

Department of Metallurgical & Materials Engineering

VNIT

Visvesvaraya National Institute of Technology



Information brochure





Vision

To contribute effectively to the national endeavor of producing quality human resource of world class standard by developing a sustainable technical education system to meet the changing technological needs of the country incorporating relevant social concerns and to build an environment to create and propagate innovative technologies for the economic development of the nation.

Mission

The mission of VNIT is to develop itself into an institute of world class reputation and advance knowledge and educate students in the areas of technology, science and allied disciplines.

VNIT is committed to generate and disseminate knowledge and to maintain the highest standards of excellence. The institute motivates its staff to work at the frontiers of academic enquiry and enable the students to reach their full potential in an excellent academic and research environment. The institute empowers the learning teaching community to serve the changing needs of the society and nation and contribute effectively to improve the quality of life.



Visvesvaraya National Institute of Technology an Institute of National Importance

- The Visvesvaraya National Institute of Technology (VNIT) is one of the twenty NITs (National Institute of Technology) declared as an Institute of National Importance under the act of parliament on August 14th 2007. The Institute established in 1960 as Regional College of Engineering, a joint venture of Govt. of India with Govt. of Maharashtra, was named after the eminent engineer, planner and statesman of the country, Bharat Ratna Sir M. Visvesvaraya.
- Over the span of more than four decades, the institution has acquired the status of a reputed National Institute, which is evidenced by a large number of graduates passing out from this institute occupying top ranking key position in national as well as international organizations in the sphere of engineering and technology.
- Imparting quality-engineering education at graduation and post graduation levels has been the prime function at VNIT since its inception. Sponsored research projects from DST, MHRD, AICTE, BRNS, AR & DB, NRB and National level R&D laboratories.
- The Institute has signed MOU with IGCAR Kalpakkam, NEERI, JNARDDC Nagpur for R&D projects. Industries of repute have enriched the research environment of the institute which gets reflected in various Ph.D. / M. Tech (by Research) programmes and M. Tech. projects. Services offered by the institute in the form of testing and consultancy to engineering industries have been largely recognized due to faculty expertise in various disciplines of engineering. Extension services in the form of continuing education programmes, seminars, symposia and conferences at National / International level is a regular feature of the institute.
- Housed on a lush green scenic campus of about 215 acres, the academic departments, fully equipped laboratories, administrative block, student's hostels for (Gents / Ladies), faculty and staff quarters of the institute cater to nearly 1750 students, at UG level and 250 students at post graduation / Ph.D. and M. Tech by research level (with 15 % girl students), 120 faculty and about 300 supporting staff.



Campus View

- The institute offers undergraduate programmes of 8 semesters (four years) duration in Civil, Mechanical, Electrical, Computer Science, Electronics and Communication, Chemical, Metallurgical and Materials and Mining Engineering along with Architecture (five years duration).
- Full time M. Tech. programmes of two years duration (4 semesters) are offered in Industrial Engg., Heat Power Engg., Environmental Engg., Integrated Power Systems, Structural Engg., Structural Dynamics and Earthquake Engg., Ferrous Process Metallurgy, Materials Engg., and Embedded Electronic Systems.
- This institute is a recognized QIP center for M. Tech. and Ph. D. programmes in Civil, Electrical and Metallurgical & Materials Engineering.
- The laboratories in various departments have excellent research and testing facilities. Under the Institutional Network Scheme of Govt. of India, the institute has acquired highly sophisticated equipments for various Departments in consultation with IITs. Under modernization programme, new equipments have been added to various laboratories in the recent years.
- The institute has highly qualified and trained faculty of national and international repute and proven capabilities in various disciplines. The faculty keep themselves abreast of the latest technological developments in the country and abroad through participation in various activities like seminars, conferences, training programmes, guest lectures. The faculty have been regularly contributing papers to the research journals of high academic repute. VNIT has been selected as a lead institute in World Bank Project under Technical Education Quality Improvement Programme (TEQIP).



Road to MEC

About the Department

The department of Metallurgical Engineering was founded in 1965 and the first batch of students passed out in 1969. The faculty and the equipment facilities in the department are well developed over the last four decades for UG/PG programme in Metallurgical and Materials Engg. Research programmes are catering to the requirement of the industrial testing and consultancy.

- The faculty has established excellent rapport and effective interaction with all the major industries and R&D organizations in and around Nagpur. This has resulted in regular flow of testing / consultancy work.
- The department is also actively engaged in continuing education programmes on Welding, Failure analysis, Testing and QC, Casting and solidification processes, Electric steel making, Structure-property correlation etc. for industries in the region.



All UG/PG programmes have been periodically accredited by AICTE. During last accreditation, the department was awarded 'A' grade for 5 years.(2002-July)

■ **Under Graduate Programme (08 Semesters)**

B. Tech. in Metallurgical & Materials Engineering : 60 Seats

■ **Post Graduate Programme (Regular)**

M. Tech. in Ferrous Process Metallurgy : 18 Seats

M. Tech. in Materials Engineering : 18 Seats

M. Tech. by Research: This is a unique facility available to the metallurgists engaged in industries and R & D organizations to facilitate them to complete their post graduation by research. Seven candidates have completed and six candidates have registered to this date.



