

# **TECHNOLOGY INNOVATION IN EXPLORATION AND MINING FOUNDATION [TEXMIN] IIT (ISM) DHANBAD**

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## ***MINUTES OF THE SECOND MEETING OF THE HUB GOVERNING BOARD***

**MARCH 31, 2023 at 12.15 P.M.**

**HYBRID (BOTH ONLINE AND OFFLINE)**

# AGENDA

Items	Particulars
2/1	Welcome to the Members of HGB and their brief introductions
2/2	Review of activities of the TEXMiN Foundation
	Technology Development: Projects supported under the Hub
	HRD and Skill Development: Capacity Building and Skill Development programs
	Innovation, Entrepreneurship and Start-up Ecosystem: Start-up supported/incubated by the Hub
2/3	Collaborations with Academic & Research Institutions and Industries
2/4	AOB

## List of Attendees

			Represented by
A.	Director, IIT (ISM) Dhanbad	Chairman	
	• Prof. Rajiv Shekhar		Self
B.	Academic Representatives:	Members	
	<ul style="list-style-type: none"> <li>Prof. Shalivahan, Director, Indian Institute of Petroleum and Energy (IIPE), Visakhapatnam &amp; Professor, Applied Geophysics, IIT (ISM) Dhanbad</li> </ul>		Self
	<ul style="list-style-type: none"> <li>Prof. Michael Hitch, Head of School, Western Australian School of Mines: Minerals, Energy and Chemical Engineering, Faculty of Science and Engineering, Curtin University, Australia</li> </ul>		Self
	<ul style="list-style-type: none"> <li>Prof. R. M. Bhattacharjee, Professor, Department, Mining Engineering, IIT (ISM) Dhanbad &amp; Director, TEXMiN Foundation</li> </ul>		Self
C	Industry and Research Organization Representatives	Members	
	<ul style="list-style-type: none"> <li>Shri Prabhat Kumar, Director-General, Directorate General of Mines Safety.</li> </ul>		Shri Niyazi Mohammad Director, (S&T), DGMS, Dhanbad
	<ul style="list-style-type: none"> <li>Dr. B. Veera Reddy, Director Technical, Coal India Limited</li> </ul>		Shri Achyut Ghatak, General Manager (Corporate Planning), Coal India Limited, HQ
	<ul style="list-style-type: none"> <li>Prof. Arvind Kumar Mishra, Director, CSIR-Central Institute of Mining &amp; Fuel Research, Dhanbad</li> </ul>		Self
	<ul style="list-style-type: none"> <li>Mr. Vinay Prakash, Director, Adani Enterprises and CEO, Natural Resources</li> </ul>		Self; and Shri Satish Sinha, Assoc. VP (Sustainability), AEL
D	Mission Director, Mission Office, DST	Member	
	<ul style="list-style-type: none"> <li>Dr. Ekta Kapoor, Mission Director, NM-ICPS and Head, Frontier and Futuristic Technologies (FFT) Division, DST, Govt of India</li> </ul>		Dr. JBV Reddy Scientist F, FFT Division, DST
E	Special Invitees to HGB (Representation of Financial Advisor, DST) <ul style="list-style-type: none"> <li>Shri Manoj Kumar, Director, IFD, DST, Govt of India</li> </ul>		
F	Project Director, TiH	Member-Secretary	
	<ul style="list-style-type: none"> <li>Prof Dheeraj Kumar, Professor, Mining Engineering, IIT(ISM) Dhanbad</li> </ul>		Self
G	Other Invitee	CEO, TEXMiN Foundation	
	<ul style="list-style-type: none"> <li>Shri Suraj Prakash, CEO, TEXMiN Foundation</li> </ul>		Self

## **Item No. 2/1: Welcome to the Members of HGB and their brief introductions**

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Professor Rajiv Shekhar, Chairman of the Hub Governing Board (HGB) & Director of IIT (ISM) Dhanbad, welcomed all the members of the HGB. [Annexure 1: Re-constituted HGB members]

Professor Dheeraj Kumar, Project Director (TIH) and Director, TEXMiN Foundation, introduced all the members of the HGB and informed the new members about the role of the HGB as mandated by the DST.

## **Item No. 2/2: Review of activities of TEXMiN Foundation**

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Professor Dheeraj Kumar, Project Director (TIH: Technologies for Mining) and Shri Suraj Prakash, CEO, TEXMiN Foundation, gave a detailed presentation on the activities of the TEXMiN Innovation Hub and its mandated objectives, targets as per NM-iCPS mandates, and achievements so far in Technology Development, HRD and Skill Development, Entrepreneurship Development, and Academic, Industrial, and Research Collaborations (Details on the activities carried out so far including the outcomes are shown in Annexure II)

### **TECHNOLOGY DEVELOPMENT**

- a) In-house technology development: Expert-driven research is taken up by TEXMiN in-house with technical support from faculty members of the Host Institutions.
- b) Tie-up with external companies/organizations/scientific institutions: The Technology Development Project (preferably, product/prototype development (TRL 8-10) from existing knowledge) are taken up under collaborative mode with external organizations/Institutions/companies. Project-specific agreements will be executed with such organizations/companies in line with the submitted project proposals.
- c) Project sanctioned to outside agencies: Projects are executed by outside research organizations/institutions/Scientific laboratories to develop technology in specific areas of core competence of such agencies (preferably, product/prototype development (TRL 8-10) in specific areas).
- d) Technology development by incubated/seed-funded companies: TEXMin incubated companies and TEXMiN promoted innovators carry out projects for developing innovative technology solutions for immediate problem redressals.

