

**Report of One-Week Faculty Development Programme on Advanced Manufacturing:
Latest Trends and Techniques**

Event Name: Faculty Development Programme (FDP)

Date of the Event: 15th-19th May, 2023

Duration of the Event: One-Week

Mode: Blended (online & offline)

Venue: Multipurpose Hall, Sandip University, Madhubani

Organizing Committee:

Chief Patrons: Dr. Sandip N. Jha (Hon'ble Chairman)

Shri Nityanand Jha (Hon'ble Chancellor)

Patrons: Dr. Samir Kumar Varma (Hon'ble Vice-Chancellor)

Dr. Brajendra Nath Tripathi (Dean Academics)

Convenors: Dr. Kunal Kishor Chandan (HoD, Department of Mechanical Engineering)

Dr. Gulshad Nawaz Ahmad (Asst. Professor)

Dr. Rajesh Kumar (Asst. Professor)

Co-ordinators: Mr. Anjay Kumar (Asst. Professor)

Mr. Keshav Kumar (Asst. Professor)

Objective of the Programme: The Department of Mechanical Engineering, Sandip University Madhubani, has successfully organized a one-week Faculty Development Programme (FDP) on “Advanced Manufacturing: Latest Trends and Techniques”. In this FDP, participants were introduced to various developments in advanced manufacturing technologies. Current research trends on Laser-based and Friction based processing were highlighted along with many other states of the art technological advancements like thin film deposition techniques, micromachining, manufacturing of lightweight structures and many more.

Programme Details: In this FDP renowned speakers from IIT Kharagpur, IIT Ranchi, Stanford University USA, and Welding and Joining Research Institute Osaka University, Japan have delivered lectures on recent advancement in manufacturing technologies. They have shared both theoretical and practical knowledge on the topic that would surely broaden the knowledge base of the audience. More than 200 participants from

different technical universities and institutions across the India have participated in the programme. The participants have learned about the importance of Additive Manufacturing and its role in Global Product Development and Innovation. The participants were exposed to underlying theories behind advanced manufacturing processes for next-generation manufacturing. The rich knowledge base of AM Metal Printing technologies, devices, capabilities, materials and applications, and various software tools and techniques will give participants the technical know-how of the process application for research and product development.

Brochure & Flexi:

 <p>Dr. Sandip N. Jha Hon'ble Chairman</p> <p>One Week Faculty Development Programme (FDP)</p> <p>on</p> <p>ADVANCED MANUFACTURING: LATEST TRENDS AND TECHNIQUES</p> <p>15th-19th May 2023 Organized by</p>  <p>SANDIP UNIVERSITY UGC Recognized</p> <p>Department of Mechanical Engineering Sandip University, Madhubani</p> 	<p>Organizing Committee</p> <p>Chief Patrons</p> <p>Dr. Sandip N. Jha Hon'ble Chairman</p> <p>Shri Nityanand Jha Hon'ble Chancellor</p> <p>Patrons</p> <p>Dr. Samir Kumar Varma Hon'ble Vice-Chancellor</p> <p>Dr. Brajendra Nath Tripathi Dean Academics</p> <p>Convenors</p> <p>Dr. Kunal Kishor Chandan HOD, Department of Mechanical Engineering</p> <p>Dr. Gulshad Nawaz Ahmad Asst. Professor, Department of Mechanical Engineering</p> <p>Dr. Rajesh Kumar Asst. Professor, Department of Mechanical Engineering</p> <p>Co-ordinators</p> <p>Mr. Anjay Kumar Asst. Professor, Department of Mechanical Engineering</p> <p>Mr. Keshav Kumar Asst. Professor, Department of Mechanical Engineering</p>	<p>About Sandip University</p> <p>Sandip University Madhubani is the first self-financed university of Bihar located in the Sijoul village of Madhubani district. The university offers undergraduate and postgraduate programmes in various fields, such as Engineering, Agriculture, Management, Computer Science, Library Science, and Education. The courses are designed to meet the requirements of the industry and society and are taught by highly qualified faculty members with extensive experience in their respective fields. Sandip University, Sijoul, is committed to providing a world-class education to its students by offering them state-of-the-art facilities and infrastructure. The university has a sprawling campus spread over 75 acres and is equipped with modern classrooms, laboratories, libraries, sports facilities, and residential accommodations for students. The university also provides various co-curricular and extra-curricular activities, such as sports, cultural events, and social service programs, which help students to develop their overall personality and leadership skills.</p> <p>About the Department</p> <p>The Department of Mechanical Engineering at Sandip University Madhubani, is one of the prominent departments in the university. The department offers undergraduate courses B.Tech. in Mechanical Engineering, Postgraduate course M.Tech. in Thermal Engineering, and Doctoral programmes in Mechanical Engineering. The faculty members of the department are highly qualified and experienced in their respective fields. They are committed to providing quality education to the students and helping them develop their skills and knowledge in the field of Mechanical Engineering. The department is equipped with modern infrastructure, including well-equipped laboratories, workshops, and classrooms. The students get hands-on experience in various areas of Mechanical Engineering through practical training and industrial visits.</p>
---	---	---



