



Bureau of Indian Standards

A Report on Metallurgical and Material Science Engineering Convention

Subject: - Report of **Annual Convention of BIS** with Deans and HoDs of Metallurgical and Materials Science Engineering discipline of MoU partner Institutes

Venue : Hotel Polo Towers, Agartala, Tripura , India

Date : 27 & 28 September 2024

BIS organized a two day annual Convention for Deans and Heads of Departments (HoDs) of MoU Partner institutions of the Metallurgical and Material Science Engineering discipline. The event took place at Hotel Polo Towers on the 27 and 28 September 2024 and featured participation from 29 delegates from 26 MoU partner institutes

Day 1 (27/09/2024) - Sessions and Activities:

The event started with traditional Lamp lighting ceremony followed by rendering of Manak Geet.





Shri Dibyendu Chakrabarti, DDG (Eastern Region) welcomed all the delegates to the 2 day convention of BIS with Deans and HoDs of Metallurgical and Materials Science Engineering discipline of MoU partner Institutes and highlighted the critical role of academia in the standardization process. He informed that this is the fourth such convention in the series being conducted by BIS to strengthen the collaboration between BIS and Academia.

He underscored the significance of contributions that academicians can make and how these collaborations can drive innovation, enhance the quality of research, and integrate academic insights into national and international standards.

Shri Sanjay Pant DDG (Standardization), officially opened the programme with his key note address.

The key note address outlined the organization's core functions and its critical role in developing and maintaining national standards. Shri Pant elaborated the involvement of stakeholders, comprehensive process of standards formulation thus explaining, the stages of formulation from the initial identification of standardization needs, preparation of draft standards, wide circulation for public comments till the final gazette notification. He further highlighted the importance of BIS-Academia partnership, urging collaboration to promote science-based standardization activities.



Shri Sanjiv Maini, Scientist- F & Head, Metallurgical Engineering Department provided insights on the scope and functioning of various Technical Committees under Metallurgical Engineering division Council. In his speech, he also highlighted the role of academia in the standardization, particularly at the international (ISO/IEC) level. During his presentation, it was also highlighted that there is an immediate need of experts in various areas of metallurgical engineering to respond to the documents received at various stages of international standards formulation. Immediately after his presentation, the standardization subjects ongoing at international level were shared with all the participants for their inputs.

Shri Vishal Kumar Rana, Scientist- C briefed the participants about the standard formulation process and other core activities including certification and hallmarking of BIS. Further, the participants were encouraged to give their input on the Wide Circulated drafts.

Shri Saaqib Raahi, Scientist- C gave a live demonstration of the BIS care mobile app application explaining all the features especially 'know your standards' which enables a user to view/download the required Standards by simply entering the IS No or the keyword for search. Also, a demonstration of e-BIS portal was also offered highlighting the process of commenting on the published Indian Standards and Indian Standards under development, becoming members of Technical Committees/Working Groups, proposing new subjects for standardization etc.

Shri Aditya Das, Scientist-E & Head (HRD) gave a Technical presentation on Corrosion Protection from the standardization perspective. During the presentation, participants were introduced to Indian Standards on corrosion protection especially the terminology, test method and code of practice standards and how they can be a useful tool for a corrosion engineer. They were encouraged to utilize Indian Standards in various facets of their work, such as in their teaching pedagogy and their research methodology.

Shri Hawelikar Dushayant, Scientist-C, gave a technical presentation on Mechanical Testing of Metals. The participants were made aware about the important Indian Standards on tensile, hardness, impact and creep testing. The participating delegates were encouraged to refer to these standards in their research papers and publications as most of these standards are harmonized with international standards and have an international acceptance

Dr. Anish Upadhyay, Professor in the Department of Materials Science and Engineering at IIT Kanpur and Chairperson of the MTD 25 Technical Committee, addressed the participants, sharing his valuable insights on his longstanding association with the Metallurgical Engineering Department of the Bureau of Indian Standards (BIS). He elaborated on the various workshops, seminars, guest lectures organised jointly by BIS and IIT Kanpur. Dr. Upadhyay further encouraged participants to actively engage with BIS, particularly through their involvement in the standardization activities of the Technical Committees of the Metallurgical Engineering Department, which span a broad spectrum of metallurgical domains.

