Himalaya Singh

M.Tech in Mechanical Design
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Professional Summary

- Mechanical Design Engineer (**M.Tech**) with over **2 years** of experience in multiphysics simulation and finite element analysis. Skilled in mathematical modelling, stress analysis, and thermomechanical coupling. Passionate about FEM based research in composites, process optimization, and advanced numerical simulation methods.

Core Competencies

○ Finite Element Method (FEM) ○ Computational Mechanist ○ Backend Computational Simulation Engineer ○ Fracture Mechanics ○ Multiphysics Simulation ○ Python Scripting ○ Designing ○ Stress Analysis

Education

Program	Institution/Board	%/CGPA	Year
M.Tech in Mechanical Design	Indian Institute of Technology Madras	**8.06**	2022-2024
B.Tech in Mechanical Engg.	GIET (JNTUK)	**8.73**	2017-2021
HSEB	Mithila Institute of Technology	**71.80%**	2014-2016
SLC	New Modern Higher Secondary School	**76.25%**	2014

Technical Skills

- **Simulation and Modeling**: ANSYS, FEniCS, SfePy ○ **Geometry and Meshing**: Gmsh, ANSYS Meshing
- **Programming** : Python ○ **Design**: Catia, Creo, Fusion 360, Solid Edge, CAD
- **Post-Processing**: ParaView, PyVista ○ **Operating Systems**: Linux, Windows
- **Equipment**: Rheometer for Young's modulus and Poisson's ratio estimation

Experience

1. Aizant Drug Research Solutions Pvt. Ltd., **June 2024- Present**
Smart Development *Research and Development*

Project 1: Compression Testing of Compacted Solids Using Finite Element Analysis

- Developed a coupled Drucker Prager plasticity and phase-field fracture FEM model for MCC tablets and validated crack initiation and force hardness evolution against experimental axial hardness data.

Project 2: Mathematical modelling of Fluid Bed Granulation process to enhance machine performance

- Developed a mathematical two phase spraying drying model using temperature dependent GAB isotherms and heat transfer formulations, and simulated bed temperature and drying evolution consistent with experimental data.

Project 3: Thermo mechanical FEM modelling of tablet compaction using FEniCS

- Developed a coupled thermo mechanical finite element model incorporating plastic work and frictional heat generation with transient heat conduction, and used temperature dependent softening to capture realistic compaction and heating behavior.

Key Projects

1. Role of Microstructure on Stress-Diffusion Interactions in Li-Ion Battery Electrodes **Aug 2023 - 2024**
M.Tech *IIT Madras*

- Simulated stress diffusion coupling during lithiation and delithiation using multiphysics FEM, and analyzed the effects of grain size, boundary thickness, and orientation on stress evolution and failure mechanisms.

2. Design of Worm Gearbox Crane Main Hoist for Uniform Shock Loads. **Jan-April 2023**
M.Tech *CAD/CAM Lab*

- Designed and modelled a worm gearbox in Creo and Fusion 360, and performed structural and thermal analysis in ANSYS to optimize load handling, durability, and performance.

3. Design and Analysis of Clutch of Hayabusa model 1340. **Jan-April 2023**
M.Tech *Design of Mechanical Transmission System*

- Designed clutch components in Creo and performed FEA in ANSYS to evaluate stress, thermal effects, and deformation, improving durability and power transmission efficiency.

4. Design & Analysis of heat transfer rate from gas turbine blade using film cooling. **Jan-May 2021**
B.Tech *GIET*

- Modelled a 3D turbine blade with internal cooling channels in Solid Edge and performed CFD and thermal simulations in ANSYS to optimize cooling performance and blade durability.

5. Fabrication of Forearm machine with electrical power generation. **June-Dec 2020**
B.Tech *GIET*

- Designed and developed an electromagnetic energy harvesting forearm device, optimizing mechanical design and performance through modelling and simulation using Creo and ANSYS.

Certifications

- Finite element analysis convergence and mesh independence (May, 2023)
- FEM linear, nonlinear analysis and post-processing (May, 2023)
- Automation in robotics control (April, 2021).
- QCAD (Aug, 2020), Solid Edge (Feb, 2020), Python Programming (May, 2023).

Internship

1. Mahindra and Mahindra. **May, 2019**

- Hands on exposure to tractor component manufacturing and assembly, including quality control, workflow optimization, and design for manufacturing practices.

2. Design Space System. **June, 2021**

- Assisted in CAD modelling, FEA, and CFD simulations to support product design, manufacturability, and performance validation.

Publication

1. Design & Analysis of heat transfer rate from gas turbine blade using film cooling. **July, 2021**
IJMTST Journal

Workshops

1. FEniCS (Python Library for Finite Element Methods) **July, 2023**
Vanderbilt University *IIT Madras*

- Received comprehensive training in the FEniCS Python library, focusing on FEM formulation, numerical solution of PDEs, and practical implementation through coding.

2. Computational Fluid Mechanics "Airflow Around a Spoiler". **June-July 2023**
Softwares: FEA,SimScale *Online Guided Projects*

- Conducted CFD simulations on aerodynamic airflow around an automotive spoiler using SimScale, performing meshing, solver setup, and post-processing of velocity and pressure fields.

3. CFD Simulation Through a Centrifugal Pump. **June-July 2023**
Softwares: FEA, Simscale, msh, CFD. *Online Guided Projects*

- Performed CFD analysis of a centrifugal pump using SimScale, including meshing, boundary condition setup, solver configuration, and evaluation of pressure and velocity fields.

Achievements & Awards

- **Certifications of Appreciation (National level Quiz Competitions, May–July 2020):** Basics of Mechanical Engineering (SCET), Strength of Materials (PVPSIT), Engineering Drawing (VIET), Industrial Robotics (NRIIT), Probability & Statistics (VITS)
- **Won 1st Prize at MEDHA-19 (GIET, Sept 2019) for designing a portable, backpack mounted agricultural water sprayer system.), MEDHA-19 (GIET)** (Sept 2019).