- Recognised QIP center for Ph. D.
- Full Time Research (Awarded - 15)
(3 Years Duration) Fellowship of VNIT. (Registered - 16)
- External registration of candidates from Industries/ R&D Organisations

Placement

The career opportunities for the students are in areas of steel plants PSU's, foundries, rolling mills, processing and fabrication industries, R&D organizations, Materials Testing and processing industries etc. The students of this department get placements through centralized Training & Placement Department. The top ranking students aspiring for higher education get admissions in reputed Universities in India and abroad.

India - REC UK Project and Materials Engineering Centre

The department was selected for British aid under India- REC-UK project on Materials Theme in Year 1994. The project (Rs.60.00 million) involved various inputs viz. :

- Curriculum Development Programme with Orientation towards Materials Engineering
- Procurement of Sophisticated Equipments
- Training of Faculty in UK
- Visits of UK Experts in the field of Materials Engineering & overarching areas

The Materials Engineering Centre was established in the year 1997, as an outcome of this project. This is an interdisciplinary research centre built primarily on academic excellence of the staff and high quality infrastructure of the Institute

Interactions

Since its inception the department has established regular interactions with other reputed organizations such as Indira Gandhi Centre for Atomic Research, Kalpakkam, DMRL Hyderabad, ARCI Hyderabad, NML Jamshedpur, JNARDDC, Nagpur, Sheffield Hallam University UK and other Universities in UK in addition to all major metallurgical based industries in and around Nagpur.

VNIT - IGCAR MoU

VNIT hosted 14th National Seminar on Aerospace Structures (NASAS) on "Fatigue, Fracture and Ageing Structures" on 30th and 31st January 2006. Dr. Baldevraj - Distinguished Scientist & Director IGCAR was the Guest of Honor. This event was marked by signing of MoU between IGCAR Kalpakkam and VNIT Nagpur for

- Collaborative research
- Sharing of research Facilities
- Exchange of faculty and scientists
- Research leading to higher degrees like M.Tech, Ph.D.

The following collaborative projects were started under MoU between IGCAR and VNIT

- "Development of radiation resistant Glasses" - (Ongoing)
Investigators : Dr. V.K. Deshpande VNIT, Nagpur
Shri Kasivisvanath, IGCAR, Kalpakkam
- "Low Cycle Fatigue of Modified 9Cr 1Mo Steels" (Under Consideration)
Investigators : Dr. R.K. Paretkar, Dr. D.R. Peshwe, Mr. A.R. Ballal
Dr. R. Sandhya, Dr. K. Bhanu Sankar Rao,
IGCAR, Kalpakkam



Research & Development Programmes at the Department

The department has completed the following R&D activities in near past :

- Fatigue of Composite Laminates containing ply drops (AR & DB sponsored project)
- Evaluation of gas turbine/compressor blade materials and setting up of performance test parameters UISTRF project in collaboration with Sheffield Hallam University; Gas Turbine Power Station - MSEB Uran and IGCAR Kalpakkam (Tamil Nadu) (DST - UISTRF project)
- Cryogenic treatment /processing of high speed tool steels
- Corrosion behaviour of Cu - Ni - Mn alloys (MHRD sponsored project)
- Development of Technical interface for rural industrialization in Northern & Eastern Maharashtra & Chhatisgarh region (KVIC Sponsored Project)
- Development of pre-innoculated low carbon equivalent cast irons & Austempered ductile iron
- Thermo-mechanical treatment of IF & IFHS steels for texture development
- Effect of weld metal chemistry and welding process parameters on microstructure and properties of weld metal with 7018 electrode (M/s Ador welding systems, Mumbai)
- Processing of rice husk for production of reactive SiO_2 . Utilization of reactive SiO_2 for the production of Aluminium-Si Nano composites (Sponsored by Rajiv Gandhi Science & Technology Commission)
- Development of polymer blends for specility applications
- High Temperature Mechanical Testing-Creep, LCF of Nuclear Power plant materials (Sponsored by IGCAR/BRNS)
- Effect of Retrogression & Re-ageing (RRA) parameters on mechanical & Stress Corrosion properties of 7010 alloy (NRB sponsored project)



Materials Engg. Lab at John Moore University, Liverpool
John Moore University, Liverpool