SANDIP UNIVERSITY
(UGC Recognized)

बिहार की सर्वश्रेष्ठ निजी विश्वविद्यालय

One Week Faculty Development Programme (FDP)

on

"Advanced Manufacturing: Latest Trends and Techniques"

Organized By:

Department of Mechanical Engineering,
School of Engineering & Technology

15th to 19th May 2023

Mode: Blended (Online & Offline)

Venue: Nena Jha Auditorium, SANDIP University, Madhubani

7001885875
8210986624 | TOLL FREE 1800-315-2714 | 7076 60 7322

SIJOU, MADHUBANI, BIHAR - 847235 | SANDIPUNIVERSITY.EDU.IN/SIJOUL

Programme Schedule:

Sl. No	Topic	Time
DAY 1 (15/05/2023), Monday		
1	Inaugural Session	11.00 AM -11.15 AM
2	Chief Guest / Resource Person Address	11.15 AM-11.55 AM
3	Lunch Break	12:00 PM – 1:00 PM
4	Introduction of expert	1:30 PM
5	Session by Dr. Sumanta Mukherjee Assistant Professor, Department of Mechanical Engineering, BIT Sindri Ph.D. IIT Kharagpur Research Interests: Design for Additive Manufacturing (DfAM), Selective Laser Melting, Light Weight Structures	1:40 PM
6	Valedictory function: (a) Overview of the session (b) Closing remarks	3:00 PM onwards
6	Notice about feedback form	4:00 PM onwards
7	Feedback from audience	4:00 PM onwards
DAY 2 (16/05/2023), Tuesday		
1	Introduction of expert	1:30 PM
2	Session by Dr. Md. Shahid Raza Research Associate, Department of Mechanical Engineering, IIT Kharagpur Ph.D. IIT, Kharagpur Research Interests: Laser Material Processing, Additive Manufacturing, Metal Foams	1:40 PM
3	Valedictory function: (a) Overview of the session (b) Closing remarks	3:00 PM onwards
4	Notice about feedback form	4:00 PM onwards
5	Feedback from audience	4:00 PM onwards
DAY 3 (17/05/2023), Wednesday		
1	Introduction of expert	1:30 PM
2	Session by Dr. Abhishek Sharma Assistant Professor, Research Division of Materials Joining Mechanism, Osaka University, Japan Research Interests: Composite Material	1:40 PM

	Processing, Friction Stir Welding, Friction Surface Processing	
3	Valedictory function: (a) Overview of the session (b) Closing remarks	3:00 PM onwards
4	Notice about feedback form	4:00 PM onwards
5	Feedback from audience	4:00 PM onwards
DAY 4 (18/05/2023), Thursday		
1	Introduction of expert	1:30 PM
2	Session by Dr. Syed Sadique Anwer Askari Assistant Professor, Department of Electronics and Communication Engineering IIT Ranchi, Jharkhand Ph.D. IIT (ISM), Dhanbad Research Interests: Thin Film Coating, Electron Beam Evaporation RF/DC Magnetron Sputtering, Fabrication of Solar Cell Devices	1:40 PM
3	Valedictory function: (a) Overview of the session (b) Closing remarks	3:00 PM onwards
4	Notice about feedback form	4:00 PM onwards
5	Feedback from audience	4:00 PM onwards
DAY 5 (19/05/2023), Friday		
1	Introduction of expert	1:30 PM
2	Session by Dr. Avinash Kumar Visiting Professor, Stanford University, USA & Assistant professor, IITDM Kancheepuram (Department of Mechanical Engineering) Research Interests: Fabrication technologies for MEMS, Micro-fluidics, Bio-medical Devices and Health Care	1:40 PM
3	(a) Overview of the session (b) Closing remarks	3:00 PM onwards
4	Valedictory and Vote of Thanks:	Dr. Brajendra Nath Tripathi (Dean Academics, Sandip University, Madhubani) 3:15 PM onwards
5	Notice about feedback form	4:00 PM onwards
6	Feedback from audience	4:00 PM onwards

