



mechanica

2012-13



Technical journal of Mechanical Engineering Society (MES)

Department of Mechanical Engineering

BRCM College of Engineering & Technology
Bahal - 127 028, Dist. - Bhiwani, Haryana



Faculty & Students at the inaugural function of MES



Mechanica

Technical Journal of
Mechanical Engineering Society
2012-2013



Estd. : 1999

Department of Mechanical Engineering
BRCM College of Engineering & Technology
Bahal - 127 028 (Distt. Bhiwani), Haryana

www.brcmcet.edu.in
June 2013



MECHANICAL ENGINEERING SOCIETY

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B. Tech. (Mechanical Engineering) Final Year Students, session 2012-13 with Faculty



H.K. Chaudhary

Chairman's Message

I am delighted to place on record the momentous and privileged sentiments on the occasion of launching of the technical journal titled 'MECHANICA' by the Mechanical Engineering Society (MES). In today's competitive world mere class room interaction between faculty and students is not enough. In addition to good class room teaching, there is also a strong need to provide opportunity to the students for an all round development of their personality. I am immensely pleased that MES has been founded at the Department of Mechanical Engineering to achieve this goal.

I am sure that Publication of MECHANICA will inspire the students to achieve high targets in life by original and creative writing and expression of thoughts on intellectual issues and hope that the readers at large will benefit from this journal and contribute immensely in the subsequent issues.

Once again I take this opportunity to thank the editorial staff for their untiring efforts and the intellectuals for their contributions in bringing out the first volume of MECHANICA .

Director's Message

I feel really pleased and honored to introduce MECHANICA, by Mechanical Engineering Society (MES), Department of Mechanical Engineering. I am of the view that the motive to develop communication, technical and managerial skills among the students will be fulfilled. I congratulate the Editorial Board and all the members for their efforts in bringing out the first edition of MECHANICA.



Dr. S. K. Sinha



Dr. B. C. Sharma

Principal's Message

At the outset I would like to congratulate the society i.e., Mechanical Engineering Society who is presenting a journal titled "MECHANICA". I would like to encourage you to submit original research notes as well as opinions, technical reports, and short communications in the general areas. I wish to see MECHANICA develop into a scientific journal with the balance changing toward research communication rather than remain a bulletin. I would also like to convey my best wishes to the Editorial Board and the members for their untiring efforts.

Message

I am pleased to know that the Department of Mechanical Engineering has formed a society under the name "Mechanical Engineering Society" (MES). Publication of the technical journal MECHANICA is an important activity of MES. The office bearers of MES and the members of the Editorial Board deserve all appreciation for successfully bringing out the first volume of MECHANICA. Publication of MECHANICA is aimed at providing an opportunity to students and faculty to enhance their technical and creative skills. In addition, MECHANICA will also act as a mirror of the various curricular and co-curricular activities of the department.

I wish MES all success in its endeavour to uplift the technical base of the Department of Mechanical Engineering.



Dr. D. B. Goel

Emeritus Professor

MECHANICAL ENGINEERING SOCIETY (MES)

AIMS & OBJECTIVES

Main objective of MES is to involve participation of students in various academic and cultural activities of the department. Through the activities of MES there will be enhanced interaction of students with faculty members. The students will be exposed to personality and skill development through its activities. The MES will organize following activities:

- Introduction/Welcome function of fresher students and farewell of outgoing students.
- Farewell of outgoing faculty members
- Invited lectures of outside and inside experts.
- Group discussion and debate competition.
- Cultural/picnic/sports activities.
- Publication of departmental magazine "MECHANICA".

OFFICE BEARERS OF MES

- | | | |
|------|---------------------------|--|
| 1. | Patron | Principal (Ex officio) |
| 2. | President | Head of Dept (Ex officio) |
| 3. | Faculty Advisor | Faculty member to be appointed by HOD |
| 4. | Secretary | III yr B.Tech student to be nominated by HOD |
| 5. | Jt Secretary | II yr B.Tech student to be nominated by HOD |
| 6. | Treasurer | III yr B.Tech student to be nominated by HOD |
| 7. | Executive members of MES: | |
| i. | B.Tech I Yr | 01 student |
| ii. | B.Tech II Yr | 01 student |
| iii. | B.Tech III Yr | 01 student |
| iv. | B.Tech IV Yr | 01 student |
| v. | M.Tech I Yr | 01 student |
| vi. | M.Tech II Yr | 01 student |
| vii. | Non Teaching Staff | 01 Member |

SOURCES OF FUNDING FOR ACTIVITIES OF MES

- Financial support from Management
- Membership subscription (per annum):
 - I Faculty members Rs. 200.00
 - II Technical staff Rs.100.00
 - III All students Rs. 100.00
- Collection of sponsorship/donations/ advertisements through students efforts



Academic Activities under MES

CONTENTS

	Page No.
● OPPORTUNITIES OF ENTREPRENEURSHIP IN MECHANICAL ENGINEERING by D.B.Goel	1
● CAREER PROSPECTS FOR MECHANICAL ENGINEERS by Amit Garg & Sunil Baloda	5
● PAPERS PUBLISHED BY FACULTY DURING 2012 - 2013	6
● CONFERENCES / SEMINARS ATTENDED BY FACULTY	8
● VISIT TO INDUSTRY BY FACULTY	8
● NEWS FROM FACULTY AND STUDENTS	8
● TECHNICAL LECTURES HELD DURING 2012 - 13	9
● STUDENTS ACTIVITIES HELD	9
● M.Tech DISSERTATION ABSTRACTS 2010-2012 Batch	10
● M. Tech. (Mech. Engg.) DISSERTATION TOPICS (2011-13 BATCH)	15
● FACULTY MECHANICAL ENGG DEPARTMENT	18
● SUPPORTING STAFF MECHANICAL ENGG DEPARTMENT	18
● LIST OF FINAL YEAR M.Tech (MECH) STUDENTS 2011 -2013 BATCH	19
● LIST OF FINAL YEAR B.Tech (MECH) STUDENTS 2012 -2013 BATCH	19

OPPORTUNITIES OF ENTREPRENEURSHIP IN MECHANICAL ENGINEERING

Dr. D.B. Goel, Emeritus Professor

INTRODUCTION :

After graduation, a B.Tech. Engineer's first priority is to secure a suitable job in a government or private sector. One eagerly wants to grab an opportunity to enter into a job which may give him or her handsome salary to ensure a comfortable life style. In India with a large population, there is a need to create more and more job opportunities. Instead of being a job seeker, an attempt must be to become a job provider. Only those persons make a mark in life, who do not become a part of the crowd. Only those people attract attention, recognition and fame who stand away from a crowd. Therefore, for making a mark in the society, one may choose the path to become an entrepreneur. There are numerous examples of distinguished Industrialists, who had started their entrepreneurship venture in a small way with limited means and rose big heights.

