

## DEPARTMENT OF MECHANICAL ENGINEERING

### Report on the 5-Day Online Faculty Development Program (FDP)

**Title:** Emerging Trends in Sustainable Design, Intelligent Manufacturing, and Thermal Engineering Systems

**Duration:** 08-07-2025 to 12-07-2025

**Organized by:** Koneru Lakshmaiah Education Foundation, Department of Mechanical Engineering, Vijayawada Campus

**Summary:** The FDP successfully enhanced participants' knowledge in engineering design, smart manufacturing, and thermal systems. It fostered interdisciplinary collaboration, emphasized sustainability, and encouraged the integration of modern tools into academic practice.

**Target Audience:** Faculty from cohorts of Engineering Design, Smart Manufacturing, and Energy & CFD.

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#### Day 1: 08-07-2025

##### Session 1:

- **Time:** 10 AM - 12:30 PM
- **Topic:** Capacity Building and Technology Familiarization on Additive Manufacturing
- **Resource Person:** Srimannarayana Raju P
- **Hosting Cohort:** Smart Manufacturing (E25)
- **Description:** Focused on introducing additive manufacturing, its applications, and future academic integration.



**Srimannarayana Raju P**  
**Design and Development**  
**Engineer**  
**Intech Additive Solutions**



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Microsoft Teams meeting

42:41

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Participants

Share invite

In this meeting (15)

- Dr. K. V. Durga Rajesh
- B Kiran Kumar
- Ch. Sabitha
- Dr V L Mangesh
- Dr. G Murali
- Dr. S. S. Rao
- Dr.S.N.Padhi Organizer
- G Diwakar
- K Sai Sarath
- kanthimathi pasumarthi (Unverified)

INTRODUCTION TO ADDITIVE MANUFACTURING TECHNOLOGY

Sriman\_xLogic Labs (Unverified)

31°C Sunny

Search

ENG IN 10:06 08-07-2025

Microsoft Teams meeting

49:12

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Participants

Share invite

In this meeting (16)

- Dr. K. V. Durga Rajesh
- B Kiran Kumar
- Dr V L Mangesh
- Dr. G Murali
- Dr. S. S. Rao
- Dr.S.N.Padhi Organizer
- DVA RamaSastry
- G Diwakar
- Gavini Naga pavani (Unverified)
- K Sai Sarath

Powder bed fusion

Fused with agent and energy Fused with laser Fused with electron beam

MJF Multi Jet Fusion SLS Selective Laser Sintering DMLS / SLM Direct Metal Laser Sintering Selective Laser Melting EBM Electron Beam Melting

Plastic Plastic Metal Metal

Depowdering and cleaning SLS 3D printed parts can be manual or automated (Source: Sinterit)

LPBF Metal 3D printing at Sandvik (Source: Sandvik)

Sriman\_xLogic Labs (Unverified)

Search

ENG IN 10:13 08-07-2025



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56:43

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Participants

Share invite

In this meeting (15)

- Dr. K. V. Durga Rajesh
- B Kiran Kumar
- Dr V L Mangesh
- Dr. G Murali
- Dr. S. S. Rao
- Dr.S.N.Padhi Organizer
- DVA RamaSastry
- G Diwakar
- Gavini Naga pavani (Unverified)
- K Sai Sarath

## Types of 3D Scanning technologies

1. LASER triangulation 3D scanning technology.
2. Structured light 3D scanning technology.
3. Photogrammetry.
4. Contact-based 3D scanning technology.
5. LASER pulse-based 3D scanning technology.

Sriman\_xLogic Labs (Unverified)

