, Die Casting Tool Manufacturing and Auto-components.In this study a diecasting machine producing cylinder block which is having average cycle time 157.09 sec with set-up time near about 12 hrs-15 hrs is taken for improving the productivity. The main objective needs are to reduce the cycle time and reduce the setup times.

The objective needs to be achieved with no investment or with very minimum investment because investment plays a vital role at a growth stage of product life cycle. The scope includes proposed implementation of modification in programme for cycle time reduction and quick release coupling, design of support for metal feeder etc for reducing the set up time. A seven step methodology used for set up time reduction to attain the objective of Project.

IMPLEMENTATION OF LEAN MANUFACTURING BY USING VALUE STREAM MAPPING

Mr. Siddhesh S. Kulkarni (121323008), Prof. B. U. Sonawane

Nowadays the automotive component manufacturing industries are facing various problems due to high expectations from customer in terms of quality, cost and delivery. According to Gerald Wolfam “Don’t try to compete today using yesterday’s methods, if you expect to be in business tomorrow”.Which methodology is the magic bullet that will provide the solution for the faster response time, reduced inventories, and PPM levels of quality and reduced level of costs? The ability of consistently delivering these differentiators will allow sales of organization to beat any competitor where delivery, price, and quality are expected by customer. To achieve these differentiative parameters companies are looking for lean manufacturing methodologies as a way to achieve competitive advantages.

Bharat Forge Limited (BFL), the pune based Indian multinational company which is global leader in metal forming, serving several sectors. Crankshaft machining line modernization at line no.2 in MCD-I has been carried out to meet the increase customer demand. This project aims to improve lead time, process ratio, reduce material movement and number of WIP inventory, and reduce floor space to meet the customer demand.

This project describes the methodologies to implement the lean manufacturing using value stream mapping. Current State VSM has drawn, wastes are identified and improvements are suggested for the future state map. To check whether the proposed solutions (improvements) for the future state of line will help to achieve the increased customer demand (From 140/day to173/ per day) without any capital investment, Simulation using Pro-Model is done for existing and future line. From the simulation results it is confirmed that proposed improvements will meet the customer target with improved machine utilities.

RESISTANCE SPOT WELDING OF SS304 AND AISI 1050, PARAMETER OPTIMIZATION BASED ON ANALYSIS OF TENSILE TEST, MICROSTRUCTURE AND HARDNESS OF WELDMENT

Mr. Vishwesh Kulkarni (121323009), Prof. S. U. Ghunage

With the rising demand for automobiles and the fierce competition, the focus has shifted towards enhancing the features and product life. Steel is the largest raw material for automobiles and the higher consumption of Stainless steels has been observed. Automobiles employ 100 to 1500 welding spots. These often exist between similar or dissimilar metals. With the increase in use of SS304 and AISI1050 in automobiles, data regarding the welding of the two is essential. This paper pursues the resistance spot welding of the two alloys and aims to generate and analyse data through a DOE of input parameters such as input voltage, current, squeeze time, no. of cycles, weld percentage energy. The effect on lap tensile strength, micro hardness would be studied and analyzed.

Publication:

1. Vishwesh Kulkarni, S. U. Ghunage, "Research on Laser Welding of Aluminium and Steel Alloys with Process Models" in International Conference on Recent Advnaces in Mechanical Engineering (ICRAME-2015) Organised by Department of Mechanical Engg., G. H. Raisoni College of Engineering and Management, Wagholi, Pune, Feb 26-28, 2015, PI-27.

DESIGN AND ANALYSIS OF 2D-VIBRATION ASSISTED GASBAG POLISHING TECHNIQUE

Ms. Priyanka A. Narwade (121323010), Prof. B. B. Ahuja

Polishing processes are mainly concerned with surface finish. This study is concerned with the effect of various parameters on surface finish in 2D-Vibration assisted Gasbag Polishing Process.

In the present work, Vibration Mechanism is designed to study and analyze effect of various parameters such as Vibration Frequency(10-20Hz), pressure inside the Gasbag(0.5-1.5bar) and the different combinations of MAPs(Sic particles 10,20 and 30gm and iron particles 15,20,25gm) in what sense they affect the Surface roughness. The silicon carbide of 15µm size and iron powder are used as abrasives. The experiments are carried out on 60×50 mm workpiece of thickness 10 mm of the die steel materials. Surface finish achieved by using soft gasbag tool and abrasive powder.

Full factorial method is used to carry out the experiments. And statistical methods are used to establish the relationships between responses and the process parameters.

DEVELOPMENT OF EXPERIMENTAL SETUP OF METAL RAPID PROTOTYPING MACHINE USING SELECTIVE LASER SINTERING

Mr. Sandesh N. Patil (121323011), Prof. Mrs. A. V. Mulay

This project work is directed towards development of experimental setup of metal rapid prototyping machine using selective laser sintering technology. Various ideas of meatal rp machine are explored and modeled and out of those optimum model is selected. The machine structure in mainly divided in to three main sections as,

(i) Z-Movementandtable,

(ii) X-Y movement arrangement, and

(iii) Feeded mechanism.

Design calculations are made for critical machine elements and manufacturing will be done. Human machine interface will be then developed for controlling movements. Simultaneously, study is carried out on selection of material. Various types of metal powders can be used for metal rp assinglemetal powder, mixture of two metals powder, and combination of metal and polymer powder. Conclusion leads to use of mixture of two metals powder to minimize the problems as,

(i) Balling effect,

(ii) Porosity.

Developed system will be validated by conducting various experiments on manufactured part check mechanical and metallurgical properties. After studing the results of these experiments, various process parameters as laser properties (aspower, speed etc.), and material properties (as grain size and structure etc.) Will be optimized and if needed system modification will be done.

Publication:

1. S. N. Patil, A. V. Mulay, B. B. Ahuja, "Development of Experimental Setup of Metal Rapid Prototyping Machine Using Selective Laser Sintering Technique" in International Conference on Additive Manufacturing, 3D Printing & 3D Scanning (ICAM-3D), The Hilton Chennai, India IE Springer (Mechanical Series C), 6-7 Feb,2015.