S. No.	Name of the Program	Total Target	Target till 3 <sup>rd</sup> year	Target Achieved
1	No of Technologies (IP, Licensing, Patents etc)	20	10	17
2	Technology Products	15	5	30
3	Publications, IPR and other Intellectual activities	45	25	12
4	Increase in CPS Research Base	70	30	38

## HRD & SKILL DEVELOPMENT

Multiple skill development activities and workshops have been organized with more than 750 participants trained in various CPS-based technologies for deployment in the mining and exploration sector.

S. No.	Name of the Program	Total Target	Target till 3 <sup>rd</sup> year	Target Achieved
1	Graduate Fellowships	97	129	49
2	Post Graduate Fellowships	21	30	10
3	Doctoral Fellowships	23	23	0
4	Faculty Fellowships	67	3	0
5	Chair Professors	20	3	0
6	Skill Development	140	210	797

### Highlights:

1. *TEXMiN Envisage portal – Designed to organize Hackathon.*
2. *TEXMiN HRMS Portal – Developed to manage projects and reports.*
3. *TEXMiN Research Intelligence – Designed for augmenting quality of research.*
4. *All Skill development programs – offer Certificate by TEXMiN and collaborating agencies.,*

S. No.	CPS Skill Development Program (June 2022 – March 2023)	No of participants
1	Underground IOT – Webinar with Talpa Solutions	97
2	Real-Time Telematics with Ecross Technologies	21
3	Resource Modelling with Dassault Systemes 3DS	23
4	Sandvik Mine Automation with Sandvik Mine and Rock Technologies	67
5	Aeromodelling & Drone Workshop with Pushpak and Rethinqtek	20
6	Sensor Technology with Qurolabs Pvt Ltd	14
7	3D Immersion with Futurotec Solutions LLP	25
8	IoT Robotics with NVCTI, IIT(ISM)	31
9	Basics of IoT with NVCTI, IIT(ISM)	16
10	Sandvik Mine automation Training with Sandvik Mine and Rock Technologies India	27
11	Sandvik Mine automation Training with Sandvik Mine and Rock Technologies India	29
12	Hands on workshop on Mobile Robots and IOT for mines with NVCTI, IIT(ISM) Dhanbad	124

## INNOVATION, INCUBATION AND ENTREPRENEURSHIP

A total of 20 start-ups are being supported as of date by the TIH, out of which eight start-ups have already commercialized their solutions for the mining industry.

Commercialization of technologies and licencing of technologies are promising to make the TIH sustainable shortly. Job creation targets are a concern. Mr. Suraj Prakash explained that this would be handled through licensing technologies, supporting spin-offs and start-ups, implementing more CPS skill training programs and increasing online participation in upcoming quarters.

S. No.	Name of the Program	Total Target	Target till 3 <sup>rd</sup> year	Target Achieved
(a)	Technology Business Incubator (TBI)	1	1	1*
(b)	Start-ups & Spin-off companies	35	25	20*
(c)	GCC - Grand Challenges & Competitions	1	1	3
(d)	Promotion and Acceleration of Young and Aspiring technology entrepreneurs (PRAYAS)	1	1	1
(e)	CPS-Entrepreneur In Residence (EIR)	21	21	1
(f)	Dedicated Innovation Accelerator (DIAL)	1	1	1
(g)	CPS-Seed Support System (CPS-SSS)	1	1	1
(h)	Job Creation	8750	3250	201

**Highlights:**

**\* TEXMiN has its own incubation program.**

**\*\*Includes 8 incubated (Seed funded) startups + 9 pre-incubated startups + 2 startups under Prayas Scheme + 1 Startup under R&D project support**

S. No.	Incubated Startups (with Equity participation)	Domain & Products/Solutions
1	Bidaal Technologies Pvt Ltd	[MINING] Smart Traffic Management ; Digital Illumination Surveying & Planning, AI-enabled Intelligent Monitoring
2	Climate-B Ventures Pvt Ltd	[MINE DISASTER MANAGEMENT] Rainfall & riverine flood risk assessment and management
3	Deep Matrix Pvt Ltd	[Geospatial Data analysis and processing] FLY, a platform-based solution provider for geospatial data-related solutions,
4	Ecross Technologies Pvt Ltd	[Real time telematics solutions] Mine Asset Tracking, Pilferage tracking, Fuel tracking
5	Futurotec Solutions LLP	[3D Visualization using Holographic Technologies] Holowall, Hologram table, and Content creation
6	Graphenera Carbon Pvt Ltd	[Carbon Enrichment] High Quality graphene manufacturing
7	Qurolabs Pvt Ltd	[SENSOR TECHNOLOGIES & IOT] Flood Level Sensing; Temperature Sensor; Air Quality Monitoring; Vibration Monitoring; Gyro Sensors; LUX Level Sensing; Automated Guided Vehicle; Position Sensors & Limit Switches
8	Incubig Innovation Pvt Ltd	[Mine Research Analytics] Patent & Research Intelligence