10:21 08-07-2025

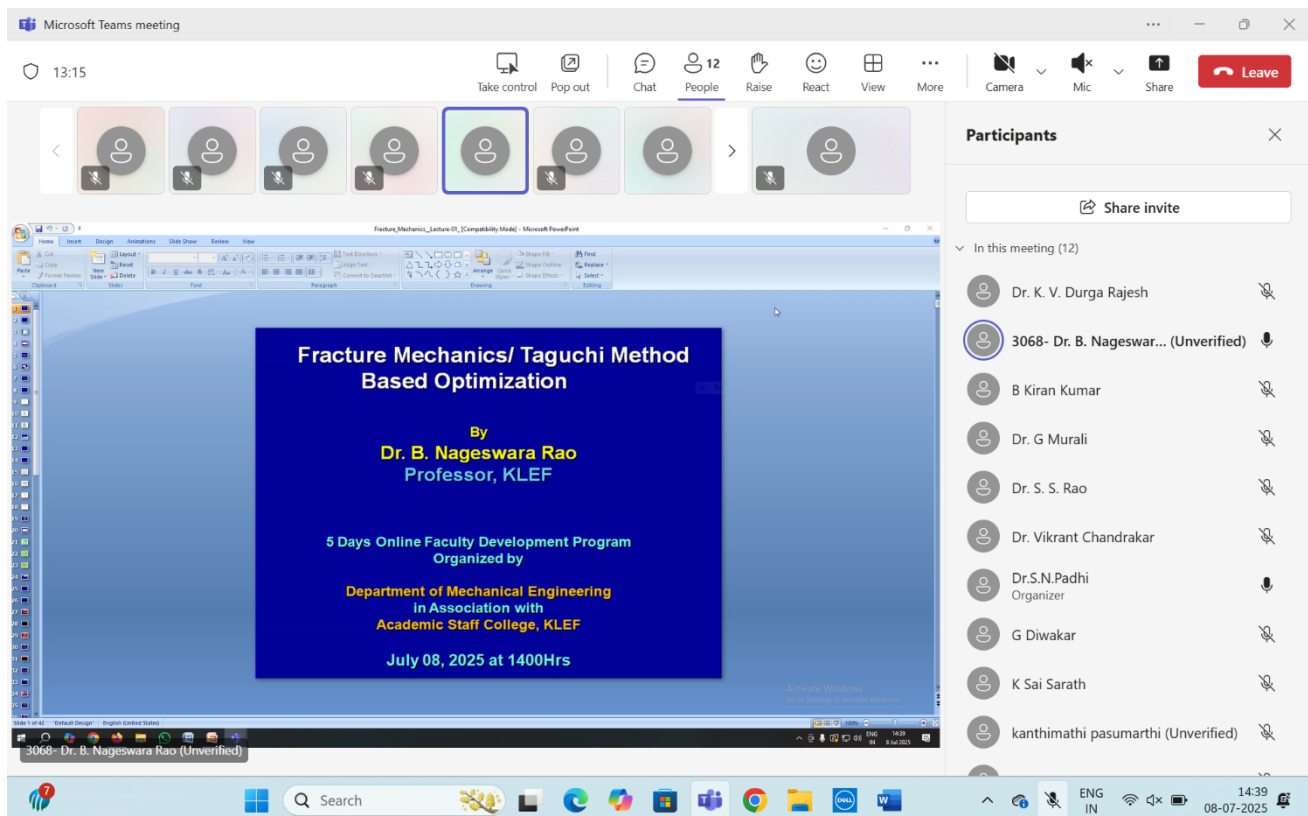


### Session 2:

- **Time:** 2:30 PM - 5 PM
- **Topic:** Fracture Mechanics / Taguchi Method Based Optimization
- **Resource Person:** Dr. B. Nageswara Rao
- **Hosting Cohort:** Engineering Design (E15)
- **Description:** Covered fundamentals of fracture mechanics and optimization using Taguchi methods.



**Dr B Nageswara Rao,  
Professor, KLEF**



Microsoft Teams meeting
39:53

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Raise
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### Statistical conditioning of data

Chauvenet's criterion which provides a consistent basis for the decision to reject or retain the data. If each data point  $y_i(j)$  lies within the limits of below Equation, then retain the data point otherwise reject it.

$$\mu_i - DR_o \sigma_i < y_i(j) < \mu_i + DR_o \sigma_i$$

Activate Windows  
Go to Settings to activate Windows.

#### Participants

[Share invite](#)

▼ In this meeting (13)

- Dr. K. V. Durga Rajesh
- 3068- Dr. B. Nageswar... (Unverified)
- B Kiran Kumar
- Dr. G Murali
- Dr. S. S. Rao
- Dr. Vikrant Chandrakar
- Dr.S.N.Padhi  
Organizer
- DVA RamaSastry
- G Diwakar
- K Sai Sarath

**Day 2: 09-07-2025**

### Session 3:

- **Time:** 10 AM - 12:30 PM
- **Topic:** Recent Trends in Friction Stir Welding and Processing
- **Resource Person:** Dr. L S Raju
- **Hosting Cohort:** Engineering Design (E15)
- **Description:** Explored applications and advancements in friction stir welding techniques.

**Dr L S Raju, Professor,  
NITTTR, Bhopal**

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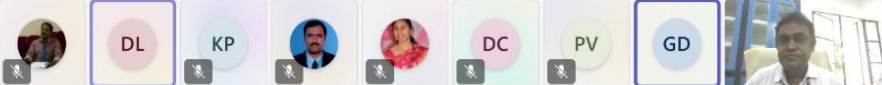
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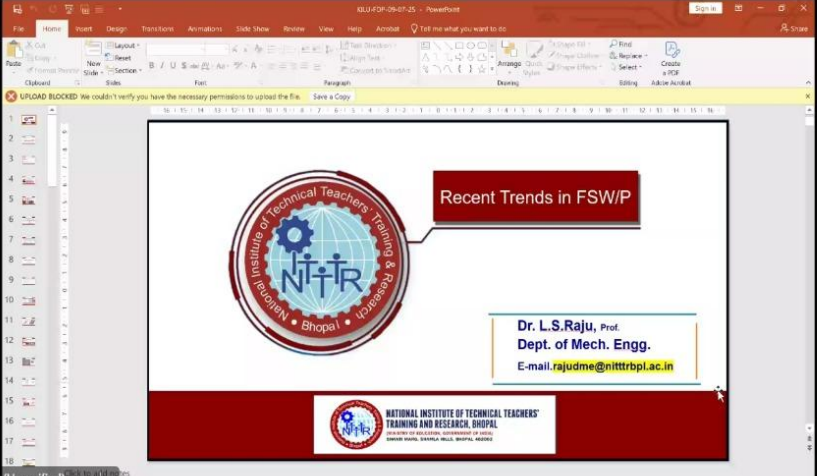
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17:39