In Mechanical Engineering there are conventional ways to become an entrepreneur and one may start with a small unit like a rolling mill, foundry shop, welding shop, forging shop, machining shop, wire drawing unit and secondary steel making plant. Entrepreneurship in these conventional shops faces very stiff competition and financial returns are also relatively meager. With the advent of advances in manufacturing technology, there are now various other streams which may prove to be extremely attractive with respect to financial returns and professional growth. Here some of the schemes and projects are given which, if followed with vigor and proper technical inputs, can lead to roads of prosperity and services to the nation.

REPAIR WELDING OF ERODED UNDER WATER PARTS IN HYDROELECTRIC PROJECTS:

In the Himalayan regions of Uttarakhand, Himachal Pradesh and Jammu & Kashmir, several hydroelectric projects are located. These hydroelectric projects suffer from severe damages in their under water parts due to high silt content in river water. Figure 1 gives a photographic view of erosion damages in runner assembly in a hydroelectric project. The silt contains a high concentration of hard silica particles which inflict severe erosion damages to under water parts to the extent that the entire power plant may have to be closed down for repairs. The only way to repair is to build up the worn out component by repair welding technique. One needs to have an in depth understanding of the weldability of various grades of steels. Normally lot of care is to be taken in the repair welding of hydroturbine steels, which becomes difficult for a non technical entrepreneur and accordingly may be highly profitable for an entrepreneur of mechanical engineering background. It is necessary to use proper electrodes and choose suitable welding parameters for successful welding. One also has to understand the various defects possible in the welds and the methods to eliminate such defects. Figure 2 shows how various heat affected zones (HAZ) may be developed and may become the cause of cracking in welds. Figure 3 shows a crack in the weld of a martensitic stainless steel resulting from improper weld parameters. The young entrepreneur need not have a large workshop, because mostly the job of weld repair is required to be executed at power plant site utilizing local facilities provided by power plant officials. Due to high technical skills involved, a young entrepreneur can earn huge financial gains with minimum investments.

ESTABLISHMENT OF SURFACE COATING UNIT :

In hydropower and thermal power plants several components suffer heavy wear losses. Similarly various components in automobiles are prone to wear. The life of such components can be increased by providing protective and hard surface coatings. This opens a new and modern way to start entrepreneurship in surface coating units. The young entrepreneur must understand the requirements of successful coatings on metal components. Figure 4 gives some details of the necessary requisites for surface coatings. It has to be ensured that strong metallic bonding is developed between the coating and metal substrate. The coating

should be hard and tough, and should be free from porosity. The thickness of the coating should also be optimum in order to ensure that it does not peel off from the surface. In addition to above requisites, there is a need to have understanding and information on the various coating substances available and their properties. Usually the coating substances contain different grades of oxides, carbides and halides. High velocity oxy Fuel (HVOF) technique may be used for development of coatings on metal substrates. In this technique heat is generated with combustion of oxygen and a hydrocarbon and the coating substance is fed in the form of powder or wire. The molten coating material is impinged on to the metal surface at a high velocity. Figure 5 gives schematic diagram of such processes. The surface coating unit aims at providing job work to power plant , automobile and tool steel sectors.



FIG. 1: EROSION DAMAGES IN RUNNER ASSEMBLY IN HYDROELECTRIC PROJECT



FIG.2: FORMATION OF HEATY AFFECTED ZONE (HAZ) IN REPAIR WELDS
 (a): SCHEMATIC PRESENTATION (b): PHOTOMICROGRAPH OF HAZ

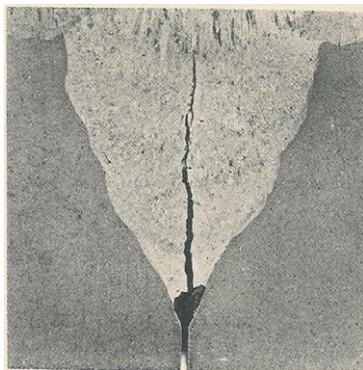


FIG.3: CRACK IN MARTENSITIC STEEL WELD

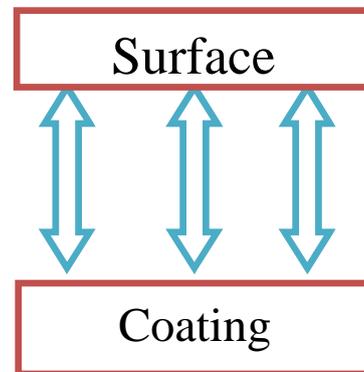


FIG.4: SCHEMATIC DIAGRAM SHOWING THE NEED OF STRONG METALLIC BONDING BETWEEN COATING & SURFACE

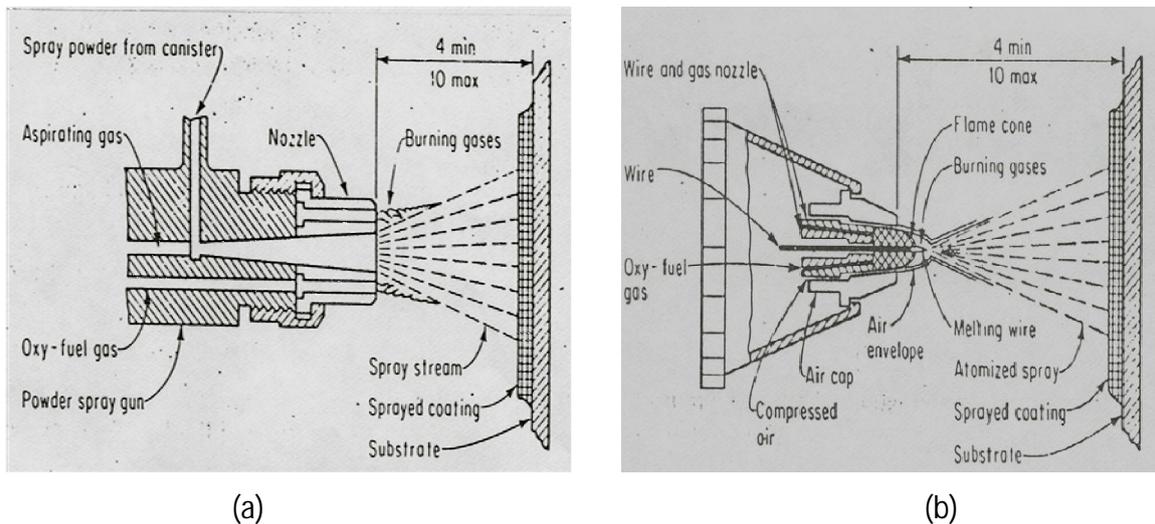


FIG. 5: HVOF COATING TECHNIQUES USING SPRAY MATERIAL IN THE FORM OF
(a) POWDER, (b) WIRE

ESTABLISHMENT OF HEAT TREATMENT UNIT

With the advancement of technology we have to use various grades of steels to meet specific requirements. These steels need to be suitably heat treated so that the desired mechanical properties may be generated. This opens a new road map for young entrepreneurs to provide job work in heat treatment technology. The equipments needed for a heat treatment shop are not very expensive. However, the entrepreneur has to be well versed with the basics of heat treatment technology. The origin of heat treatment technology of steels and cast irons lies in the Fe-C system (Fig. 6). The austenite (γ) phase is the mother of various transformations in steels. Suitable heat treatments may yield eutectoid (pearlite), martensite or bainite transformations leading to a vast choice of mechanical properties. Time Temperature Transformation (TTT) diagrams (Fig. 7) provide suitable guidelines to design a heat treatment cycle in order to achieve required mechanical properties. The important heat treatment processes include annealing, normalizing, quenching, tempering and case hardening. The job work in a heat Treatment shop may be secured from tool makers and automobile manufacturing units.