Important Points highlighted by the participants:

The various points highlighted by the delegates of MoU partner Institutes was shared as under:

1. Participants raised a concern on how standards can keep pace with innovation given that startups are developing new materials quite frequently which may need to be standardized. It was clarified by BIS that sectional committees, which are powered by the expertise of various experts, are working to continually update standards as per latest scientific research, by making use of collaborative IT tools. However, caution was advised against over-standardization, which may stifle innovation in emerging areas.
2. Participants raised concerns as to how the current application-driven approach to standardization in BIS for metallurgy and materials science will be able reconcile itself with the interdisciplinary and process-driven approach in industry towards materials science in areas such as composites, PCBs, polymers, TMT rebars, nano-materials. It was informed by BIS that while the Metallurgical Division Council has a defined scope, there are 16 other division councils under which various sectional committees are working on standardization in various different areas. Participants were encouraged to participate in any of the areas, even beyond the scope of Metallurgical Engineering Division Council, in which they have expertise and would be able to contribute to.
3. Participants raised a concern regarding the use of ASTM/DIN standards in mechanical testing of metals instead of Indian Standards. They requested that a comparative chart may be developed indicating the corresponding Indian Standards for the ASTM/DIN standards in use for mechanical testing so that they can accordingly introduce Indian Standards in labs for testing.

Identification of New subjects/areas for Standardization

The first day of the convention ended with exciting group task of finding gap area in the standardization. During the session, each of the participant was given a task to identify key areas where new standards are needed. Delegates engaged actively and following area for standardization were proposed:

Sl. No.	Institute	Name of Delegate	New Subject/area proposed for Standardization	Remarks
1.	NIT Rourkela	Prof Debasis Chaira HOD & Prof., Dept. of Metallurgical and Materials Engineering,	Standardization in Hardness testing of powder Metallurgy components: Various Hardness Tests (Rockwell, Vickers, Brinell, Koop Hardness Tests)	Powder metallurgy components contain higher amount of porosity and are not 100% dense. Although there is standardization of bulk materials, there should be standardization of PM Components
			Tensile, Compression and bend tests of PM Components	There are ASTM and MPIF standards for PM components but no Indian Standards are available for these tests of PM components.
2.	NIT Rourkela	Prof. Archana Malik	Electro galvanization- i) Pure Zinc ii) Alloy Coating (Zn/Ni; Zn/Al) iii) Composite Coatings (Zn/Al; Zn/Graphene)	Parameters to be considered: i) Thickness ii) Uniformity and grain distribution iii) S/L Hardness iv) Corrosion Rate
			Chemical Analysis of Copper Chalcopyrite Ore	—
3.	NIT Srinagar (J&K)	Dr. Yashwant Mehta	Standardization of testing protocols for Bipolar electrode corrosion using bipolar electro-chemistry	Bipolar chemistry enables creation of a linear potential gradient along the surface of the electrode, allowing for the simultaneous observation of both anodic and cathodic reaction across a single sample.
			Adoption of ISO 16111:2018 Transportable gas storage devices — Hydrogen absorbed in reversible metal hydride	This document defines the requirements applicable to the material, design, construction, and testing of transportable hydrogen gas storage systems, referred to as "metal hydride assemblies" (MH assemblies). This document is applicable to refillable storage MH assemblies where hydrogen is the only transferred media.
4.	SRM Institute of Science and Technology Chennai	Dr. Shubharata Datta	Orthopedic implants - Titanium alloys - Specifications based on mechanical properties, corrosion and biocompatibility aspects are needed.	Pure Ti or Ti-6Al-4V alloy is used generally, but there are scope for improvement with alloys of superior performance. Commercialization of such alloys are restricted due to lack of standard specifications.

			Mechanical testing methods of metallic foams.	A growing area for lightweight shock absorbing materials.
			Mechanical testing methods of Metal+ FRP Sandwich composites	- Lightweight material and e-mobility
5.	MBM University Jodhpur	Dr. Ronit Rawal	Railway Track Material	-Capacity Increased - Speed Increased - To avoid frequent accidents.
			Recycling of Metals and other materials	Due to environment-With time old tech. items will be discarded be and their disposal will be affect the environment- Recycling of EV Batteries <ul style="list-style-type: none"> • Current EV Batteries material are having life of 5-7 years only • It's huge waste. (will Create)
			Uniformity in quality control and testing standards	–
			Implementation of standards with Industry and consumer's willful acceptance	–
			Current EV Batteries	Current EV Batteries material are having life of 5-7 years only. It will create huge waste at the end of its life cycle.
6.	VSSVT, Sambhalpur Odisha	Prof Sushant Kumar Badjena	Replacement of Advanced High-Strength Steels (AHSS) Steel with TRIP (Transformation induced plasticity) or TWIP(Twinning-Induced Plasticity) Steels (New Manufacturing Technique)	–

