



A Report on

Five-Day Faculty Development Program (FDP)

“Contemporary Progressions, Challenges and Issues in Metal 3D Printing Technology”

19th – 23rd June 2023

The Department of Mechanical Engineering, MITS and Faculty Development Program (FDP) cell, JNTUA in association with ISTE AP section jointly organized a 5-Day FDP program titled "Contemporary Progressions, Challenges and Issues in Metal 3D Printing Technology" from 19.06.23 to 23.06.23 at Madanapalle Institute of Technology & Science, Madanapalle.

The registration started at 9.00 a.m. in the Fluid Mechanics & Hydraulics Lab. The Honorable Vice Chancellor of JNTUA **Prof. G. Ranga Janardhna** was invited as a chief guest for the inauguration ceremony along with a resource person Dr. S. Anand Kumar from IIT Jammu. The Inauguration started by 9.45 a.m. at Auditorium, MITS. The Vice principals, Deans, HoDs, Faculty & Staff members from various departments, External participants from various institutes and Students were participated in inauguration ceremony.



Welcoming Honorable Vice Chancellor Prof. G. Ranga Janardhna



Lighting the Lamp



Opening Remarks by Dr. S. Baskaran, Coordinator



Welcome Remarks by Dr. M. Lakshmana Rao, HoD, Dept. of ME, MITS



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Fig. 1 Inauguration Ceremony by Honorable Vice Chancellor of JNTUA Prof. G. Ranga Janardhna

Mrs. Rupshree Ozah anchored the entire inauguration ceremony. She welcomed the Coordinator, HoD, Principal, Resource person and Chief guest to the Dais. The program started with a prayer song and with lighting of a lamp. **Dr. S. Baskaran**, Coordinator has given the opening remarks about the FDP program. **Dr. M. Lakshmana Rao**, HoD, Department of Mechanical Engineering, MITS welcomed all the external participants and other dignitaries off the dais. **Dr. C. Yuvaraj**, Principal, MITS has delivered a welcome note to the dignitaries and highlighted the institute achievements, facilities and wished all the participants to attend the



FDP program and learn new things. **Dr. S. Anand Kumar, Resource Person (19.06.23)**, IIT Jammu delivered a speech on the importance of 3D printing technology to the audience.

The Honorable Vice Chancellor of JNTUA **Prof. G. Ranga Janardhna** congratulated the MITS for organizing the FDP and given a motivational talk to the audience. He highlighted the latest trends in mechanical engineering field at National and International forum. He shared his valuable experience to the participants and reasons for funding to conduct the FDP program in JNTUA affiliated colleges. He blessed all the participants, coordinators and others for the smooth conduction of FDP for five days. **Dr. R. Prithvirajan, Coordinator** proposed a vote of thanks. Really, we are very thankful to Vice Chancellor of JNTUA **Prof. G. Ranga Janardhna** garu and Director, FDP Cell, **Prof. B. Eswara Reddy** garu for providing financial support to the Department of Mechanical Engineering, MITS to conduct FDP program. After the inauguration ceremony, high tea was provided to participants and others then the lectures were started as per the program schedule.

Date: 19.06.23, Session: I & II, Resource Person: Dr Anand Kumar S, IITJammu

Dr Anand Kumar from **Indian Institute of Technology, Jammu** has given the first lecture on “Key aspects of Design for Additive manufacturing (DfAM)”. He delivered the lecture in three parts as mentioned below

Part I: Motivation to Additive Manufacturing: A Manufacturing Perspective

Part II: Design for Additive Manufacturing: A critical methodology enabler for complex and functional geometrical parts

Part III: Promising Engineering Applications of DfAM Approaches, Case studies - DfAM approaches

His lecture was very informative to the participants and given more insights on 3D metal printing technology.



Fig. 2 Session I & II by Dr. S. Anand Kumar, IIT Jammu on 19.06.2023 FN

Date: 19.06.23, Session: III & IV, Resource Person: Dr. M. Ravi Sankar, IIT Tirupati

Dr. M. Ravi Sankar has delivered a talk on Post processing of additive manufactured complex internal & external features. Post processing is the very important process especially for complex shape products fabricated by metal printing. He explained the complications of the various post processing techniques such as polishing, grinding, abrasive flow machining.



Fig. 3 Session III & IV by Dr. M. Ravi Sankar, IIT Tirupati on 19.06.2023 AN

Date: 20.06.23, Session: I & II, Resource Person: Dr. S. Renold Elsen, VIT Vellore

The second day lecture started with **Dr. Renold Elsen** from VIT vellore. He covered the basics of 3D metal printing, classification, various process parameters and applications. Also, he shared his own experience in the development of a metal additive manufactured Ti-6Al-4V alloy control arm plate using generative design.