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### Participants

Waiting in lobby (1)


- AK Anant Kurh... (Unverified) ✓ ✕

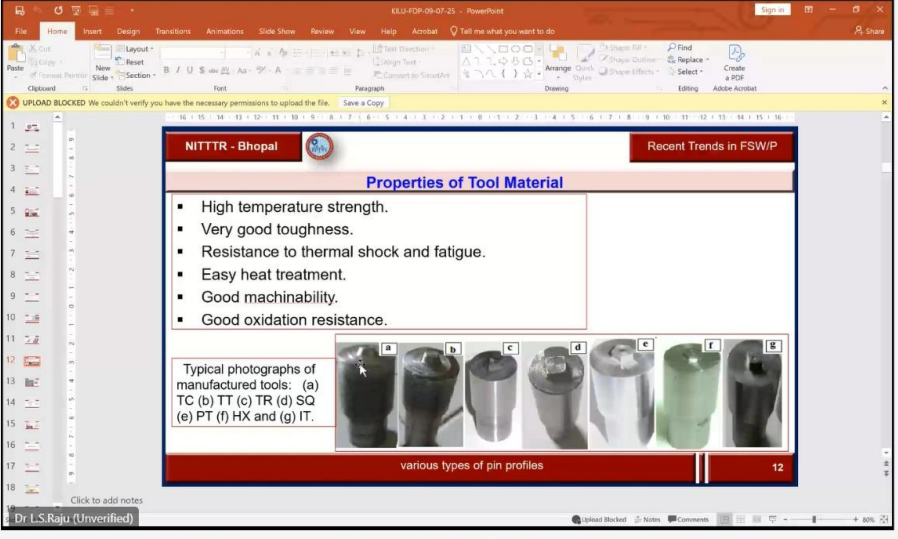
In this meeting (9) Mute all

- Dr. S. S. Rao
- B Kiran Kumar
- DL Dr L.S.Raju (Unverified)
- Dr. G Murali
- DC Dr. Vikrant Chandrakar
- Dr.Sireesha K
- GD G Diwakar

26:31

Pop out
Chat
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Raise
React
View
More
Camera
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Share
Leave





### Participants

In this meeting (15)

- Dr. K. V. Durga Rajesh
- Anant Kurhade (Unverified)
- ARJUN (Unverified)
- B Kiran Kumar
- Dr L.S.Raju (Unverified)
- Dr. G Murali
- Dr. S. S. Rao
- Dr. Vikrant Chandrakar
- Dr.Sireesha K
- G Diwakar

Microsoft Teams meeting
45:54

Pop out
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18 People
Raise
React
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More

Camera
Mic
Share
Leave

### Participants

Share invite

In this meeting (18)

Dr. K. V. Durga Rajesh

anant kurhade

On hold

ARJUN (Unverified)

B Kiran Kumar

Dr L.S.Raju (Unverified)

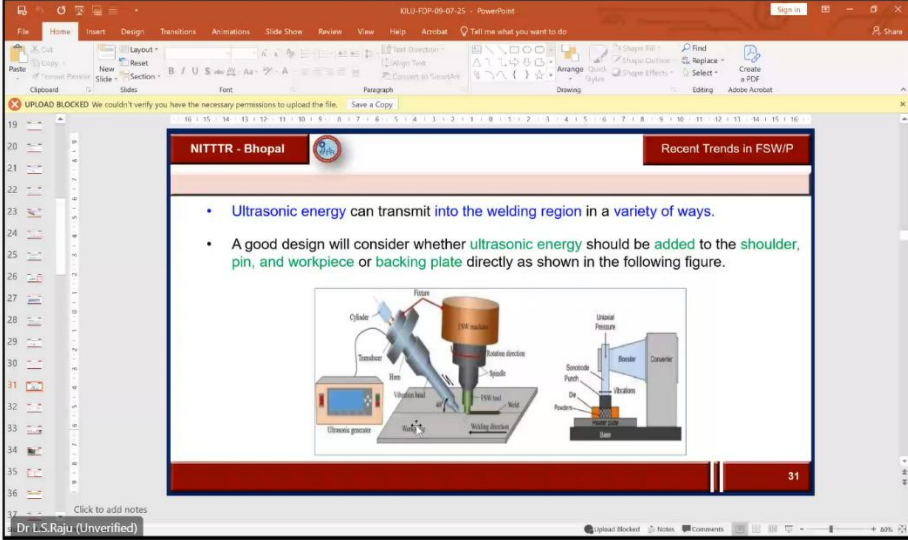
Dr. G Murali

Dr. S. S. Rao

Dr. Vikrant Chandrakar

Dr.Sireesha K

G Diwakar



10:44  
09-07-2025

#### Session 4:

- **Time:** 2:30 PM - 5 PM
- **Topic:** Advanced Smart Manufacturing Practices
- **Resource Person:** Dr. V Mangesh
- **Hosting Cohort:** Smart Manufacturing (E25)
- **Description:** Addressed innovative manufacturing technologies and process improvements.



