

# **Portfolio**

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# Areas of Expertise

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- Research and Development
- Concept CAD Design , Manufacturing CAD Design
- Detailed Structural Analysis (FEA)
- CFD Analysis (Aerodynamic Analysis , Heat Transfer Analysis)
- Combustion Modelling and Optimization
- Rocket Propulsion Analysis
- Prototyping , Manufacturing

# **Project 01**

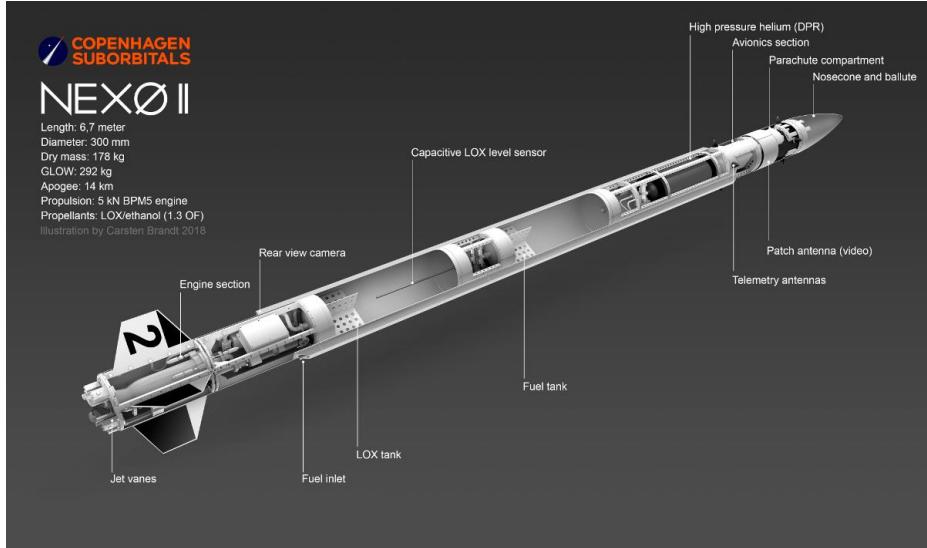
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# High-Performance Small Liquid Propellant Rocket Engine Design & Validation

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- This project showcases the design, validation, and construction of miniature liquid propellant rocket engines. Key aspects include:
- Mechanical design and analysis of critical components like combustion chamber, injector, and nozzle.
- Material selection and manufacturing considerations for high-performance and weight optimization.
- Validation of engine performance through numerical simulation on commercial codes like ANSYS Fluent.

# High-Performance Small Liquid Propellant Rocket Engine Design & Validation



Structural Design of  
Reference Case



Structural Design of Self study

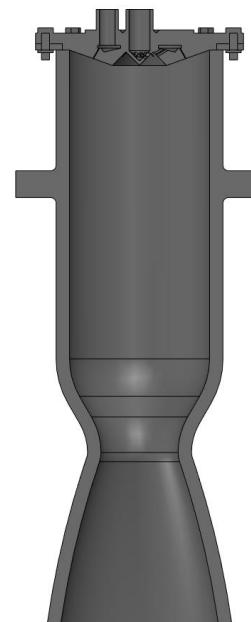
# Liquid Propellant Rocket Engine : CAD Model-Design-1



- Propellants: ethanol/hydrogen peroxide
- Thrust: 5kN
- Atmospheric ISP: 256 seconds,
- Injection System: Shower Head Injection.
- Maximum temperature: 2773 K

