

**A Report on Workshop**  
**“Hands-on 3DP Workshop on Design Optimization and Part Printing”**  
**Organized by Department of Mechanical Engineering**  
**in association with ISTE student chapter**  
**on 12.09.2024**



**Submitted by: Dr. Rupshree Ozah and Dr. Dhruvajit Sarma, Assistant Professor, Department of Mechanical Engineering**

**Resource Person:**

1. **Dr. Solomon Bobby, Director (Training), EOS India Pvt. Ltd.**
2. **Mr. C. Karunakaran, Design Engineer, EOS India Pvt. Ltd.**
3. **Mr. Selvanayagam, Engineer, EOS India Pvt. Ltd.**

**Venue: Scaleup Room and CAD/CAM Lab-1 (ME dept.)**

**Attendance: 60 participants, including faculty and students**

**Mode of Conduct: Offline**

The Department of Mechanical Engineering, in association with the ISTE Student Chapter, successfully organized a "Hands-on 3DP Workshop on Design Optimization and Part Printing" on 12th September 2024 at Madanapalle Institute of Technology & Science. The workshop aimed to provide participants with practical insights into advanced additive manufacturing technologies, design optimization, and 3D part printing.

**Inaugural Session (9:45 AM)**

The inaugural session of the workshop commenced with Mr. Md. Azmathullah (IV BTech student). He welcomed and invited the distinguished dignitaries onto the stage, which included Coordinator of the event, Dr. Rupshree Ozah, Assistant Professor (ME Department) and Dr. S. Baskaran, Head of the Department of Mechanical Engineering, Dr. C. Yuvaraj, the Principal of MITS, and the Chief Guest, Dr. Solomon Bobby, Director (Training) at EOS India Pvt. Ltd. Additionally, the Guests of Honor were Mr. C. Karunakaran and Mr. Selvanayagam from EOS India Pvt. Ltd.

The event began with the lighting of the lamp by the Chief Guest and other dignitaries, symbolizing the start of a fruitful learning experience.

Dr. Rupshree Ozah, the coordinator of the event, delivered the opening remarks, emphasizing the relevance of design optimization in the evolving field of additive manufacturing. This was followed by a welcome note from Dr. S. Baskaran, Head of the Mechanical Engineering Department, who highlighted the department's ongoing efforts to bring industry expertise to students.

Dr. C. Yuvaraj, the Principal of MITS, addressed the gathering, focusing on the significance of additive manufacturing in the current industrial scenario. He urged the students to take full advantage of the opportunity to learn directly from the experts at EOS India Pvt. Ltd.

The chief guest, Dr. Solomon Bobby, in his address, shared his expertise and offered valuable insights into the latest advancements in additive manufacturing technologies. He stressed the importance of continuous learning in keeping pace with industry trends and innovation.

The session concluded with a vote of thanks by Dr. Dhruvajit Sarma, the co-coordinator, who expressed gratitude to the Management of MITS, dignitaries, resource persons, and participants for their involvement.

### **Technical Sessions**

Following the inaugural session, the workshop proceeded with a series of technical and hands-on sessions led by the resource persons from EOS India Pvt. Ltd.

#### **Session 1: Insights into Advanced Additive Manufacturing**

The first technical session, led by Dr. S. Solomon Bobby, provided a detailed overview of advanced additive manufacturing technologies. Dr. Bobby introduced the participants to the various types of 3D printing technologies, including Fused Deposition Modeling (FDM), Selective Laser Sintering (SLS), and Direct Metal Laser Sintering (DMLS). He elaborated on

how these technologies are being utilized across different industries to enhance product development cycles, improve customization, and reduce material waste. Dr. Bobby's session also covered the key challenges associated with additive manufacturing, such as material limitations, surface finish quality, and post-processing requirements. This session was particularly beneficial for students and faculty who were new to the field, as it laid a solid foundation for understanding the technical aspects of 3D printing.

### Session 2: Introduction to Design Optimization and Case Study

The second session was conducted by Mr. C. Karunakaran, a Design Engineer at EOS India Pvt. Ltd. His session focused on the principles of design optimization; a crucial aspect of 3D printing that ensures parts are manufactured with minimal material usage while maintaining structural integrity. Mr. Karunakaran presented a detailed case study that demonstrated how design optimization can lead to significant cost savings and performance improvements in industrial applications. The case study provided a practical example of how topology optimization, a subset of design optimization, can be used to create lightweight yet durable components. Participants were highly engaged during this session, as it gave them a clear understanding of how theoretical concepts are applied in real-world manufacturing processes.



### Session 3: Hands-on Design Optimization Tutorial

Following the theoretical sessions, participants were given the opportunity to apply what they had learned through a hands-on tutorial on design optimization. Under the guidance of the resource persons, the participants used specialized software tools to optimize the design of a given part. The expert team provided step-by-step instructions on how to use topology optimization to improve the design's efficiency while maintaining its functionality. This interactive session allowed the participants to explore various design possibilities and better understand the role of optimization in additive manufacturing.

### Session 4: Hands-on Topology Optimization and Part Printing

The final session of the day involved the actual 3D printing of optimized parts. The team from EOS India brought a Functional Deposition Modeling (FDM) machine to the venue, enabling participants to witness the complete process of 3D printing firsthand. In this session, participants applied the design optimizations using Autodesk 360 fusion student version from the previous session to create parts that were then printed using the FDM machine. The expert team provided guidance on how to prepare the digital models for printing, set up the machine, and monitor the printing process. The tangible results of this session—actual 3D printed parts—were a highlight for many participants, as they could see the direct outcome of their design efforts.

### Conclusion:

The "Hands-on 3DP Workshop on Design Optimization and Part Printing" was a success, offering participants a unique opportunity to learn from industry experts and gain practical experience with cutting-edge technology. The workshop not only deepened the participants' understanding of additive manufacturing and design optimization but also sparked a sense of curiosity and innovation among them. The expert team from EOS India Pvt. Ltd. played a crucial role in ensuring that the sessions were both informative and interactive, catering to the needs of the participants.

### Outcome:

The workshop's hands-on sessions on design and topology optimization offered participants practical experience in using design software, allowing them to apply theoretical concepts in a real-world context. The interactive nature of the sessions, combined with the use of industry-standard tools, strengthened participants' technical skills, making them more confident in applying optimization techniques in future projects.

A key highlight was the hands-on 3D printing experience, where participants optimized their designs and saw them transformed into physical parts using an FDM machine. This hands-on exposure to the entire AM process, from design to production, reinforced their learning and provided tangible results of their efforts.

The event also fostered closer collaboration between academia and industry. EOS India's involvement allowed participants to gain insights into real-world industrial applications and standards, inspiring students to pursue further research and innovation in the field of AM. The workshop also positioned participants for better employability by equipping them with skills directly applicable in the modern manufacturing sector. Overall, the workshop was a resounding success, achieving its goals of enhancing knowledge, fostering innovation, and bridging the gap between academia and industry.