**Dr V Mangesh, Professor,  
KLEF**





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04:48:20

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Participants

Share invite

anant kurhade On hold

B Kiran Kumar

Dr. G Murali On hold

Dr. S. S. Rao

Dr. Vikrant Chandrakar

Dr.S.N.Padhi Organizer

DVA RamaSastry

kanthimathi pasumarthi (Unverified)

M. RAMAGOPALA CHA... (Unverified)

T. VIJAYA KUMAR-HODME

V L Mangesh (Unverified)

Alternate Fuels for Diesel Engines

Microsoft Teams meeting

04:51:24

Take control Pop out Chat People Raise React View More Camera Mic Share Leave

Participants

Share invite

In this meeting (12)

Dr. K. V. Durga Rajesh

anant kurhade On hold

B Kiran Kumar

Dr. G Murali

Dr. S. S. Rao

Dr. Vikrant Chandrakar

Dr.S.N.Padhi Organizer

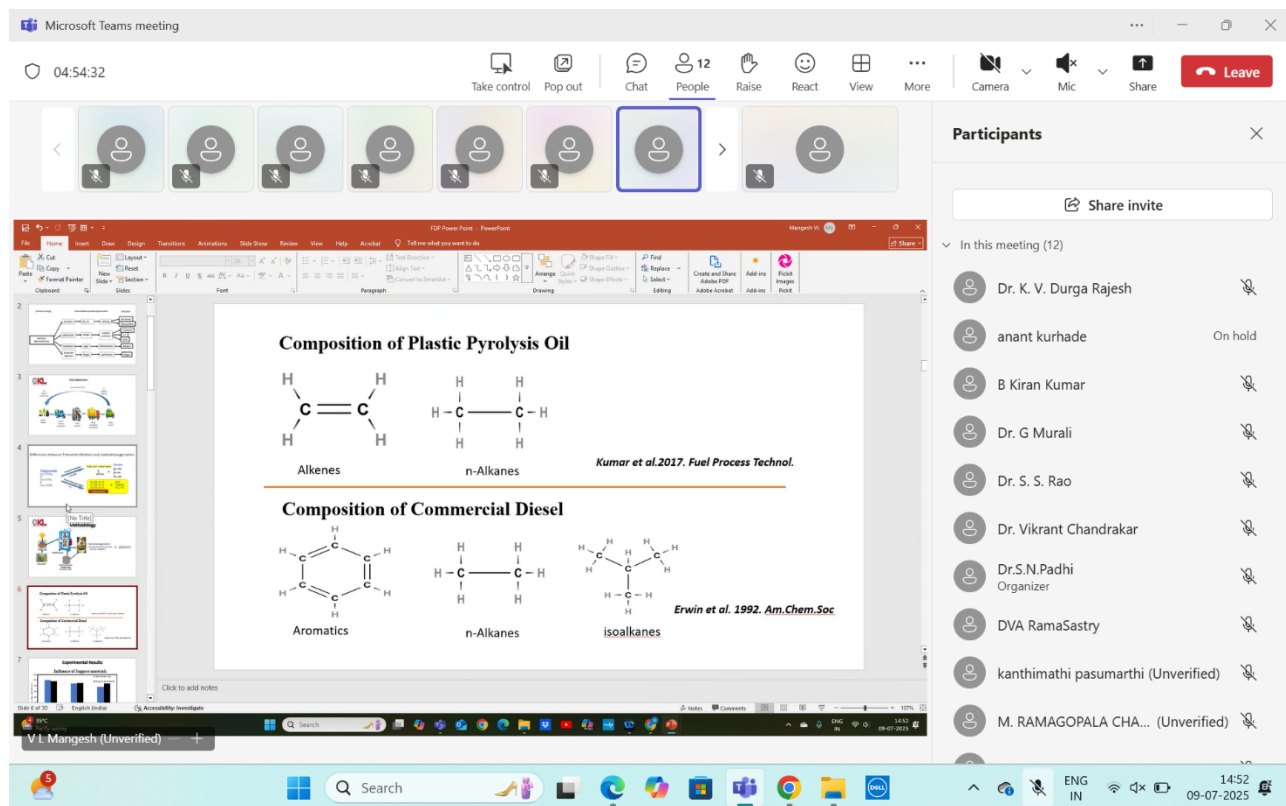
DVA RamaSastry

kanthimathi pasumarthi (Unverified)

M. RAMAGOPALA CHAR... (Unverified)

Introduction





**Day 3: 10-07-2025**

**Session 5:**

- **Time:** 10 AM - 12:30 PM
- **Topic:** Smart Manufacturing Scenarios in Industry 4.0
- **Resource Person:** Dr. SS Rao
- **Hosting Cohort:** Smart Manufacturing (E25)
- **Description:** Emphasized digital transformation, IoT applications, and smart factories.



