



Legacy that Inspires the Future



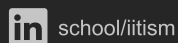
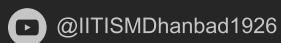
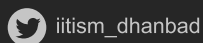
Office of the Dean (Research and Development)
IIT(ISM) Dhanbad

R&D Brochure (2024-25)



IIT(ISM) DHANBAD
Jharkhand, India-826004

[www.https://people.iitism.ac.in/~research/](https://people.iitism.ac.in/~research/)



MESSAGE FROM THE DIRECTOR



Indian Institute of Technology (Indian School of Mines), Dhanbad is one of the premier institutions in India, which is actively engaged in developing cutting-edge technologies and state-of-the-art research facilities. IIT(ISM) Dhanbad has nearly 100 years of legacy in teaching and research, which makes it one of the most sought-after IITs among undergraduate, postgraduate and doctoral students. At IIT(ISM) Dhanbad, we have a cosmopolitan culture and our faculty members are from world-renowned institutions. As a result, IIT(ISM) Dhanbad has developed a niche in fundamental and applied research pertinent to societal and industrial needs. Indeed, several state-of-the-art technologies and services offered by our faculty members are being used in esteemed organizations such as Coal India Limited, Wadhvani

Innovation Network CoE (~42 crore), IMiN (~67.5 crore), TATA Steel Ltd., DRDO, L&T, etc. In the last few years, we have created world-class research infrastructure and facilities to cater to our nation towards short and long-term research goals. In recent years, various sponsored centres [namely, Tata Steel ICMMR (23.15 crore), CIL Centre (10 Crore), NVCCUS (10 Crore)] have been established. I wholeheartedly welcome funding agencies and companies to become a part of the IIT(ISM) Dhanbad fraternity by using our expertise & facilities to develop indigenous technologies and help us to fulfill the vision of “Make in India”.

Best regards,

Prof. Sukumar Mishra
Director
IIT(ISM) Dhanbad

MESSAGE OF DEAN (RESEARCH & DEVELOPMENT)



Greetings from the office of the Dean (Research and Development), IIT(ISM) Dhanbad. The office of the Dean (R&D) primarily deals with strategic planning, creating research infrastructure, and fostering new and interdisciplinary research initiatives and collaborations. We strive to build strong collaborations with the Industry/Academia/PSUs to fulfil their fundamental and applied research needs. Indeed, the institute has strong industry collaborations, establishing several Centres of Excellence (CoE) at IIT(ISM) Dhanbad.

At present, IIT(ISM) Dhanbad has 17 departments and several centres, which are equipped with all necessary infrastructure and world-class faculties to undertake all kinds of fundamental and applied research problems. I am pleased to share that IIT(ISM) Dhanbad has

been placed 20th Globally (by Subject-Mineral & Mining) and No. 1 in India in the QS World University Ranking 2025.

I am confident that, with the help of our colleagues/students, we will make this Institute a Global Leader in the field of industrial and applied research.

