Engineering Design Portfolio | Tristan Brasov

A selected portfolio of mechanical and aerospace design projects completed during undergraduate studies at the University of Missouri. Each section highlights an academic or industry-aligned project emphasizing analytical precision, engineering design, and applied problem-solving.

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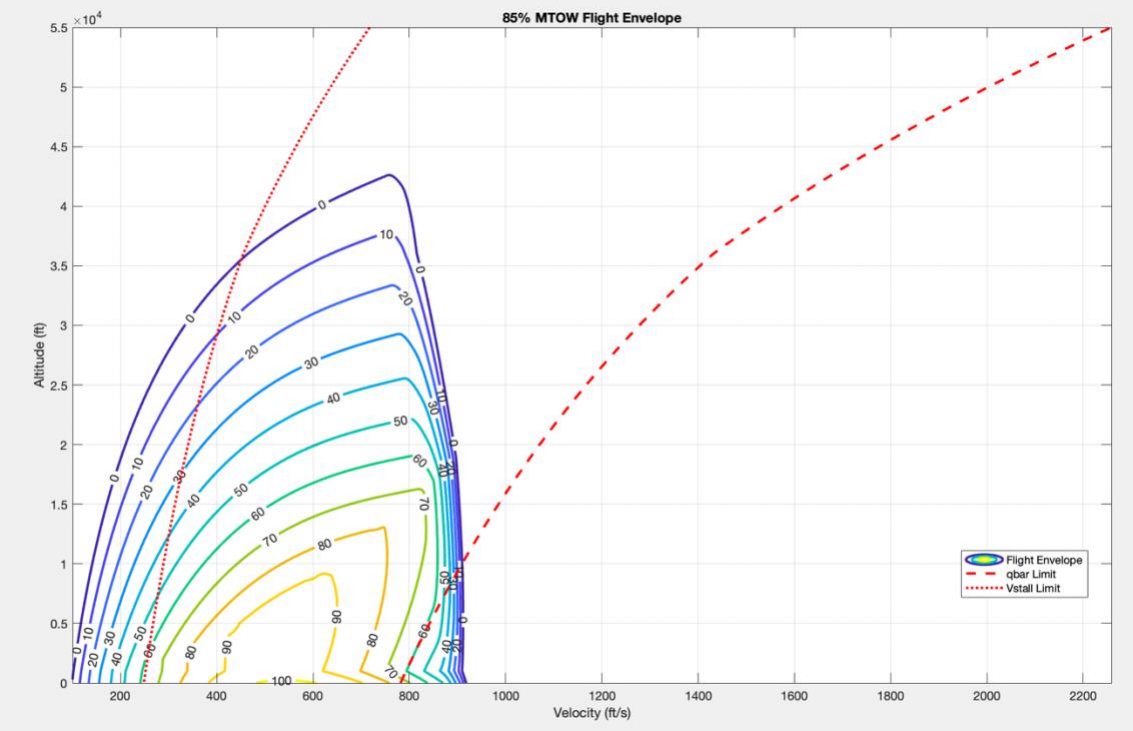
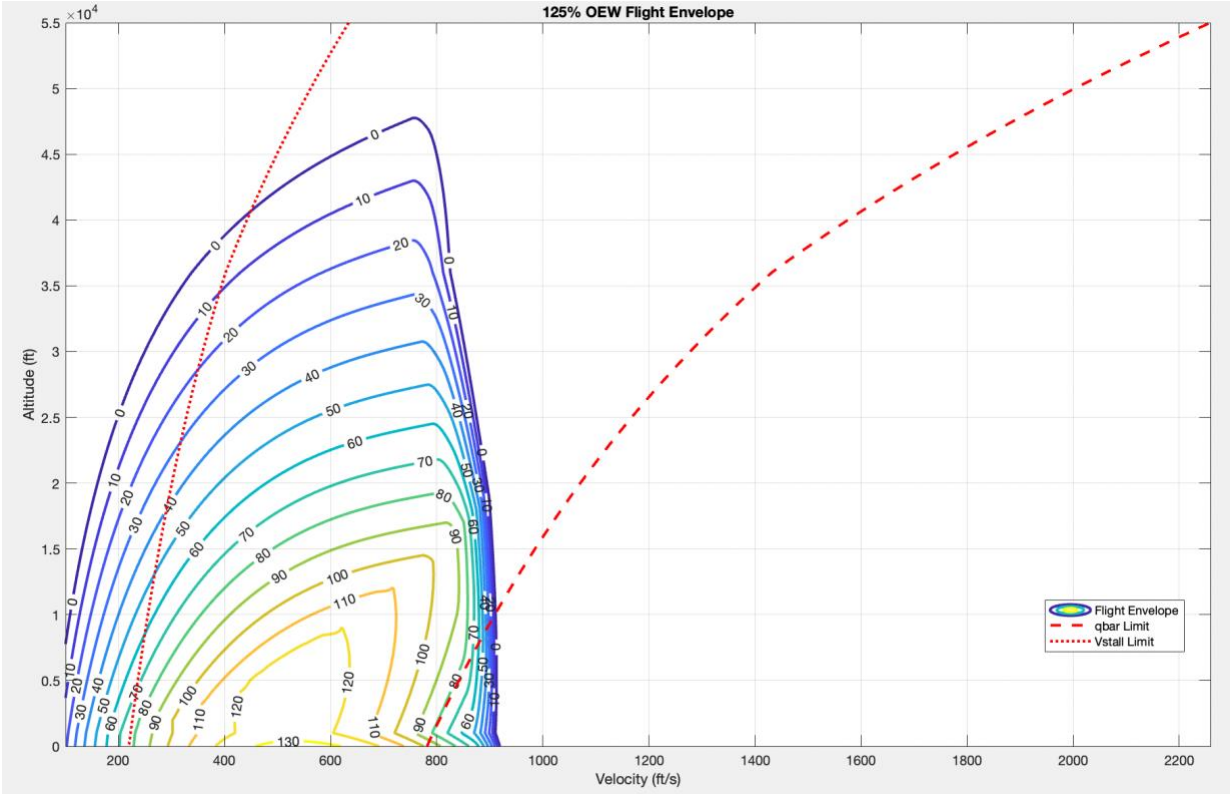
Senior Capstone Project