Glasgow University

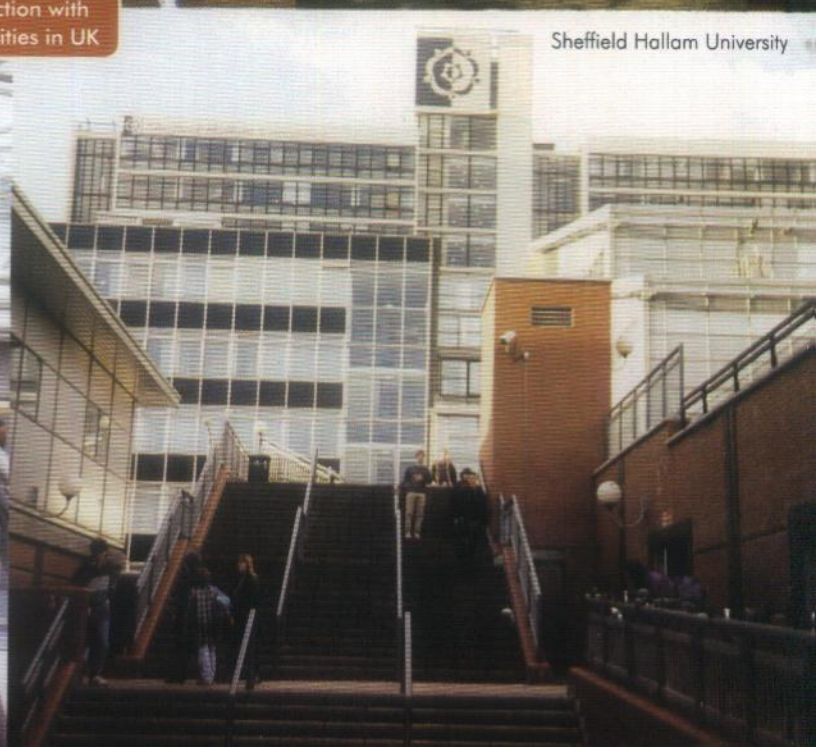


University of Leeds

Interaction with Universities in UK



Technical Discussion with faculty at Sheffield Hallam University



Sheffield Hallam University



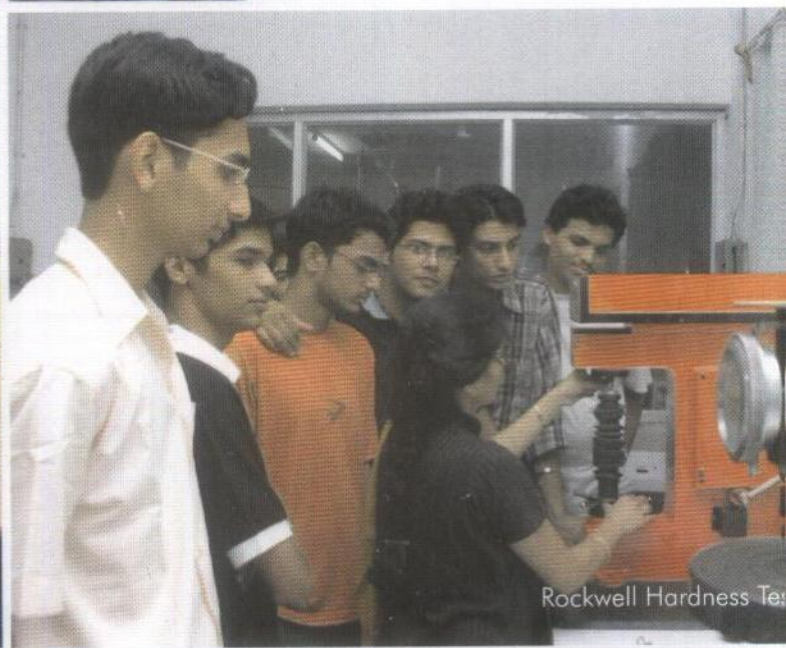
INSTRON 8502



Microhardness Test



Ultrasonic Tester



Rockwell Hardness Test

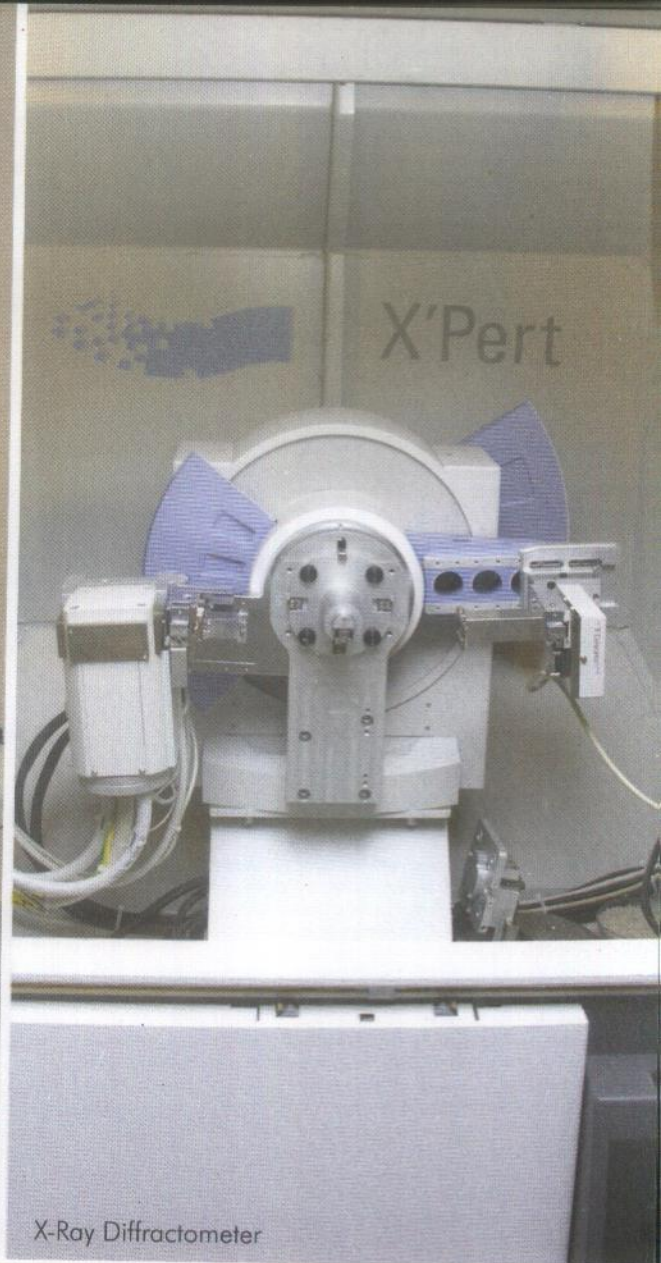
Facilities

Mechanical Characterization :

- 1 INSTRON Universal Testing Machine : Model 4467, 30KN--- 2 Nos
computerized with high Temperature Testing facility. (400°C)
- 2 INSTRON servo Hydraulic testing system : Model 8502, 100 KN