TRIBOLOGICAL BEHAVIOUR OF MATERIALS IN MULTI-DIRECTIONAL SLIDING USING BI-DIRECTIONAL PIN-ON-PLATE RECIPROCATING UNDER DYNAMIC LOADING

Mr. Pranay P. Pawar (121323013), Prof. S. M. Patil

Different types of experimental setups are available to study the tribological behavior of material under various types of loading such as static load, impact load and vibrations. The various contact condition are observed like Pin-on disk, Pin-on drum, Pin-on-ring, Reciprocating etc. It has been found that no work has been carried out to study the tribological behavior (i.e. effect of variable load on wear) of material under variable simultaneously X and Y reciprocating direction with variable amplitude and frequency of reciprocation under dynamic loading condition.

This work is endeavor of a completely novel method to study the tribological behavior of 'PTFE' and 'UHMWPE' material under variable simultaneously X and Y reciprocating direction and dynamic loading condition. An experimental setup has been designed and manufactured.

The setup consist of X and Y table, dynamic loading arrangement, vertical arm holding the specimen. With this novel experimental setup experiments can be carried out to study the tribological behavior of materials by considering the factors such as Sliding Velocity, Dynamic Loading Coefficient (i.e. range of fluctuating load in terms of ratio of maximum load to minimum load), variable Loading Frequency, Contact pressure, variable simultaneous X and Y reciprocating direction amplitude and variable simultaneous X and Y reciprocating direction frequency and sliding time or distance.

STUDY OF PROCESS PARAMETERS AFFECTING THE DIAMETER AND MORPHOLOGY OF ELECTROSPUN POLYVINYLIDENE FLUORIDE (PVDF) NANOFIBERS AND ANALYSIS OF THEIR PIEZOELECTRIC PROPERTIES

Mr. Dhananjay D. Pise (121323014), Prof. B. B. Ahuja

The recent developments in technology are to design and manufacture the devices of portable size with increase in efficiency, less energy consumption and more effectiveness. Fabrication of nanofibers of different polymer solution and their increasing use in wide range of applications is directing towards this. Out of different manufacturing techniques of nanofibers, electrospinning is the simple, more productive and low cost method. Nanofibers find applications in energy harvesters, biomedical applications, healthcare, defence and environmental applications.In this study, the nanofibers of polyvinylidene fluoride (PVDF) in solvent Dimethyl Formamide (DMF) are spun with the help of electrospinning technique at different combination of input parameters such as concentration, voltage, flow rate and distance between collector and syringe tip. Taguchi method of design of experiments (L9) is used for combination of these input parameters. Further, the diameter and morphology of collected nanofibers are studied with the help of SEM images. The objective is being to study the effects of parameters and produce nanofibers of minimum diameter and defect free morphology by controlling the input parameters. The X-Ray diffraction method is used to study the different phase of PVDF nanofibers. To analyse the piezoelectric properties of PVDF nanofibers, vibration generator and oscilloscope setup is used. Further, the application of this property in the energy field is studied briefly.

Publication:

1. Mr. Dhananjay D. Pise, B. B. Ahuja, Prof. S. M. Shendokar, " Study of Process Parameters Affecting the Diameter and Morphology of Electrospun Polyvinylidene Fluoride (PVDF) Nanofibers" International Journal of Science and Research (IJSR) volume 4, issue 6, June 2015.

EXPERIMENTAL INVESTIGATION AND OPTIMIZATION OF CUTTING PARAMETERS IN CRYOGENIC MACHINING OF INCONEL 625

Mr. Vishal D. sabale (121323015), Prof. P. D. Pantawane

This experimental study was conducted to determine the effects of Cryogenic and dry machining processes on surface roughness and cutting force generation in finish turning of Inconel 625 using tungsten carbide (TNMG Type) inserts . Inconel 625 Alloy is used in chemical processing, paper making, ship building industries, & Aerospace industries, & in Nuclear reactors. Combined effects of three cutting parameters, namely cutting speed, feed rate and depth of cut, on the outputs-surface roughness and cutting force components, are explored by analysis of variance (ANOVA). Optimal cutting conditions for each performance level are established. The relationship between the results shows how much surface roughness is mainly influenced by cutting speed and feed rate. The depth of cut exhibits maximum influence on cutting force components as compared to the feed rate and cutting speed. Also use of cryogenic cooling improves surface finish and results in low cutting forces as compared to dry turning. Study of the chip formation also done as considering the chip thickness, shear angle, nature of the chips i.e. continuous or discontinuous chips is studied with vision microscope.

The tool wear during machining is measured by tracer type profile gram meter, it is absorbed that tool wear in cryogenic machining is much lower than dry turning.

EFFECT OF CRYOGENIC TREATMENT ON ELECTRODES AND PROCESS PARAMETERS IN NDEDM

Ms. Renu K. Shastri (121323016), Prof. M. N. Shaikh

This project investigates the NDEDM machine process.It uses liquid as the dielectric fluid. In this, project we studied the effect of electrode cooling during the NDEDM of titanium alloy (Ti-6Al-4V). In this work, Cryogenic treatment on copper and Brass electrodes are carried out.

In this Project work Current, pulse on-time, pause off-time, and gap voltage were considered as the machining parameters while Material removal rate (MRR) and Tool wear rate are the response. Statistical methods are used to estimate relation between output parameters i.e. MRR and TWR and input parameter. Regression analysis and Analysis of variance (ANOVA) is carried out with the help of Minitab software.

Publication:

1. Mrs. R.K. Shastri, Mr. M.N. Shaikh, Mr. Rajiv B., "Effect of Cryogenic Treated Electrodes on Process Parameters in Rapid Drill EDM Machine" in International Conference on Precision, Meso, Micro and Nano Engineering Organized by Department of Mechanical Engineering, IIT Bombay Dec 10-12, 2015.