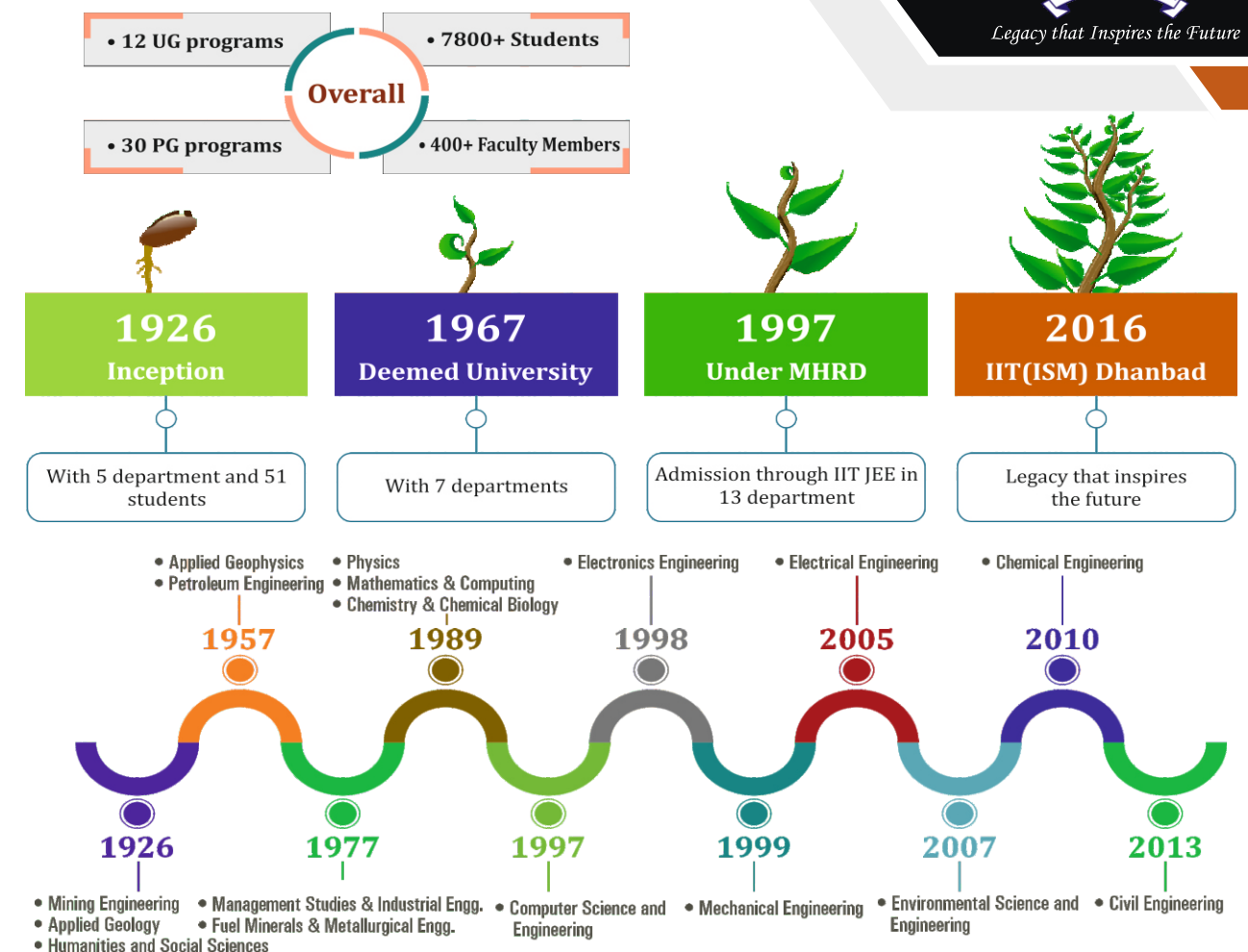
I invite you to join our journey by utilizing our expertise, intellectual property, and research infrastructure to develop technologies pertinent to your organization.

Prof. Sagar Pal
Dean (R&D)
IIT(ISM) Dhanbad

IIT(ISM) Dhanbad at a Glance



Legacy that Inspires the Future



Indian Institute of Technology (Indian School of Mines), Dhanbad was established on 9th December 1926 by the British Government of India. The institute was formally inaugurated by His Excellency the Viceroy Lord Irwin on the model of Royal School of Mines, London. The highest quality of education imparted to the Graduates, Post Graduates and Research Scholars help them prepare to tackle all challenges and perform well in industries across the world.

Initially started as an institution to impart mining education, has now graduated into a full-fledged premier institution of international acclaim offering a host of programs such as B.Tech, Dual Degree, Integrated M.Tech, Double Major, Minor, M.Tech, MSc Tech, MSc. and MBA. In addition, the institute also offers a PhD Program and post-Doctoral fellowship.

20th

Globally (by Subject - Mineral & Mining) and
No. 1 in India in the QS World University Ranking 2025

15th

Rank by NIRF in
Engineering, 2024

IIT(ISM) DHANBAD



Our major role is to:

Interlink Research and Industries with government policies such as:

- Make in India
- Clean India
- Aatma Nirbhar Bharat
- Smart City initiatives and so on.



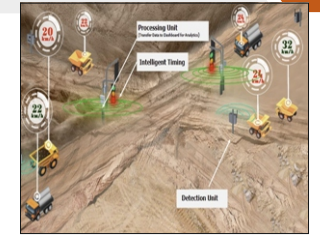
Smart Traffic Management System for Safety and Congestion-Cut Using AI



Heavy-duty 500t SAGES with a remote radio-controlled and digital display system



Virtual Reality Mine Simulator (VRMS) for Improving Safety and Productivity in Coal Mines



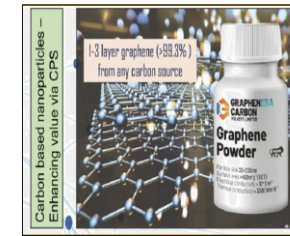
AI-based Smart Traffic Management and collision avoidance system in mines



Hybrid micro machining technology using μ -ECM and μ -EDM processes



High Power Handling Dielectric Resonator Antenna



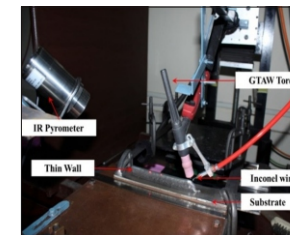
1-3 Layer graphene (> 99.3%) from any carbon source