Computerized with high temperature testing attachments (upto 1000°C)
and low cycle fatigue
- 3 Universal Testing Machine: 100 MT with attachments : FSA Make
- 4 Hardness Testers :
 - Brinell Hardness Tester (FIE)
 - Rockwell Hardness Tester (FIE)
 - Vicker Hardness Tester
 - Portable Hardness Tester
 - Shimadzu Microhardness Tester.
- 5 Non Destructive Testing :
 - Die-Penetrant testing
 - Sona Test Ultrasonic.
- 6 Impact Testing Machine : 50 Joules capacity, 25 Joules capacity. (INSTRON)
- 7 Erichson cupping Machine : Erichson Model CTM II



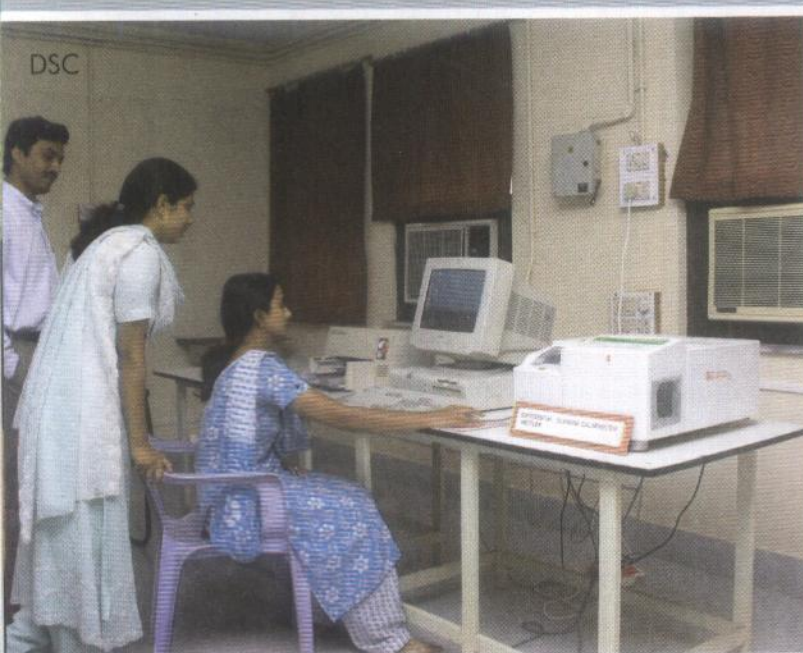
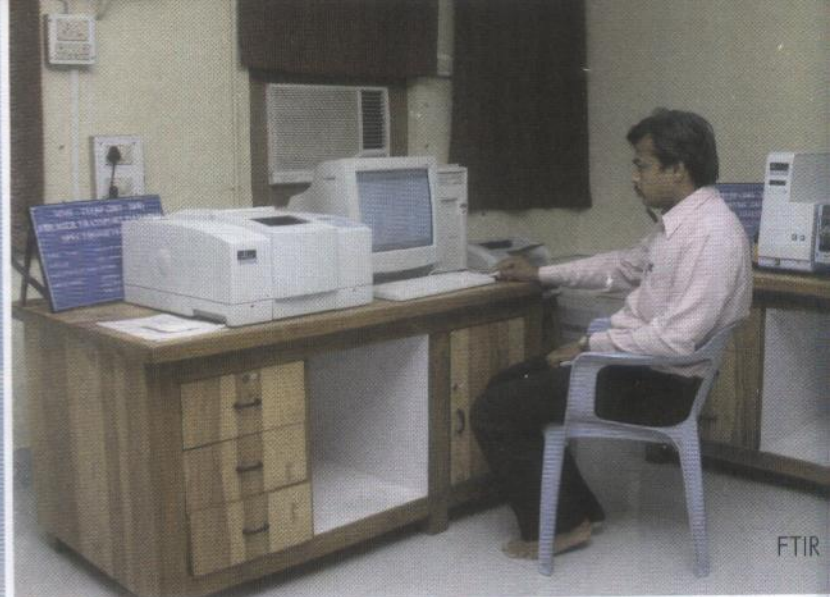
SEM with EDS



