



Date: 25-06-2026

DEPARTMENT OF MECHANICAL ENGINEERING

Report on Faculty Development Program

Sustainability-Driven Mechanical Engineering: Challenges, Innovations and Opportunities

FDP Schedule: 15-06-2026 to 20-06-2026

Name of the Coordinators:

1. Dr. P.Ravindra Kumar, Professor
2. Dr. Ch.Siva Sankara Babu, Assoc. Professor
3. Mr. K.V.Viswanadh Asst.Professor

Audience: Faculty Participants, Research Scholars, P.G. Students

Total Number of Registrations: 295

Total Number of Participants eligible for certificates: 197

Objective of the Event:

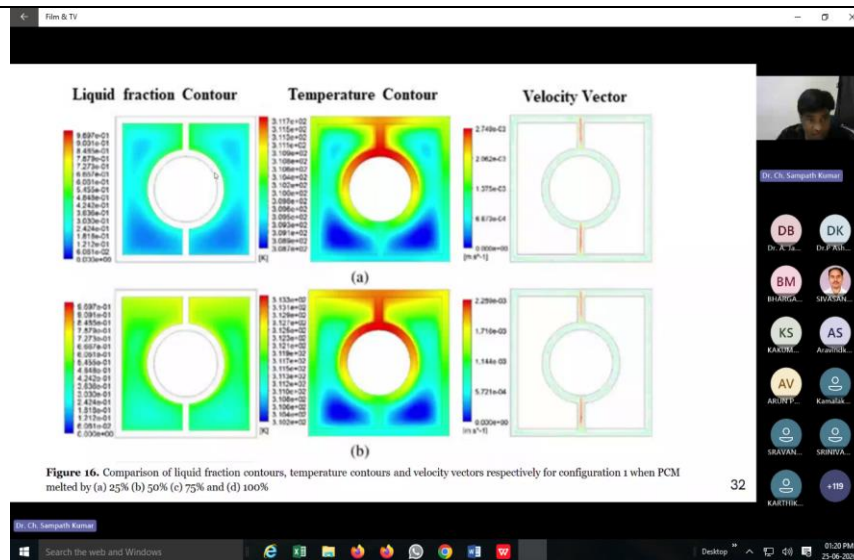
1. To familiarize participants with emerging sustainable technologies in design, manufacturing, thermal and energy systems.
2. To develop awareness on global sustainability challenges, climate change, energy conservation and environmental protection.

Outcome of the Event:

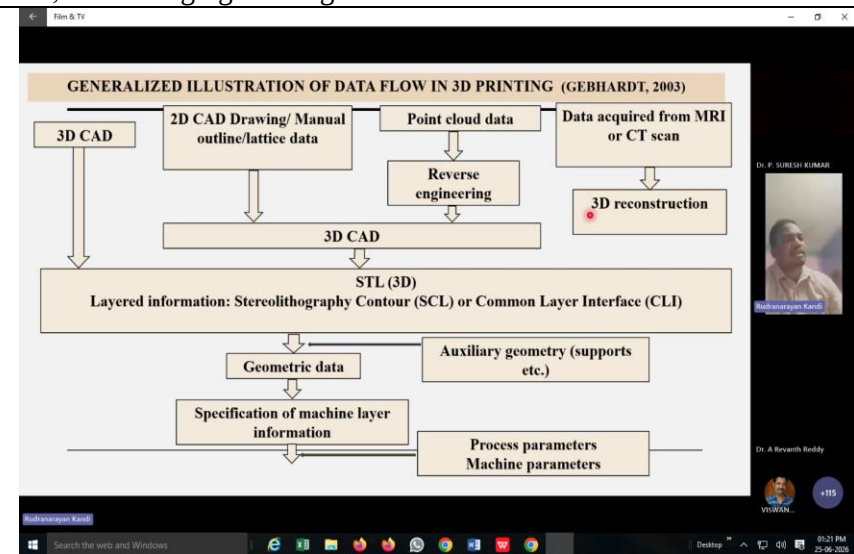
1. Understand modern sustainability challenges in Mechanical Engineering.
2. Explore innovative technologies for energy and environmental sustainability
3. Develop research ideas in sustainable mechanical systems
4. Integrate smart and sustainable solutions into teaching and research activities
5. Enhance industry-oriented knowledge in emerging sustainable technologies