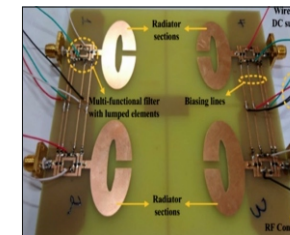
Advanced AI-powered air quality monitoring system



Equipment for cutting of Composite Hardware (used canister)



Direct energy deposition facility



4-Port MIMO CR System



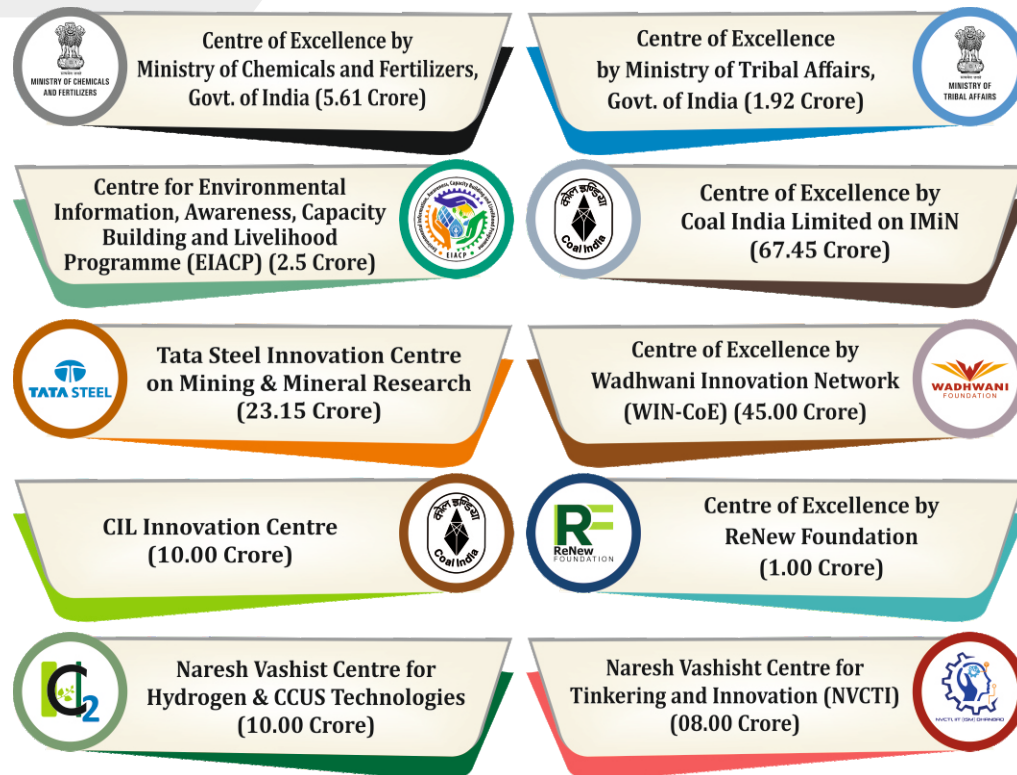
MEMS DRA with Wideband and High Gain capability



High Power Handling Dielectric Resonator Antenna



Hybrid charging system for e- vehicles



Major Initiatives (In-house)



HR-TEM



XPS



FESEM



SXR



Rheometer



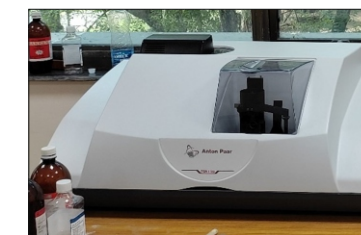
UV Vis DRS



HRMS



HR-XRD



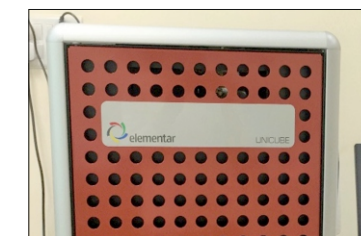
Particle Size Analyser



DMA



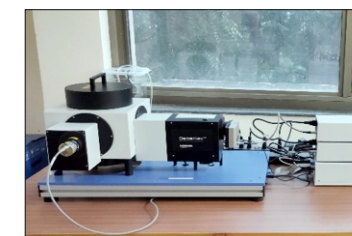
Solid Particle Zetameter



CHNSO



DSC



TCSPC



Cell Culture Lab

Fabrication & 3D-Printing Facility



3D Composite Printer
(Markforge)