Inaugural Session:



Lamp Lighting



Inaugural speech by Hon'ble Vice-Chancellor



Participants



FDP brief by Dean Academics



Session hosting by Dr. Rajesh



Felicitation of guest by Dean Academics



Felicitation of guest



Mechanical Engineering Department of guest

Day 1 (15/05/2023): Lecture session by Dr. Sumanta Mukherjee



Dr. Sumanta Mukherjee

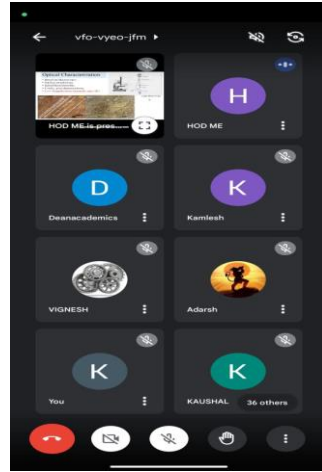
Assistant Professor, BIT Sindri

Topic: Design and Manufacturing of Lightweight Structures

Dr. Sumanta Mukherjee did his B.Tech in Production Engineering from Jadavpur University, Kolkata. He obtained his M.Tech and Ph.D. from the Department of Mechanical Engineering, IIT Kharagapur. Presently Dr. Mukherjee is working as an Assistant Professor at BIT Sindri, Jharkhand. He has authored multiple research papers in internationally reputed journals and has two patent applications, out of which one has already been granted. His research interests include design for additive manufacturing and biomedical applications of additive manufacturing.



Lecture session by Dr. Sumanta Mukherjee

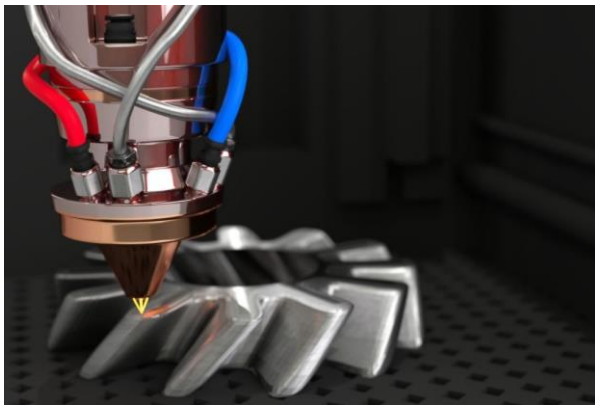


Participants in online mode



Participants in offline mode

Day 2 (16/05/2023): Lecture session by Dr. Mohammad Shahid Raza



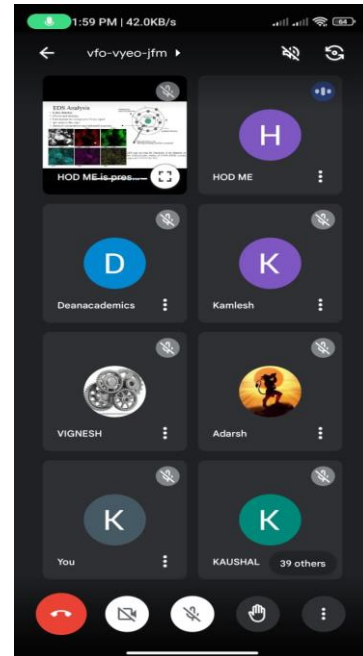
Dr. Mohammad Shahid Raza

Research Consultant (Additive manufacturing), IIT Kharagpur
Topic: Additive Manufacturing:Processes, Testings and Case Studies

Dr. Mohammad Shahid Raza is a researcher in Laser Material Processing with a PhD in Manufacturing Technology in the Mechanical Engineering Department, IIT Kharagpur. He completed his Master from IIT_ISM Dhanbad on Manufacturing Tecgnologies. Presently, he is working as a Research Consultant (Additive manufacturing) in Centre of Excellence in Advanced Manufacturing Technology, IIT Kharagpur . He is actively working in laser forming, welding, and additive manufacturing processes and its experimental and numerical analysis.