ESTABLISHMENT OF FABRICATION SHOP

A modern fabrication shop for metal components provides excellent opportunities of entrepreneurship. The fabrication shop may have facilities of sheet metal working, machining, shaping and welding. Attractive job work may be secured from Public Sector Undertakings like BHEL, ONGC and automobile sectors, since these sectors find it convenient to offload the machining and job fabrication work to fabrication shops. There are various fabrication shops in Yamunanagar and Faridabad (Haryana) which initially started in a small way and now are engaged in fabricating sophisticated equipments.

ESTABLISHMENT OF UNIT FOR FERRO ALLOY PRODUCTION

Ferro Alloys like ferro-silicon, ferro-chrome and ferro-manganese find wide application in steel melting units. The purpose of ferro alloy addition is to provide required level of concentration of Si, Cr & Mn in steels. The base of steel industry in India is very wide and accordingly there is huge requirement of various grades of ferro alloys. The entrepreneur has to be well conversant with the chemistry of ferro alloy making. Orders may be obtained from small, medium or large scale steel manufacturers.

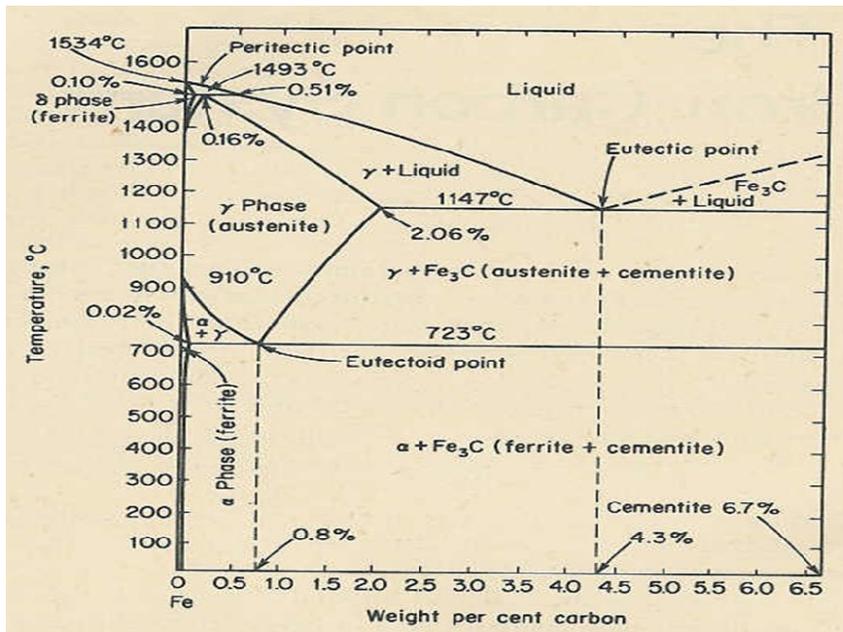


FIG. 6: THE IRON - CARBON PHASE DIAGRAM

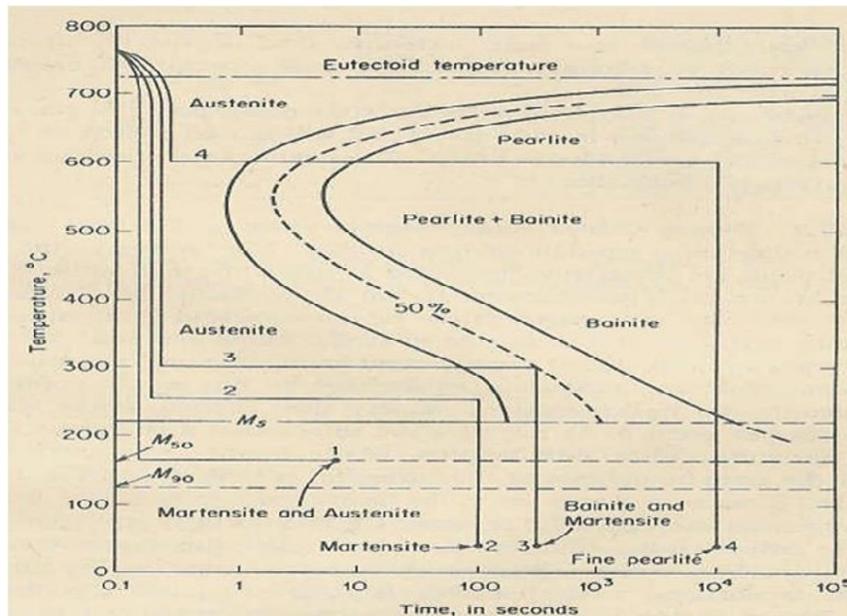


FIG.7: TIME-TEMPERATURE TRANSFORMATION DIAGRAM FOR AN EUTECTOID STEEL

ESTABLISHMENT OF TEST CENTRE

With the advent of large competition in manufacturing units, the steel fabricators have now become quality conscious. Now one understands that a steel component manufacturer can survive only if he is able to maintain a high quality of his products. He therefore needs the help of well established test centres, where he can get a close check on the quality and properties of his manufactured goods. This opens a new way of entrepreneurship for establishing diagnostic centre for metal components. The main quality check includes chemical composition, metallographic examination and determination of mechanical properties like hardness, tensile properties, toughness and creep properties. The equipments for chemical analysis (mass spectrometer) and creep behavior (creep machine) are somewhat expensive, but other test equipments are not so much fund consuming. There are a few such test centres in Faridabad and Gurgaon, who are getting huge job work order from various types of industries, especially from automobile and tool industries and also from power plant sector. In Faridabad, a few test centres initially started in a small way, but are now doing sophisticated business in providing additional services like failure analysis, soil testing and pollution monitoring.

ENTREPRENEURSHIP IN SUPPLY AND VENDOR SERVICES

A large variety of raw materials are required in various industrial units like foundries, steel plants, rolling mills, forging units and wire drawing. Many entrepreneurs have made successful career as supplier of raw materials to these manufacturing units. One needs only to have an office equipped with internet and communication facilities. Raw materials directly from manufacturer can be supplied to various production units at substantial profits. After having some experience of marketing, the entrepreneur may widen his domain to supply semi finished metallic goods like ingots, castings and forgings to medium and large scale manufacturing units. There are several examples of entrepreneurs who initially started as suppliers of raw materials and later on made their presence in the field of export and import and even became manufacturers of several consumer items.