Resource Persons

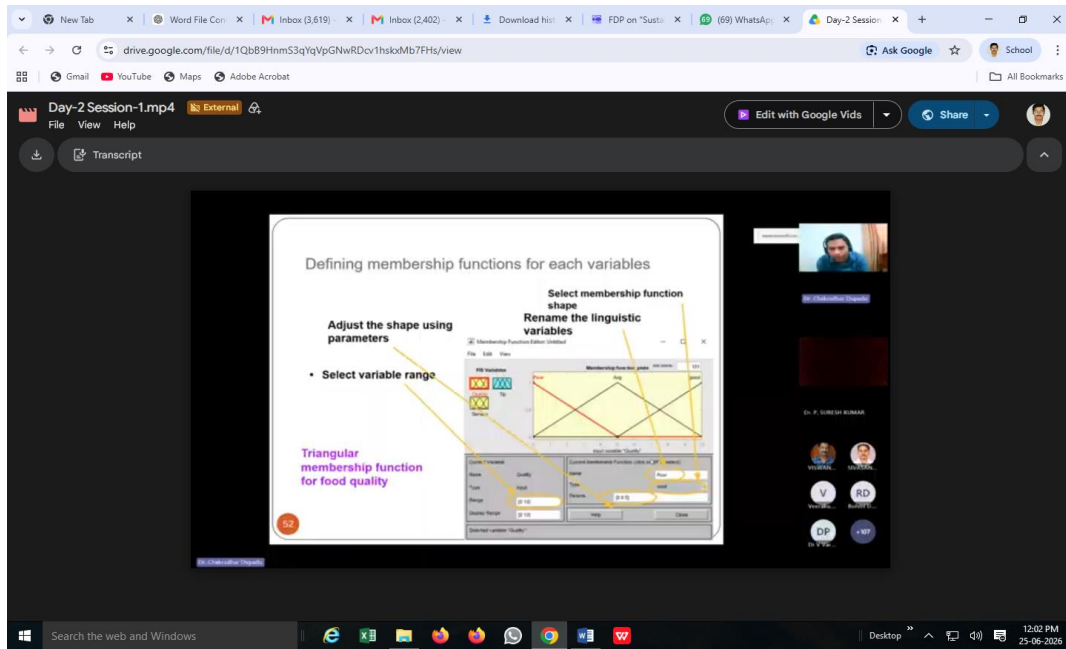
- 1) Dr. P. Anil Kumar, Scientist-G, RCI, DRDO
- 2) Dr. Chakradhar Dupadu, IIT Palakkad
- 3) Dr. Ankush Kumar Jaiswal, IIT Hyderabad
- 4) Dr. Chinige Sampath Kumar, NITW, Warangal
- 5) Dr. Krishna Kishore Mugada, NIT Surat
- 6) Dr Rudranarayan Kandi, NIT Rourkela, Odisha
- 7) Dr. Anil Kumar Birru, NIT Manipur
- 8) Dr. Thella Babu Rao, NIT A.P.
- 9) Dr. Kaki Venkata Rao, NITTTR Kolkata
- 10) Dr. M. Pullarao, IIITDM, Kurnool
- 11) Dr. Ramana MV, Application Engineer, CAE Structural Solutions Private Ltd, Hyderabad
- 12) Dr. G. Radha Krishna, Presidency University, Bangalore



- 1) 15-06-2026 – Morning Session- **Dr. Chinige Sampath Kumar, NITW, Warangal**
Title: Battery Thermal Management Systems for Electric Vehicles: Battery Technologies, Thermal Requirements, and Emerging Cooling Solutions



- 2) 15-06-2026 – Afternoon Session - **Dr Rudranarayan kandi NIT Rourkela, Odisha**
Title: Fundamentals to Additive Manufacturing and its recent applications in diverse fields