X-Ray Diffractometer

Structural Characterization:

- X-ray Diffraction Unit : PANalytical (Philips) with attachments for Texture Analysis, Stress Measurements and Small angle Xray scattering (SAXS)
- Scanning Electron Microscope With EDS attachment JEOL : Magnification 2 Lacs X with Elemental mapping Microanalysis (EDS)
- Metallographs : NIKON, UNION, OLYMPUS Metallographs with Image Analysis System (upto 2000 X magnification)
- Sample Preparation Units : Ceramic / Diamond cutter and Polishing Setup.
- In- situ Metallography : Portable sample preparation and microscope Kit to carry out in situ metallographic investigation
- Hot stage microscope : Carl Zeiss, (1500°C) for high temperature microscopy with Image analyser.



Chemical & Thermal characterization :

■ Spectrometer	:	Metal scan 2000 (Arun & Co, UK) (Iron, copper & Al Base)
■ Atomic Absorption Spectrometer	:	GBC Australia
■ Rapid C-S Analyser	:	LECO make
■ Differential scanning Calorimeter(DSC)	:	Mettler Ltd 902, Switzerland
■ Thermo Gravimetric Analyser/ Differential Thermal Analyser	:	Perkin Elmer Make
■ Thermo Mechanical Analyser	:	Perkin Elmer Make
■ Fourier transform infrared spectrometer (FTIR)	:	Perkin Elmer Make



TIG & MIG Welding Machine



Slurry Abrasion Tester



Pin on disc wear machine



UTM-100 T

Wear, Welding & Process Metallurgy :

- | | | |
|----------------------|---|---|
| ■ Wear Analysis | : | Pin-on-Disc, Dry / Wet abrasion Wear, Slurry erosion wear, Two body wear |
| ■ Welding | : | TIG /MIG/Arc welding, Gas welding setup |
| ■ Foundry | : | Melting Units, Sand testing Equipments, Sand Muller. |
| ■ Mineral Dressing | : | Jaw Crusher, Roll crusher, Ball mill and road mill, Classifiers Cells, V-filters, Electromagnetic and Electrostatic separator. |
| ■ Process Metallurgy | : | Driers, Roasters, Autoclave, Reducibility apparatus (CO , H_2) Furnaces, Leaching of Concentrates and Electrolytic Cells. |
| ■ Audio Visual Aids | : | Computer Laboratory having Server with 30 Nodes connected and are installed with software learning packages with Internet facilities. About 200 title VCDs with popular topics from metallurgical and Material Engineering. |



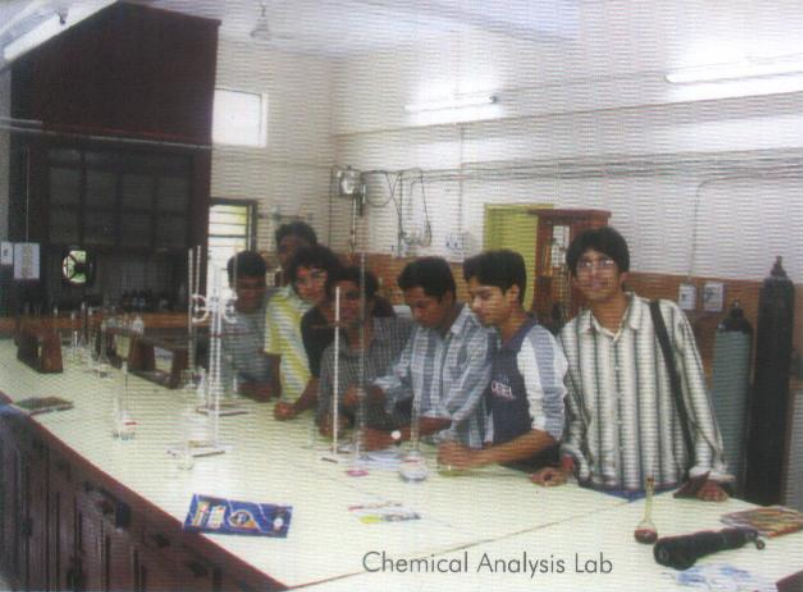
Vacuum Forming Machine



Hot Moulding Press

Polymer Processing and Testing :

- Polymer Moulding and Testing Machine : Polylab, UK
- Vacuum Forming Machine : Formech, UK
- Melt Flow Indexer : Dynisco Ltd, UK
- Heat Distortion Temperature (HDT) and Vicat Softening Point (VSP) Apparatus : IEL, India
- Dart Impact Tester for polymer : IEL India Films.
- Hydraulic Hot Moulding Press with Pressclave : George Moore, UK
- Dual Column Densitometer : TMI, USA.
- Single screw Extruder and Granulator : Boolani Engg. Corpn., Mumbai
- Environmental stabilization chamber : C.M. Equip. & Inst. (India)