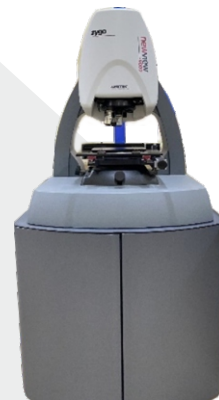
3D Metallic Printer
(Flex 200)



3D Ceramic Printer
(Nanoe)



3D Polymer Printer
(Formlab 3)



3D Profilometer

~ **Rs. 10 Crore** funded Fabrication & 3D-Printing Facility has been established at IIT (ISM) Dhanbad

High Performance Computing (HPC) Facility

CPU based cluster-

50 nodes, 2264 cores, 240 TB PSF Storage

GPU based cluster-

NVIDIA DGX-1, 40 cores, 8 x V100 GPUs, 256 GB RAM

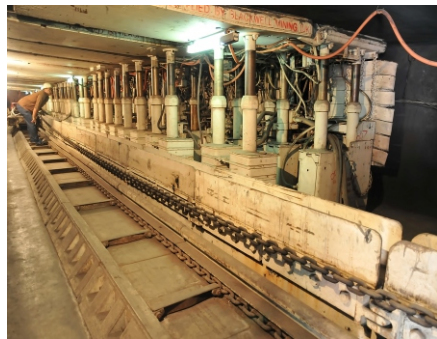


~ **Rs. 10 Crore** computing and software resources at IIT(ISM) Dhanbad has been established for Research purposes to cater growing and diversifying computing and data research needs.

The Department of Applied Geology, IIT(ISM) Dhanbad houses the oldest and richest Geological Museum among all the Indian Universities. It was established in July 1926 and houses about 12000 exhibits. It has separate galleries for rocks, minerals, gemstones, coal, hydrocarbon, structures, fossils, etc. This museum also housed a gallery having state-wise mineral resources from India.



Longwall Mine Gallery



An unique 30 Meter longwall mock gallery with Powered Support, Shearer, AFC, Stage Loader, Power Pack etc, a facility which is not available in any other institute in India

Seismological Observatory

Seismological Observatory at IIT(ISM) Dhanbad has been established to understanding earthquake-related phenomena and their effects through the development and application of innovative seismological research methods to build an earthquake-resilient society.



Panoramic view of observatory

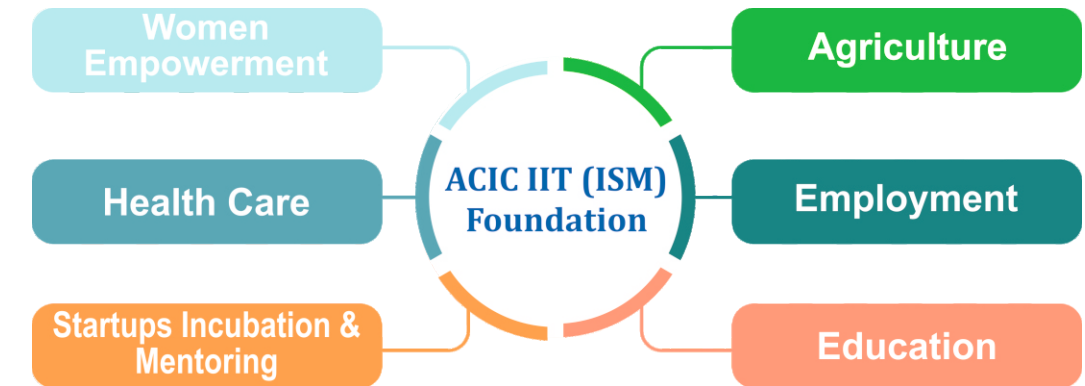


Data analysis room



Broadband, Analog and Short Period sensors installed on a concrete pillar

ACIC is one of the entrepreneurial initiatives of the Institute & Niti Aayog directed towards **community development**.
The Objective of ACIC is: “**for the community & by the community**”





Startups Support

- Natural plant-based product development Division
- Rural Livelihood Laboratory
- Co-working space to our Start-ups
- Mentorship






Skill Development Programs


- Training on Jute products
- Workshop on Lac Scrapping
- Workshop on organic Products
- Seminars & Boot Camps





Community Outreach

- Two projects have been launched to make the ball pin hammer and Chisel at Bhendra tools cluster competitive to the market
- Working on a project with SBI Life to uplift the living condition and Education of children