CAREER PROSPECTS FOR MECHANICAL ENGINEERS

"With a degree in mechanical engineering, diversity is the key."

Amit Garg , Asstt Prof & Sunil Baloda, Asstt Prof

Practically every company that designs and produces a product employs a mechanical engineer. But mechanical engineers can also be found in research labs, the military, government, and in other professions such as medicine, law or teaching.

Most mechanical engineering jobs require design experience. When a need comes about for a new or improved product, companies call upon mechanical engineers to do the job. Engineers have to push beyond the limits of their previous work and use innovative technology to meet project requirements successfully.

A second major area of employment for mechanical engineers is manufacturing. Manufacturing jobs cover nearly everything involved in developing a product, from selecting the appropriate materials to choosing the correct machinery to manufacture the product. Most mechanical engineers in this industry work for equipment manufacturers, aerospace companies, utilities, material processing plants, transportation companies, and petroleum companies. They also work with small firms, consulting practices, universities, and government research labs.

Specific assignments might involve research and development, design of equipment or systems, supervision of production, plant engineering, administration, sales engineering, the testing and evaluation of machines and entire plants. Some mechanical engineering titles and their functions include:

AUTOMOTIVE ENGINEER: Mechanical engineers design many car parts for the automobile industry. As an automotive engineer, you could solve transportation and safety problems by creating better and more efficient engines or by developing improved safety features.

BIOMEDICAL ENGINEER: Mechanical engineers work with a variety of medical professionals to design mobility aids, prosthetics, and artificial organs.

CONSULTING: Once mechanical engineers have gained significant on-the-job experience and developed a high level of expertise, they might choose to work for themselves as consultants or independent contractors. The consulting field offers opportunities in large and small engineering service firms and in private practice.

HEATING, VENTILATION, AND AIR CONDITIONING (HVAC) ENGINEER: In this field, engineers design refrigeration systems for making frozen foods, or air-conditioning and heating systems for businesses and industrial buildings, residential homes, autos, hospitals, and schools.

NUCLEAR ENGINEER: The design of nuclear power plants requires the services of a mechanical engineer. The engineer must understand the fundamentals of nuclear design; know how to operate the plant efficiently, and evaluate the environmental factors associated with nuclear plants.

ROBOTICS ENGINEER: A mechanical engineer may design machines that build other machines. For instance, a robotics engineer may be involved with creating the devices that are used in assembling automobiles.

Engineers are concerned with the robot's structure, its joint mechanisms, bearings, and heat transfer characteristics.

Teaching: A desire to help mold the next generation of engineers motivates some mechanical engineers to move into academic careers. Engineers in colleges oversee research activities, manage laboratories, and mentor students. They also write and publish books and technical papers about mechanical engineering.

"The best mechanical engineers truly enjoy complex problem solving. They are innovators at heart. If you choose engineering as a career, you will turn ideas into reality and solve problems that better society. You will be right on the cutting edge of technology."

Mechanical engineers can find employment virtually at any institute where innovation takes place. They commonly work in the government, research, industry, military, teaching, management or consulting sectors.

The government agencies that typically hire mechanical engineers include the Indian Navy and Air Force, Patent and Trademark Office, PSUs, Army Corps of Engineers and Department of Atomic Energy etc.

From developing toys to prosthetic legs, the types of projects you can be a part of are as vast as your imagination. With a degree in mechanical engineering, diversity is the key. You can wind up working in a laboratory or an outdoor construction site. Remember, nearly every mechanical device was created by a mechanical engineer so the possibilities for employment are virtually endless!

"To the optimist, the glass is half full. To the pessimist, the glass is half empty. To the engineer, the glass is twice as big as it needs to be."

PAPERS PUBLISHED BY FACULTY DURING 2012 - 2013

Professor Dr D B Goel

- 1 D.B. Goel, Erosive Damages in Hydro Power Projects in the Himalayan Region and the Role of Metallurgy in providing relevant remedial Measures, Proc. National Seminar on Metallurgical Problems in Power Projects in India, MNIT Jaipur, Feb 22-23, 2013, p.1-10
- 2 Aniruddha A. Gadhikar, Ashok Sharma, C.P.Sharma, D.B.Goel & S.K.Goel, Study of Nitronic Steels for Hydro Power Plant Applications, Proc. National Seminar on Metallurgical Problems in Power Projects in India, MNIT Jaipur, Feb 22-23, 2013, p.1-10 Proc. National Seminar on Metallurgical Problems in Power Projects in India, MNIT Jaipur, Feb 22-23, 2013, p.11-16
- 3 Aniruddha A. Gadhikar, Ashok Sharma, C.P.Sharma, D.B.Goel & S.K.Goel, Effect of Heat treatment on Erosion Behaviour of 23-8-N Steel, Proc. National Seminar on Metallurgical Problems in Power Projects in India, MNIT Jaipur, Feb 22-23, 2013, p.125-29
- 4 Ashish Selokar, D.B.Goel and U.Prakash, Cavitation and Solid Particle Erosive Behaviour of Hydro Turbine Stainless Steel, Proc. National Seminar on Metallurgical Problems in Power Projects in India, MNIT Jaipur, Feb 22-23, 2013, p.44-49
- 5 Avnish Kumar, Ashok Sharma & D.B.Goel, Role of Nitrogen in Steels for erosion Resistance Applications, Proc. National Seminar on Metallurgical Problems in Power Projects in India, MNIT Jaipur, Feb 22-23, 2013, p.67-72
- 6 Sanjay Panwar and D.B.Goel, Erosion Behaviour of 13/4 Martensitic Stainless Steel, Proc. National Seminar on Metallurgical Problems in Power Projects in India, MNIT Jaipur, Feb 22-23, 2013, p.126-131

Shri Sunil Baloda, Asst Prof

1. Sunil, Varun and Naveen Sharma, Modelling the Drying Kinetics of Green Peas in a Solar Dryer and under open Sun, Int. Journal of Engineering and Environment, Vol 4, No.4, 2013, p. 663-676
2. Sunil, Construction and performance analysis of an indirect solar dryer integrated with solar air heater, Procedia Engineering (Elsevier) 38, 2012, p. 3260-3269