Lecture session by Dr. Mohammad Shahid Raza





Participants in online mode



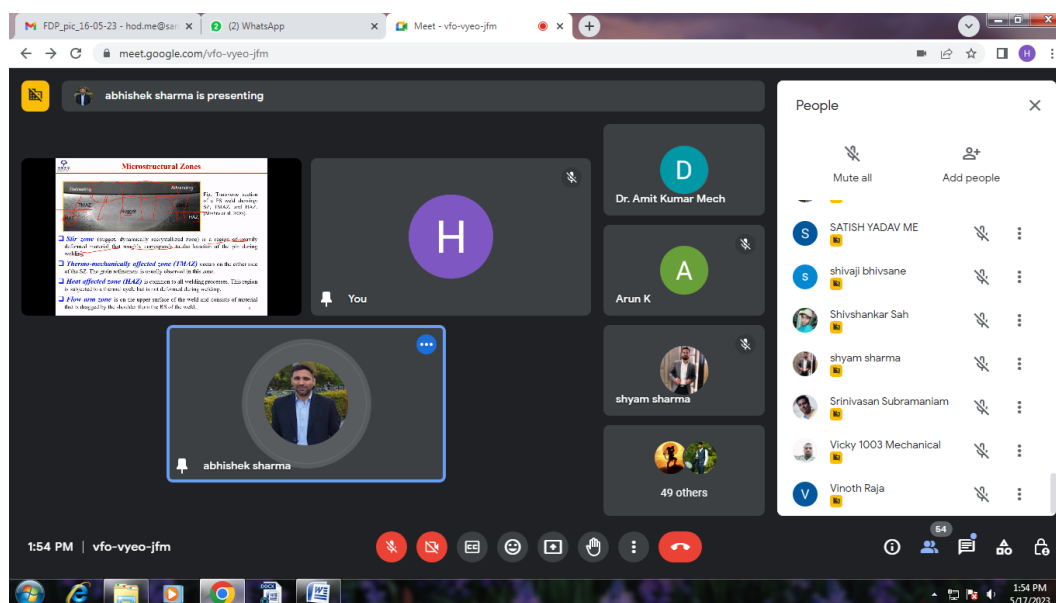
Participants in offline mode

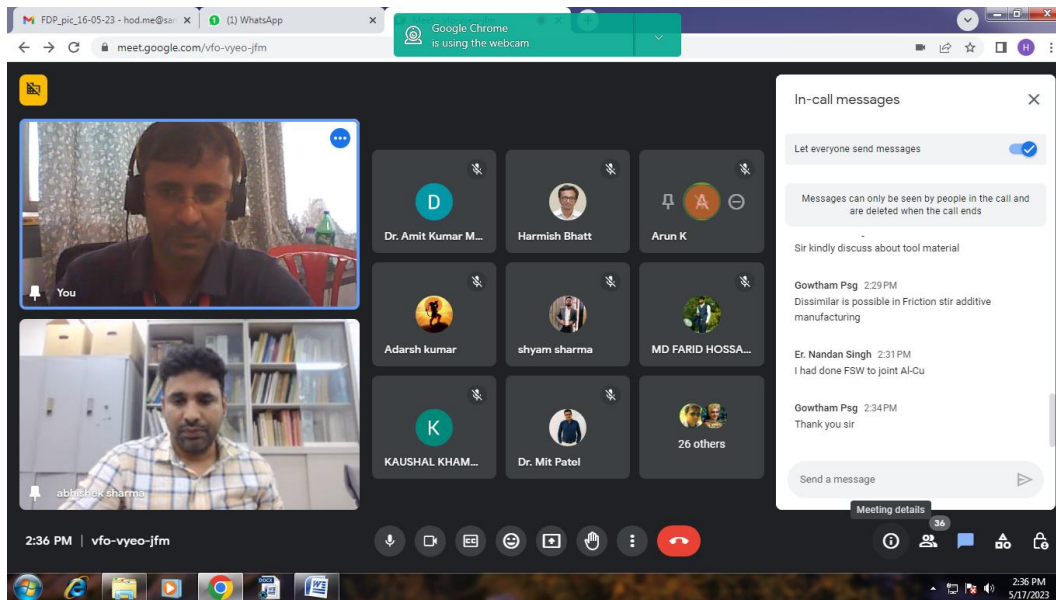
Day 3 (17/05/2023): Lecture session by Dr. Abhishek Sharma