**Dr SS Rao, Professor,  
KLEF**



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01:49:41



Smart Manufacturing Scenarios in Industry 4.0

The Fourth Industrial Revolution  
Digital transformation reshaping manufacturing globally

DEPARTMENT OF MECHANICAL ENGINEERING  
IN ASSOCIATION WITH  
ACADEMIC STAFF COLLEGE

Emerging Trends in Sustainable Design, Intelligent Manufacturing, and Thermal Engineering Systems  
(08-12 July 2025)

Prof. S S Rao  
K L University

Slide 1 of 16 English (India) Accessibility: Good to go

Dr. S. S. Rao (Unverified)

01:53:04



## Executive Summary

The Challenge	The Solution
<ul style="list-style-type: none"><li>Traditional manufacturing faces efficiency limits</li><li>Growing demand for customization and flexibility</li><li>Need for sustainable, data-driven operations</li></ul>	<ul style="list-style-type: none"><li>Industry 4.0 technologies enable smart manufacturing</li><li>Real-time connectivity and intelligent automation</li><li>Data-driven decision making and predictive capabilities</li></ul>

Expected Outcomes

- Increased operational efficiency and reduced downtime
- Enhanced product quality and customization
- Competitive advantage through digital transformation

Dr. S. S. Rao (Unverified)



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01:53:29



## The Fourth Industrial Revolution

Industry 4.0 represents a fundamental shift in manufacturing, moving beyond traditional automation to create **intelligent, interconnected production systems**. This transformation integrates cyber-physical systems, IoT, AI, and robotics to enable real-time data sharing between machines, systems, and people.

### Connected Systems

Integration of cyber-physical systems with IoT sensors creating intelligent networks

### Real-time Data

Continuous data sharing between machines, systems, and people for immediate insights

### Adaptive Production

Flexible factories that can quickly adapt to changing demands and conditions



Dr. S. S. Rao (Unverified)

Microsoft Teams meeting

02:02:03



## Scenario 2: Smart Factory Automation

### Robotics & AGVs for Autonomous Operations

#### Automated Material Handling

- AGVs transport materials autonomously between stations
- Intelligent routing optimizes delivery times
- Integration with ERP systems for real-time inventory

40%

Production speed increase  
Automated systems enable faster throughput

#### Precision Manufacturing

- Robotic arms perform welding, assembly with high precision
- Vision systems ensure quality control
- Collaborative robots work safely alongside humans

60%

Quality improvement  
Robotic precision reduces defects

25%

Safety enhancement  
Reduced workplace accidents

**Example:** Great Wall Motor's smart factory in Thailand uses intelligent robots and AGVs to achieve 24

Dr. S. S. Rao (Unverified)





### Session 6:

- **Time:** 2:30 PM - 5 PM
- **Topic:** Embedding Sustainability in Mechanical Engineering Courses
- **Resource Person:** Dr. D.V.A. RamaSastry
- **Hosting Cohort:** Engineering Design (E15)
- **Description:** Discussed sustainability integration into mechanical engineering education.



**Dr. D.V.A. RamaSastry,  
Associate Professor, KLEF**

11:54

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Share
Leave

CR

GD

DR

KS


CK

A talk on

## Embedding Sustainability in Core Mechanical Engineering Courses

Dr. DVA Ramasastry

5 day Faculty Development Program



### Participants

In this meeting (9)

Dr. S. S. Rao

✕

CR

ch Venkata Krish... (Unverified)

✕

CK

ch venkata krish... (Unverified)

✕

DR

Dr. K. V. Durga R... (Unverified)