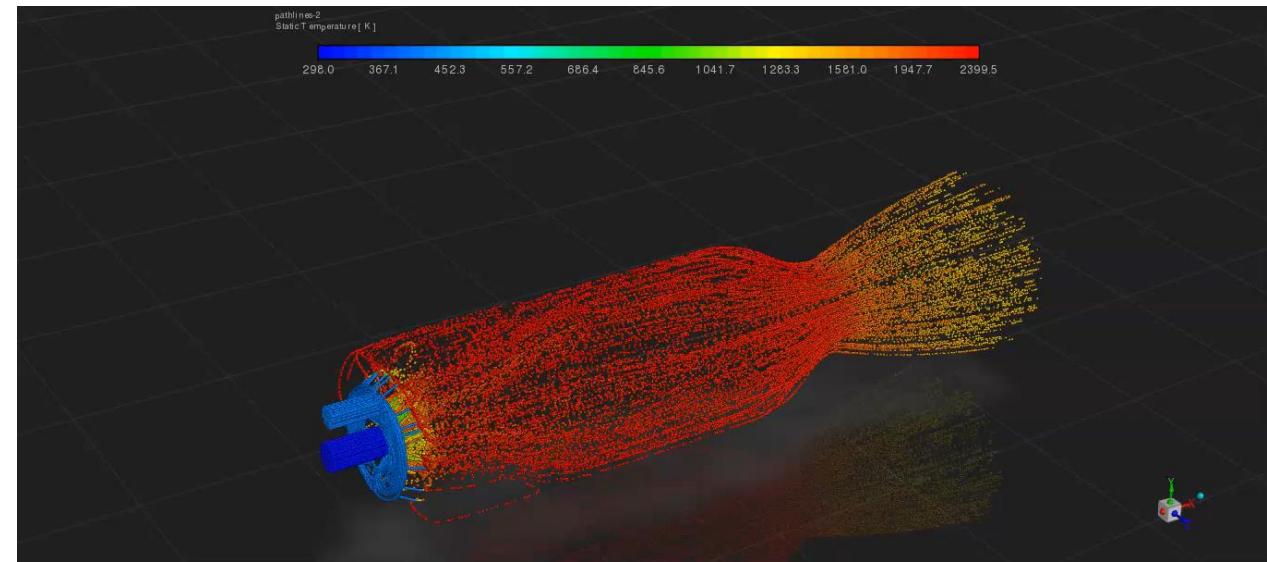
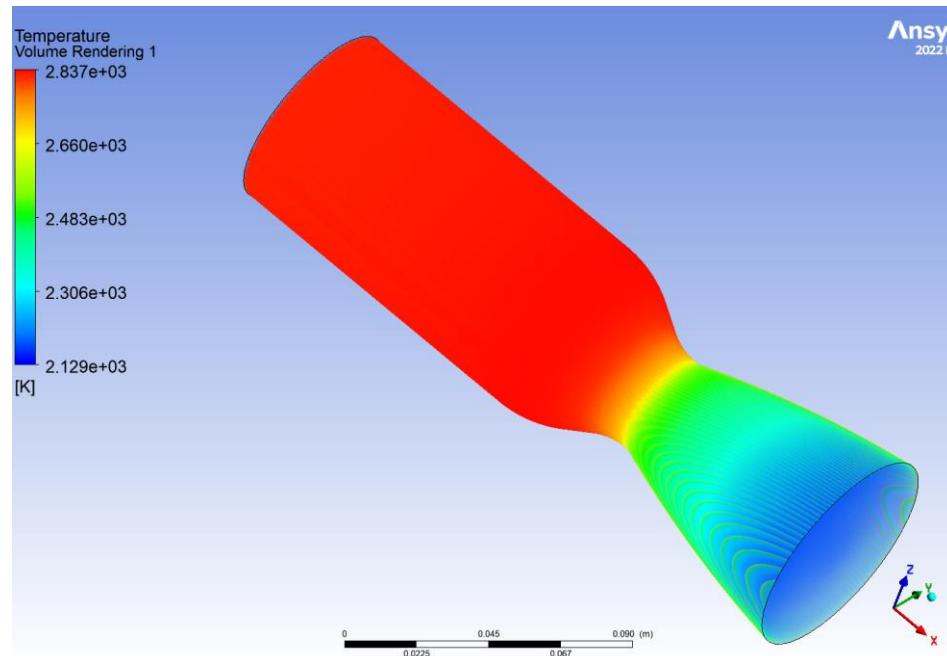
# Liquid Propellant Rocket Engine : CAD Model-Design-2

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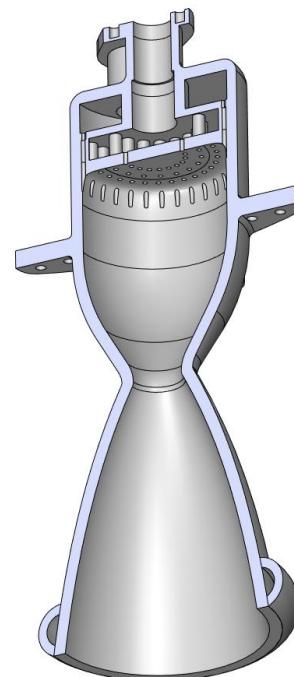


- Propellants: ethanol/hydrogen peroxide
- Thrust: 5kN
- Atmospheric ISP: 256 seconds,
- Injection System: Impinging injection at 60 deg.
- Maximum temperature: 2773 K

# Liquid Propellant Rocket Engine : CFD Analysis-Combustion



# Liquid Propellant Rocket Engine : CAD Model-Design-1



- Propellants: ethanol/hydrogen peroxide
- Thrust: 5kN
- Atmospheric ISP: 256 seconds,
- Injection System: Shower Head Injection.
- Maximum temperature: 2773 K