Dr. Abhishek Sharma
Specially Appointed Assistant Professor
JWRI, Osaka University, Japan
Topic: Overview of Friction stir welding & allied processes

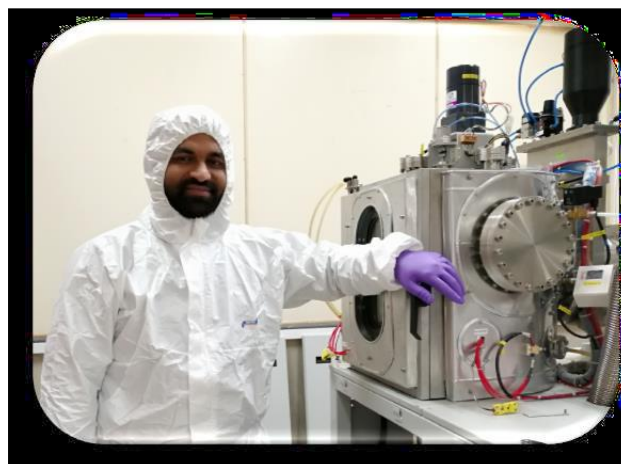
Dr. Abhishek Sharma is currently working as a specially appointed assistant professor in the Research Division of Materials Joining Mechanism at Joining & Welding Research Institute (JWRI), Osaka University, Japan. His primary research focus includes the development of solid-state friction stir welding and processing of aluminium alloys. He is also actively engaged in the development of Al-based composites with carbonaceous reinforcements such as Graphene, CNTs, graphite, etc. He worked for 2 years as a specially appointed researcher (post-doctoral fellow) at JWRI, Osaka University before getting promoted to Assistant Professor. Dr. Sharma obtained his Ph.D. from the Indian Institute of Technology Kharagpur and M.Tech from NIFFT Ranchi. He has published around 27 SCI/SCIE research articles in various reputed international journals and has presented his works at 8 international conferences.





Participants in online mode

Day 4 (18/05/2023): Lecture session by Dr. Syed Sadique Anwer Askari



Dr. Syed Sadique Anwer Askari

Assistant Professor, IIIT Ranchi

Topic: Recent Trend in Thin Film Deposition Strategy by Physical Vapour Deposition (PVD) System: Surface Engineering in Advanced Manufacturing

Presently, he is working as Assistant Professor at in Dept. of Electronics and Communication Engineering at IIIT Ranchi. He received his B. Tech degree in Electronics and Communication Engineering, from West Bengal University of Technology, Kolkata, India and M. Tech degrees in Electronics and Communication Engineering, from ISM Dhanbad, India, respectively in 2010 and 2012. He worked as Junior Research Fellow at Department of Electronics & Electrical Communication Engineering of IIT, Kharagpur, India in 2013-2014. He completed the Ph.D. degree in photovoltaics from the Department of Electronics Engineering, IIT(ISM) Dhanbad, India in 2021. He was a recipient of the M.H.R.D. Scholarship for Masters and Doctoral Study. He served as Vice-President of SPIE Student Chapter and OSA student Chapter IIT

(ISM) Dhanbad and active member of various technical and professional societies, such as IEEE, OSA and SPIE. He is a life fellow member of Optical Society of India (OSI) and Life Member of Solar Energy Society of India (SESI). He worked as Research Associate under the Centre of Excellence in Renewable Energy, in 2019-2021 and under Dept. of Electronics Engineering in 2021-2023 at IIT (ISM) Dhanbad. His current research is focused on Modeling of spectral response of Quantum dot solar cell, Simulation and PVD Growth of complete oxide based Thin Film Solar Cell and Metal-oxide Semiconductor based Thin Film Solar Cell. He served as a Reviewer of many journals including IEEE Journal of Photovoltaics, IOP Semiconductor Science and Technology, IET Micro & Nano Letters, European Physical Journal Applied Physics.

The screenshot shows a Google Meet window with a presentation slide titled "Evaporation". The slide content includes:

- Evaporation**
- Simplest technique to deposit thin films
- Materials to be evaporated is heated in an evacuated chamber so that it can attain gaseous state.
- Vapour of Materials transported to target in vacuum.
- Film quality is often not as good as sputtered film (that involves energetic bombardment of ions to the as-deposited film, which makes the film denser).
- The film thickness can be monitored precisely using a quartz balance

The diagram illustrates the process: Source (Solid/Liquid) → Evaporation → Gas Phase → Transport & Deposition → Solid Phase (Change in physical morphology). It also shows a physical chamber diagram with a substrate and source.