A COMPARATIVE STUDY OF DRY AND WET MACHINING OF TITANIUM ALLOY TI-6AL-4V AND INCONEL 718 USING CARBIDE COATED TOOL

Mr. Shubhangi S. Shetake (121323017), Prof. Rajiv B

This experimental study was conducted to compare the effects of Wet and Dry machining processes on surface roughness, cutting force, circularity and temperature generation in finish turning of Ti alloy (Ti- 6Al- 4V) and Nickel-based alloys (Inconel 718) using Tungsten carbide inserts. Ti alloy (Ti- 6Al- 4V) and Nickel-based alloys (Inconel 718) is generally used for the machine aerospace industry, Biomechanical applications, Marine applications, Gas turbines. Combined effects of three cutting parameters, namely cutting speed, feed rate and depth of cut, on the outputs-surface roughness, cutting force, circularity and temperature components, are explored by analysis of variance (ANOVA). Optimal cutting conditions for each performance level are established. The relationship between the results shows how much surface roughness is mainly influenced by cutting speed and feed rate. The depth of cut exhibits maximum influence on cutting force components as compared to the feed rate and cutting speed. The speed and depth of cut influenced on temperature. Circularity most is depth of cut followed by feed and speed. Also use of wet machining improves surface finish and also results in low force components generation as compared to dry turning.

Wet machining improve surface finish, low cutting force and low temperature both material Ti alloy (Ti- 6Al- 4V) and Nickel-based alloys (Inconel 718) as compare to dry machining.

EXPERIMENTAL INVESTIGATION OF FRICTION STIR WELDED ALUMINIUM 6061 TO SPCC STEEL USING CARBIDE TOOL

Mr. Sourabh Shukla (121323018), Prof. P. D. Pantawane

The aim of the present work is to optimize the welding parameters viz. tool rotational speed, plunge depth, dwell time for friction stir spot welded A6061 & SPCC steel using RSM methodology. A6061 and low carbon steel sheets, SPCC, whose thicknesses are 1.3 & 1.5 mm respectively, are welded by a friction stir spot welding (FSSW) technique using three different tool geometries viz. Square, Cylindrical & Triangular. Tensile-shear failure tests are performed on the specimens. The effect of these three different geometries on the tensile shear fracture load (TSFL) is studied and accordingly the best geometry for the process is determined. Further, examination of the weld cross-sections, micro-hardness tests, & fracture characterization of the selected friction stir spot welded joints are conducted to understand the better performance of the joints.

Department of Production Engineering & Industrial Management
College of Engineering, Pune

S. Y. M. Tech. Production (Manufacturing Engineering & Automation)[2015-2016]
List of Dissertation Titles

Sr. No.	MIS No.	Student	Guide	Dissertation Title
1.	121423001	Mr. Bagwan Jameer Khaleel	Prof. M. N. Shaikh	Effect Of Cryogenic Treatment On Machinability Of AISIM2 HSS Using Copper Electrode On EDM
2.	121423002	Mr. Bhivara Sagar Prakash	Prof. B. B. Ahuja	Study Of Process Parameters Affecting The Diameter And Morphology Of Multiwall Carbon Nanotube Reinforced And Nano Reinforced BPDA
3.	121423003	Mr. Gurav Shatarupa Gajanan	Prof. Rajiv B.	Design And Analysis Of Material Handling System For TVS-3 Wheeler
4.	121423004	Mr. Malborgaonkar Saurabh Ramrao	Prof. B.U. Sonawane	Analysis Of Tribological Behavior Of Polymer At Cryogenic Temperature
5.	121423005	Mr. Mule Shreekrushana Mahadev	Prof. S. U. Ghunage	Experimental Investigation Of Resistant Spot Welding For Dissimilar Materials AHSS And Low Carbon Steel AISI 1050
6.	121423006	Mr. Ragade Sanket Dilip	Prof. (Mrs.) A. V. Mulay	Simulation Of Sheet Metal Forming Component And Analysis With Different Working Parameters
7.	121423007	Mr. Saigaonkar Sagar Dipak	Prof. P. D. Pantawane	Design Of Straightening Fixture To Control The Distortion After Full Welding
8.	121423008	Mr. Shardul Shekhar Amin	Prof. (Mrs.) N.R. Rajhans	Optimization Of Inventory Of Bought Items Using Simulation And Forecasting Techniques
9.	121423009	Mr. Suryavanshi Amar Raghunath	Prof. B. U. Sonawane	Experimental Study And Analysis Of Drawing Process Of CRCA M.S. Sheet"
10.	121423010	Mr. Vivek Ranjan	Prof. S. M. Patil	Value Stream Mapping For The Adaptable Section And TPM (Autonomous Maintenance) For DOOSAN-1555
11.	121423011	Mr. Mangnale Shivshankar Vijaykumar	Prof. Rajiv B.	Experimental Investigation Of Machining Parameters Of Rotary Edm Using Copper Tool On AL-Sic Composite
12.	121423012	Mr. Sarda Jagdish Satyanarayan	Prof. M. R. Dhanvijay	Process Capability Studies For Repeatability Measurement Of Electrochemical Discharge Process
13.	121423013	Mr. Agrahari Vijay Ashok	Prof. M. D. Jaybhaye	Improvement In Changeover Time Using Lean Manufacturing Principles In Die Casting Industry

Sr. No.	MIS No.	Student	Guide	Dissertation Title
14.	121423014	Mr. Pathade Vishal Anilrao	Prof. P. D. Pantawane	Experimental Investigation Of Wheel Composition And Machine Parameters Of Surface Grinding Of Titanium Alloy (Ti-6Al-Tr)
15.	121423015	Mr. Kapase Akash Sunil	Prof. M. N. Shaikh	Assembly And Inspection Of Crown And Tailcone Tooling Of An Aircraft In Compliance To Aerospace Standards.
16.	121423017	Mr. Sojitra Vikas Prafulbhai	Prof. J. S. Karajagikar	Investigating The Condition Of Single Speed Worm Gearbox Using Ferrography Analysis And Vibration Analysis
17.	121423018	Mr. Bakshi Kartik Ramesh	Prof. (Mrs.) A.V.Mulay	Metal Rapid Prototyping Using Selective Laser Sintering
18.	121323012	Mr.Pawar Pankal Gokul	Prof. Rajiv B.	Design And Development Of Under Run Protection Device For Four Wheeler Vehicle Having Low Ground Clearance.

EFFECT OF CRYOGENIC TREATMENT ON MACHINABILITY OF AISIM2 HSS USING COPPER ELECTRODE ON EDM

Mr. Jameer B. Khaleel (121423001), Prof. M. N. Shaikh

The effect of cryogenic treatment is widely studied in EDM process to increase MRR and reduce TWR. In this work the cryogenic treatment of tool as well as work piece is carried out to investigate the effect on MRR, TWR and Radial overcut.