3) 16-06-2026 – Morning Session **Dr. D. Chakradhar**, Indian Institute of Technology Palakkad
Title: Artificial Intelligence in Manufacturing

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CHALLENGES

Taxonomy of Key Challenges

Challenge	Specific Issue	Affected Signal(s)	Impact on TCM
Complex cutting dynamics	Chatter-induced spectral smearing	Vibration, AE	Wear features masked by chatter harmonics
Complex cutting dynamics	Non-stationary force transients	Cutting force	Feature instability across tool life stages
Sensor noise & interference	Electromagnetic interference on current sensors	Spindle current	False wear alarms; threshold drift
Process variability	Batch-to-batch workpiece hardness variation	Force, vibration	Model prediction error +20-40%
Process variability	Cutting condition changes (speed, feed, DoC)	All modalities	Domain shift; model generalisation failure
Data scarcity & imbalance	Severe wear events are rare	All modalities	Class imbalance degrades classifier recall
Model generalisation	Cross-machine, cross-material transfer	All modalities	Accuracy drops 15-30% on unseen machines
Direct measurement	Chip/coolant occlusion of cutting	Vision/optical	In-situ flank wear imaging is

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4) 16-06-2026 - Afternoon Session **Dr. Thella Babu Rao**, National Institute of Technology AP
Title: AI-Enabled Multi-Sensor Monitoring and Tool Condition Prediction in Intelligent Metal Cutting

❑ Delta Mechanism for AM

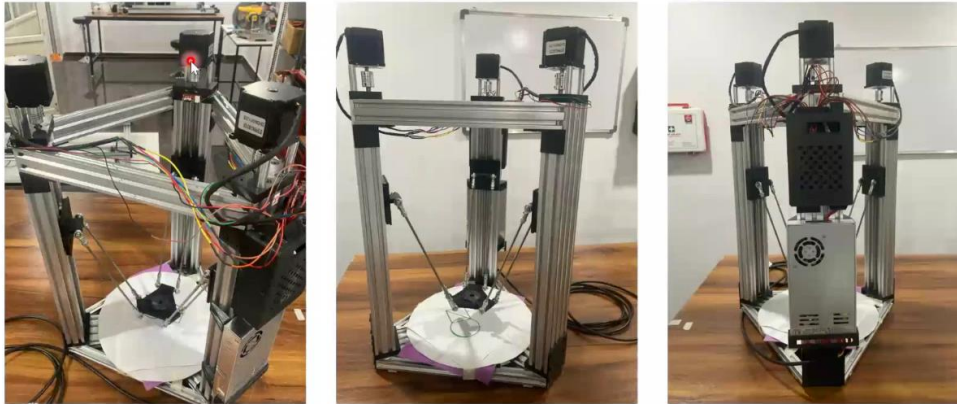


Figure: Delta Robot of Lab Scale for AM in different views

5) 17-06-2026 - Morning Session- **Dr. Krishna Kishore Mugada, NIT Surat**

Title: Wire Arc Additive Manufacturing of Curved components with multi-Sensor Fusion for Process control

Introduction to 3D Printing: History, Principles, and Applications

Early Days: The 1980s
3D printing originated in the 1980s with the development of stereolithography, a process using UV light to solidify liquid resin layer by layer. This early form of additive manufacturing laid the foundation for the technology we see today.

Rapid Evolution: The 1990s and 2000s
The 1990s saw the introduction of various 3D printing techniques, including fused deposition modeling (FDM), where thermoplastic materials are extruded layer by layer. The 2000s witnessed the emergence of open-source software and desktop 3D printers, making the technology more accessible.

Advancement and Diversification: The Present Day
Today, 3D printing has evolved significantly, encompassing a wide range of techniques and materials. It finds applications in various industries, from prototyping and manufacturing to personalized medicine and art.

6) 17-06-2026 - Afternoon Session- **Dr. Anil Kumar Birru, NIT Manipur**

Title: Innovations in Biomedical 3D Printing

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- To create Geometry, we have two methods: method-1: Importing and Method-2: Creating
- Method -1:** Go to Geometry > To import already created Geometry > Select file from My links > click on Import Geometry Tab> Click Yes (It will replace geometry with new file).
- If you want both old and new geometry, use Duplicate/Import component.
- You can import geometry from SC2TL file, UNV file

Geometry

My Links tool bar

Warning: New geometry information will replace the current geometry. Are you sure you want to continue?