Meeting details: 2:37 PM | vfo-vyeeo-jfm

The screenshot shows a Google Meet window with a presentation slide titled "Chamber Configuration Cont...". The slide contains a schematic diagram of a vacuum chamber system with the following components:

- Motor
- Substrate (target)
- Vacuum chamber
- Vent valve
- Vacuum gauge
- Thickness monitor
- High current source (> 100A)
- Source
- High vacuum pump
- Rough vacuum pump

Meeting details: 2:31 PM | vfo-vyeeo-jfm

Participants in online mode

Day 5 (19/05/2023): Lecture session by Dr. Avinash Kumar



Dr. Avinash Kumar

Visiting Assistant Professor, Stanford University, USA
Assistant Professor, IITDM, Kancheepuram
Topic: Laser machining and its applications

Dr. Avinash is an Assistant Professor in the Department of Mechanical Engineering at the Indian Institute of Information Technology, Design and Manufacturing (IIITD&M) Kancheepuram. He is also affiliated as Visiting Assistant Professor in the Department of Mechanical Engineering at the School of Engineering, Stanford University, California, USA 94305. Dr. Avinash obtained his Ph.D. from IIT Delhi and M. Tech from the Department of Mechanical Engineering, IIT Kanpur. In the past, he worked as a Post-Doctoral Fellow at the Indian Institute of Technology Kanpur until 2019. He also worked as Research Associate with Prof. G. K. Ananthuresh and Prof. Ashitava Ghoshal in Robert Bosch Centre for Cyber Physical system, Mechanical Engineering Department, Indian Institute of Science Bangalore for a year (2013). He has authored multiple research papers in internationally reputed journals, and has presented his works at national and international conferences. His research interests include Fabrication Technologies (Micro/Nanofabrication, Laser Machining, and Surface Engineering) for MEMS, Micro/Nano-fluidics, Bio-fluidics, Bio-medical Devices and Health Care.

Flow anisotropy: general introduction

$\langle Q \rangle = k_{eff} \langle \Delta P \rangle$

Hydraulic Permeability: k_{eff} h = height of channel
 Q = flow rate
 P = applied pressure

Where, $K_{NS} = \frac{h^2}{12\mu}$

$b_{1^0} = \begin{pmatrix} b_1 & 0 \\ 0 & b_2 \end{pmatrix}$ $b_{2^0} = \begin{pmatrix} b_1 \cos^2 \theta + b_2 \sin^2 \theta & (b_2 - b_1) \cos \theta \sin \theta \\ (b_2 - b_1) \cos \theta \sin \theta & b_2 \cos^2 \theta + b_1 \sin^2 \theta \end{pmatrix}$

$k_{eff} = \begin{pmatrix} k_1 \cos^2 \theta + k_2 \sin^2 \theta & (k_2 - k_1) \cos \theta \sin \theta \\ (k_2 - k_1) \cos \theta \sin \theta & k_2 \cos^2 \theta + k_1 \sin^2 \theta \end{pmatrix}$

$\theta_{OPTIMAL} = \tan^{-1} \left(\frac{k_1}{k_2} \right)$ $\phi_{opt} = \tan^{-1} \left(\frac{1}{2} \left(\sqrt{\tan \theta} - \frac{1}{\sqrt{\tan \theta}} \right) \right) = \tan^{-1} \left(\frac{k_1 - k_2}{2\sqrt{k_1 k_2}} \right)$

θ = angle between applied pressure and principal direction
 ϕ = angle between flow direction and applied pressure

In-call messages

Let everyone send messages

Messages can only be seen by people in the call and are deleted when the call ends

PINTU KUMAR YADAV 1:50 PM
PINTU KUMAR YADAV CIVIL DEPARTMENTSANDIP UNIVERSITY
VERY GOOD PRESENTATION SIR

You 2:34 PM
If any query, please write in the chat box

Gowtham Psg 2:35 PM
Laser machining process is applicable for hybrid manufacturing process sir??

