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GOVERNMENT ENGINEERING COLLEGE
GANDHINAGAR
॥ कर्ममयं ज्ञानं एवं ज्ञानमयं कर्म ॥

STUDENTS' SOCIETY OF METALLURGY ENGINEERING GANDHINAGAR
SSMEG
ESTD-2012
Regd.No. GUJ/2051/Gandhinagar

NEWSLETTER

METALLURGY DEPARTMENT

January 2019 to June 2019

METALLURGY

GOVERNMENT ENGINEERING COLLEGE
SEC-28. GANDHINAGAR

ABOUT THE INSTITUTE

Established in 2004, Government Engineering College, Gandhinagar (GEC-Gn) takes pride in its highly motivated students. Our students are life-long assets that help this institute to continuously evolve and work towards its Vision. Approved by AICTE. The College is administrated by Directorate of Technical Education, Gujarat State, Gandhinagar. GEC-Gn is affiliated to Gujarat Technological University. GEC-Gn offers its students a wide range of courses like Biomedical, Computer, Electronics & Communication, Instrumentation & Control, Information Technology and Metallurgy.

VISION OF THE INSTITUTE

To be a premier engineering institution, imparting quality education for innovative solutions relevant to society and environment.

MISION OF THE INSTITUTE

- To develop human potential to its fullest extent so that intellectual and innovative engineers can emerge in a wide range of professions.
- To advance knowledge and educate students in engineering and other areas of scholarship that will best serve the nation and the world in future.
- To produce quality engineers, entrepreneurs and leaders to meet the present and future needs of society as well as environment.

METALLURGY

ABOUT THE DEPARTMENT

The Metallurgy Department since its inception in 2008 is a backbone of GEC-Gandhinagar's events, research activities and initiatives. It is a unique initiative of Government of Gujarat in the present science and technology education and research scenario of India. At present, the department offers a four year undergraduate course in engineering. Faculty members are good blend of industrial/ academic research experienced, studied from national and state reputed institutes. Department has developed COQ (Centre for Quality) NDT which established under "Vibrant Gujarat–2019"- Financial MOU in collaboration with Gulfnde along with various well equipped metallurgical laboratories.

Currently, the focus of department activities are multi-directional with an emphasis on both research and education. Our collaborations with FCIPT, CFER, INDUS University, PUPU, IIM–Baroda Chapter, IIF- Ahmedabad Chapter, ASM International - Gujarat Chapter, IE–Gujarat Section, etc. Students are encouraged and supported to actively participate in various curricular and non-curricular activities at different level.

VISION OF THE DEPARTMENT

Developing excellence in Metallurgy Engineering education through research, development innovation and team work for the benefit of society and environment.

MISION OF THE DEPARTMENT

- To prepare competent metallurgy engineers who can apply metallurgical fundamentals to control and manage different metallurgical and materials processing operations to produce quality metals products in industries.
- To deliver information about current trends in the field of metallurgy and materials to the students.
- To encourage students to work on innovative projects related to metallurgy engineering for managing defects free, economical, energy efficient products, processes or devices to best serve the nation to fulfil the socio-economic, techno-commercial and environmental needs.

ACHIVEMENTS OF FACULTIES

Prof. M. S. Dani and Dr. I. B. Dave has published Research paper in Journal of Inst. Eng. India Ser. D, Springer, with a title of "Corrosion Behavior of Die-Cast and Friction Stir-Processed AZ91 Magnesium Alloys in 5% NaCl" March 2019.

Abstract: Abstract Corrosion resistance and microstructure by optical microscopy of commercially available die-cast, friction stir-processed (without aluminum powder) and friction stir-processed (with aluminum powder) AZ91 magnesium (Mg) alloys (three conditions) were investigated. For corrosion study, salt spray and immersion tests in 5% NaCl solution were carried out. Corrosion behavior was analyzed by scanning electron microscopy for investigation of pits available after 48 h in specimens of all three conditions. This SEM investigation proved that AZ91 Mg alloy that is friction stir-processed with aluminum powder has the lowest pit size compared to the friction stir-processed AZ91 Mg alloy and commercially available die-cast AZ91 Mg alloy. This is because of more solubility of aluminum in a-phase and high fraction of b-phase (Mg17-Al12) which improves corrosion resistance of friction stir processed AZ91 Mg alloy with aluminum powder.