Design of experiment is carried out by using RSM. To study the effect of cryogenic treatment, RSM is used for four combination of tool and work piece with untreated tool & workpiece and cryogenically treated tool & workpiece. The combinations include conventional tool and workpiece,cryogenically treated tool and conventional work piece, conventional tool and cryogenically treated work piece, and cryogenically treated tool and work piece.To carry out this investigation Discharge current, pulse on time, duty cycle and gap voltage is considered as input parameters and MRR, TWR and Radial overcut as the responses. The Radial overcut for cryogenic treated tool is less than that of all cryogenic treated cases but greater than conventional tool and work piece.

Compared to conventional tool and work piece, the improvement in the MRR for cryogenically treated tool shows 4.93%, cryogenically treated work piece shows 3.56 % and cryogenicallytreated tool and work piece shows 6.68%. The reduction in TWR is about 22.74% is observed in the cryogenically treated tool. Also SEM images show the machined surface by EDM surface. The cryogenically treated tool and cryogenically treated tool and work piece improve the machined surface compared to other.

Keywords: Cryogenic treatment, EDM , MRR, TWR.

STUDY OF PROCESS PARAMETERS AFFECTING THE DIAMETER AND MORPHOLOGY OF MULTIWALL CARBON NANOTUBE REINFORCED AND NANO REINFORCED BPDA

Mr. Sagar P. Bhivara (121423002), Prof. B. B. Ahuja

This project work is directed towards the study of influence of process parameters on the electrospinning of BPDA-PDA Polyimide nanofibers reinforced with Multiwalled carbon nanotubes and the obtained fibres diameter. Electrospinning has proved to be one of the most practical methods to produce continuous non-woven nanofiber mats of various polymers from their polymer solutions or polymer melts. Various polymers were studied and the BPDA-PDA Polyimide was selected for the study owing to its superior nanofiber strength displayed as compared to other polymer nanofibers and the recently growing interest in its application for use in electrical industry. The project work is mainly divided into (i) Study of the effect of process parameters on electrospinning of BPDA-PDA Polyimide polymer and nanofiber diameter. (ii) Study of the influence of reinforcement of Multiwalled carbon nanotubes (MWCNTs) on the polymer nanofiber mats. The aim of the project work is to optimize the process parameters to create nanofiber mats of the smallest possible diameters which exhibit continuous fiber morphology with greatest orientation and minimum defects. The results will be validated by testing the nanofiber mats on Scanning electron microscope (SEM) for nanofiber diameter and morphology.

Keywords: Electrospinning, BPDA-PDA Polyimide, MWCNTs.

DESIGN AND ANALYSIS OF MATERIAL HANDLING SYSTEM FOR TVS-3 WHEELER

Ms. Shatarupa G. Gurav (121423003), Prof. Rajiv B.

In Today's fast world of Manufacturing design of Proper Material Handling Systems in industry is one of the important requirements for fast production & high output with less efforts. The material handling systems costs 70% cost in overall production. It plays an important role in manufacturing industry. The project is based on "Design & Analysis of Material Handling System for TVs Wheeler". The Assembly line is designed as per requirement of customer by considering the flow of material, available space, facility planning, time requirement. Material handling equipment ,cost. The proposed plan for assembly line is designed & studied properly it is found that assembly line is consists of four workstations which includes Tilting station in which the chassis of three wheeler will tilt in 90 for easiness of rickshaw & cabin mounting operation. The next station is depacking station in which chassis will depack. The next station is conveyor line which is 66 meter long slat conveyor on which pegs mounted with the help of hoist & cranes the chassis will mount on are conveyor on which the various 145 operations of fitment will perform. The last station is inspection station. The takt time provided by customer for assembly line 6,69 Min & the human efforts required more As per need the automated mechanisms are designed. This includes Tilting mechanism & Lifting hanger for chassis. The use of Sensors, P.L.C s at proper place makes mechanism useful which is easily operated by workers. Design of proper system is important because cost is invested in it & expected production is depend on it. To design failure free system analysis of critical parts is done by which we can find critical elements in systems & can reduce the failure or breakdown of system.

Keywords: Assembly line, design, failure, breakdown.

ANALYSIS OF TRIBOLOGICAL BEHAVIOUR OF POLYMER AT CRYOGENIC TEMPERATURE

Mr. Saurabh R. Malborgaonkar (121423004), Prof. B. U. Sonawane

This project work is directed towards the new method of studying the tribological behaviour of polyoxymethylene (DELRIN) and Ultra High Molecular Weight Polyethylene (UHMWPE) at cryogenic temperatures. Polymers have been widely used in various industrial applications such as aerospace, automotive and chemical industries. At cryogenic environment, the components with interacting surfaces or in relative motion (tribosystems) like bearings, seals and valves often generate undesired heat and experience high wear. Such materials require high strength to weight ratio. Wear and friction test using apin on disc machine is used to investigate the role of different cryogenic treatment on DELRIN and UHMWPE. Wear tests are performed at different pressure, cryogenic temperature, sliding time, sliding distance and sliding velocities keeping the rest of the parameters constant. The experiment shows that the wear resistance improves as the cryogenic temperature decreases. It can be stated that the cryogenic environment has a significant influence on the tribological performance of the polymer. SEM analysis is performed to determine the characteristics of the polymer which has transferred material onto the disc at very low temperatures and investigated under the experimental conditions. From testing on EDS machine it has been found that nitrogen is absorbed by the material.

Keywords: Cryogenic temperatures, Pin on disc, SEM.