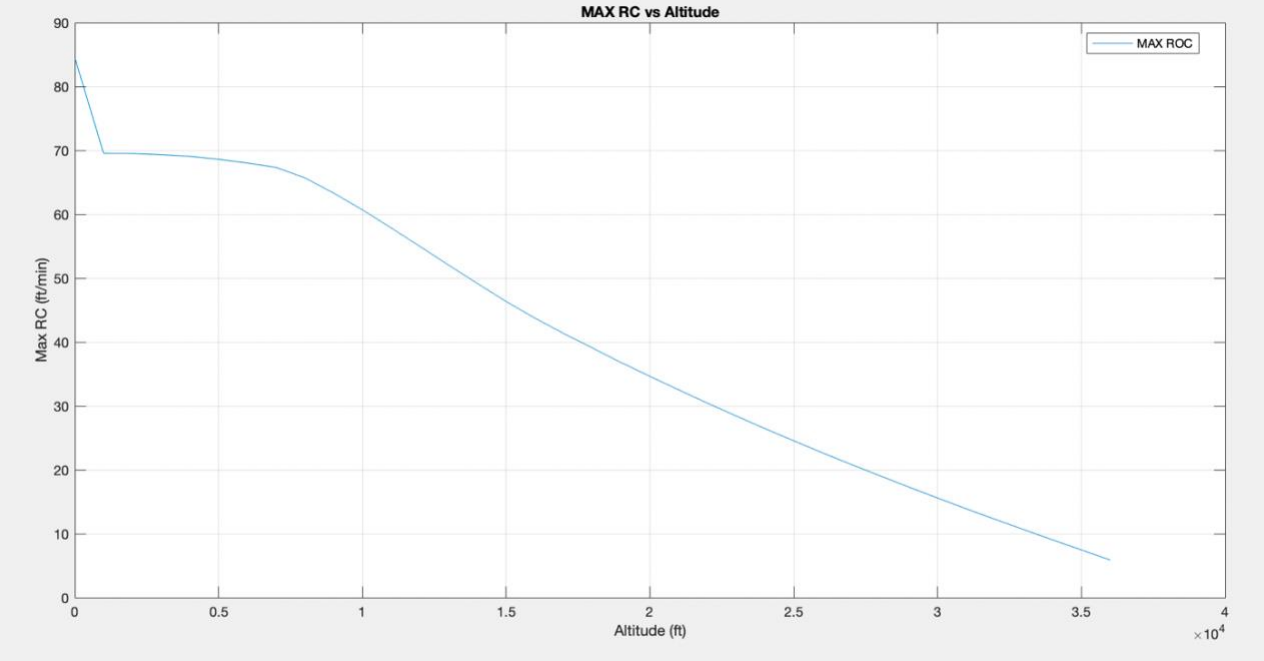
Redesigned skid steer ramps, reducing weight by 60% and improving FOS from 1.5 to 2.1 using SolidWorks and FEA; validated performance through TIG-welded fabrication and full-load testing.

Aircraft Flight Performance Semester Project Fall 2024

The Gulfstream G550 mission analysis is centered on modeling flight envelopes and rate-of-climb performance to evaluate aircraft capability across operating weights. Two flight envelopes were developed, one at 85% of maximum takeoff weight and another at 125% of operational empty weight. These envelopes illustrate how available thrust, aerodynamic limits, and energy height interact through each phase of flight. The accompanying rate-of-climb figure quantifies climb performance versus altitude, derived from MATLAB simulations using excess power relations. Together, the envelopes and RC curve demonstrate how aerodynamic efficiency and thrust decay with altitude govern achievable climb rates and ceiling performance for the G550.




125% OEW Flight Envelope
×10^4
Altitude (ft)
Velocity (ft/s)
Flight Envelope
qbar Limit
Vstall Limit


MAX RC vs Altitude
MAX ROC
Max RC (ft/min)
Altitude (ft)
×10^4

Machine Element Design Semester Project Fall 2024

Developed a compact two-stage reduction gearbox that increased torque by a factor of five while maintaining high reliability and manufacturability. The system consisted of four spur gears mounted on three steel shafts, supported by high carbon steel bearings with interference fits to ensure precise alignment. Detailed analysis included gear tooth stress, bending and contact fatigue, shaft deflection, and bearing life calculations, all verified to exceed a factor of safety of two. Using SolidWorks and manual calculations, the gearbox was optimized for minimal size, smooth power transmission, and a 10,000-hour operational lifetime. The final design balanced performance, material efficiency, and cost while demonstrating proficiency in mechanical design, tolerance analysis, and design for manufacture principles.