Chemical Analysis Lab



Inductotherm Induction Furnace



Leco C & S Analyser

Electronic & Electromagnetic Materials :

- Multi - channel Galvanometer
- Kelvin's Double Bridge
- Resistivity Meter
- LCR Meter PC.
- Trainer (UK Model)
- Alpha-Impedance Analyzer
- Directional Solidification and Single crystal apparatus



Corrosion Engineering :

- Computerized Potentiostat (Sixteen Channels)
- Single Channel Potentiostat
- Salt Spray Apparatus, Coating Thickness Measurement Instruments
- Stress Corrosion Cracking set up

Backup facilities :

- Vacuum Induction Melting Furnace Inductotherm 30KW, Vacuum Melting 2Kg, 10^{-3} torr, Air melting 2, 5 & 10, 18 Kgs.
- High Temperature Heat Treatment Furnaces (Lenton, UK) (up to 1600°C)
- Controlled Atmosphere Muffle furnace (1200°C)
- Mineral Processing & Process Metallurgy Equipments

Faculty

S.N.	Name	Area of Specialization
Professors :		
1	Dr. D.R.Peshwe Head of the Department	Physical Metallurgy, Welding, Casting process, Wear of Engineering Materials Tribology, Polymers & Composites.
2	Dr S.U.Pathak	Extractive Metallurgy, Solidification Thermodynamics and kinetics, Failure Analysis.
3	Dr. R.K.Paretkar	Mechanical Metallurgy, Tribology, Ferro Alloys.
Assistant Professors:		
1.	Mr. A.D. Chopde	Physical Metallurgy, Surface Hardening, Chemical Characterization, Heat Treatment.
2.	Dr. V. K. Didolkar	Mineral Dressing, Powder Metallurgy, Ceramics & Refractories.
3.	Dr. S.N. Paul	Structural Metallurgy, Polymer & Composites, Materials Characterization.
4.	Mr. D.V. Moghe	Iron & Steel Making, DRI Technology, Thermodynamics & Kinetics
5.	Dr. A.P. Patil	Corrosion Engineering, Surface Engineering, Simulation & Modelling, Alloy Steel Making.
6.	Dr. S.G. Sapate	Wear & Tribology, Heat Transfer, Physical Metallurgy.
Lecturers :		
1.	Mr. R.C. Rathod	Polymer, Corrosion.
2	Mr. A. R. Ballal	Corrosion, Mechanical Processing, Ceramics, Fuel Cells
3	Mr. R. K. Khatirkar	Characterization of Materials, Texture and XRD - Analysis.
4	Mr. Y. Y. Mahajan	Physical Metallurgy, Heat treatment & NDT.

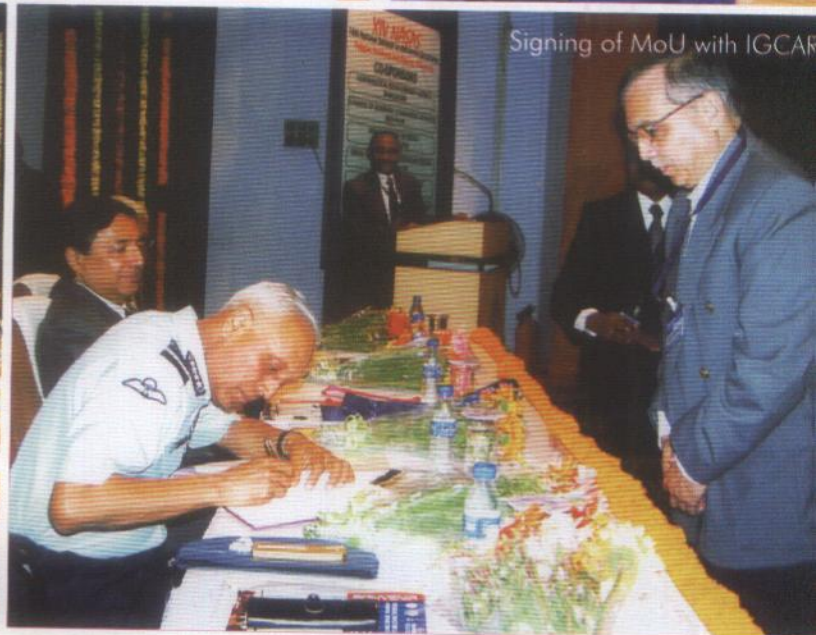
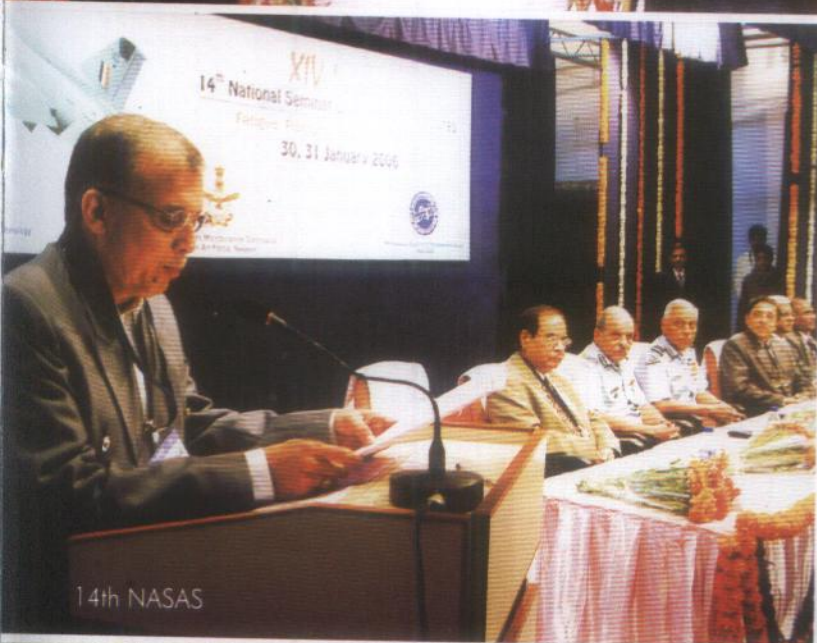