Shri Ashok Kumar Mishra, Asst Prof

1. Nishant, Ashok Kumar Mishra, B.K.Roy Parameters Optimization For Gas Metal Arc Welding of Mild Steel Using Taguchi's Technique, INTERNATIONAL JOURNAL OF INNOVATIVE TECHNOLOGY AND CREATIVE ENGINEERING (ISSN:2045-8711) VOL.3 NO.3 MARCH 2013
2. Ashok Kr Mishra, Ravindra yadav and R.K. Srivastava, Wear Behaviour of Al-6061 with different Reinforcement & Particle Size of SiC Metal Matrix Composites, European Journal of Scientific Research ISSN 1450-216X / 1450-202X Vol. 98 No 4 March, 2013, pp.542-550
3. Ashok Kumar Mishra, Optimization of tribological parameters in Al6061/SiC metal matrix composite by Taguchi's technique, International journal of innovative and creative engineering, vol 2, No.11, 2012.
4. Ashok Kumar Mishra, Tribological Behaviour of Al-6061 / SiC Metal Matrix Composite by Taguchi's Techniques, Int. Jrl of Scientific and Research Publications, Vol 2, No. 10, 2012, p. 2250

Shri Kanwarpal, Asst. Prof

1. Kanwarpal et al. "Simulated study of feasibility & design of 10 kWp SPV" in 2nd international conference on "Evolution in Science and Technology and Eyn on Educational Methodologies (ESTEEM-2013)", PPIMT Hissar, Haryana, 03rd-04th March, 2013, page(405-411)
2. Kanwar Pal, Sombir Sharma, B.N.Pathak, Arvind Kumar "An analysis of surface roughness and machinability of al-fe-si alloys" Proceedings of the National Conference on Trends and Advances in Mechanical Engineering, YMCA University of Science & Technology, Faridabad, Haryana, Oct 19-20, 2012, pages(567 -570)

Shri Naresh Kumar, Asstt Prof

1. Naresh Kumar, Does Quality management need for today, Int. jrl on emerging technologies 4(1), 2013, p. 75-80

Shri Sanjay Kumar, Asst. Prof.

1. Sanjay Kumar, A feasibility study of a parabolic trough collector using glass mirror as a reflective material for hot water generation", ;pp no.278-282, Proc of the Int Conf. IMPERIA-2013 (PPIMT UNIVERSE, HISAR) Held on April 11-12, 2013, p. 278-282
2. Sanjay Kumar, Performance Analysis of A Parabolic Trough Collector Using Aluminium Foil as A Reflective Material for Hot Water Generation, Proc of the Conf NCRMAES-2013 (SHANTI NIKETAN ENGG.COLLEGE, HISAR) Held on 24TH APRIL, 2013, p. T3 A 16.
3. Sanjay Kumar, A Comparative Performance Analysis of A Parabolic Trough Collector for Domestic Hot Water Generation." Proc of the Conf NCRMAES-2013 (SHANTI NIKETAN ENGG.COLLEGE, HISAR) Held on 24TH APRIL, 2013, Proc of the Conf NCRMAES-2013 (SHANTI NIKETAN ENGG.COLLEGE, HISAR) Held on 24TH APRIL, 2013, p. p. T3 A 06.

CONFERENCES / SEMINARS ATTENDED BY FACULTY

1. Dr D. B.Goel, Emeritus Professor attended a National Seminar on “Metallurgical Problems in Power Plants in India held at MNIT Jaipur during Feb 22-23, 2013 and presented a Keynote lecture on “ Silt Damages in Hydro Electric Projects in the Himalayan Region and the Role of Metallurgy in providing relevant remedial Measures”. He was also Chief Guest at the Inaugural Function of the Seminar.
2. Shri Kanwarpal, Asstt Prof attended the 2nd International Conference on “Evolution in Science and Technology and Eyme on Educational Methodologies (ESTEEM-2013)”, held on March 03-04, 2013 at PPIMT Hissar (Haryana) and presented a paper titled “Simulated study of feasibility & design of 10 kWp SPV ” .
3. Shri Sanjay Kumar, Asst. Prof. attended Int. Conf IMPERIA-2013 (PPIMT UNIVERSE, HISAR) held on April 11-12,2013 and presented a paper on ‘A feasibility study of a parabolic trough collector using glass mirror as a reflective material for hot water generation,
4. Shri Sanjay Kumar, Asstt. Prof. attended a national conf on NCRMAES-2013 (SHANTI NIKETAN ENGG.COLLEGE, HISAR) held on 24TH APRIL,2013 and presented two papers on “Performance Analysis of A Parabolic Trough Collector Using Aluminium Foil as A Reflective Material for Hot Water Generation” and “A Comparative Performance Analysis of A Parabolic Trough Collector for Domestic Hot Water Generation.”
5. Shri Sanjay Kumar, Asstt. Prof. attended NCASE-2013: (NIT KURUKSHETRA) held on 25-26th May 2013 and presented a paper on “Performance Analysis of A Parabolic Trough Collector Using Different Reflective Material for Hot Water Generation.”

VISIT TO INDUSTRY BY FACULTY

1. Shri Ashok Mishra Asstt Prof and Shri Naresh Kumar Asstt Prof visited M/S Star Wire India Ltd, Ballabgarh (Haryana) on April 06, 2013. and held discussion on the development of various value added steels by this company. They also brought a Nitronic steel sample for M.Tech research at BRCM CET. Bahal.

NEWS FROM FACULTY AND STUDENTS

NOMINATION:

1. The Ministry of Human Resource Development (Govt of India) has nominated Prof Dr D.B.Goel as a member of the Board of Governors of I I T Guwahati for a period of three years.

AWARDS & DISTINCTIONS :

1. Shri Amit Garg Asstt. Prof. secured 1st Rank in Masters of Technology in Mechanical Engineering

Batch 2010-2012, at Guru Jambheshwar University of Science and Technology, Hisar and received a Gold Medal.

- Gaurav Attrey, B.Tech (Mech) Final year secured 15th Rank in the VII Semester Examination of MDU University held in December 2013.

PLACEMENTS :

Following students have been short listed for SSB selection for Army UES 23:

Sr No.	Name	Roll No
1.	Ashok kumar Chauhan	5409
2.	Nitish kumar	5435
3.	Himanshu Goyal	5418
4.	Anil Kumar	5406

Following students have been short listed for SSB selection for Navy UES 23:

Sr no.	Name	Roll no
1.	Nitish Kumar	5435

TECHNICAL LECTURES HELD DURING 2012 - 13

DATE	TOPIC	SPEAKER
27.02.2013	Planning of M.Tech Projects	Dr D.B. Goel, Emeritus Professor, BRCM CET Bahal
02.03.2013	Motivation for Faculty & Students	Dr P.C. Tiwari, Professor, Mech Engg, NIT Kurukshetra
02.03.2013	Advanced Teaching Skills	Dr P.C. tiwari, Professor, Mech Engg, NIT Kurukshetra
16.03.2013	Man Metal & Material Science	Dr D.B. Goel, Emeritus Professor, BRCM CET Bahal

STUDENTS ACTIVITIES HELD

INDUSTRIAL VISIT:

Mechanical Engineering department has organized a one day industrial tour for the students of 3rd Year (6th Semester) in STAR WIRE Ltd. Ballabgarh on 6-4-2013. About 60 students along with Shri Ashok Mishra, Asstt. Professor, ME & Shri Naresh Kumar, Assistant Professor (ME) visited the company, especially in the following:

Defence & Armour, Steel Castings, Engine Valve Steels, Special Steel, Forging Quality Ingot and Tool & Die Steel

Student Feedback : " This visit will help us in our future practical life and bring a positive change in our thinking and practical behavior regarding education and engineering".