EXPERIMENTAL INVESTIGATION OF RESISTANCE SPOT WELDING FOR DISSIMILAR MATERIALS AHSS DP600 AND LOW CARBON STEEL AISI1050

Mr. Shreekrushna M. Mule (121423005), Prof. S. U. Ghunage

Resistance spot welding (RSW) is considered as the dominant process for joining sheet metals in automotive industry. Typically, there are about 2000–5000 spot welds in a modern vehicle. Simplicity, low cost, high speed (low process time) and automation possibility are among the advantages of this process. Dual-phase steels are finding increased use in automotive bodies due to a combination of high strength and high ductility; hence, they possess excellent formability. Dual-phase steel possesses a unique microstructure consisting of ferrite and martensite that offers high strength to these steels coupled with high formability. With the increase in usage of high strength steels in the automotive industry, spot welding has become an important topic due to the modified welding response of these materials. Spot welding is the primary joining method for automotive structures due to the short process time and continued use of spot welding for advanced high strength steels (AHSS). In this project work possibility of RSW of AHSS type Dual phase 600 steel with low carbon steel AISI 1050 investigated. Resistance spot welding on similar DP600-DP600 and dissimilar DP600-AISI1050 samples performed. With the help of literature survey, input parameters are selected for the optimization are weld time, weld current, electrode force. The design of experiment is performed to understand the process input parameter relation on weld load carrying capacity, weld diameter, and indentation, micro hardness. Results from the design of experiment then analyzed and optimized.

Keywords: Resistance spot welding, dissimilar metals, weld load, weld diameter.

Publication:

S.M. Mule, S.U. Ghunage and B.B. Ahuja, "Process Characterisation of Resistance Spot Welding of Dual Phase Stainless (DP600) Steel" in 6th International and 27th All India Manufacturing Technology, Design and Research Conference AIMTDR 2016, Dec 16-18 2014, 118-9 to 119-2.

SIMULATION OF SHEET METAL FORMING COMPONENT AND ANALYSIS WITH DIFFERENT WORKING PARAMETERS

Mr. Sanket D. Ragade (121423006), Prof. Mrs. A. V. Mulay

Achieving high standard quality products in almost no time with great economy in industry demands for a technology that helps exceed the engineering requirement of products. This report highlights development of forming component and the changes made in product design due to manufacturing and assembly reasons considering the design intent and also the advantages of using various 'CAE' softwares used in designing forming tools. It helps reducing the complete product development cycle as compared to what happens with conventional methods. Lesser effort and ease to model the complete setup and important features with different design parameters, improved the product development without compromising quality. Thorough attempt is aimed for design sheet metal die using the latest technology to make it time and cost effective, identifying the problem areas through simulation analysis results and based on the analysis prepare the query report and suggest revisions modifications in the product design. Finally, work out the best die design to produce defect-free components based on the inputs received. Thus using the CAE software one can design economical die because the design changes, modifications and challenges can be observed and solved in the initial phase of the design only. Besides that optimum working conditions can be achieved by changing working parameters and comparing analysis of product simulation results to find optimum combination of parameters. Otherwise without these efforts the die design and the processing could end up as a costly and complicated assignment.

Keywords: Design intent, Economy, FEM simulation, Product design, Sheet metal die, Optimum working conditions.

DESIGN OF STRAIGHTENING FIXTURE TO CONTROL THE (BOOGIE) DISTORTION AFTER FULL WELDING

Mr. Sagar D. Saigaonkar (121423007), Prof. P. D. Pantawane

Railway manufacturers are engaged with design, development and production of bogies which also provides services for the complete product life cycle of the bogies. Bogie is the vital area where wheels come in contact with rails which is widely considered the single and most crucial component of a train. Manufacturing of bogie chassis for railcar having distortion continues to be important issue and is subjected to large amount of research. Distortion effects encountered in the welding sector have been widely recognized as a feature which will never be completely eliminated. This paper demonstrates the most economical and controllable method of heat straightening with the help of design of straightening fixture to eliminate the distortion, the fixture design is carried out by using CATIA V5 R20 Modelling software and the components are analysed by finite element method (FEM) using ANSYS software.

Keywords: Welding distortion, Static Structural analysis (FEA), Flame Straightening.

Publication:

Sagar D. Saigaonkar, Prof. P.D.Pantawane, " Design of Straightening Fixture to Control the (Bogie) Distortion after Welding Process " IJSRD - International Journal for Scientific Research & Development| Vol. 4, Issue 04, 2016 | ISSN (online): 2321-0613.

OPTIMIZATION OF INVENTORY OF BOUGHT OUT ITEMS USING FORECASTING AND SIMULATION TECHNIQUES

Mr. Shardul S. Amin (121423008), Prof. Mrs. N. R. Rajhans

In today's industrial world when the going gets tough for a company, it is very important for the company to survive and sustain itself in this competitive world. Managers frequently need to make decisions about the future of the organization. Forecasting is the science of estimating or predicting future trends to support managers in this process. Forecasting methods can be used to provide information to support decisions about many aspects of the business including buying, selling, production, and hiring.

High class items are very important for an organization. Because of the high value of these items, frequent value analysis is required. In addition to that, an organization needs to choose an appropriate order pattern to avoid excess capacity.This study aims to keep an optimum inventory of high class items by forecasting the demands of these items which play a significant role in deciding company's profit/loss.The high class items are mainly identified by using pareto analysis. Pareto analysis is a statistical technique in decision making that is used for the selection of a limited number of tasks that produce significant overall effect. Pareto analysis is a relatively simple methodology that is used when trying to determine which tasks or items in an organization will have the most impact. In this study the items which amount to 80% of material cost for various projects are identified.

In order to maintain a competitive position in the global market, organizations have to follow strategies to achieve shorter lead times, reduced costs and higher quality. Therefore, suppliers play a key role in achieving corporate competitiveness, and as a result of this, selecting the right supplier is a critical component of these new strategies. Several conflicting quantitative and qualitative factors or criteria like cost, quality, delivery etc. affect supplier selection problem. Therefore, it is a multi-criteria decision making problem that includes both quantitative and qualitative factors, some of which conflict to each other. Selecting an appropriate supplier among different suppliers is a critical issue for top management. Since these high class items play such a vital role in a company, hence it is very important to purchase them from right suppliers.This study shows how the supplier selection and prioritization is done byusing AHP(Analytical

Hierarchy Process) and (Technique for Order ofPreference by Similarity to Ideal Solution)TOPSIS method.

Keywords: AHP, TOPSIS, OTD.

Publication:

Shardul S. Amin, Prof. Mrs. N.R. Rajhans, "Application of Integrated AHP and TOPSIS Method for Prioritization and Selection of Suppliers: Case Study in Automotive Industry" in 6th International and 27th All India Manufacturing Technology, Design and Research Conference AIMTDR 2016, Dec 16-18 2014, 195-9 to 196-2.