ACHIVEMENTS OF FACULTIES

- Prof. D. G. Sharma has published Research paper in ASME Journal of Tribology. "Fabrication of Hybrid Surface composites AA6061/ (B4C+MoS2) via Friction Stir Processing" Published in May 2019, Vol. 141

Abstract: Poor tribological properties restrict structural applications of aluminum alloys and surface composites of aluminum alloys have gained more attention in material processing. The addition of solid lubricant reinforcement particles along with abrasive ceramics contributes to the enhancement of tribological performance of surface composites. In the present study, the solid-state technique, friction stir processing (FSP) was used to develop mono (B4C) and hybrid (B4C+ MoS2) surface composites in the AA6061-T651 aluminum alloy. The hybrid surface composites were produced by varying an amount of MoS2. Multipass FSP with different direction strategies was adopted for achieving uniform distribution of reinforcement powders in the aluminum matrix. Microstructure analysis showed a uniform dispersal of reinforcement particles without any clustering or agglomeration in the processing zone. Microhardness and wear performance of mono and hybrid composites improved in comparison with the base metal. The mono surface composite exhibited the highest hardness while the hybrid surface composite (75%B4C+25%MoS2) achieved the highest wear resistance. This was attributed to the solid lubricant nature of MoS2. Furthermore, dissolution of the strengthening precipitate condition during multipass FSP without reinforcement particles resulted in the reduction of hardness and wear resistance.

- Prof. D. G. Sharma has published a paper titled "Effect of different anti-corrosion metallic primer coatings : A review" in international conference of science, technology, engineering and mathematics STEM–2019 under Vibrant Gujarat 2019.

INTERNSHIP/VOCASSIONAL TRAINING ATTENDED BY STUDENTS

No. of Industry	No. of Students
8	16

- 16 final year students have undergone training / internship in 8 reputed industries like Tata Steels, Essar Steels, Welspun Steels Ltd, Inox India Ltd. etc during summer 2019 for the duration of 2 weeks to 5 weeks.

TRAINING/ACTIVITY ATTENDED BY FACULTY

Sr. No.	Name of the Faculty	Title of Training / Activity	Duration	Venue
1	Prof. I. B. Dave	Seminar on STEM, Vibrant Gujarat 2019	17/1/2019	Science city, Ahmedabad
2	Prof. D. G. Sharma	Seminar on Student Strat-Ups and Ecosystem	6/6/2019–7/6/2019	EDII, Gandhinagar
3	Prof. H. H. Jadav	STTP on Heat Transfer and its Application	11/02/19 - 17/02/19	MSU, Vadodara
4	Prof. S. I. Patel	Seminar on Student Strat-Ups and Ecosystem	6/6/2019–7/6/2019	EDII, Gandhinagar
5	Prof. P. K. Nanavati	Seminar on STEM, Vibrant Gujarat 2019	17/1/2019	Science city, Ahmedabad
6	Prof. B. R. Rana	Seminar on Student Strat-Ups and Ecosystem	6/6/2019–7/6/2019	EDII, Gandhinagar
7	Prof. D. V. Mahant	Seminar on STEM, Vibrant Gujarat 2019	17/1/2019	Science city, Ahmedabad
8	Prof. M. S. Dani	Seminar on STEM, Vibrant Gujarat 2019	17/1/2019	Science city, Ahmedabad

STTP/FDP/WORKSHOP ORGANIZED BY DEPARTMENT

3 day's Workshop on NDT jointly organised by Metallurgy Department and Gulfnde, Ahmedabad from 14/02/2019 to 16/02/2019. Participants have participated from various colleges of Gujarat (MSU & INDUS)

GLIMPSES OF VARIOUS "EXPERT LECTURES"

GLIMPSES OF "INDUSTRIAL/LAB VISITS"

GLIMPSES OF "3 DAY'S WORKSHOP ON NDT"

INDUSTRIAL VISITS

- 6th Sem 33 Students have visited CFER, Odhav, Maruti Foundry and Technocraft Heat Treatment with Prof. D. V. Mahant and Prof. M. S. Dani on 8/2/2019
- 8th sem 30 students have visited FCIPT, IPR, Gandhinagar with Prof. D. G. Sharma and Prof. M. S. Dani on 13/2/2019
- 4th Sem, 49 Students have visited Indus University lab for the Subject of Heat and Mass Transfer with Prof. H. H. Jadav on 30/3/2019

National Seminar at PDPU, Gandhinagar from 7/2/2019 to 8/2/2019. 16 students participated from 8th SEM.

Emerging Foundry Technologies" jointly organized by IIF, Ahmedabad chapter and CFER from 23/2/2019 to 24/2/2019. 17 students have attended with Prof. I. B. DAve.

Industrial visit on CFER, Odhav, Maruti Foundry and Technocraft Heat Treatment.