ACME 2013: A Technical Fest Acme was organized on 5-6 April, 2013 by Mechanical Engineering Department under the supervision of Mr. Sanjay Sharma, Assistant Professor . Nine technical events like TPP, Tool Recognition, Mock Parliament, Situation Reaction Test, IQ Test, Group Discussion, Just a Minute, Technical Interview, HR Interview were held.

A large number of Students of Mechanical Engineering Department participated in the Fest.

List of winners for Acme 2k13

Sr No.	Name	Roll no	Year	Event
1.	Jyoti mittal	5015	3 rd year	H.R Interview
2.	Ashish bihani	5408	3 rd year	TPP
3.	Sukhbir singh	5668	3 rd year	Tool Recognition
4.	Chandgi ram	5613	3 rd year	Tool recognition
5.	Ishwar	5624	3 rd year	Tool Recognition
6.	Ashutosh	5609	3 rd year	Tool Recognition
7.	Himanshu	5418	3 rd year	CAD Race
8.	Nitish Kumar	5435	3 rd year	Mock parliament
9.	Neha Sheoran	6242	2 nd year	Mock parliament
10.	Vikas Kumar	5456	3 rd year	Just A Minute
11.	Sumit Kumar	5452	3 rd year	just A Minute

M. Tech. DISSERTATION (ABSTRACTS) -2010-2012 Batch

REDUCING SETUP TIME BY QUICK CHANGEOVER TECHNIQUE COMBINED WITH GENETIC ALGORITHM— By: AJAY MAHENDRU, University Roll No.1135911001

At the end of World War 2 the industrial world saw the beginning of a new era. The industrial world witnessed great changes in the production system. Due to globalization of the industries the completion became tough. As the demands of the customers increased the product cost also increased. Due to increasing competition the companies wanted to offer the best product and services to their customers. In order to gain competitive advantage the companies wanted to offer the best quality products to their customers.

As we know that quality adds cost to the product. Better quality results in increased cost of the product. The companies had to cut the cost of the product but without any compromise with the product quality. So it resulted in many new production practices such as: Toyota Production System (TPS), Lean Manufacturing, just in Time (JIT) etc. which emphasized on reducing the activities that do not add value to the product. These philosophies were driven by the need to survive in the market. These were soon implemented all over the globe by companies wanting to reduce the product cost.

Just In Time (JIT) stresses upon reducing all types of wastes in any industry. Waste is something that does not add value to the product. JIT philosophy uses many tools to eliminate these wastes. In batch type industries lots of useful time is wasted in setups. It was reported by various researchers that setups consume as much as 50% of the production time.

This problem of large setup time even gets worse in the case of batch type industries. As setups are frequent, the time wasted is also large. Therefore reducing setup time or changeover time becomes necessary. Quick changeover becomes a necessity for these organizations as they are facing a unique disadvantage in the form technology and financial resources as compared with large giants. The present work was conducted at FEDERAL-MOGUL GOETZE INDIA LIMITED, Patiala plant. The work shows that immense financial and other gains are possible by successful implementation of Quick changeover technique (S.M.E.D.) combined with GA.

EXPERIMENTAL INVESTIGATION OF DEFECTIVE GLASS FIBER REINFORCED POLYMER COMPOSITE IN TENSILE TEST— By: JAYESH KUMAR, University Roll No.1135911005

Composite materials are used in almost all aspect of the industrial and commercial fields in aircraft, ships, common vehicles, etc. Their most attractive properties are the high strength-to-weight ratio. However, these materials also have some problems such as fiber breakage, matrix cracking and delamination. Matrix cracks and fiber breakages play an important role in laminates under tensile load. One of the most common failure modes in composite laminates is delamination. Delamination may be formed due to a wide variety of foreign object impact damage, poor fabrication process and fatigue from environment cycle.

In the present study, an experimental work was carried out to determine the ultimate breaking load using Tensile tests of damage delaminated 90-degree glass fiber-reinforced, laminated in tension. E-glass/epoxy composites were manufactured to fabricate the specimens, using Hand lay-up technique. The laminated composites were prepared with longitudinal multiple delaminations. The delamination length of the manufactured lamination was fixed to 15.5% of the global beam length. Tests were carried out on laminated beam with $[90^{\circ}15]$. The influence of various defects on the ultimate breaking load of the defected laminated composites was examined using the load verses displacement graphs. The results show that, the increase in the number of lateral multiple delaminations significantly reduces the ultimate breaking load of the laminated composites.

OPTIMIZATION OF GAS METAL ARC WELDING PARAMETERS FOR IMPACT STRENGTH OF MS 1018 WITH TAGUCHI METHOD— By: KULDEEP SINGH, University Roll No.1135911007

This is a report on an investigation of the effect and optimization of welding parameters on the impact strength in the Gas Metal Arc Welding (GMAW) process. Experimental studies were conducted under varying arc current, welding voltage and gas flow rate. The settings of welding parameters were determined by using the Taguchi experimental design method. The level of importance of the welding parameters on the impact

strength is determined by using analysis of variance (NOVA). The optimum welding parameter combination was obtained by using the analysis of signal-to-noise (S/N) ratio. The confirmation tests indicated that it is possible to increase impact strength significantly by using the Taguchi method. The experimental results confirmed the validity of the used Taguchi method for enhancing the welding performance and optimizing the welding parameters in the SMAW process.

For optimization L9 orthogonal array was chosen and total 9 setups were determined and the best combination for best toughness found out with the calculation of Signal to Noise ratio.

After test results the data signal-to-noise (S/N) ratio were determined and used in order to calculate optimum levels for every input parameter. Subsequently, using analysis of variance (ANOVA) the significant coefficients for each input parameter on impact strength were determined and validated. Finally a result in the contribution of every parameter is calculated and best combination determined.

AN EXPERIMENTAL STUDY ON ALUMINUM 2014 COMPOSITES REINFORCED WITH SILICON CARBIDE AND FLY ASH PARTICLES— By: MANBIR SINGH, University Roll No.1135911010

Metal matrix composites are the materials in which reinforcements are added in a matrix of metal to improve certain properties. Metal matrix composites are used mostly in space ships, aerospace, automotive, nuclear, biotechnology, electronic and sporting goods industries, but due to their high cost, experiments are usually done to reduce the cost of the composites and inexpensive materials are utilized for metal matrix composites. Fly ash is one of the most inexpensive and low density reinforcement available in large quantities as solid waste byproduct during combustion of coal in thermal power plants. So, composites with fly ash can be used to reduce the cost of the metal matrix for various applications. It is therefore expected that the incorporation of fly ash particles in aluminum alloy will promote yet another use of this low cost waste byproduct and at the same time has the potential for conserving by reducing weight and thereby, reducing the cost of aluminum products. During this investigation, dry fly ash as received from CRTPP, Thermal Power Plant, Yamunanagar was used with Aluminum 2014 reinforced with SiC and a composite was prepared using Liquid metal stir casting route with the reducing quantity of SiC. Tests carried out on the samples prepared and effects on samples were observed. Vickers and Rockwell hardness machine are used to find out effect of fly ash on hardness of the material. Optical microscopy technique is used to study the microstructure of fabricated samples. Density, modulus of elasticity is calculated to see the effects of fly ash addition. Cost analysis is done to study the economic aspect. It was found that fly ash addition has significant effect on the properties of the metal matrix composites. Hardness, modulus of elasticity of material increases and density, cost, tensile strength decreases.