			Using TIG Welding for joining similar or dissimilar metals.	
7.	NIT Jamshedpur	Dr. Renu Kumari	Bio-implant materials - orthopedic, Dental, and other- Properties	Bio-implant materials- The Standard Properties of the implant material need a standard because lot of implant failure is occurring & after that second Surgery is required.
			Surface modification.	Surface modification based on microstructural refinement & chemical composition change of the surface, its properties needs standardization.
			Composite coating- Ceramic oxide Coating	Composite coating, like ceramic oxide composite(for various application) its properties need to be Standardized
		Dr Binay kumar	Additive Manufacturing (3D Printing)	-
			Processes based on utilization of Hydrogen like Green Iron making & Steelmaking	
			Recycling of Metallurgical waste	
8.	NIT Raipur	Dr. S. k. Sinha	Classification & standardization of Ti6Al4V based Ti-alloys for implant application	-
			Classification & BIS Certification of Refractory Brick standardization for Steel industry.	-
		Dr Naga Sruthi Neelam	Oxidation test for high temperature applications	Need for standard testing method such as sampling , code of practice and methods of test
			Standardization of powder characteristics for Additive Manufacturing	Most widely used powder bed SLM technique is a powder-based method. Powder is the raw material and powder characterization for its characteristics is very critical. Hence, standard tests for determination of powder characteristics like powder

				size, flow rate, morphology may be formulated.
9.	National Institute of Advanced manufacture (NIANT) Technology Ranchi	Dr. Ghanshyam Das Prof. &HOD, Matarials & Metallurgists Engg	Pipeline Materials (Carrying oil/water/gas and mixture)	Internal pipeline Corrosion & its prevention is an issue in Petroleum Industries. So the NACE std. is available but we require as Indian standards as per NACE standards particularly for avoiding/minimizing internal corrosion in pipes carrying up oil/gas/crude oil.
			Internal protective coating is essentially required as per ISO Standard	
			Stress-corrosion Craacking for Steel sworking in severe corrosive environments (and it should be as per as per NACE (National Association of corrosion engineers) Standards.	
			Nanocomposite Coatings(for effective coating)	
			Bio-Implant Materials & its Nano-composite Coating	
			High temperature corrosion of sheet & its coatings under dynamic flow condition.	
			Foundry and Forged products standardization is required to fulfill the requirements of export grade products. The new emerging areas are: a) Green Smart Foundry b) Orbital forging	—
10.	VITI Mumbai	Dr. Suresh Jadhav	Testing methods - 1) Additive manufacture welding 2) Nano-indentation test 3) Fatigue testing for composite material 4) Dynamic mechanical Tests	—
			Intermetallic compounds (Ex.- Nickel Titanium alloys)	<u>Intermetallic compounds like</u> Example- Nickel-Titanium alloy exhibit unique properties- shape memory and super elasticity. Application: A) Medical device like stents B) Actuators on aerospace Lack of standards: Different ratios of nickel to titanium can result in

				significant different properties.
			Titanium aluminide (TIAL) Additively manufactured metals	Used in high temperature application particularly in aerospace. We donot have comprehensive standardized guidelines for their variations and applications
11.	IIT (ISM) Dhanbad	Dr. Shatrughan Soren Associate Professor ssoren@iitism.ac.in	Guidelines for Laboratory scale Drum pelletization of iron ore fines	The Indian Standard for laboratory scale disc pelletisation is available. However, pellet making using drum need to be required, As the properties of the product produced is different from different processes.
12.	IIT Bombay	Prof. N. Prabhu	Tensile testing of composite laminates Processing of TiAl4V alloy through additive manufacturing Impact Strength of Thermo Mechanically Treated (TMT) rebar	—
13.	IIT Kharagpur	Dr Kaushik Biswas	Standard methods of testing mechanical properties of composite materials(MMC,CMC) Standard methods of measurement of elstic constants of porous bodies (Metallic and Ceramic Composites) by ultrasonic method Use of EAF slag for production of slag-cement clinkers	—
14.	IIT Jammu	Dr Srinivasan	Biaxial tensile testing of metallic materials of sheet metals	Application of test method: a) Fabrication testing of pressure vessels/missile cones which are bound to experience biaxial stress state during service conditions b) Stamping of Sheet Metals require biaxial stress state data Justification for the standard: No Indian Standard exists for the biaxial testing of sheet metals. In addition, ASTM has not formulated any standard relating the biaxial tensile testing.