EXPERIMENTAL STUDY AND ANALYSIS OF DRAWING PROCESS OF CRCA M.S. SHEET

Mr. Amar R. Suryavanshi (121423009), Prof. B. U. Sonawane

Investigation of the influence of process parameters and their levels in the Sheet metal drawing is an important task to obtain an efficient drawing process and a non defective product. The two important parameters namely, Blank holding pressure and Punch pressure are examined in the drawing of CRCA M.S. Steel (IS 153DD) for the manufacturing of parts of silencer of agriculture diesel engine pump manufactured in Dhiraj Industries, Kolhapur**.** The Full Factorial method in Design of Experiment was employed to study the effect of each process parameter considered in this experiment. The thickness measurements and surface finish measurements at different locations on the cup are recorded thus average values for each experiment are determined. Based on the average values of thickness and surface roughness Analysis of variance (ANOVA) is done using minitab software. Also the combination of Draw force and Blank holding force is determined for which the thickness variation and surface roughness is minimum. The optimization of selected parameters is done through ROVOP technique.

Keywords: Deep Drawing, Thickness variation, Surface finish, ANOVA.

VALUE STREAM MAPPING FOR THE ADAPTABLE SECTION AND TOTAL PRODUCTIVE MAINTENANCE (Autonomous Maintenance) for DOOSAN-1555

Mr. Vivek Ranjan (121423010), Prof. S. M. Patil

Premium has been the leader in mechanical transmission for over five decades. It has been the leader always by setting new benchmarks in quality, product design and value for money to their customers. Its products are highly reliable and it's fit & forget technology ensures its longevity and hassle free performance. Manufactured in modern, ISO 9001:2008 certified plants, premium products reach the customer through an extensive branch and dealer network that ensures unmatched application and service support.

In today's market scenario there are many new manufacturing companies coming up. The demand for transmission equipment has grown consistently. With this scenario continuing for long period and the government inviting public and private sector companies to setup new plants in steel, cement, sugar, material handling etc. there has been a tremendous increase in competition among gear box manufacturing companies to supply best quality products with the most reasonably possible prices. In this trend, over last few year's various gear box manufacturing companies are trying to cover Original Equipment Manufacturing (OEM) fitment with different segments of customers, replacement market and other new ventures.

PROJECT-I

"*Value Stream mapping for Adoptable gear box*" deals with losses occur during the manufacturing process of adaptable gear box from raw material to the customer and work in removing those losses. Currently company is going through lots of losses. Losses in terms of scrap, time, high inventory cost, cost to manufacturing, etc. The major problem is the high lead time to manufacture the gear box during transferring from supplier to the end user, because there is lots of movement between the suppliers and PTL and suppliers to suppliers and it takes almost ***26 days***. Other problems are the loss in the setting of the machine, defects, high maintenance cost, machine break down, lots of inventory places, lots of movement, lots of suppliers, etc. all are the non-added value which cost but did not add any value in the product. Which create lots of complication and very high losses. Attempts are made to reduce the lead time in two phases by

considering the entire major, like suppliers, cost, quality, manufacturing time, delivery time. But the process efficiency is not up to the company expectation. Therefore, it is decided that find the assembly supplier who is able to keep the high inventory for 2 months, which he directly get the finished sub-assemblies from their respective manufacturing of sub- assemblies' suppliers. Whenever company gets the demand of the gear box, the supplier is able to supply the assembled gear box within 4 days. The company only dispatches the product to its customers. This step also reduces the operator cost up to 40%. There will be less movement of the inventory.

PROJECT-II

"*Total Productive Maintenance* (Autonomous Maintenance) *for DOOSAN-1555*" deals with maintenance program with the newly well-defined concept for maintaining the equipment DOOSHAN-1555. This equipment is used to manufacture the case for the industrial gear box for the worm gears. Currently company is going through lots of losses. Losses in terms of Breakdown due to poor maintenance, time for the repair of the equipment, time loss due to non-availability of the tools near the equipment, setting time loss, etc.

Due to these losses the efficiency of the machine is very low as compared to the targeted value. Attempts are made to reduce the down time of the machine by using the pillars of TPM that is Autonomous maintenance. Others pillars of TPM are also used to remove the wastes.

Such as Planned Maintenance, 5's, TPM office, etc.

Keywords: Value stream mapping, TPM, lead time.

Publication:

Sudhir M. Patil and Vivek B. Ranjan, "Lead Time and Cost Reduction using Value Stream Mapping for Manufacturing the Adaptable Gear Box in 6th International and 27th All India Manufacturing Technology, Design and Research Conference AIMTDR 2016, Dec 16-18 2014, 876 to 879.

EXPERIMENTAL INVESTIGATION OF MACHINING PARAMETERS OF ROTARY EDM USING COPPER TOOL ON AL-SIC COMPOSITE

Mr. Shivshankar V. Mangnale (121423011), Prof. Rajiv B.

The correct selection of manufacturing conditions is one of the most important aspects to take into consideration in the majority of manufacturing processes and particularly, in processes related to Electrical Discharge Machining (EDM) has been recognized as an efficient production machining of electrically conducting hardened

material.

This study investigate the feasibility and optimization of machining parameter of rotary EDM. In this study we used per as an electrode of 3 mm external diameter and 1 mm internal diameter with through hole flushing. AL423200 Al-Sic composite used as work piece material because of their weight sensitive application and aerospace application. EDM oil used as lubrication medium. In this study four input parameter selected three as electrical parameters current, voltage, pulse on time and one as non electrical parameter RPM of tool and each parameter has been different in three level as low, medium and high.

The main objective is to study the effect of current, voltage, pulse on time & RPM of tool on metal removal rate, tool wear rate and over cut. A well designed experimental scheme was used to reduce the total number of experiments. Parts of the experiments were conducted with the L27 Orthogonal array with one repetition based on the Taguchi method. Moreover Analysis of variance is carried out with the help of Minitab software and optimization of input parameters is carried out by using AHP and TOPSIS method and Gray Relational analysis the signal-to-noise ratios associated with the observed values in the experiments determined the current was most significant parameter, then too rpm, voltage and last pulse on time were most affected by the Responses of Material Removal Rate (MRR), Tool Wear Rate (TWR) and Over Cut (OC).