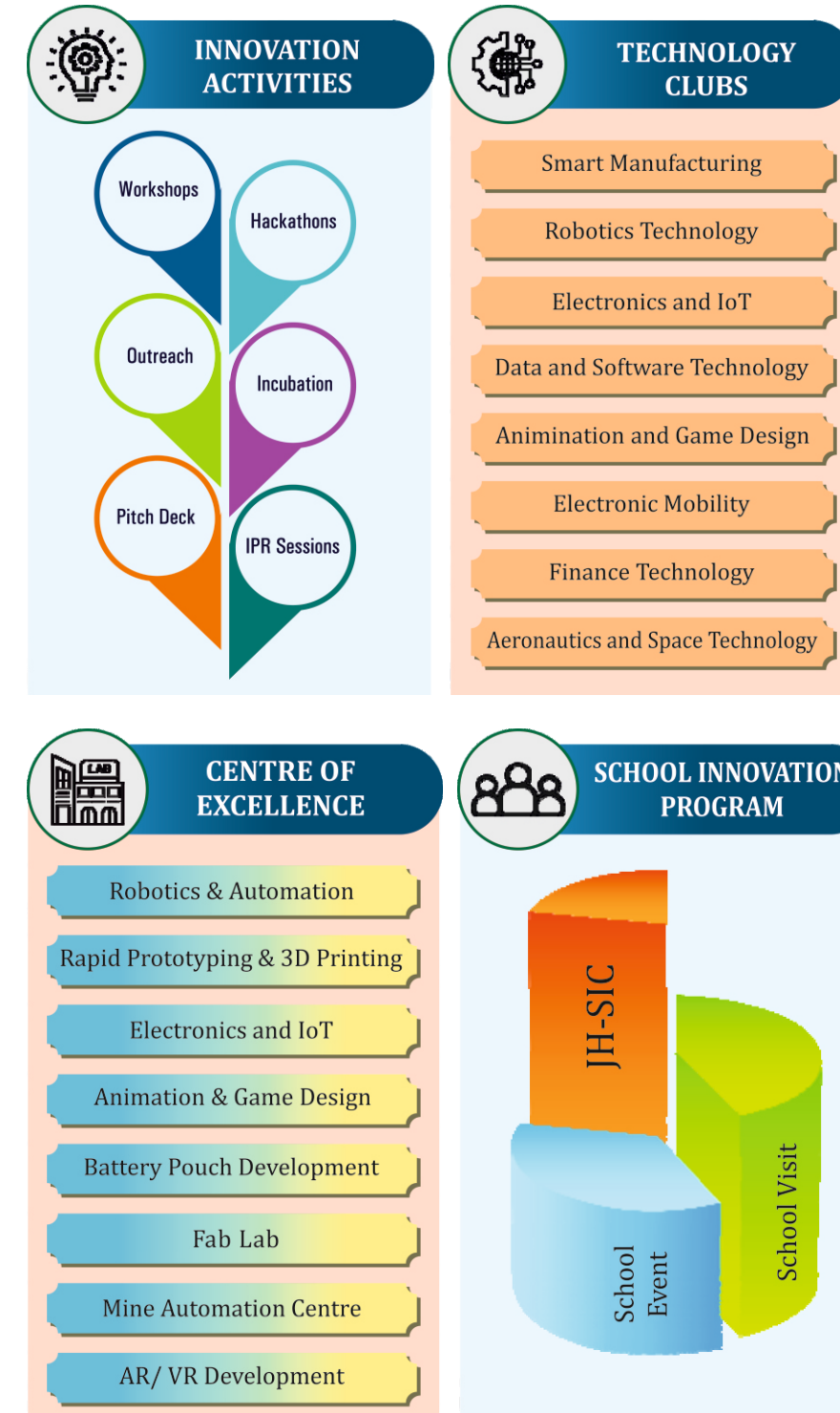


Centre Highlights

- ▶ NVCTI - IIT(ISM) Dhanbad has been initiated by our distinguished Alumni and donor Shri Naresh Vashisht, and his generous contribution of 1 million dollars towards the welfare of society.
- ▶ The primary objective is to enhance the interdisciplinary skills of professionals and students across various sectors, including government organizations, academic institutions, and industry..
- ▶ Conceptualized to build a positive innovation ecosystem and to provide a state of the art workspace to transform ideas into product leading to a successful entrepreneurship.
- ▶ Activities steered by an Innovation Council (IC) comprising Student Innovation Cell (SIC), Faculty Innovation Cell (FIC), and Invited members from industries/Alumni.