Yes No

Geometry

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- Acquisition settings, Triggering levels, Data Storage, Windowing, will automatically update please check all parameters once > Increment > Select test method > FRF Setting > Select Auto reject with overload, Detect double impact and Auto reject with double impact > Select Geometry feedback > Close.

Measure

All Settings

Acquisition Settings

Triggering

Data Storage

Windowing

Increment

Ready

3DPre-Test:134

3DPre-Test:158:~Z (Acc)

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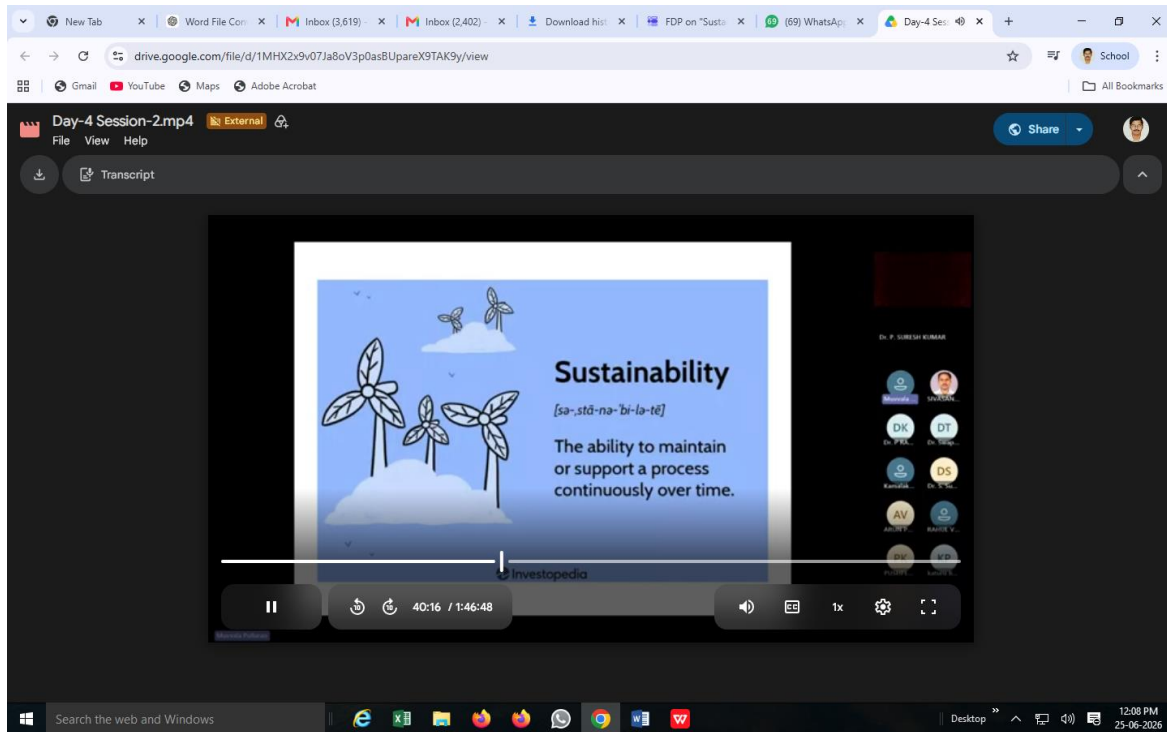
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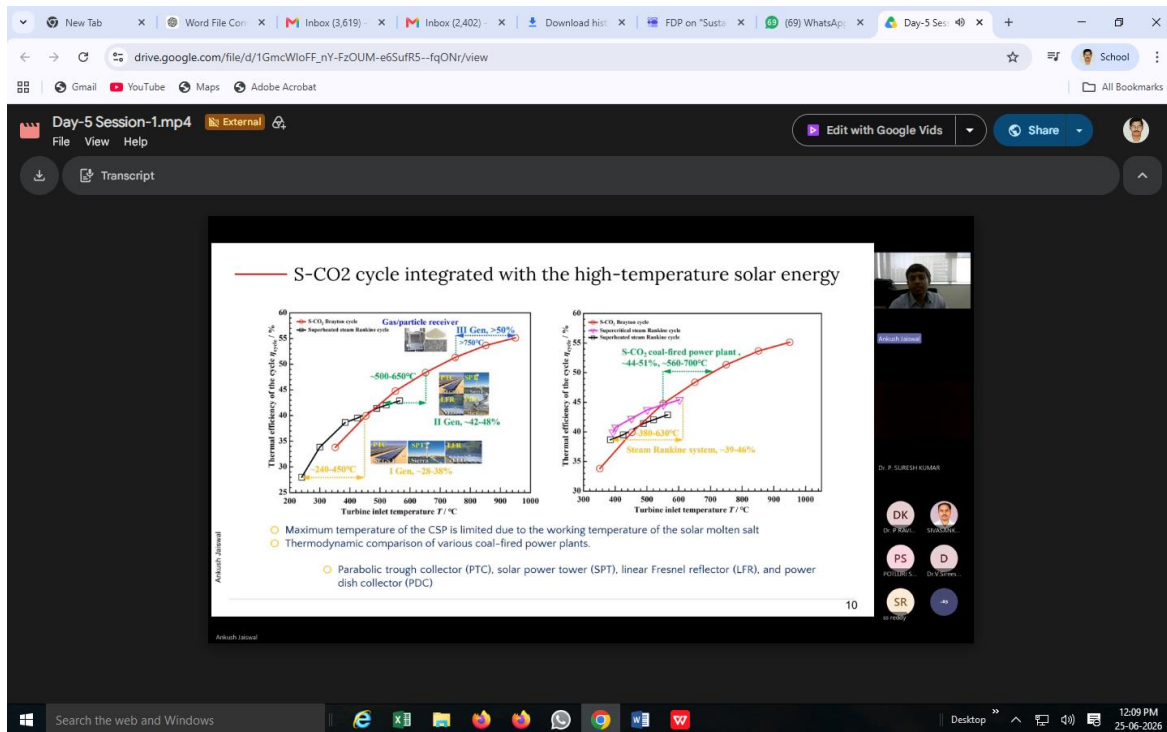
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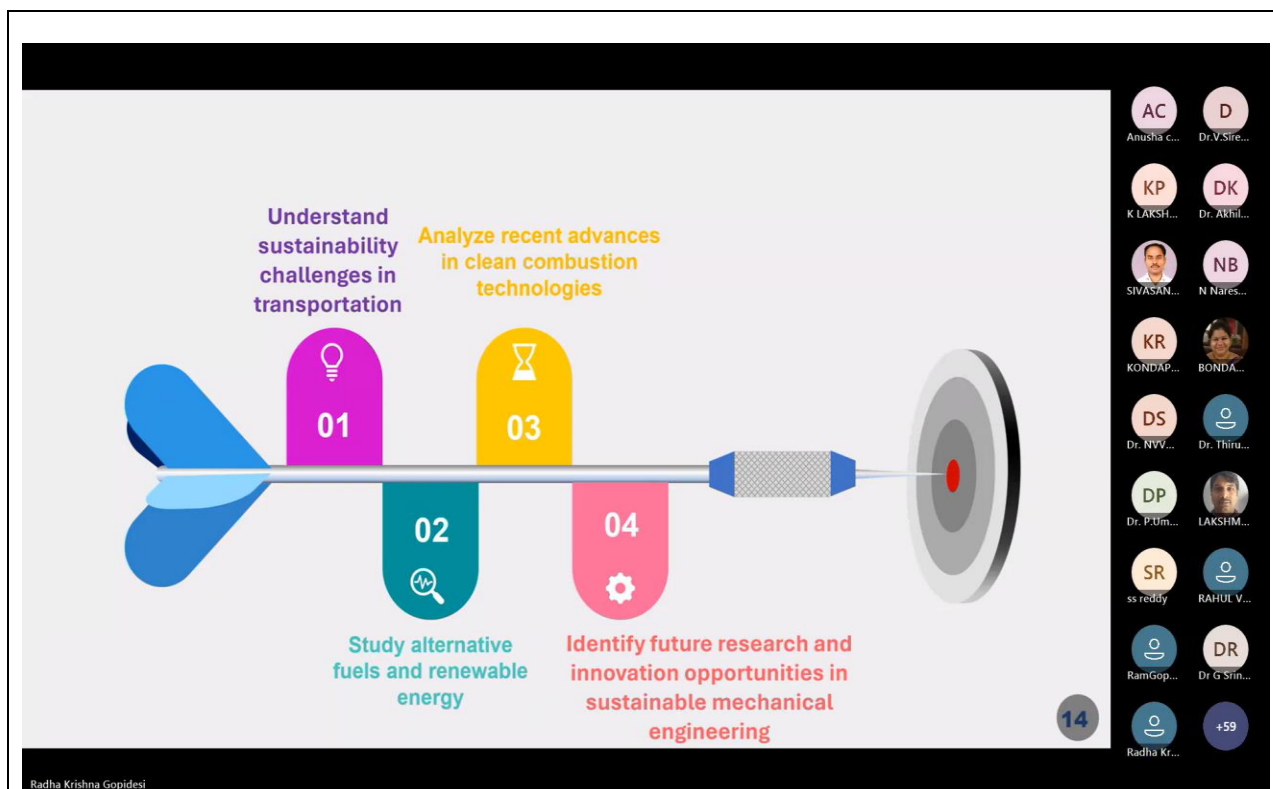
7) 18-06-2026 - Morning Session- Dr. Ramana MV, Application Engineer, CAE Structural Solutions Private Limited, Hyderabad
 Title: Pre-Test Planning in Experimental Modal Analysis: Industrial Applications and Case Studies



