SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A+' Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF MECHATRONICS ENGINEERING

19MCE302 – INTELLIGENT MANUFACTURING TECHNOLOGY

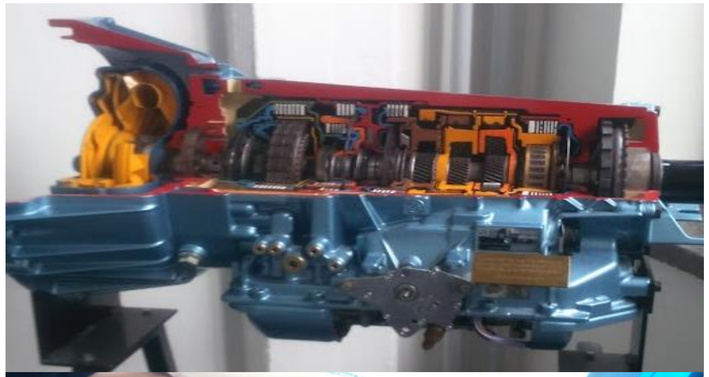
III YEAR V SEM

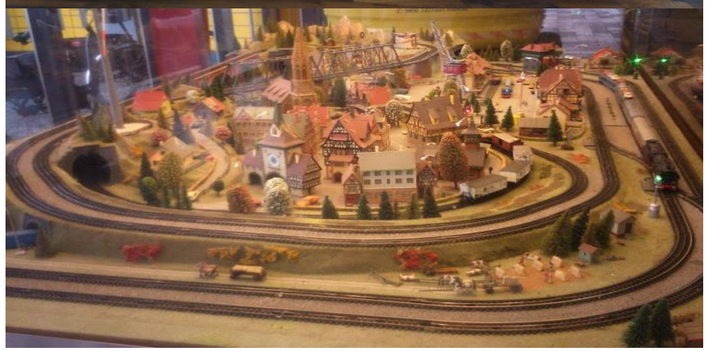
UNIT 1 – MANUFACTURING SYSTEMS AND MODELS

TOPIC 7 – MODELS USES

UNDERSTANDING MODELS IN MANUFACTURING

- **Models** are simplified representations of complex systems.
- **Purpose:** Understand, predict, and optimize manufacturing processes.
- **Types:** Physical, mathematical, and simulation models.





PHYSICAL MODELS

Tangible representations of manufacturing systems.

Types:

Static models: Capture a system at a fixed point in time (e.g., scale models, mock-ups, layouts).

Uses: Design review, spatial analysis, communication, and training.

Dynamic models: Represent systems in motion (e.g., simulations, prototypes, animated models).

Uses: Process analysis, performance prediction, and problem-solving.

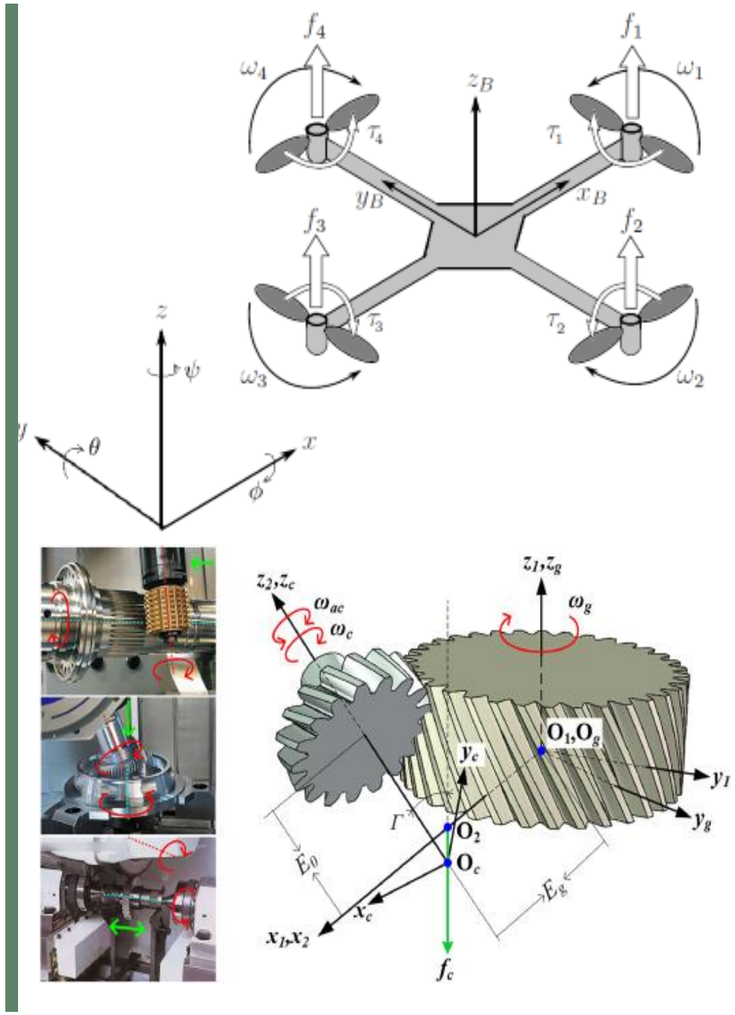
MATHEMATICAL MODELS

Represent systems using mathematical equations and formulas.