Send a message

Participants in online mode

Programme Outcomes:

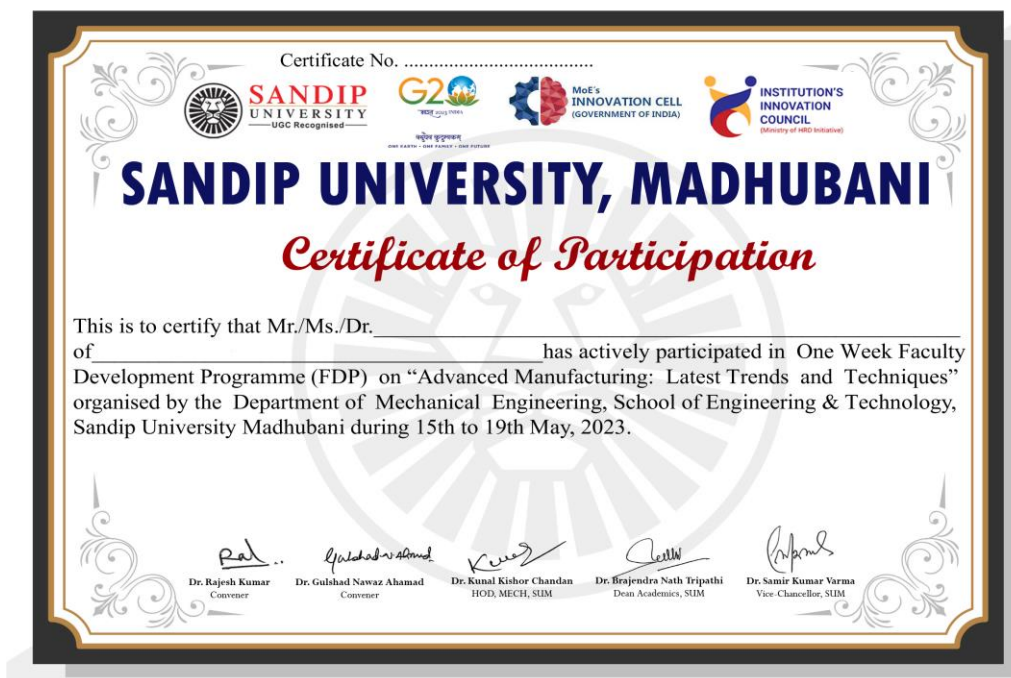
Through this one week FDP on “Advanced Manufacturing: Latest trends and Techniques” participants have gained a comprehensive understanding of various additive manufacturing techniques, 3D printing, and their applications in different industries. They have also learned about laser machining for bio-medical devices fabrication, frictions surface processing, and thin film deposition process.

1. Enhanced understanding of lightweight structures: Participants have gained a deep understanding of the principles, concepts, and techniques involved in the design and fabrication of lightweight structures. They have learned about the selection of lightweight materials, optimization, methods,

structural analysis, bio-mimicry technique, and manufacturing processes specific to lightweight structures.

2. Additive manufacturing: Participants understand the principles of additive manufacturing and various processes of 3D-printing and their applications. They have gained knowledge about the principles, process, materials, and parameters involved in additive manufacturing. The programme also covers the design consideration, post-processing techniques, quality control, materials testing, and characterizations.
3. Friction surface processing: Participants have learned about friction-based surface processing techniques i.e., friction stir welding, friction surfacing, and friction based additive manufacturing. The programme also covers the application of friction surface processing in joining, repair, and surface modification of materials. Participants get insights into process, optimization, defects, and quality control.
4. Thin film deposition: This topic focuses on the deposition of thin films onto various substrates. Participants have learned about different deposition techniques i.e., physical vapour deposition (PVD) and chemical vapour deposition (CVD). The programme covers the application for thin film in electronic, optics, solar cell devices fabrication, coatings, and energy storage. Participants have explored the materials used in thin film deposition, and characterization techniques.
5. Laser machining and its application: This topic focuses on the use of lasers for precision machining and fabrication in the bio-medical field. Participants have explored how laser machining can be utilized to fabricate customized implants, prosthetics, medical devices, and tissue engineering scaffolds.

Certificate:



Rajesh Kumar

Dr. Rajesh Kumar
Assistant Professor

Gulshad Nawaz Ahamad

Dr. Gulshad Nawaz Ahamad
Assistant Professor

Kunal Kishor Chandan

Dr. Kunal Kishor Chandan
HoD, Mechanical Engineering

Brajendra Nath Tripathi

Dr. B. N. Tripathi
Dean Academics

Samir Kumar Varma

Dr. Samir Kumar Varma
Hon'ble Vice-Chancellor