Well Wishers - Advisors

S.N.	Name	S.N.	Name
1	Dr. Placid Rodriguez, IIT, Madras	12	Dr. Ajit Kulkarni, I.I.T., Bombay
2	Dr. Baldev Raj, IGCAR, Kalpakkam	13	Dr. S. A. Paranjpe, Welmet Tech., Nagpur
3	Dr. Jyoti Mukhopadhyaya, J.N.A.R.D.D.C., Nagpur	14	Mr. P. R. K. Reddy, Nelcast, Chennai
4	Dr. P. D. Mangalgi, G. M. Bangalore	15	Dr. R. H. Tupkary, Retd. faculty & Ex-Chairman B.OG.
5	Dr. Bhanu Sankar Rao, IGCAR, Kalpakkam	16	Dr. A. V. RamaRao, Retd. faculty
6	Dr. B. S. Murty, IIT, Madras	17	Dr. R. C. Sinval, Retd. faculty
7	Dr. Amol Gokhale, D.M.R.L., Hyderabad	18	Dr. P. M. Padole, Deptt. of Mech. Engg.
8	Dr. C. M. Manjunatha, N.A.L., Bangalore	19	Dr. R. M. Patrikar, Deptt. of Electronics
9	Dr. Ranganathan, N.A.L., Bangalore	20	Dr. V. K. Deshpande, Deptt. of Appl. Physics.
10	Dr. R. K. P. Singh, Institute for Steel Development and Growth, Kolkata		
11	Dr. R. W. Khare, Bangalore		



View of Class Room



Major Events

- 14th National Seminar on Aerospace Structures (XIV NASAS), 31st January-2nd February 2006) organized by Deptt. of Metallurgical & Materials Engg., VNIT jointly with Head Quarters-Maintenance-Command, Indian Airforce, Vayusena Nagar, Nagpur and National Aerospace Laboratories, Bangalore.
- Short Term Training Programme (STTP) on Failure Analysis of Engineering Materials and Welding Process and Metallurgy.
- Workshop on "Characterization of Materials".
- Students Technical Festival "TATVA 2007" in January 2007.
- National Seminars on Ferro Alloys Technology (1978), Recovery of metals from waste (1982), Special casting Processes (1992).
- Technical Teachers Cooperative Training programme in UK
- National level workshop on Rural Development and utilisation of Bamboo as construction material.
- Felicitation of Dr B. S. Murty (Aluminus) for getting Shanti Swaroop Bhatnagar Award (2007)



SEM Workshop



Service Offered to Industries :

Testing & Consultancy :

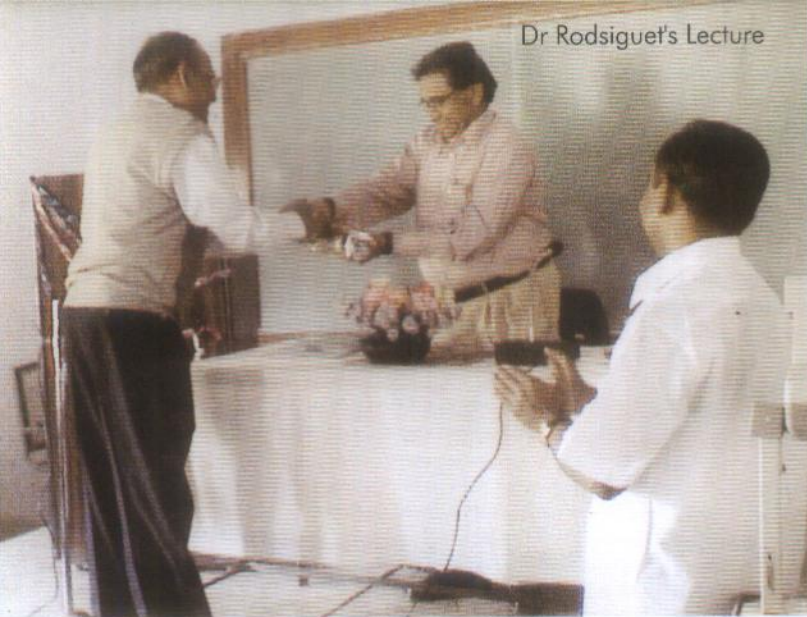
- Chemical characterization of Engineering Materials
- Mechanical characterization of Engineering Materials
- Structural characterization of Engineering Materials
- Wear behaviour and analysis
- Characterization of Coating & Tribological behaviours
- Weld metal / HAZ Assessment and study of weld parameters
- Residual life assessment of industrial plants and components
- Re-engineering of critical and import substitute components
- Material selection and specification
- Corrosion investigations
- Non destructive examination of engineering components
- Melting - refining, heat treatment studies
- Fracture toughness investigations, fatigue analysis
- Failure Investigations
- Project Report preparation for new entrepreneurs
- Assessment of capacities and performance evaluation of various equipments in materials processing industries
- Renewal of sick units - Assessment and Analysis
- Continuing Education Programme
- Refresher courses in Materials Selection, Characterization & Processing, welding, Failure Analysis etc.
- Short Term certificate courses
- In-service Training Programmes
- Seminars / Conference / Exhibitions
- Distance Learning Module for Non-metallurgists engaged in industries