Types: Linear, nonlinear, static, dynamic, deterministic, and stochastic models.

Applications: Optimization, forecasting, simulation, and control.

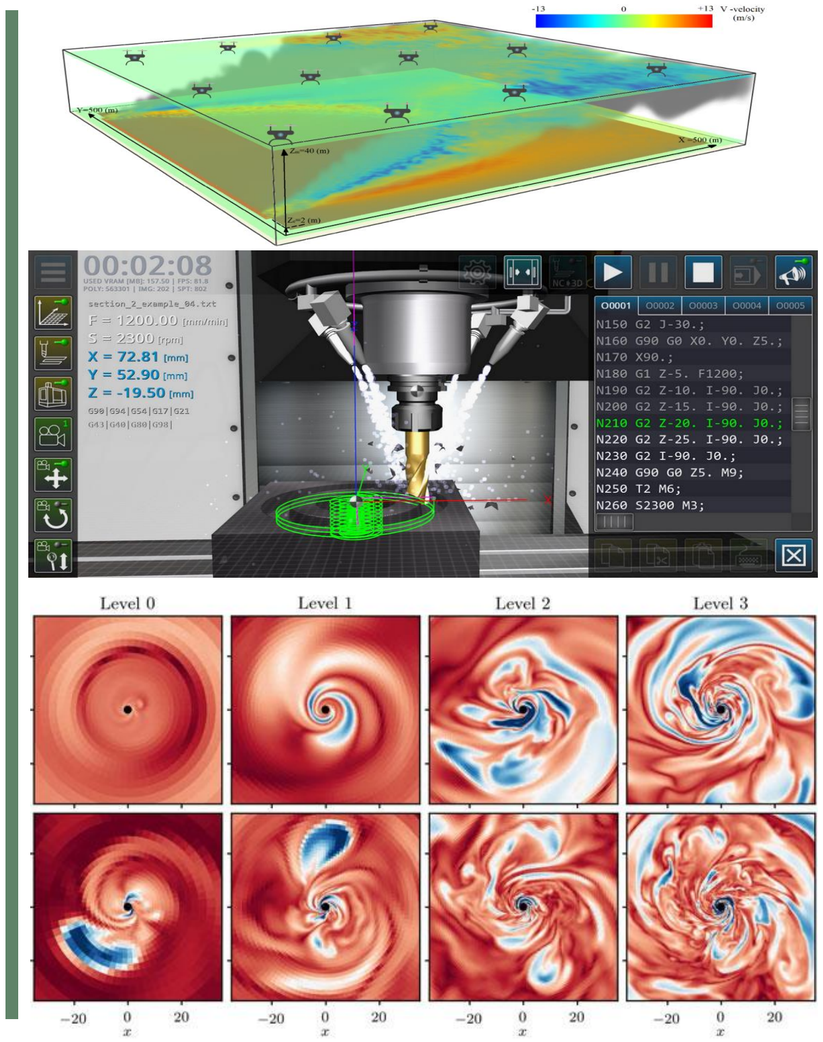
Example: Linear programming for production scheduling.



SIMULATION MODELS

Digital representations of real-world systems.

- **Types:** Discrete event, continuous, and agent-based simulations.
- **Uses:** Process optimization, risk assessment, capacity planning, and training.
- **Example:** Simulating supply chain operations to identify bottlenecks.



ROLE OF MODELS IN MANUFACTURING

- **Design and development:** Creating new products and processes.
- **Process improvement:** Identifying inefficiencies and optimizing workflows.
- **Decision support:** Providing data for informed decision-making.
- **Risk management:** Assessing potential challenges and developing mitigation strategies.
- **Communication and collaboration:** Facilitating effective knowledge sharing.

CHALLENGES AND CONSIDERATIONS

- **Model complexity:** Balancing detail with usability.
- **Data quality and availability:** Accurate data is essential.
- **Validation and verification:** Ensuring model accuracy.
- **Computational resources:** Requirements for complex simulations.
- **Interpretation and communication:** Effectively conveying model results to stakeholders.

THANK YOU

QUESTIONS?