Fig. 4 Session I & II by Dr. S. Renold Elsen, VIT Vellore on 20.06.2023 FN

Date: 20.06.23, Session: III & IV, Resource Person: Dr. C. Karunakaran, Additive 3D

Dr. C. Karunakaran is an industrialist and presently working as a Design Engineer in Additive 3D. He delivered a talk on Experimental Investigation of Residual Stress Induced during Deep Cold Rolling of Aerospace components & Cases studies. His session was very informative and discussed more on the microstructure, residual stress, surface roughness of electron beam additive manufactured Alloy 718.



Fig. 5 Session III & IV by Dr. C. Karunakaran, Additive 3D on 20.06.2023 AN

Date: 21.06.23, Session: I & II, Resource Person: Dr. K. Senthilkumaran, IIITDM

The third day started with Dr. K. Senthikumaran from IIITDM, Kanchipuram. He delivered a talk on Material efficiency in additive manufacturing. His lecture was entirely different, he discussed about the various standards available in 3D metal printing and later discussed the importance of material efficiency in detail.



Fig. 6 Session I & II by Dr. K. Senthilkumaran, IIITDM Kanchipuram on 21.06.2023 FN

Date: 21.06.23, Session: III & IV, Resource Person: Dr. Sohini Chowdhury, IIT Madras

Dr. Sohini Chowdhury is a senior researcher at IIT Madras. She delivered a talk on Fundamentals & Future Research Trends in Additive Manufacturing. She covered all the basics related to 3D metal printing and specific applications, trends in additive manufacturing. The session was very informative to the participants.



Fig. 7 Session III & IV by Dr. Sohini Chowdhury, IIT Madras on 21.06.2023 AN

Date: 22.06.23, Session: I & II, Resource Person: Dr. Ram Prabhu, DRDO

Dr. Ram Prabhu from DRDO has given a wonderful session on Research opportunities in additive manufacturing & Case studies. His talk was very informative and mostly interactive mode. He exposed various research problems related to 3D metal printing such as processing of steels, super alloys, Ti alloys, Al alloys and various opportunities.

**Fig. 8 Session I & II by Dr. Ram Prabhu, DRDO, Bangalore on 22.06.2023 FN****Date: 22.06.23, Session: III & IV, Resource Person: Mr. B N Manjunath, CMTI**

Mr. B.N. Manjunath is working as a Scientist C at CMTI, Bangalore. He delivered a lecture on Metal additive manufacturing design for metal additive manufacturing. He covered different aspects of designing a component for 3D metal printing. He discussed various projects carried out at CMTI Bangalore.

**Fig. 9 Session III & IV by Mr. B N Manjunath, CMTI, Bangalore on 22.06.2023 AN****Date: 23.06.23, Session: I & II, Resource Person: Mr. G. Radhakrishna, ARK Infosolutions**

The final day of the FDP program started with Mr. G. Radhakrishna, Senior Application Engineer at ARK infosolutions Pvt Ltd, Bangalore. He discussed on the topic of Novel applications of metal additive manufacturing & its challenges. His lecture gave more insights to the participants on the challenges of additive manufacturing. He showed different working animations and videos on different types of metal printing.



Fig. 10 Session I & II by Mr. G. Radhakrishna, ARK Infosolutions Pvt Ltd, Bangalore on 23.06.2023 FN

Date: 23.06.23, Session: III & IV, Resource Person: Dr. Solomon Bobby, EOS

Dr. Solomon Bobby, Director of EOS company which is one of the top most manufacturer of 3D printers in the world. He has given the talk on Metal printer, A user friendly? or Research friendly? His lecture was amazing, interactive and informative. He discussed many aspects of standards, challenges, opportunities and trends in metal printing.



Fig. 11 Session III & IV by Dr. Solomon Bobby, EOS, Bangalore on 23.06.2023 AN

Valedictory Ceremony

Dr. Anantharaman, Assistant Professor, Dept. of Mechanical Engineering, MITS anchored the valedictory ceremony. The Principal, MITS and Associate Dean R & D, MITS graced the valedictory ceremony. **Dr. S. Baskaran** briefed about the summary of the FDP program and thanked all the participants for providing support and attending the 5 Day program. **Dr. C. Yuvaraj**, Principal congratulated all the participants on their completion of FDP and thanked JNTUA, MITS Management and Principals & Managements of external participants for sending the faculty members to attend the 5 Day FDP program. Later, we took feedback from the participants to get suggestions and improvements for the future events. Finally, we distributed the participation certificates to the participants. At the end, the group photo was taken with all the participants.



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Valedictory Ceremony

Fig. 12 Valedictory Ceremony



Feedback from External participant



Feedback from Internal participant

Fig. 13 Feedback form participants



Certificate distribution to participant



Certificate distribution to participant



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Fig. 14 Certificate Distribution



Fig. 15 Group photo of participants with MITS Principal Dr. C. Yuvaraj