Facilities at NVCTI

- ▶ Electronics & IoT Facilities
- ▶ Advanced Rapid Prototyping & Manufacturing
- ▶ Industry Robotics & Automation
- ▶ Battery Manufacturing Unit
- ▶ AR/VR Gaming & Animation



State of Art Innovation & Tinkering Facilities



CNC Milling



Vertical Milling



Lathe Machine



Battery Development



PCB Printing



CNC Lathe



3D Printing



Glove Box

CIL Innovation & Incubation Centre

CIL INNOVATION & INCUBATION CENTRE
IIT(ISM) DHANBAD

कोल इण्डिया लिमिटेड
Coal India Limited
भारत सरकार का उपक्रम
A Government of India Undertaking
एक महीरतन कंपनी A Miniratna Company

NITI Aayog

AIM
ATAL INNOVATION MISSION

TEXMiN



Start-ups pre-incubated under CII Centre

Pinacple Depth Mine Management & Services Pvt Ltd
Title of Project : Electronic Borehole Compass - An indigenous device to determine the borehole trajectory



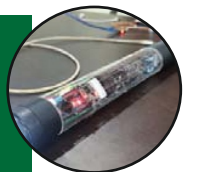
Joymettec Pvt. Ltd.
Title of Project : MinoVR – Mine to Meta



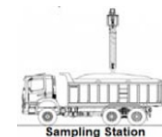
Spire Viz Pvt Ltd
Title of Project : 360-Degree Mine Simulator

Geo Lib Pvt. Ltd.

Title of Project : Design and Development of an automated borehole televiwer



Ongoing Projects



Prevention of coal pilferage in mining using AI & IOT and development of mechanical sampler



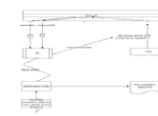
Development of Cost - Effective Data Acquisition System



Development of electronic Clar Compass



Payload monitoring of loading equipment (Shovel / Excavators) displayed in the operator's cabin



Automation in UG mines roof competency (strength) test



Day to day tracking of human resources for entry and exit out of UG mines



Health ATM



Instrumented Rock- bolt Extensometer Load measuring devices



COLLABORATION



Microsoft for Startups

- Up to \$150,000 Azure credits to the start-ups of CII Centre
- Mentorship from business leaders and technical experts all around the globe
- GitHub and Visual Studio Core for developer collaboration
- Powerful development and productivity tools including Microsoft
- CII Centre may use Microsoft logo in his partner offerings to the start-ups and start-up program related social media announcements.



- SIPL will provide fund to IIT(ISM) Dhanbad for development of Industry 4.0 platform in CII Centre
Focus area
- Application of Industry 4.0 (IOT, AI, Big data analytics, cloud computing etc.) for machine failure analysis, predictive maintenance of HEMM, SMP, environmental monitoring and control, coal quality analysis, auto-evaluation of tender, enhancing availability and utilization of HEMM, etc.
- Augmented Reality for training remote maintenance of plant and machine, risk identification and risk assessment, performing mock rehearsals, mine simulation, etc.



Amazon Web Services

- \$50,000 in Aws Activate credits to the start-ups of CII Centre
- Mentorship from business leaders and technical experts all around the globe
- CII Centre is an AWS activate partner who can approve the benefits of the start-up's



- Collaboration in the area of Storage, cloud computing, AI and Big data analytics
- Mentorship from business leaders and technical experts all around the globe
- NetApp India will help start-ups in arranging the funds by connecting them to the VC's.



✉ contact@texmin.in



Mining Technology Innovation Hub

Digitization and Digitalization of the Entire Mining Value Chain - **DIGITAL TRANSFORMATION**

The objective of TEXMiN is to achieve 3S Mining (Safe, Smart, and Sustainable Mining leading to Mining 4.0) through operation & process optimization across the mining value chain.

Covers

AI & ML
AUGMENTED REALITY
VIRTUAL REALITY
SMART SENSORS AND MINER'S TRACKING SYSTEMS
SMART AND INTELLIGENT SENSING SYSTEM
ROBOTIC MINERS SYSTEM
ENTERPRISE-BASED DECISION SUPPORT SYSTEMS
MINE DATA ANALYTICS

www.texmin.in



TIH at IIT (ISM): Technology Vertical 'Technologies for Mining' (Exploration & Mining- Technology Innovation in Exploration & Mining Foundation - TEXMiN - A Section 8 Company.

Mining 4.0

Exploration 4.0

Office premises:
Institute Innovation Hub (i2h), IIT (ISM) Dhanbad

Problem Statements source

Various Ministries

- Ministry of Mines ■ Ministry of Coal
- Ministry of Telcom
- Ministry of Electronics and Information Technology