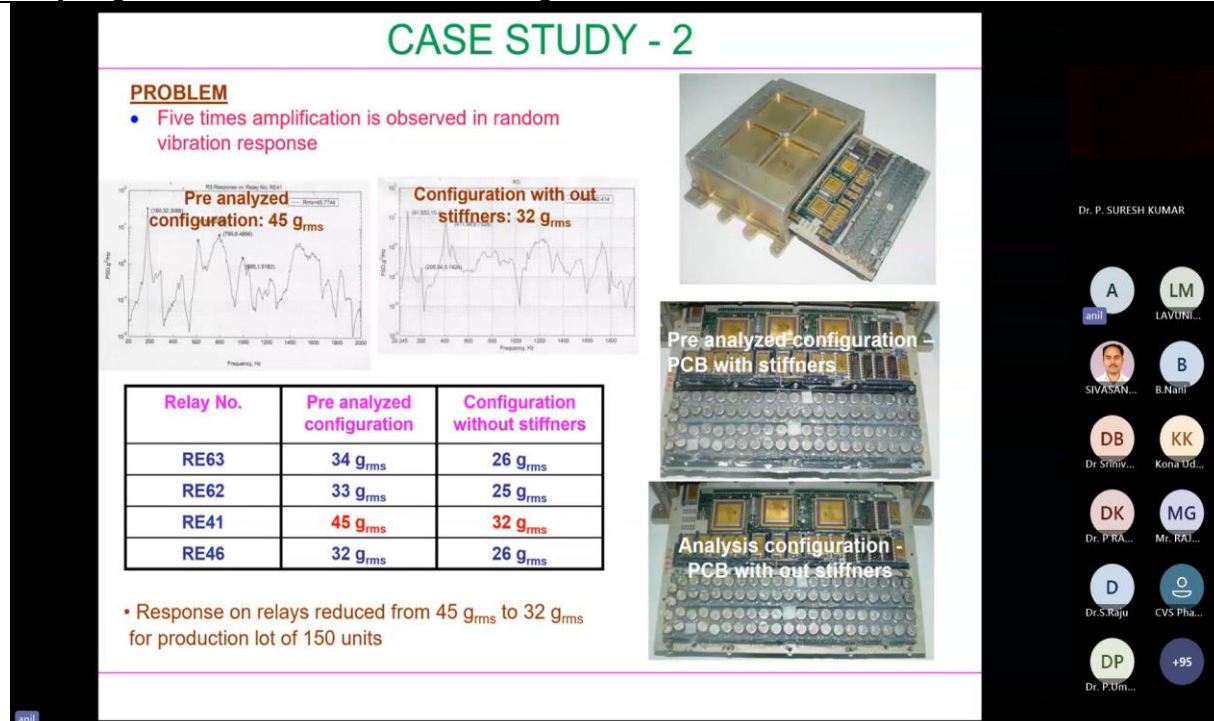
8) 18-06-2026 - Afternoon Session- **Dr. M. Pullarao, IIITDM, Kurnool**
Title: Sustainable Design