Keywords: EDM, composite, MRR, TWR.

PROCESS CAPABLITY STUDIES FOR REPETABLITY MEASUREMENT OF ELECTROCHEMICAL DISCHARGE MACHINING PROCESS

Mr. Jagdish S. Sarda (121423012), Prof M. R. Dhanvijay

Electrochemical discharge machining is a recent technique in the field of non-conventional machining to machine electrically non-conducting materials like glass, quartz, ceramics etc using the electrochemical discharge phenomenon. If a voltage is applied to an electrochemical cell, beyond the critical voltage then discharge initiates between one tool of the electrodes and the surrounding electrolyte, which is termed here 'electrochemical discharge'. It is an advanced hybrid machining process comprising the techniques of electrochemical machining (ECM) and electro discharge machining (EDM). Materials with high hardness, brittleness, strength, and electrical insulation, which are difficult-to-cut, can be machined by Electro-Chemical Discharge Machining (ECDM). The tool (cathode), auxiliary electrode (anode) and the work piece are immersed in the electrolyte. The discharge takes place when voltage exceeds the critical voltage. Material removal takes due to high temperature melting assisted by chemical etching. A new method has been investigated to improve ECDM process by use vibration to the tool (cathode). Precise control of spark in ECDM process has been a challenging problem. In current project, CU18 transducer is used to supply the vibration to the tool. Electrolytic copper is used as tool, NaOH as an electrolyte, E-Glass Fibre Epoxy Composite is used as work piece material, and Nickel sheet as anode material.

This work aims towards possibility of improving the material removal rate (MRR) and reduction of diametric over cut (DOC) and tool wear rate (TWR), by using vibration to the tool. Also study of repeatability ECDM process by process capability. RSM based Box-Behnken design of experiment is used to carry out the experiment. Optimum setting found out with the help of response optimizer is 20 kHz frequency, 75V voltage, 19% electrolyte concentration, and 78% duty factor. Analysis is done by ANOVA and contour plots as well as surface plots. Optimization is also done by AHP and TOPSIS methods and results optimum settings obtained are 20 kHz frequency, 75V voltage, 24% by weight concentration, and 80% duty factor. Similarly Cp and Cpk values are very close to each other i.e. they are indicating that the process is centered on target and conform to specifications. Values obtained for Cp and Cpk are 1.79 and 1.76.

Keywords: ECDM, composite, MRR, TWR of diametric over cut.

Publication:

Jagdish S. Sarda, M.R. Dhanvijay and B.B. Ahuja, "Experimental Investigation of Glass Epoxy Composites by Tool Vibrations using ECDM Process" in 6th International and 27th All India Manufacturing Technology, Design and Research Conference AIMTDR 2016, Dec 16-18 2014, 161-2 to 161-5.

IMPROVEMENT IN CHANGEOVER TIME USING LEAN MANUFACTURING PRINCIPLES IN DIE CASTING INDUSTRY

Mr. Vijay A. Agrahari (121423013), Prof. M. D. Jayabhaye

The thesis illustrates the possible reasons and variation in high pressure die casting die changeover time. It also provides set-up instructions and the standardized set-up procedure with considering the constraints in foundries. It uses a case study in a large scale pressure die casting foundry to generate an integrated set-up reduction approach, utilizing lean manufacturing principle specifically single minute exchange of die (SMED). It demonstrates the viability of quick changeovers in large scale industry based on a "Lean" approach. Changeover process in pressure die casting requires large proportion of time and thus decreases the overall effective efficiency and productivity of machine. Tools like Pareto analysis, Multiple activity charts and method study have been used to analyse the pre-existing procedure of changeovers practised in the industry. Lean manufacturing tools like SMED, 5S, Poke-Yoke, TPM, Shojinka, Teian are implemented to further reduce the changeover times. The study finally concludes with time saved through implementation of lean tools and economic justification of the implemented improvements in setup process.

Keywords: ECDM, composite, MRR, TWR of diametric over cut.

Publication:

V.A. Agrahari and M.D. Jaybhaye, "Improvement in High Pressure Die Casting Die Changeover Time using Lean Manufacturing Principles" in 6th International and 27th All India Manufacturing Technology, Design and Research Conference AIMTDR 2016, Dec 16-18 2014, 204-1 to 204-4.

EXPERIMENTAL INVESTIGATION OF WHEEL COMPOSITION AND MACHINE PARAMETERS ON SURFACE GRINDING OF TITANIUM ALLOY TI-6AL-4V

Mr. Vishal A. Pathade (121423014), Prof. P. D. Pantawane

Titanium alloy Ti-6Al-4V is widely used in aerospace as well as automotive industry owing to its properties like low density, high tensile strength and toughness even at extreme temperature condition. This material is light in weight and excellent corrosion resistant. This material is mainly used in aircraft, spacecraft, medical devices etc. In the present work grinding of Titanium alloy Ti-6Al-4V has been investigated with the aim to explore grinding force, surface finish and topography and effect of these parameters with change in wheel composition. The conventional surface grinding machine tool has been used for the experimentation and process parameters viz. depth of cut, feed, coolants and grinding wheel compositions have been varied. Kistler force dynamometer 9257B has been used to measure the grinding forces. The machined surface has been investigated for microstructure alteration. Surface finish found to be improved with different coolants. Also it is observed that use of coolants affect the grinding forces.

Keywords: Titanium alloys, Surface grinding, Grinding forces, Surface finish.

ASSEMBLY AND INSPECTION OF CROWN & TAILCONE TOOLING OF AN AIRCRAFT IN COMPLIANCE TO AEROSPACE STANDARDS

Mr. Akash S. Kapase (121423015), Prof. M. N. Shaikh

This project is being carried out at "TAL Manufacturing Solutions", 'TATA MOTORS' Chinchwad Campus. A dedicated team of 15 employees is associated with this project. This project comprises of manufacturing, assembly and inspection of Crown and Tailcone tooling (jigs and fixtures) of an aircraft of a major aircraft manufacturer. This project is directed towards manufacturing, assembly and inspection of a set of twenty tools(jigs and fixtures) belonging to seven different categories namely Holding Fixtures(HF's),Drill Jigs(DJ's),Drill Fixtures(DF's),Locating Jigs(LJ's),Over Head Mechanical Equipment (OHME),Transportation Mechanical Equipment(TME),Assembly Jigs(AJ's).MBD (Model Based Definition) of tools, its interpretation and aerospace tooling standards are the key aspects of this project. Unlike the traditional practice of referring 2D drawings for manufacturing, assembly and inspection of tools, in this project tools are manufactured, assembled and inspected in reference to the MBD (3D model) of tools provided by the customer.