✕

Dr.S.N.Padhi  
Organizer

✕

DVA RamaSastry

✕

GD

G Diwakar

✕

KS

K Sai Sarath

✕

Priyaranjan Samal

✕



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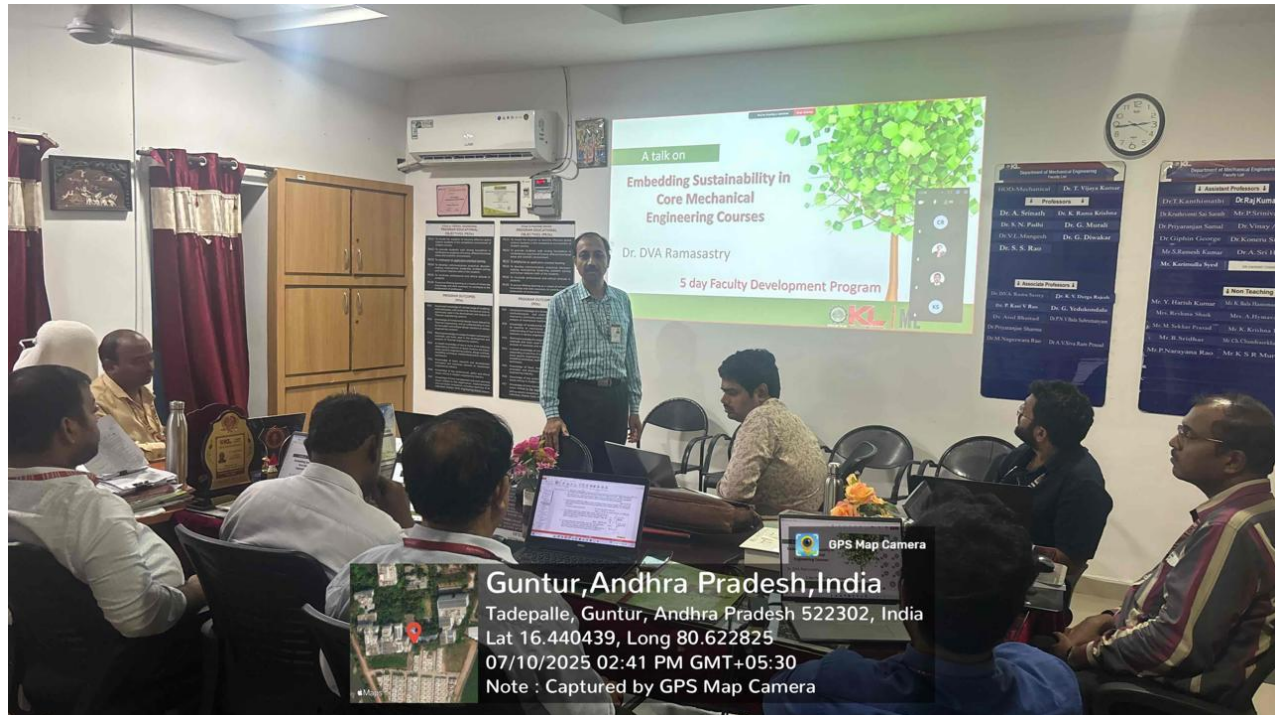
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## Importance of Sustainable Development Goals (SDGs)

By aligning curriculum and projects with these goals, engineering students can contribute to sustainable solutions from local to global scales.

Adopted by the United Nations in 2015

Blueprint to achieve a better and more sustainable future

There are 17 SDGs

Integrated goals that recognize that action in one area will affect outcomes in others

Addresses global challenges

Universal call to action to protect the planet by 2030

**SUSTAINABLE DEVELOPMENT GOALS**  
SDGs or Global Goals

- 1 NO POVERTY
- 2 ZERO HUNGER
- 3 GOOD HEALTH AND WELL-BEING
- 4 QUALITY EDUCATION
- 5 GENDER EQUALITY
- 6 CLEAN WATER AND SANITATION
- 7 AFFORDABLE AND CLEAN ENERGY
- 8 DECENT WORK AND ECONOMIC GROWTH
- 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
- 10 REDUCED INEQUALITIES
- 11 SUSTAINABLE CITIES AND COMMUNITIES
- 12 RESPONSIBLE CONSUMPTION AND PRODUCTION
- 13 CLIMATE ACTION
- 14 LIFE BELOW WATER
- 15 LIFE ON LAND
- 16 PEACE, JUSTICE AND STRONG INSTITUTIONS
- 17 PARTNERSHIPS FOR THE GOALS

DVA RamaSastry (Unverified)

14:55 10-07-2025



**Day 4: 11-07-2025**

**Session 7:**

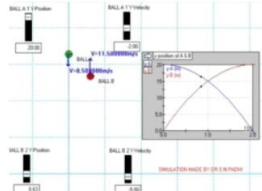
- **Time:** 10 AM - 12:30 PM
- **Topic:** Integrating Simulation & Computational Tools in ME Curriculum
- **Resource Person:** Dr. S N Padhi
- **Hosting Cohort:** Engineering Design (E15)
- **Description:** Introduced simulation tools like ANSYS and MATLAB for academic use.



**Dr. S N Padhi, Professor,  
KLEF**


**Integrating Simulation and Computational Tools in Mechanical Engineering Education**

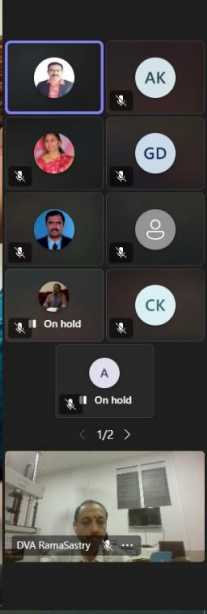
*'Empowering the next generation of mechanical engineers with cutting-edge computational skills.'*



**S.N.Padhi**  
Professor  
Dept. of Mechanical Engineering

1





Dr.S.N.Padhi
10:13 11-07-2025





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Microsoft Teams meeting

23:39

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Participants

Share invite

In this meeting (11)

- UU Unknown User (Unverified) Meeting guest
- V V KRISHNA MOHAN (Guest) Meeting guest
- A Arjun (Guest) Meeting guest On hold
- BK B Kiran Kumar
- CK ch venkata krishnarao (Guest) Meeting guest
- DM Dr. G Murali On hold
- D Dr.S.N.Padhi Organizer
- DK Dr.Sireesha K
- DR DVA RamaSastry
- GD G Diwakar
- SC Sukhadip Chougule (Guest) Meeting guest

