

REPORT OF NON SPONSORED/LOCAL ACTIVITIES ORGANISED BY CENTRES / OVERSEAS CHAPTERS

Name of Centre	ANDHRA PRADESH		
Name of the Centre / Forum	ANDHRA PRADESH STATE CENTRE		
Title of the Seminar:	Simulation and modelling for Additive Manufacturing		
Under the aegis of which Divisional Board:	Aerospace		
Program Date:	06th - 02 - 2025	Program Time:	2 PM
Associate organization (if any):	LBRCE		
No. of Participants logged in	188		



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Report of Non-sponsored Activities

Number of Attendies – 188 Members (8 Corporate Members +180 Non Member)

Simulation and modelling for Additive Manufacturing
Lecture by Shri. Adwaith Gupta, Founder and CEO Paanduv Applications,



Shri. Adwaith Gupta, Founder and CEO Paanduv Applications



Audience

1. Introduction

Shri Adwaith Gupta, the Founder and CEO of Paanduv Applications, delivered an insightful and comprehensive presentation focused on the pivotal role of simulation and modelling in additive manufacturing (AM). The session explored how advanced computational modelling techniques can revolutionize AM processes by improving efficiency, optimizing material usage, and minimizing defects.

Paanduv Applications is a technology company at the forefront of computational physics, AI, and scientific software development. The company focuses on providing cutting-edge solutions to various industries, with a specialization in additive manufacturing and related domains.

2. Paanduv Applications: Overview

- **Company Background:** Paanduv Applications is a leading technology company that works with industries ranging from aerospace to automotive and defense, offering advanced software tools designed to optimize manufacturing processes.
- **Core Competencies:**
 - Computational physics and simulations
 - Artificial intelligence and data-driven models
 - Scientific software development for process optimization
- **Mission:** Paanduv Applications aims to transform manufacturing processes by integrating state-of-the-art simulation and computational models into industries that rely heavily on additive manufacturing techniques.

3. Introduction to Additive Manufacturing (AM)

Shri Gupta began the presentation by providing a clear definition of additive manufacturing and its relevance in modern industrial processes. AM refers to the process of creating three-dimensional objects by adding material layer by layer, which contrasts with traditional subtractive manufacturing methods. The main advantages of AM are:

- Customization of parts
- Complex geometries that would be impossible with traditional methods
- Material efficiency and reduced waste

4. The Importance of Simulation and Modelling in AM

- **Simulation in Additive Manufacturing:** Simulation plays a vital role in optimizing AM processes. It allows manufacturers to predict and analyze various aspects of the production process before physical production begins. This includes thermal behavior, structural integrity, and material properties.
- **Types of Simulations:**

1. Thermal Simulation: Predicts temperature distribution during the printing process, which can affect material properties and part quality.
2. Mechanical Simulation: Analyzes stress, strain, and deformations to ensure structural integrity.
3. Material Modeling: Simulates how different materials behave under specific conditions during the printing process.

Simulation enables manufacturers to predict defects such as warping, residual stresses, and delamination before they occur, reducing the risk of costly mistakes and rework.

5. AM PravaH Software by Paanduv Applications

A significant portion of the presentation focused on AM PravaH, a comprehensive 3D computational software tool developed by Paanduv Applications. This software provides users with powerful tools for simulating and optimizing the additive manufacturing process.

Key Features of AM PravaH:

- Comprehensive Process Modeling: AM PravaH simulates various additive manufacturing techniques such as Laser Powder Bed Fusion (LPBF), Directed Energy Deposition (DED), and welding processes for both metals and plastics.
- Process Optimization: It helps identify areas for optimization by simulating multiple factors, including material behavior, laser interactions, and part orientation.
- Multilayer Modeling: It provides accurate predictions for multilayer processes, crucial for ensuring quality in complex builds.

Advantages of AM PravaH:

- Improved Material Efficiency: The software helps minimize waste by predicting optimal usage of material.
- Enhanced Build Quality: It predicts defects such as distortion, porosity, and cracks, enabling manufacturers to adjust their process before building the part.
- Cost Reduction: By optimizing the design and production process, AM PravaH helps manufacturers reduce the overall cost of production.

6. Collaborations and Partnerships

Shri Gupta highlighted a key collaboration between Paanduv Applications and the Indian Defence Organisation to enhance metal additive manufacturing simulation. This collaboration is particularly important for military applications, where precision and material integrity are crucial. By integrating Paanduv's simulation tools into the defense sector, the partnership aims to advance the development of highly reliable and cost-effective AM processes for military applications.

7. Key Applications in Industry

Shri Gupta discussed various industry applications where simulation and modeling play an essential role:

- **Aerospace:** Simulation allows aerospace manufacturers to design complex, lightweight structures with optimized material use, while ensuring compliance with strict performance standards.
- **Automotive:** By simulating the additive manufacturing of parts, manufacturers can explore new geometries that reduce weight and improve performance.
- **Medical Devices:** Simulation helps in designing custom implants and prosthetics tailored to individual patient needs.
- **Defense:** For military applications, high-precision parts and components are crucial. Simulation ensures that every part meets stringent specifications for performance and durability.

8. Future Developments

Shri Gupta concluded his presentation by providing insights into the future directions of additive manufacturing simulations. Paanduv Applications is working on expanding the capabilities of AM PravaH to include:

- **Laser Beam Shaping:** Improved simulation of laser beam distribution to enhance the precision of the AM process.
- **Non-Spherical Powder Particle Modelling:** Modeling non-spherical particles will further improve material deposition accuracy.
- **DED Process Enhancements:** Adding dedicated modules for Directed Energy Deposition, which is expected to bring significant improvements in large-scale metal printing processes.

These developments will contribute to more accurate simulations and better overall optimization of the additive manufacturing process.

9. Conclusion

Shri Adwaith Gupta's presentation provided invaluable insights into the transformative potential of simulation and modelling in additive manufacturing. By using computational tools like AM PravaH, manufacturers can optimize their processes, reduce defects, and explore new possibilities in product design and material usage. With continuous advancements in simulation technology, the future of additive manufacturing looks promising, offering enhanced efficiency, precision, and cost-effectiveness across a range of industries.

Felicitation of Chief Guest.



Felicitation of Shri. Adwaih Gupta, Founder and CEO Paanduv Applications

Felicitation of Dignitaries



Felicitation of Prof. (Dr.) M L S Deva Kumar, FIE



Felicitation of Prof. (Dr.) A V Naresh Babu, FIE

Chairman, IEI APSC



**Felicitation of Dr. C V Sriram, FIE
Imm. Past Chairman, IEI APSC**

Hon. Secretary, IEI APSC



**Felicitation of Er. Alapati Prasad,
FIE, Corporate Member**