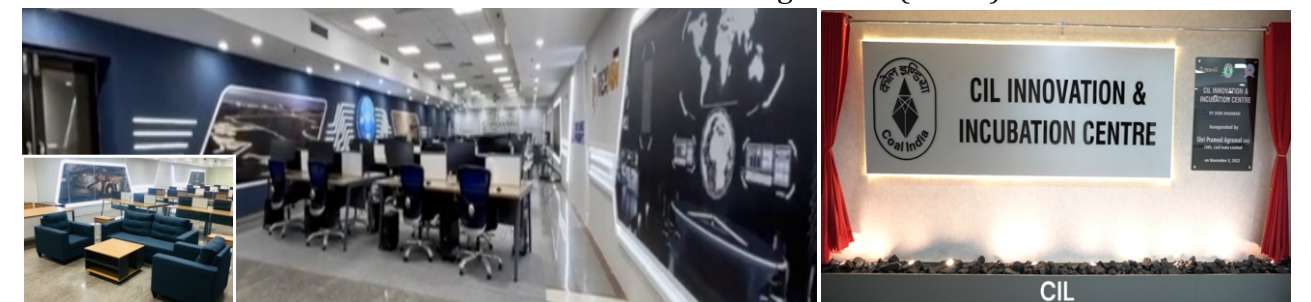
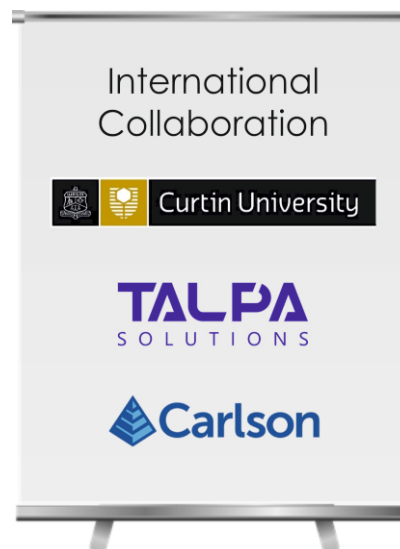


Sandvik Mine Automation Learning Centre (SMAC)



SME (Subject Matter Experts)

- Academic Institutes (15)
- Industry experts (100+)
- Inhouse experts

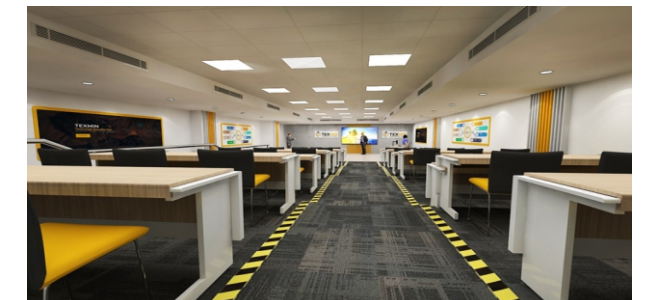


Mining Technology Excellence Centre – TEXMiN & Dassault

Coal India Innovation & Incubation Centre



TATA Innovation Centre for Mining & Mineral Research



TEXMiN - Esri Geospatial Excellence Centre



Adani 3S Mining Excellence Centre



TEXMiN – Carlson Geodesy Centre

Quite a few in Pipeline...

IIT (ISM) Dhanbad is a part of Heritage Network, Indo-French Consortium, Finnish Universities Consortium and has collaborations with more than 20 Universities worldwide



Ecole Nationale Supérieure d'Ingénieurs de Tunis



- MoU based Dual PhD Program
- Faculty Mobility Programme
- Sandwich PhD Programme