EFFECT OF PROCESS PARAMETERS ON MATERIAL REMOVAL RATE IN WIRE ELECTRIC DISCHARGE MACHINING (WEDM) - By: SATISH VERMA, University Roll No.1135911015

Wire Electrical Discharge Machining (WEEDM) is a specialized thermal machining process capable of

accurately machining parts with varying hardness or complex shapes, which have sharp edges that are very difficult to be machined by the conventional machining processes. The development of new advanced engineering materials and the need to meet demand for precise and flexible prototype and low-volume production of components has made wire electrical discharge machining (WEDM) an important manufacturing process. Wire Electrical Discharge Machining (WEDM) is a widely accepted non-traditional material removal process used to manufacture components with intricate shapes and profiles. WEDM utilizes a continuously traveling wire electrode made of Cu, brass or tungsten of diameter 0.05 -0.30mm, capable of achieving very small corner radii. The wire is kept in tension using a mechanical tensioning device reducing the tendency of producing inaccurate parts. During the WEDM process, the material is eroded ahead of the wire and there is no direct contact between the work piece and the wire electrode, eliminating the mechanical stresses during machining. The effects of various process parameters of WEDM pulse on time (T_{on}), pulse off time (T_{off}), gap voltage (SV), peak current (IP), have been investigated to reveal their impact on material removal rate. The experimental plan is performed by a standard RESPONSE SURFACE METHODOLOGY (RSM) design called central composite design. The experimental studies were performed on ELECTRONICA SPRINTCUT WEDM machine. It is concluded from the study that the Material Removal Rate (MRR) increases with increase in pulse on time (T_{on}) and peak current (IP) while it decreases with increase in pulse off timer (T_{off}) and servo voltage (SV).

DESIGN ANALYSIS AND OPTIMIZATION OF VARIOUS PARAMETERS OF CONNECTING ROD USING CAE SOFTWARES— By: GAURAV MEHTA, University Roll No.1135911003

Automobile internal combustion engine Connecting Rod is a high volume production component subjected to complex loading. Therefore, proper optimization of designed part component becomes very necessary so as to increase the efficiency and life of the component. Variety of stresses, strains and deformations get developed due to the increased number of cycles of operation.

To get optimized design parameters, seven CAD models have been made and analysed and then results of optimized design have been illustrated in this report. Analysis of design includes comparison of stresses, strains, total deformation, biaxiality indication and life with the existing results using various CAE softwares especially CATIAV5R19 and ANSYS12.0 Workbench. Model has been checked for both Normal Load and Buckling Load considering factor of safety. Model is first made in CATIA, then it is imported in Solid Works to make it compatible with format of Ansys Workbench which is x_t format. Then this model after getting imported in ANSYS has been analysed and various aspects and results have been discussed in this dissertation work.

In first part of the study Static Analysis with normal loading conditions has been carried out and in the second part Fatigue Failure Analysis has been done with reversed loading conditions so that none of the factors remain unconsidered which otherwise may affect the design parameters.

OPTIMIZATION OF PRODUCTION PLANNING AND CONTROL IN AN ENGINEERING INDUSTRY USING MICROSOFT EXCEL SHEET— By: KAMAL KUMAR, University Roll No.1135911006

Production Planning and Control (PPC) is essential for efficient and economical production. Planned

production is an important feature of an industry. All the manufacturing and service operations require planning and control. The purpose of Production Planning and Control (PPC) is to ensure that manufacturing runs effectively and efficiently and it produces products as required by customers. A PPC system plans for the orderly and systematic change of production capacity to meet peaks and valleys of the expected customer demand. It makes sure that enough capacity is available to satisfy the expected demand. It is essential for obtaining the maximum output from the available resources. Organizations willing to succeed in global competition have to integrate their internal and external processes. This specially includes planning and production control (PPC) processes. Optimized allocation of the production resources and quick response to demand change results in lower cost and improvement of production performance. Practitioners and researches have been trying to achieve these goals using production planning techniques. Although the results are significant, it seems necessary to integrate production operations in order to improve the production performance. Designing an efficient PPC system by implementing MS Excel PPC software is of the same importance. The goals, information and decisions taken in production planning and control and process planning are often very different and difficult to integrate. In the current work, firstly the latest production planning framework has been reviewed and modified. This framework has been customized to meet requirements and constraints of an industry by using developed PPC software. MS EXCEL spreadsheet has been used for production planning. Microsoft Excel is available as a part of the popular MS Office package. It has an add-in module for solving problems, called-Solver, that can be used for tasks solving. As MS Office Excel is a widespread and used software system it has the advantage to be well known, thus making sense to use it as a tool for production planning. The application of the mathematical model and logic has been considered for a production system in BEM, Ltd, KGF Complex established in May 1964 in Karnataka.

STUDY & PERFORMANCE ANALYSIS OF A PLATE FIN TYPE COMPACT HEAT EXCHANGER

By: LALIT KUMAR, University Roll No.1135911008

Compact heat exchanger is one of the most critical components in cryogenic applications. Compact heat exchangers are characterized by a high heat transfer surface area per unit volume of the exchanger. The heat exchangers having surface area density (β) greater than $700 \text{ m}^2 / \text{m}^3$ in either one or more sides of two-stream or multi stream heat exchanger is called as a compact heat exchanger. Plate fin heat exchanger is a type of compact heat exchanger which is widely used in automobiles, cryogenics, space applications and chemical industries.

The plate fin heat exchangers are mostly used for the nitrogen liquefiers; so they need to be highly efficient because no liquid nitrogen is produced if the effectiveness of heat exchanger is less than 87%. So it becomes necessary to test the effectiveness of these heat exchangers before putting them in to operation. The effectiveness of heat exchanger is found out for different mass flow rates. Various correlations are available in the literature for estimation of heat transfer and flow friction characteristics of the plate fin heat exchanger; so the various performance parameters like effectiveness, heat transfer coefficient and pressure drop obtained through experiments are compared with the values obtained from different correlations.