Traditional vs. Modern Curriculum

From Chalkboards To Digital Twins

Dr.S.N.Padhi

3

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ENG IN 10:15 11-07-2025

Microsoft Teams meeting

40:35

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Participants

Share invite

In this meeting (14)

- UU Unknown User (Unverified) Meeting guest
- V V KRISHNA MOHAN (Guest) Meeting guest
- A Arjun (Guest) Meeting guest On hold
- BK B Kiran Kumar
- CR ch Venkata krishna Rao (Guest) Meeting guest
- DM Dr. G Murali On hold
- D Dr.S.N.Padhi Organizer
- DK Dr.Sireesha K
- DR DVA RamaSastry
- GD G Diwakar
- KS K Sai Sarath
- S sirisha (Guest) Meeting guest

Specialized Domains: Automotive & Energy Systems

Automobile Engineering

Design, development, and testing of vehicle systems, including powertrains, chassis, and safety features.

Electric Vehicle Technology

Focus on battery systems, electric motors, power electronics, and charging infrastructure for sustainable transport.

Renewable Energy Systems

Harnessing solar, wind, hydro, and geothermal energy for sustainable power generation and energy efficiency.

Dr.S.N.Padhi

16

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ENG IN 10:32 11-07-2025



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### Session 8:

- **Time:** 2:30 PM - 5 PM
- **Topic:** Laser Micromachining for Aerospace Applications
- **Resource Person:** Dr. T. Jagadesh
- **Hosting Cohort:** Energy & CFD (E14)
- **Description:** Focused on laser-based micromachining and its aerospace applications.



**Dr. T. Jagadesh, Assistant Professor-Grade I, NITT**

You're in a call on another device. Want to join on this one? Join call

51:18 Pop out Chat People 17 Raise React View More Camera Mic Share Leave

**Participants**

Type a name 🔍

▼ In this meeting (17) Mute all

- KS K Sai Sarath 🔊
- B Kiran Kumar 🔊
- CK ch venkata krish... (Unverified) 🔊
- CW CHANDRIKA WA... (Unverified) 🔊
- DM Dr V L Mangesh 🔊
- DC Dr. Vikrant Chandrakar 🔊
- Dr.S.N.Padhi Organizer 🔊
- GD G Diwakar 🔊
- JT Jagadesh T (Unverified) 🔊
- JR JAI GANESH R 🔊
- KK KARTHIK KOTTHAP... (External) 🔊
- MC M. RAMAGOPAL... (Unverified) 🔊

### Fused deposition modeling

The diagram illustrates the Fused Deposition Modeling (FDM) process. A **Liquifier** (moves in X and Y direction) extrudes material through **Extrusion nozzles** onto a **Foundation sheet**. The material is supported by **Supports**. The **Build platform** (moves up and down in Z direction) moves the part. A **Support material spool** and a **Model material spool** are shown.

### Selective Laser Sintering

The diagram illustrates the Selective Laser Sintering (SLS) process. A **CO<sub>2</sub> Laser** beam is directed by **X-Y Scanning Mirrors** onto a **Powder Bed**. The laser beam is focused through a **Laser Beam** lens. The powder bed is heated by an **IR heater**. A **Counter-Rotating Powder Leveling Roller** is used to level the powder. **Feed Cartridges** are used to supply the powder. The **Build Platform** moves the part.

Jagadesh T (Unverified)

56:07

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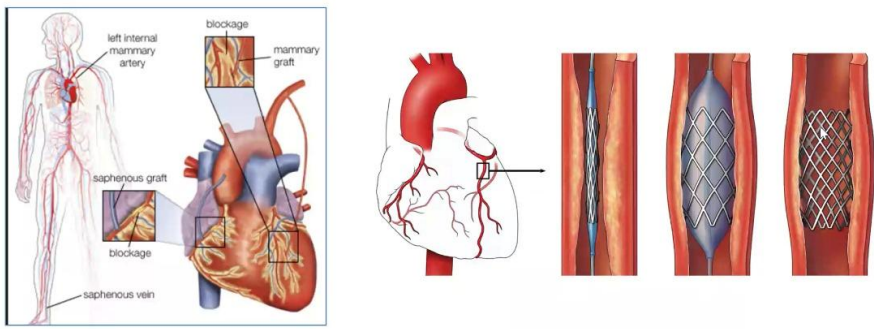
JT  
Jagadesh T (Unverified)

DM  
Dr V L Man...

MC  
M. RAMAG...

VM  
V L Mange...

KS



**Participants**

Type a name

In this meeting (17) Mute all

- KS K Sai Sarath
- B Kiran Kumar
- CK ch venkata krish... (Unverified)
- CW CHANDRIKA WA... (Unverified)
- DM Dr V L Mangesh
- DC Dr. Vikrant Chandrakar
- Dr.S.N.Padhi Organizer
- GD G Diwakar
- JT Jagadesh T (Unverified)
- JR JAI GANESH R
- KK KARTHIK KOTTHAP... (External)
- MC M. RAMAGOPAL... (Unverified)

**Day 5: 12-07-2025**

### Session 9:

- **Time:** 10 AM - 12:30 PM
- **Topic:** Additive Manufacturing – Applications in Space
- **Resource Person:** Sri Singari Reddaiah
- **Hosting Cohort:** Engineering Design (E15)
- **Description:** Detailed ISRO's implementation of additive manufacturing technologies.