# **Project 02**

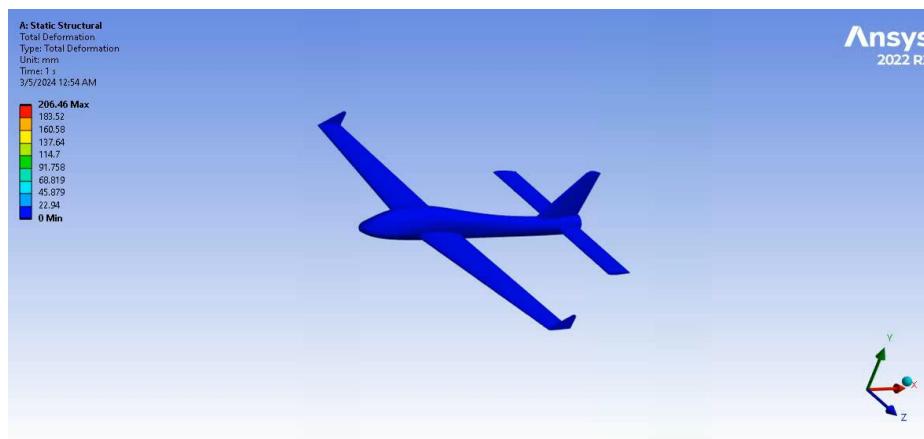
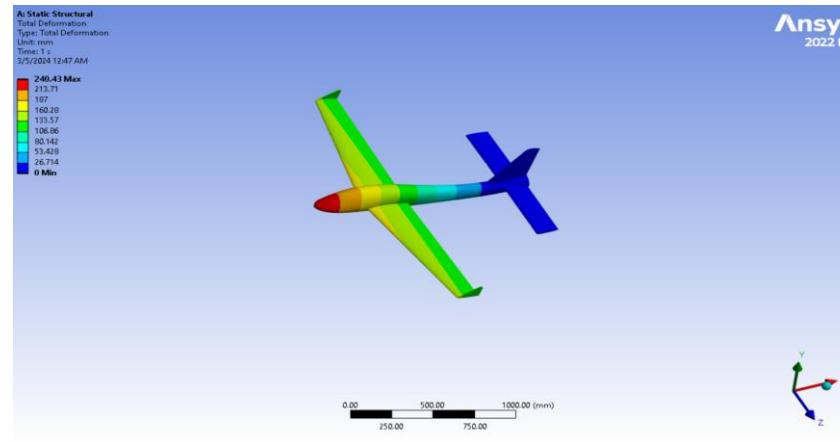
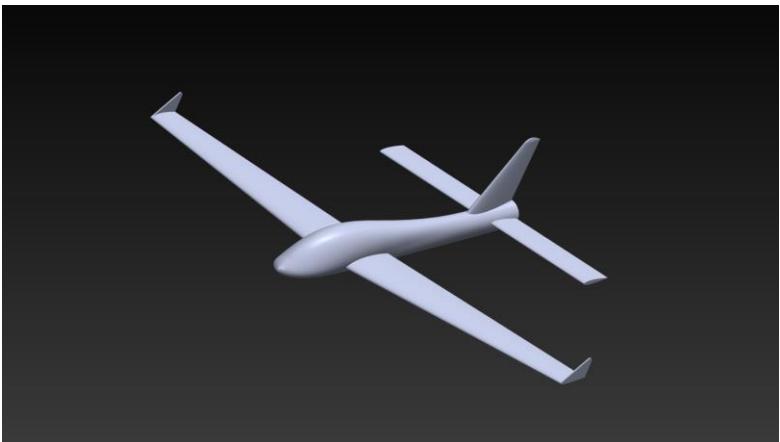
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# Finite Element Analysis of UAV

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- Created a digital model of the UAV body using FEA software.
- Simulated real-world loads like wind and flight maneuvers on the model.
- Analyzed stress concentrations within the body structure.
- Verified the UAV body's strength and ability to withstand these forces.