EXPERT LECTURES

Sr. No	Semester	Subject	Venue	Speaker
1	6	Electroless deposition on Noble Metals,	Classroom, Met. Dept	Mr. Dhaivat Solanki, Ph.D. Scholar,Houstan Uni. USA
2	6	Expert talk on Foundry	CFER , Ahmedabad	Mr. Vaishnav
3	8	Electrochemical testing	FCIPT, Gandhinagar	Dr. Alphonsa Joseph, Scientist, FCIPT

- By, Prof D. G. Sharma, Asst. Prof. Metallurgy Department

Plasma Immersion Ion Implantation (PI^3) – A review

Plasma Immersion Ion Implantation or PI^3 is a process of hardening metals, mainly for the tooling and materials processing industries and is a registered trade mark of The Australian Nuclear Science and Technology Organisation (ANSTO).

Origins of Technology

ANSTO's research into PI^3 originally grew out of a project in the 1980s that investigated the fundamental properties of plasmas relevant to their use in nuclear fusion. At the completion of that project, ANSTO looked for ways to utilise its plasma expertise in areas with possible industrial applications. ANSTO scientists realised that many of the problems associated with using ion beams to modify the surface of three dimensional objects such as tools, dies and mechanical parts could be overcome by immersing objects to be treated in a plasma. The positive ions from the plasma are accelerated towards all exposed surfaces by applying a high negative voltage to the object. This forms the basis of PI^3. This was proved in experiments in late 1987, leading to a successful patent application by ANSTO in 1988. Further testing using nitrogen ions, has shown that PP is able to extend the use of nitriding (a well-known heat treatment technique) to alloys not amenable to normal nitriding treatments. According to ANSTO, the depth of the modified layer ranges from 1-200µm, depending on the treatment time, temperature and composition of the material.

Plasmas and Plasma Processing

Plasmas are ionised gases and are sometimes referred to as the 'fourth state of matter'. Ion implantation causes ions to penetrate below the surface of a material, giving it unique electronic, mechanical or chemical properties. Plasma nitriding as this method is also called, allows the desired object to be immersed in a plasma of nitrogen gas. The ANSTO process is somewhat unique in that the plasma gas is independently generated by the use of radio frequency (RF) excitation. Although extensively used in the microelectronics industry, ion implantation has not been adopted by the broader manufacturing industry, despite its potential for surface hardening and for improving the corrosion properties of metals. Subsequently, PI^3 has emerged as a viable alternative to the conventional methods of ion implantation, particularly in applications such as ion nitriding and ion-assisted deposition of hard coatings. While nitriding has been extensively used for treating steels to improve their surface hardness, there are many components and alloys that cannot be treated by conventional nitriding techniques. The PI^3 process, which uses lower treatment temperatures, is particularly suited to stainless steel and high precision items that suffer distortion or lose their corrosion resistance during standard nitriding processes.

The PI^3 Process

The process requires careful control of several parameters. Treatment is carried out in a vacuum and temperature is held at between 300 to 500°C. ANSTO for its part, has been using a PLC and SCADA system connected to a PC to run the whole system which it finds very suitable due to the need to connect many other monitoring devices such as a temperature controller, a mass spectrometer and an optical emission spectrometer. In developing the technology that allows high voltage pulses to be applied to components immersed in a plasma, ANSTO has produced equipment which is not only effective, but can be also scaled up or down to suit a particular purpose.