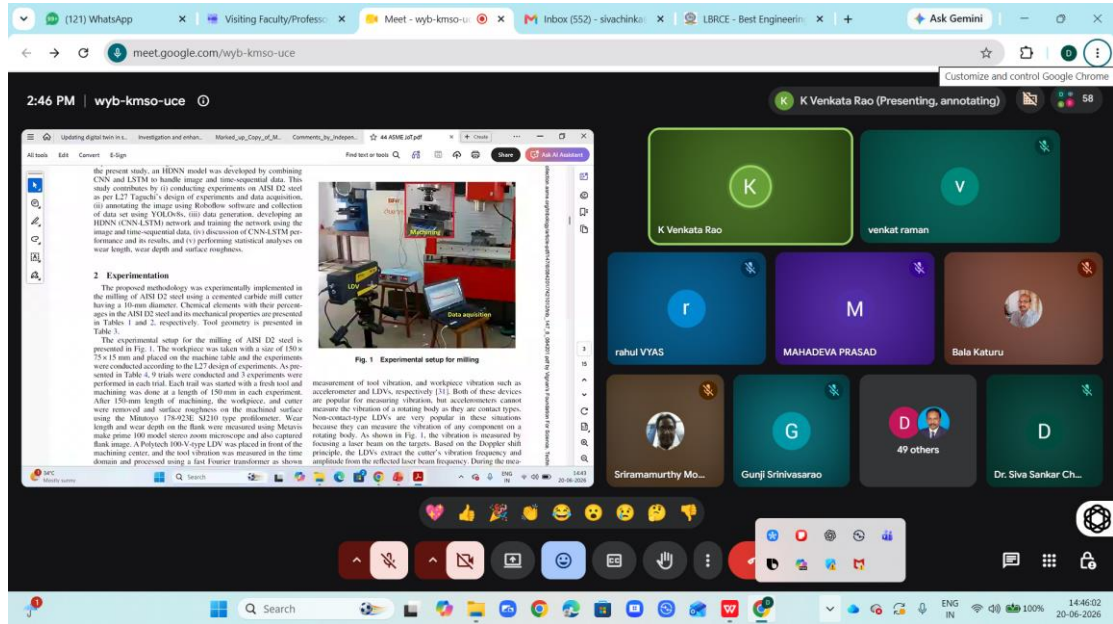
9) 19-06-2026 - Morning Session - **Dr. Ankush Kumar Jaiswal, IIT Hyderabad**
Title: Sustainable Energy Efficiency Systems



10) 19-06-2026 - Afternoon Session- **Dr. G. Radha Krishna, Presidency University, Bangalore**
Title: Sustainable Transportation through Alternative Fuels: Advances in Biodiesel, Emulsified Fuels, and Hydrogen-Enriched Combustion Technologies



11) 20-06-2026 - Morning Session- **Dr. P. Anil Kumar, Scientist-G, Head, Structural Dynamics & Acoustic Division, RCI, DRDO**
Title: Challenges and novel solutions for vibration problems in Defence



12) 20-06-2026 - Afternoon Session- **Dr. Kaki Venkata Rao, NITTR Kolkata**
Title: Artificial Intelligence and Digital Twins for Sustainable Engineering Solutions