Computer Centre



Health Centre



Central Library



Open Air Theatre



Penman Auditorium



Swimming Pool



International Hostel



Sports Complex



Upper Ground



Lower Ground



Squash Complex



Student Activity Centre



Main Canteen



Geological Museum



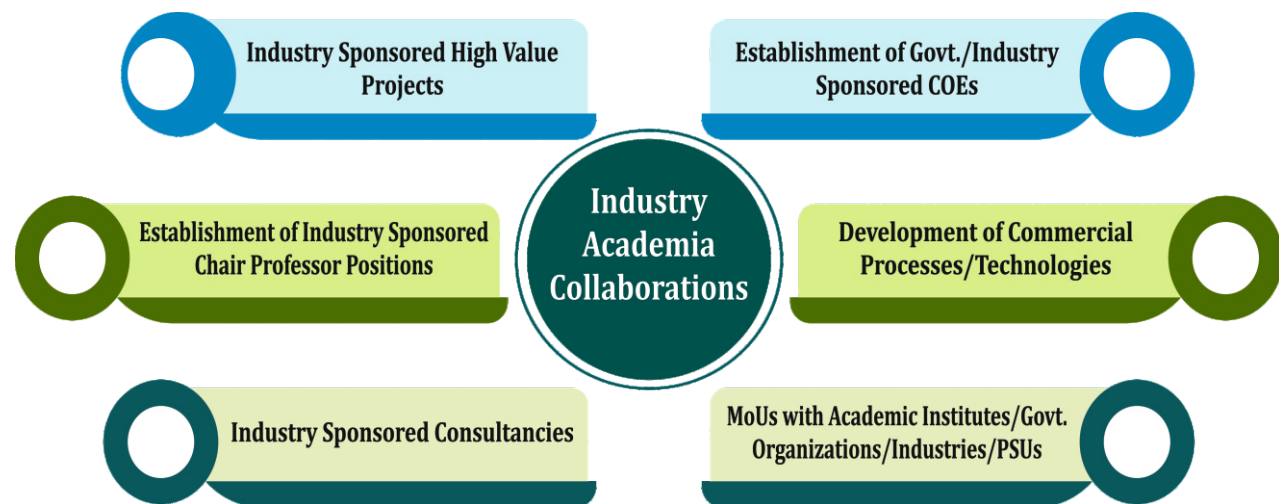
Seismological Observatory



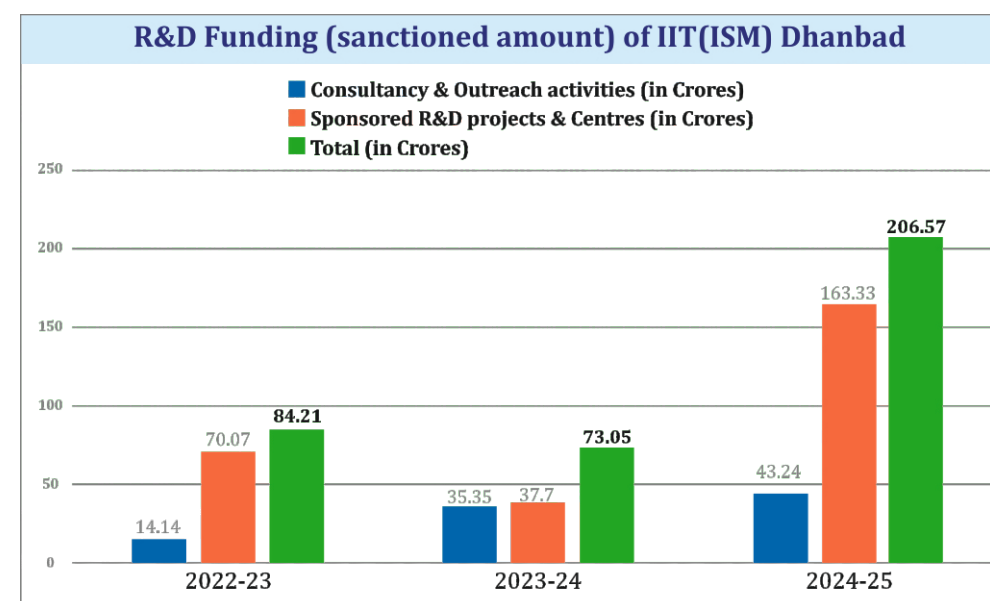
The Institute is equipped with advanced analytical instruments, fabrication facilities, high performance computing facilities, several innovation and incubation centers.

R&D Projects/ CoEs	Research Facilities	Patents/Publications/ Citations	Industrial Collaborations
<ul style="list-style-type: none"> ~ 250 Ongoing R&D Projects. 10 Externally funded CoEs. ~ 32 International Projects. Total Outlay of Ongoing Projects/CoEs: ~ 277 Crores. <p>Both fundamental and applied research are being carried out at IIT(ISM) Dhanbad</p>	<ul style="list-style-type: none"> State-of-the-Art Central Research Facility. High Performance Computational Facilities. Fabrication and 3D Printing Facilities. Departmental Research Facilities. <p>IIT(ISM) Dhanbad has one of the best Research Infrastructural Facilities at the Eastern part of India.</p> <p>600+ state-of-the-art Instruments are listed at i-STEM portal</p>	<ul style="list-style-type: none"> Total Publications: 16996 (Scopus); 10034 (WoS, 20 Years); 5719 (WoS, 5 Years). Total Citations: 230137 (Scopus); 165356 (WoS, 20 Years); 54817 (WoS, 5 Years). H-Index: 135 (Scopus); 123 (WoS). 198 Patents granted/filed in the last 5 years. 	<ul style="list-style-type: none"> ~ 359 Ongoing Industry Sponsored Consultancy Projects/Outreach Programmes. 100+ Startups & 50+ Technologies developed and delivered. 3 Section-8 companies. Total outlay of Ongoing Consultancy Projects / Outreach Program : ~ 75 Crores. <p>100+ Industry Sponsors inducing ONGC, CIL, Reliance, Tata Steel, BRO, NBCC, SAIL, NTPC, Adani, Jindal etc.</p>

What we are looking for?



Resource Generation IIT(ISM) Dhanbad Research Funding (01-04-2022 to 31-03-2025)



Dean (R&D) Team



Legacy that Inspires the Future



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