TO STUDY THE MECHANICAL PROPERTIES OF Al-SiC USING POWDER METALLURGY AND CASTING METHODS - By: SANJAY SHARMA, University Roll No.1135911016

Silicon carbide particle reinforced aluminum matrix composites have been developed over the past few decades, owing to their excellent properties like light weight, high elastic modulus and wear resistance. These composites have many applications in aerospace, aircraft, automobile and electronic industries. The present research work has been taken up to examine the various mechanical properties of Al-SiC composites prepared by both powder metallurgy and foundry techniques and compare their mechanical properties. The main steps in powder metallurgy are blending, compaction and sintering. Casting is a manufacturing process by which a liquid material is usually poured into the mould, which contains a hollow cavity of the desired shape, and then allowed to solidify. The solidified part is ejected or broken out of the mould to complete the process.

A1 of A₁ grade and SiC have been chosen as matrix and reinforcement material respectively. The studies have been conducted on mechanical behavior of silicon carbide particle reinforced aluminum matrix composites. The influence of 0, 5, 10 and 15 weight percent of silicon carbide particles on mechanical behavior has been examined by different researchers, but in this study the aim is to improve the mechanical properties by increasing the weight percentage of SiC. Experiments have been conducted by varying weight fraction of SiC (20 % 25% 30 %) while keeping all other parameters constant. A decreasing trend of hardness with increase in weight percentage of SiC has been observed. The best results (Maximum hardness 52 BHN) have been obtained at 20% weight fraction of SiC. In addition to mechanical properties the micro structural studies were also conducted. The results have been compared with the published data.

M. Tech. (Mech. Engg.) DISSERTATION TOPICS (2011-13 BATCH)

S.N.	Name of Student	Guide	Topic	Scope of work
1.	SANDEEP KUMAR	Shri G.P Yadav	Study of characteristics of HAZ in MIG welded plain carbon steel plates	MIG welding of plain carbon steel plates using different welding parameters will be carried out and the resultant changes in microstructure and mechanical properties will be studied as a function of weld parameters.
2.	VIKESH KUMAR	Shri G.P Yadav	Welding of plain carbon steel plate with copper electrode.	MIG welding will be carried out on carbon steel plates of different compositions using copper electrodes and different weld zones will be studied with respect to microstructure and mechanical properties.
3.	SUNIL DUTT	Shri G.P Yadav	Study of wear properties of Al 6061/SiC Metal-Matrix composites and application of grey Taguchi method for optimizing wear properties	In this project cast metal matrix composites of Al/SiC will be prepared with three different concentrations of SiC. Pin on disc technique will be utilized for study of wear properties.

S.N.	Name of Student	Guide	Topic	Scope of work
4.	NITIN KUMAR	Shri G.P Yadav	Study of Mechanical properties and thermal conductivity of Al 6061/ Sic metal matrix composites	In this project cast metal matrix composites of Al/SiC will be prepared with three different concentrations of SiC. Mechanical properties (tensile, hardness, impact) and thermal conductivity of these composites will be studied with a view to explore their industrial applications.
5.	ANKIT KUMAR	Prof. D.B. Goel	Erosion problems in hydroelectric projects	A critical analysis will be made of the erosion damages of under water parts in hydroelectric projects. Mechanisms of various damages will be analyzed. Study will be made on the factors responsible for the occurrence of these damages. Efforts will be made to design and fabricates an erosion testing apparatus indigenously
6.	SONU KUMAR	Shri Kanwar Pal	Optimization of parameters in powder Metallurgy of Al-base alloys	The project is aimed at enhancing the mechanical properties of Al-base P/M products by choosing proper alloying elements and other P/M parameters.
7.	LALIT	Shri Kanwar Pal	Optimization of parameters in welding of M.S. plate	Effect of welding parameters like electrode dia, current, voltage etc will be studied in order to have an optimization for best welding results
8.	NAVEEN BALHARA	Shri Suresh Jangra	CNC machining parameter optimization	Various parameters like depth of cut, feed rate etc will be studied in the CNC machining of commercial Al in order to determine the optimum combination for best machining results.
9.	MANISH KAUSHIK	Shri Ashok Mishra	Wear behavior of Al-6061/SiC/Al ₂ O ₃ /graphite metal matrix composites (MMCs).	Composites of Al – 15%SiC- 15% Al ₂ O ₃ - 10% Graphite will be produced by stir casting and studies will be conducted on the wear rate and micro structural analysis.
10.	RAVI YADAV	Shri Ashok Mishra	Wear behavior of Al-6061/SiC/Al ₂ O ₃ /fly ash metal -matrix composites (MMCs).	Composites of Al – 15%SiC- 15% Al ₂ O ₃ - 5% Fly ash will be produced by stir casting and studies will be conducted on the wear rate and micro structural analysis.

S.N.	Name of Student	Guide	Topic	Scope of work
11.	NISHANT	Shri Sanjay Kumar	Design, fabrication and experimental analysis of a solar still coupled with flat plate collector for desalination	Basic principle of solar water distillation is simple. Sun's energy heats water to the point of evaporation. As the water evaporates, the water vapour rises and condensed on the glass surface for collection. In the present experimental work, solar still will be coupled with flat plate collector which is used for heating of water. Solar still is analyzed for its temperature rise, mass of water (pure) collected and its efficiency (system). Result can be compared with solar still alone.
12.	SUKHBIR	Shri. Sunil Baloda	CFD modeling of particulate flow (2-phase flow) in pipe lines using fluent software	(1)To study the effect of concentration on flow properties in pipe line, (2) To study the effect of pressure drop and (3)Effect of particulate flow at bends in pipe line.
13.	MUKESH KUMAR	Shri Suresh Kumar	Application of Taguchi Method for optimizing CNC milling process parameters	In this project, effect of three machining parameters viz. spindle speed, feed rate and depth of cut will be studied on the material removal rate by CNC milling operation on mild steel specimens and Taguchi method will be applied to determine the quality of machined products.
14.	SACHIN	Shri Vishwajeet Kumar	Experimental analysis of heat exchanger and simulation by using fluent software	Experiments to be performed on heat-exchanger present in HT lab Result can be compared for counter flow and parallel flow Further these results have to be compared by using the software FLUENT
15.	ROMMY SETHI	Shri Ajay Mahendru	Optimization of welding process PARAMETERS using JIT tools/ Taguchi method	In this proposed work specimens with different compositions will be prepared and Taguchi method will be used to optimize the various process parameters of the welding process.
16.	NEHA RANI	Shri Ajay Mahendru	Effect of tool profile on F.S.W of Al-1100 & Al-6061	Double Pass Friction Stir Welding of Al alloys will be carried out using different tool profiles viz. cylindrical pin, Square pin & threaded pin. Microstructure , hardness and tensile tests will be carried out on test samples. Transverse & rotational speed will be kept constant.
17.	GOPAL KRISHAN	Shri Naresh Kumar	Design and Simulation of CHP (combined Heat and Power System)	Mathematical modeling will be carried out based on Mass, Energy and Energy Balance across various components using software for different cycle operating parameters.

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