KVIC Team with Award

Credentials

- Recipient of prestigious Parke award from Maharashtra Chamber of Commerce of Industries (MCCI) Pune for Development of Carbon free ferrochrome (1974)
- Prestigious Parkhe award for developing Instrumented Test Rig for formability testing of thick plates (1971)
- Promoted participation of undergraduate students in National Level Technical Paper Contest, Metallurgical / Materials Quiz and Annual Technical Meeting of the Indian Institute of Metals. The students have won prizes in almost all the competitions
- Organized National level Conferences on (1) Recent Trends in production of Ferro Alloys, (2) Recovery of Minor metals from Metallurgical Waste, (3) Recent Trends in casting production, (4) Inspection, testing and quality control in Metallurgical industries and (5) Tatva, Technical festival of Metallurgical and Materials Engineering students
- Recipient of prestigious S&T Best Innovation Award from KVIC (Ministry of M.S.M.E. Delhi) for development of rural technologies (2007)



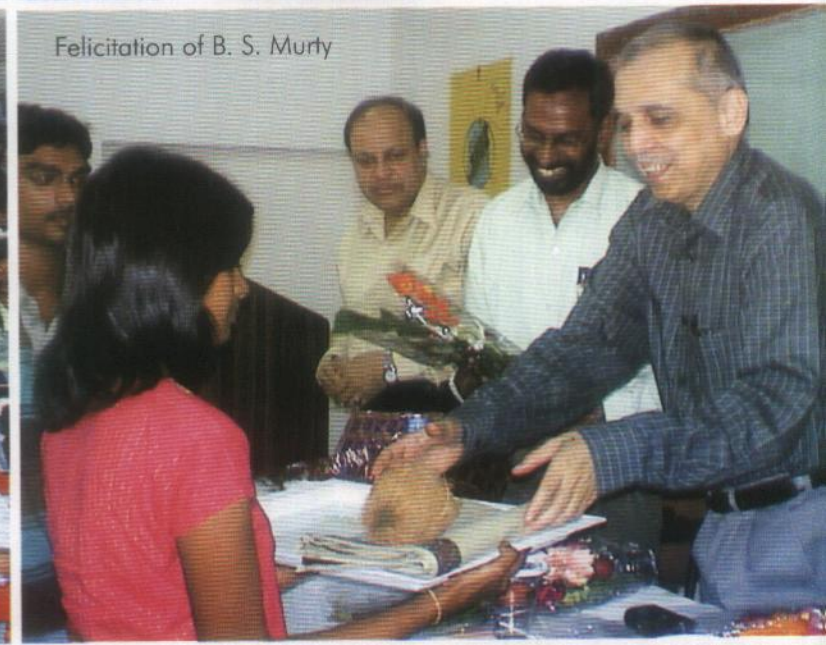
Dr Rodsiguet's Lecture



Parakhe Award



View of 14th NASAS



Felicitation of B. S. Murty

- Organized workshops on Librarians Training, Science Park, Entrepreneurship Development, Image Analysis, Failure Analysis of Engineering Materials, Electro ceramics, and Polymers for Future
- Active collaboration with M/s. Indian Bureau of Mines, Nagpur, M/s. Jawaharlal Nehru Research Design & Development Centre, Nagpur; NML Jamshedpur, DMRL Hyderabad, ARCI Hyderabad, ADA Bangalore, IGCAR, Kalpakkam
- More than 85% of final year students get suitable placement through campus interviews
- Up-to-date curriculum in undergraduate programme, the only department offering Post Graduate Degree in Ferrous Process Metallurgy (FPM) and Materials Engineering (MTE)
- More than 150 Industries / Govt. organizations avail the testing / consultancy services of the department
- Technical Teachers Cooperative Training programmes in UK
- National level workshop on Rural Development and Utilisation of Bamboo as construction material

**WORKSHOP
ON
CHARACTERIZATION OF MATERIALS**
(Sponsored - TEQIP) 28 - 30 September 2006
Deptt. of Metallurgical & Materials Engg
VNIT, Nagpur - 440011



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