The project aims at detailed study and implementation of aerospace standards in compliance with MBD during manufacturing, assembly and inspection. The project aims to provide tools to customer with specified quality, in desired quantity and in specified time. It also consists of installation and commissioning of tools at "TASL (Tata Advanced Systems Ltd) Hyderabad.With systematic planning, a dedicated team and modern setup all the tools have been dispatched, installed and commissioned at the customer's place. All the tools have received customer's quality clearance.

Keywords: Crown and Tailcone assembly, MBD (model-based definition), aerospace standards.

INVESTIGATING THE CONDITION OF SINGLE SPEED WORM GEARBOX USING FERROGRAPHY ANALYSIS AND VIBRATION ANALYSIS

Mr. Vikas P. Sojitra (121423017), Prof. J. S. Karajagikar

There are various ways of knowing condition of a mechanical system. Out of these vibration and ferrography analysis are the two main condition monitoring techniques for equipment fault diagnosis and maintenance policy decision.

In this experiment, these two methodologies are used to investigate the condition of a single speed gearbox. An experimental test rig, consisting of a single speed gearbox driven by AC motor (0.5hp) is used for this analysis. The gearbox run under normal loading/operating condition as per industrial application. It includes gearbox lubrication oil (Castrol EP 90) monitoring for identifying presence of wear debris particles. Ferrography analysis includes direct reading ferrography, which gives wear particle concentration (WPC) and wear severity index (WSI) for oil samples collected after predetermined running interval. At the same time vibration analysis which gives wear particle concentration (WPC) using vibration analyser (VA-12) is used to compare the condition of gearbox. Further Analytical Ferrography and EDX are carried out for ferrogram making and microscopic analysis to check the composition and morphology of wear particles.So it will help to reveal the composition of wear particles based on temper colour phenomenon and subsequently the source of wear.

Correlating this data which is produced by ferrography analysis and vibration analysis will help to investigate the condition of a single speed gearbox. Also it will help to develop condition based maintenance policy to maintain condition of gearbox at desired level.

Keywords: Vibration analysis, ferrography analysis, wear particle concentration (WPC), wear particle concentration (WPC).

Publication:

J.S. Karajagikar, Vikas P. Sojitra and B.U. Sonawane, "Investigate the Condition of Single Speed Worm Gearbox using Ferrography and Vibration Analysis" in 6th International and 27th All India Manufacturing Technology, Design and Research Conference AIMTDR 2016, Dec 16-18 2014, 202-2 to 202-7.

METAL RAPID PROTOTYPING BY USING SELECTIVE LASER SINTERING

Mr. Kartik R. Bakshi (121423018), Prof. Mrs. A. V. Mulay

. This project work is directed towards the development of experimental set up of metal rapid prototyping machine by using selective laser sintering technique. Rapid prototyping as one of the advanced manufacturing technology under non-traditional manufacturing sector has already proved its importance to manufacture wide range of products with reduced time, reduced cost and improved flexibility. Various ideas for development of machine are explored and modelled. Optimum model is selected according to requirements and necessities. The machine structure is mainly divided into four main sections as- A) Hardware and B) Software Hardware consists of 1. Z-axis movement of base plate, 2. XY-axes movements for laser source, 3. Powder feeder mechanism, 4. Enclosed gas shielded chamber. Design calculations are made for critical machine elements and selected optimum design is then fabricated.

Study is carried out for design and selection of feeder mechanism, selection of Laser and material. Various models are developed for powder feeder and optimum-compact one is selected. There are options for laser like fibre laser, CO2 laser and diode laser etc. Laser is selected based on machine and process requirements. In software sections, human machine interface is developed to control XYZ movements along with the movement of powder spreader mechanism. Material selection is another important factor for SLS. Various types of metal powders can be used for metal rapid prototyping as a single powder (direct method) or combination of metal and polymer (indirect method) or mixture of two different metal powders (two component method). Then, validation of developed system by producing prototype is to be done.

Keywords: SLS, rapid prototyping, feeder mechanism, laser.

Publication:

K.R. Bakshi, A. V. Mulay, " A Review on Selective Laser Sintering: A Rapid Prototyping Technology" in 6th International and 27th All India Manufacturing Technology, Design and Research Conference AIMTDR 2016, Dec 16-18 2014, 53 to 57.

DESIGN AND DEVELOPMENT OF UNDER RUN PROTECTION DEVICE FOR FOUR WHEELER VEHICLE HAVING LOW GROUND CLEARANCE.

Mr. Pankaj G. Pawar (121323012), Prof. Rajiv B.

This invention is about providing safety mechanism on vehicles and more generally cars having low ground clearance particularly with respect to truck and buses. During collision between vehicle with low ground clearance (cars) to vehicle with high ground clearance (trucks) sufficient opposition forces which are necessary to slow down vehicles with low ground clearance in control manner are not created in this kind of scenario, because of height mismatch of energy absorbing structure between car and truck causes under run of passenger vehicle with low ground clearance (car) beneath the truck having high ground clearance causing serious injuries to passenger inside the car.

It is therefore is desirable to provide some mechanism on vehicle more generally on cars body having low ground clearance which will avoid car from submerging under truck or buses having high ground clearance. For this purpose a mechanism comprises a pair of bars installed on car's body at front end to transfer force form point above its energy absorbing structure to energy absorbing structure of car, the mechanism also comprises energy absorbing structure, comprises sensors to sense the object in its proximity and comprises actuating system to provide motion to bars when condition of collision is detected by sensors. The whole mechanism is controlled by microcontroller.

Keywords: Crash, crashworthiness, composites, steel, abaqus, ansys.