				<p>However, ISO has formulated ISO 16842 for biaxial tensile testing. But there are certain lacunas which are not addressed in the ISO standard. The ISO standard does not capture the entire biaxial stress-strain response of sheet metal until fracture. It is suitable until yield point only. Hence, a new Indian Standard is required for biaxial tensile testing of sheet metals. The following Indian standards are available which are relevant to the topic: IS 10175 (Various Parts) and IS 1608 (Various Parts)</p>
		<i>Dr Rani Rohini</i>	Standards for nanomaterials/polymers based anti-corrosive coating for metals	Explanation: In recent past, there has been development of nanomaterial/ polymer based coating for corrosion resistance of steels surfaces. These steels are commercially available as well. We need to have new standard to resolve the issue, without compromising quality
			Standards for polymer/nanocomposite based welding/joining material for metal surfaces	Explanation: Polymer based metal joining is a new alternative for many commercial products. We should have standard for the same.
15.	<i>VIT Chennai</i>	<i>Dr K. Karunamurthy</i>	Standards for fabrication and coating evacuated tube collectors(ETC)	-
			Standards for metal 3D printing	
			Standards for potting of battery terminal	
			Standards for potting of electronic circuits	
		<i>Dr Mrutuajay Paigrahi</i>	Shape Memory alloys	Used in eyeglasses, frames and automotive applications
			Biomaterials	Dental applications and drug delivery
Radioactive materials (U, Th)	For making new medicine and its use in medical imaging techniques.			
16.	<i>IIT Kanpur</i>	<i>Dr Anish Upadhyaya</i>	Rapid tooling and prototyping	-

			Better cross-pollination with other divisions(For example PGD and MTD eg Frangible P/M bullets – No standards exist)	
			Post processing steps standardization eg RP-RD and Sinter Hardening	
17.	<i>BITS Pilani</i>	<i>Dr. Arun Kumar Jalan</i>	Tribological properties of contacting surfaces for specific applications	–
			Bearings material for plastic & Polymers for Industry which may useful for industry like toys	–
			Standardize the Contacts between metal and non-metal in terms different material properties like strength, friction etc	Now in present era it is a common phenomenon in one different parts having different material it will helps to design the product in an effective way especially all kinds of dynamic component, Automotive industry are using this Concept.
18.	<i>IIT Patna</i>	<i>Dr. Anup kumar Keshav</i>	Nano composite coating material	–
			Grapheme reinforced composites	
			CNT reinforced composites	
			Nano diamond reinforced composites	
			High Entropy alloys	
			Bulk Metallic glasses	
			Plasma spray coatings	
			HVAF spray coatings	
19.	<i>IIT BHU</i>	<i>Prof Sunil Mahajan</i>	Critical Metals	–
			Recycling of PCB	
20.	<i>NIT Patna</i>	<i>Prof Prakash Chandra</i>	Smart Material	–
			MEMS	
21.	<i>MNIT Jaipur</i>	<i>Prof. Rajendra Kumar Goyal</i>	Standard for PCB properties.	–
			Standard for Electronic substrate properties	
			Standard on Polytetrathmethylene (PTFE) coated non-stick pan (wear resistance)	
			Standard on plastic bags to the (Used for liquid)	
			Standard Ag foil used for	

			sweets.	
22.	IIT Roorkee	Prof R. S.S Daniels	Aluminium Foam Metal Foam	–
23.	Shri Sai Ram Engineering College, Chennai	Dr. B. Vejaje Romnabt	Tensile-ASTM D 2344 — Basalt PVC Composite panel	Standards for testing of composite materials can be formed based on ASTM standards
			Flexural-ASTM D 2344 — Basalt PVC Composite panel	
			Tensile-ASTM D638 — Basalt PVC Composite panel	
			Flexural ASTM D 790 — Polymer Composite	
			Izod impact- ASTM D4812 — Polymer Composite	
			Hardness ASTM D 2240 — Polymer Composite	
			Standard for shear test of composites	–
Standard for delamination test of composites				
24.	RGUKT, Nuzvid Varanasi	Dr B Venkateshwar	Standardization of biomaterials.	No Indian Standard on bio-materials formulated by MTD. A large number of materials are used to replace the functioning of the human organs or to assist them. The point of mechanical integrity , corrosion, toxicity levels, bio-degradation rates etc must be standardized.