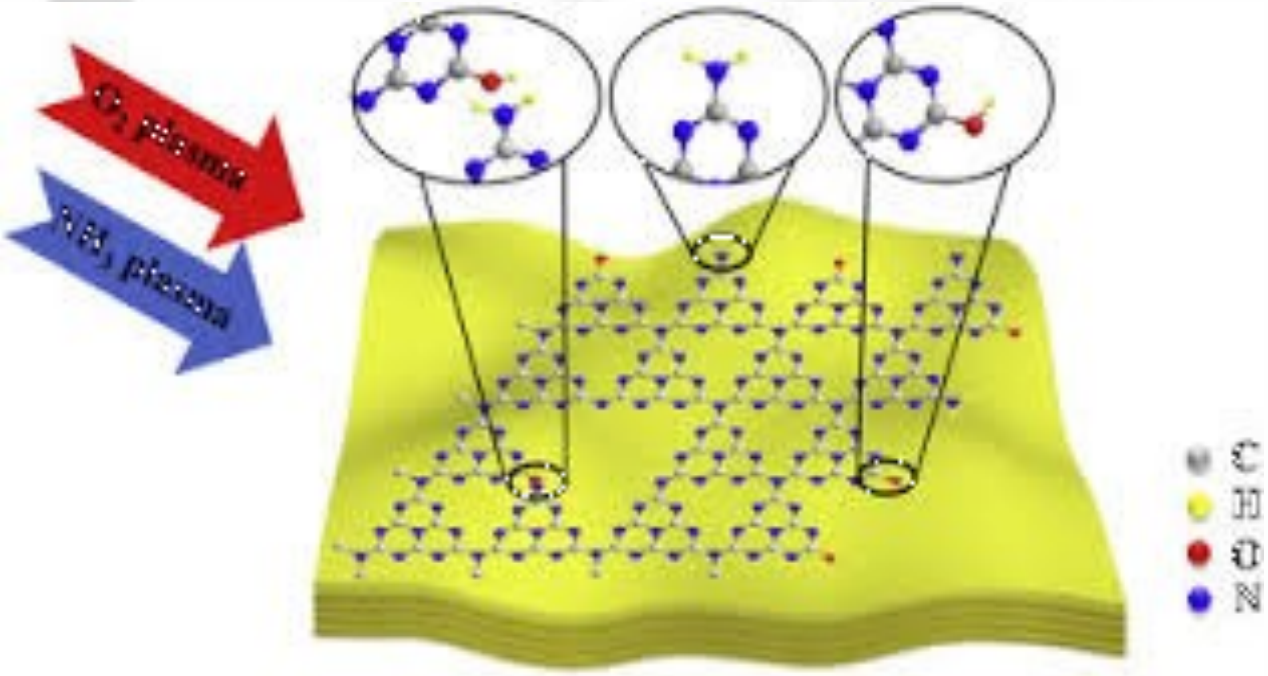
PI^3 Applications

There are a number of uses for this process ranging from metal hardening in the tool making field to improving the adhesion of coatings as well as more exotic applications such as changing the surface properties of polymers.

Success and Acceptance

PI^3 is ideal for use in research labs but provides the basis for one that would be suitable for industrial settings and PI^3 equipment can be operated by non-plasma specialists. PI^3 used in many areas of the manufacturing sector, particularly those that deal with metals, alloys and the modification of their properties by a range of surface treatments.

For more information on this source please visit The Institute of Materials Engineering Australia



NBA ACCREDITATION: THE NEED OF THE HOUR !

- By, Prof P. K. Nanavati, Asst. Prof. Metallurgy Department

Dear Students! you might have read in various leading newspaper that many leading Public sectors, private sectors, employers of India and abroad prefer to have employees who have obtained their qualifications from NBA accredited campuses.

So, the need of an NBA accreditation has been realized across the state government engineering institutions, Grant-in –aids & Private State financed institutions.

Well, the history dates backs in 1989 , the year Washington Accord was originally signed among six countries including India, which was an international level agreement among countries whose educational bodies shall be responsible for accrediting undergraduate engineering degree program**.** So it means that a student in India graduating from an institute accredited by NBA is eligible to practice as an engineer in his/her relevant domain in any of the countries that have signed the Washington Accord.

An India has been now an official member of the Washington accord from 13th June 2014 with the permanent signatory status of the National Board of Accreditation (NBA).

Let us understand what an NBA in few very simple words is. ! NBA acronym stands for National Board of Accreditations" - The NBA is already conducting accreditation of technical programs being run by institutions. "The AICTE Regulation recognize NBA as an "assessment and accreditation agency" for the purpose of undertaking accreditation," The applying engineering institutions have to establish systematic procedure for Teaching and learning activities, student support & infrastructure that lead to

NBA is playing a vital role for enhancing constant quality improvement in higher learning institutes. **NBA accreditation** recognizes the students' contributions, innovations and achievements towards their technical learning happen in institutes. The **accreditation** of **NBA** helps higher educational institute to know its strengths, weaknesses and opportunities and challenges and give a clear road map to improve the quality in Technical Education System. NBA accreditation mandatory for institutions running technical courses. Accreditation is important because it: Helps determine if an institution meets or exceeds minimum standards of quality. Helps students determine acceptable institutions for enrollment. Employers often require proper evidence that applicants have received a degree from an accredited school or program.

Open House project fair for SSIP was organised at GEC Gandhinagar, out of 13 projects 2 projects of Metallurgy department were selected for SSIP.

सपना

रात में सपनों के नीले
समंदर में बहती वो
कश्तियां ,
उजाला होते ही दिल को खुश
करदे वो मस्तीया ,
सब के मुंह पर प्यारी सी
मुस्कान वाली वो बस्तियां ,
सबकुछ कितना अपना सा
लगता है ,
लेकिन क्या करे जागने पर
सब सपना सा लगता है ।

Art performed by,
Mr. Jainam Sakariya
En. No. 180130121048

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Metallurgy Department

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