**Sri S Reddaiah Scientist G  
and Deputy Project  
Director, SHAR- ISRO**





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UU Dr.S.N.Padhi DM On hold DC Dr. Vikrant ... DR Dr. K. V. Du... AK

**ADDITIVE MANUFACTURING**

Emerging Technologies and Disruptive Potential  
Innovative additive manufacturing technologies are reshaping traditional production methods, unlocking new design possibilities and material capabilities.

Shift Towards Digital Manufacturing  
The transition to digital manufacturing processes is enabling unprecedented customisation, reduced lead times, and enhanced production flexibility.

Implications for Supply Chain and Logistics  
Additive manufacturing is poised to revolutionise supply chain dynamics, offering customised production, on-demand manufacturing, and reduced inventory requirements.

The Evolving Landscape of Additive Manufacturing  
Exploring the Transformative Potential and Future Possibilities

Reddeiah S, APD, SDSC SHAR (Guest)

Participants

Share invite

In this meeting (15)

- AK Ashwini Kumar (Guest) Meeting guest
- BK B Kiran Kumar
- DM Dr. G Murali On hold
- DR Dr. K. V. Durga Rajesh (Guest) Meeting guest
- DC Dr. Vikrant Chandrakar
- D Dr.S.N.Padhi Organiser
- DR DVA RamaSastry
- GD G Diwakar
- JR JAI GANESH R
- KS K Sai Sarath
- PS Priyaranjan Samal
- RK Radha Krishna (Guest)

10:20 12-07-2025

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UU Dr.S.N.Padhi DM On hold DC Dr. Vikrant ... DR Dr. K. V. Du... AK

**ADDITIVE MANUFACTURING**

Reddeiah S, APD, SDSC SHAR (Guest)

Participants

Share invite

In this meeting (15)

- DR Dr. K. V. Durga Rajesh (Guest) Meeting guest
- DC Dr. Vikrant Chandrakar
- D Dr.S.N.Padhi Organiser
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- GD G Diwakar
- JR JAI GANESH R
- KS K Sai Sarath
- PS Priyaranjan Samal
- RK Radha Krishna (Guest) Meeting guest
- AS Reddeiah S, APD, SDSC SHAR (Guest) Meeting guest
- TK T. KANTHIMATHI
- TK T. VIJAYA KUMAR- HODME

10:21 12-07-2025



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## 3D Printing Vs Conventional Machining

The diagram illustrates two manufacturing processes:

- A Subtractive Manufacturing:** Material → Subtractive Manufacturing → 3D object + Waste
- B Additive Manufacturing:** Material → Additive Manufacturing → 3D object + Waste

Reddelaiah S, APD, SDSC SHAR (Guest)

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## The Genius 3D Printers That Make SpaceX Rockets

Reddelaiah S, APD, SDSC SHAR (Guest)

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### Session 10:

- **Time:** 2:30 PM - 5 PM
- **Topic:** Energy Systems and CFD Applications
- **Resource Person:** Dr. G Murali
- **Hosting Cohort:** Energy & CFD (E14)
- **Description:** Explained energy system modeling and CFD simulations in mechanical systems.



**Dr G Murali, Professor,  
KLEF**





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5

## Pathways to Zero Carbon

- ▶ Renewable Energy (solar, wind, hydro)
- ▶ Energy Efficiency (building insulation, smart grids)
- ▶ Electrification (transportation, industry)
- ▶ Carbon Capture, Utilization and Storage (CCUS)
- ▶ Sustainable Land Use (forestry, agriculture)
- ▶ Climate-Resilient Infrastructure

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Dr.G.Murali (Unverified)

Participants

Share invite

In this meeting (18)

- Dr. K. V. Durga Rajesh (Unverified)
- B Kiran Kumar
- Dr. G Murali On hold
- Dr. G.Yedukondalu (Unverified)
- Dr. Vikrant Chandrakar
- Dr.G.Murali (Unverified) Organizer
- Dr.S.N.Padhi
- Dr.Sireesha K
- DVA RamaSastry
- JAI GANESH R Show desktop

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04:33:04

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14

## Additional resources and information on zero-carbon technologies and strategies

- ▶ Country-Specific Zero-Carbon Plans
  1. European Union's Green Deal
  2. United States' Climate Action Plan
  3. China's National Climate Change Plan
  4. India's National Action Plan on Climate Change
  5. Japan's Long-Term Strategy under the Paris Agreement

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Dr.G.Murali (Unverified)

Participants

Share invite

In this meeting (16)

- Dr. K. V. Durga Rajesh (Unverified)
- B Kiran Kumar
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- Dr. Vikrant Chandrakar
- Dr.G.Murali (Unverified) Organizer
- Dr.S.N.Padhi
- DVA RamaSastry
- JAI GANESH R
- M. RAMAGOPALA CHA... (Unverified)

ENG IN 14:43 12-07-2025

Prepared by

Approved by