Day 2 (21-09-2024) – Interaction and Field visit:

The second day of the convention focused on strengthening the collaboration between BIS and academic institutions, particularly in enhancing the existing Memoranda of Understanding (MoUs). The Keynote Address by Shri Sanjay Pant, DDG (Standardization-II) focused on building a strategic roadmap for integrating BIS standards into academic research and curriculum. He emphasized the significance of prioritizing Indian Standards (IS) in research papers and academic work, advocating for the use of Indian standards over international alternatives. He also underscored the crucial role academic institutions would play in actively promoting Indian standards through their research contributions, apart from active participation of faculty members in the standardization work.

Suggestions by participants to make MoU more effective:

The address was followed by an interactive session where participants gave their suggestions to improve the integration of BIS activities with MoU Institutions. The suggestions from various MoU partner Institutes are given as under:

1. Participants suggested that BIS should aim to recognize institute labs for testing of metallurgical products. It was clarified by BIS that BIS runs a lab recognition scheme (LRS) to support the operation of its product certification schemes. Under the LRS, private labs which are NABL accredited and apply for BIS recognition through the LIMS portal (on eBIS) can be granted recognition whereas government labs which apply can be empanelled. BIS can also support the development/upgradation of laboratory infrastructure in MoU partner institutions which are willing take up testing of products to support BIS certification. For details, they were requested to reach out to BIS Lab Recognition and Management Department (LRMD).

2. Dr. Yashwant Mehta, Associate Professor MMED & Dean P&D, NIT Srinagar Kashmir raised the concern regarding the internship scheme of BIS. He requested BIS to expand their internship programme for the winters also as the institution remains closed during winter break only for a considerable time unlike the other institution of the country.

3. Participants suggested that BIS should organize guest lectures on standardization for students. It was informed by BIS that it is already organizing guest lectures by BIS officers in MoU partner institutions on various topics related to metallurgical engineering as well as other disciplines.

4. Participants suggested that since incorporation of standardization in course curricula may take some time, immediate implementation of Indian Standards can be done in the institute laboratories. This was agreed and participants were requested to reach out to BIS for any support required in this respect.

5. Participants highlighted that since students do not know Indian Standards, the display of Indian standards for testing in Institute laboratories may be one such step and the display of SOP's for performing the test methods as per the Indian Standards may also be displayed. It was informed by BIS that this could be further pushed by making the standard clubs in colleges more effective in addition to the support the BIS will provide.

6. Participants suggested that in addition to incorporation of standardization in the curricula of individual institutions, BIS can also request AICTE to include Indian Standards in its Model Curriculum for UG and PG courses in engineering and technology. This suggestion was noted.

7. Participants from IIT Jammu requested the BIS to create a General Introductory Book on standard, which may be introduced in the course work. Although they have already started a course on standardization

8. Participants also highlighted the need of more scientific officers considering the vast activities of BIS especially the enforcement part.

9. Participants also highlighted the need for reforming the current process of nomination of chair professors in the technical colleges, and requested BIS to frame guidelines for process of selection/nomination of chair professors by the technical colleges/institutions, in order to keep the selection transparent and fair.

For academic institutions, the key takeaways included as follows:

- Incorporation of Course/Module on Standardization and Indian Standards available on subjects included in the academic curricula to be referred during delivering of the lectures by the faculties.
- Submission of Plan for organizing technical sessions on Indian Standards at MOU partner Institutes.
- Quiz and other competitions on standards to be conducted extensively for broadening engagement with students.
- Nominating experts at International Level in ISO/IEC Panels/Working Groups/Study Groups to mark India's presence at the International Standardization.

Overall, this convention marks a significant step forward in bridging the gap between academia and standardization bodies, creating pathways for research which will directly impact policy and industry practices. It set the stage for a more dynamic partnership, ensuring that India's standards are not only in tune with global developments but are also at the forefront of technological and scientific advancements.