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### **Item No. 2/3: Collaborations with Academic and Research Institutions and Industry**

Professor Dheeraj Kumar presented in brief about the academic, research and industry collaboration of TEXMiN. The TIH has collaborated with Government bodies, other TIHs, partner agencies, industry and research partners and academic institutions. Several infrastructure facilities have been set up, including fabrication labs, data visualization labs and COEs, namely, Sandvik Mine Automation Learning Centre [Sandvik Mining and Rock Technologies, India], Coal India Innovation and Incubation Centre [Coal India Limited], Mining Technology Excellence Centre [Dassault Systems], and Geospatial Excellence Centre [ESRI India]. CoEs by Adani Enterprises and Hindalco are under consideration.

## Collaborators:

	Institute/Body	
Government Bodies	Directorate General of Mines and Safety	
	Skill council of mining sector	
Other TiH	AI4CPS, TiH of IIT Kharagpur	
	TiHAN, TiH of IIT Hyderabad	
	Awadh, TiH of IIT Ropar	
	iHub-Drishti, TiH of IIT Jodhpur	
Partner Agencies	CDAC	
	iCreate	
	Electropreneur Park, STPI Bhubneshwar	
	NCL – IIT (Bhu)	
Industry collaboration	Coal India	
	Dassault Systemes	
	Sandvik Mining and Rock Technology India Pvt Ltd	
	ESRI India Technologies Private Limited	
	Adani Enterprises Limited	
	.....+many others in active pipeline	
Academic Collaboration	I.I.T (ISM) Dhanbad	
	B.I.T Sindri	
	IIT Kharagpur	IIT Bombay
	IIT BHU	IIT Delhi
	IIT Kanpur	NIT Rourkela
	IIT Kharagpur	IIT Bombay
	.....+100 colleges under TEXMiN University program in pipeline	

The Board appreciated that these centres would provide a learning place and means for providing industry connections. The Board also appreciated the Project Director and his team for getting industrial support from major mining industries and regulatory bodies.

It was informed to the Board that Secretary DST and NM-ICPS team would visit TEXMiN Foundation from 28-29 April 2023 to inaugurate the TEXMiN Foundation on April 29, 2023.

Professor Dheeraj Kumar invited all the HGB members for their presence at the Inauguration of the TEXMiN Foundation and to witness the progress made so far in TEXMiN.



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The Board members appreciated the achievements of TEXMiN on its mandated activities and rated it excellent (Annexure – III). It was also informed to the Board regarding the visit of Dr. JBV Reddy Scientist F, FFT Division, DST and his team during December 26-27, 2022, at IIT (ISM) Dhanbad to review its activities and gave excellent feedback.

Prof. Michael Hitch expressed his good wishes for the international collaboration between Western Australian School of Mines (WASM), Curtin University (World QS 2<sup>nd</sup> rank institute in Mining & Mineral Engg) & TEXMiN and opined that WASM is also very hopeful with the collaboration as both the partner organizations and Govt. have similar goals and objectives.

Mr. Mohammad Niyazi suggested focusing on technologies that would provide digital solutions to the mining industry to make the workplace safer and smarter. He expressed satisfaction with the IIOT-based technologies being developed and implemented in mines. He further suggested that more innovations could be carried out for safety applications in mines, using 5G communications and tracking solutions.

Prof. Arvind Kumar Mishra also appreciated the developments and activities undertaken and reiterated his full support in achieving the stated objectives.

Dr. Satish Sinha expressed his satisfaction and added that Adani Excellence Centre would be set up at TEXMiN, IIT (ISM) Dhanbad as part of Adani- IIT(ISM)-TEXMiN MoU. This will result in developing more solutions for catering to mine, machine and man in the mining industry.

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Dr. J B V Reddy advised reaching out to Pan India Mining Clusters and appraising them on indigenous technologies developed by TEXMiN and its incubated partner companies for safe, smart and sustainable mining (3S Mining). It was also advised to organize workshops/meetings with policymakers from line ministries/decision makers in mining and mineral industries at various locations to discuss their problem statements, appraise them about available technology solutions, and jointly develop non-available indigenous technologies. This will give a pace to sustainability and further help TEXMiN provide CPS-based indigenous technologies needed in mining sectors.

He also advised having representation from line ministries in the HGB. Accordingly, it was suggested to request the Advisor, Coal, Ministry of Coal, Govt. of India to be a member of HGB.

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## **Item No. 2/4      AOB**

The meeting ended with a vote of thanks.