# Finite Element Analysis of UAV: CAD & FEA



# **Project 03**

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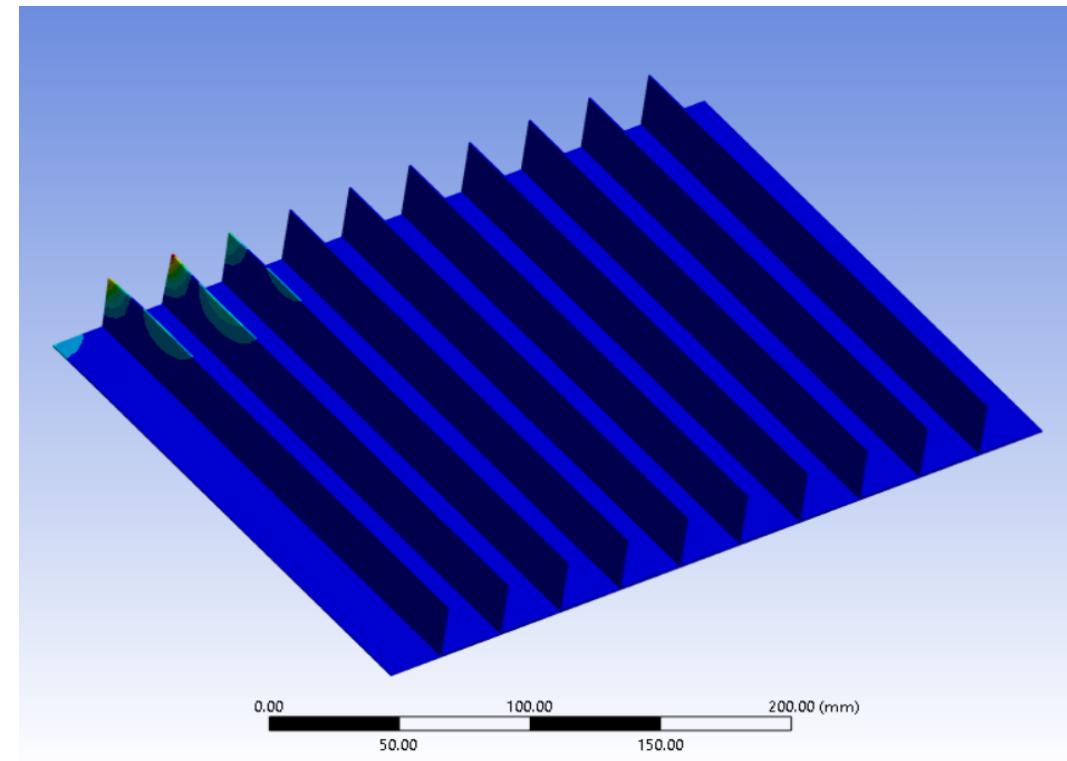
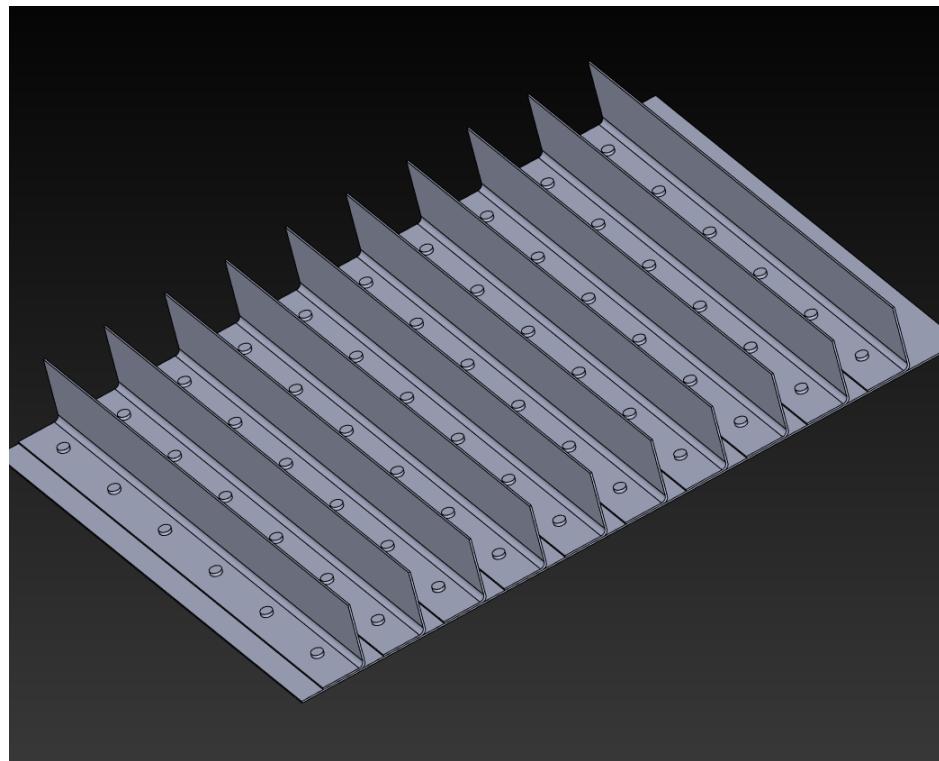
# Custom Designed Stiffener for Aircrafts Frames

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- Stiffener designed for the aircraft frame. A 3D CAD model was created, ensuring manufacturability for prototyping and proper meshing for FEA analysis.
- Prototype testing done to validate the design fits and functions well within the frame assembly.
- FEA analysis validated the design's ability to handle expected loads, with stresses and deformations well within acceptable limits.

# Custom Designed Stiffener for Aircrafts Frames: CAD & FEA

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# Thank you

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