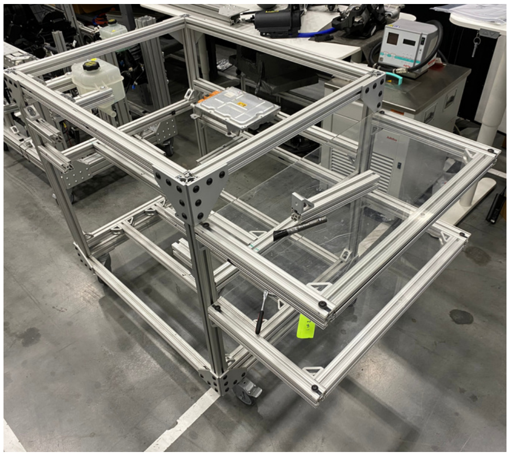
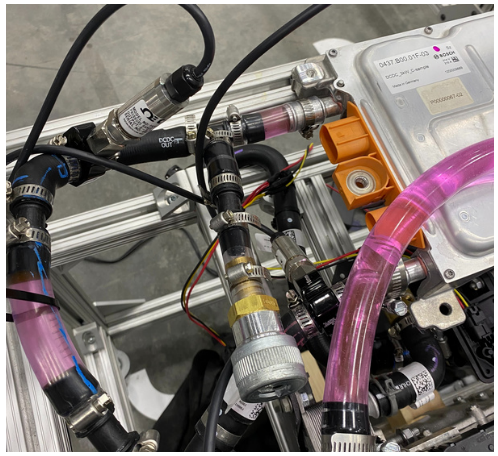
ANDI ZHOU

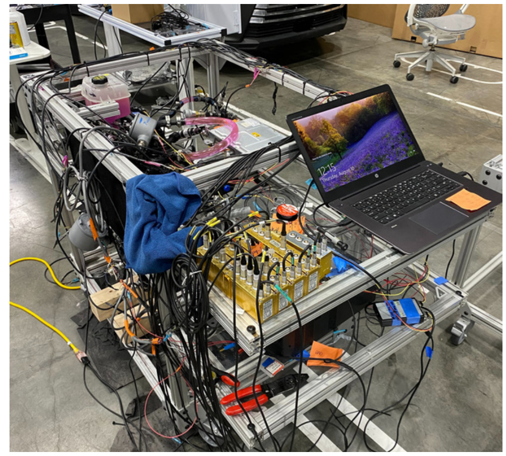
M.S.E AEROSPACE ENGINEERING AT THE UNIVERSITY OF MICHIGAN

andi.zhou1324@gmail.com
linkedin.com/in/andizhou1324
(734) 881-4192

POWERTRAIN & BATTERY COOLING SYSTEM TEST STAND - ZOOX







What?

- Designed, built and operated the powertrain and battery cooling system test stand
- Measured **pressure drop and flowrate data** subjecting to different system configurations (pump speed,valve positions, etc.)

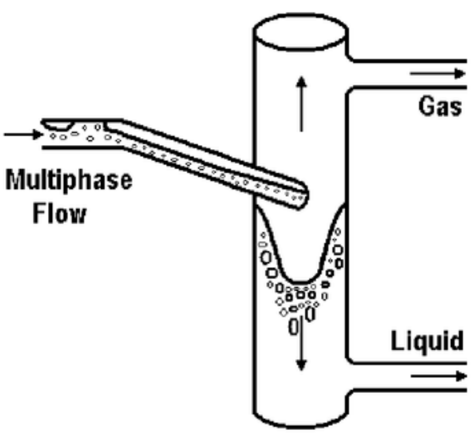
How?

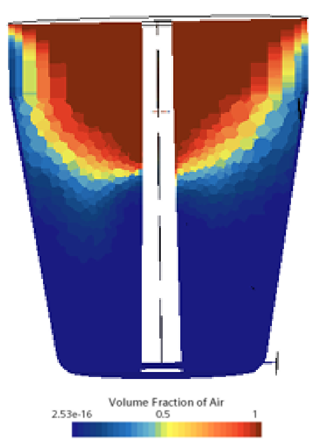
- Designed **instrumentation diagrams**
- Installed **pressure sensors, thermocouples,** and turbine **flowmeters**
- Collected data using **IPETronik**
- Automated testing via **Visual Basic Script/Python**

Result?

- Confirmed flow data from Original Equipment Manufacturers (OEMs)
- Validated **1D Simulations**
- Decreased testing time by **80%** via automation
- Increased system performance by **7.5%**

SWIRL EXPANSION TANK OPTIMIZATION - VOLVO TRUCK





What?

- Conducted optimization studies on swirl tank geometry and operation
- It is used to de-aerate the coolant system and decrease the truck frontal area for drag reduction

How?

- Geometry created using **Creo CAD**
- Optimized using transient **Star CCM+ Multiphase Flow**

Result?

- Maintained a separation efficiency of **99%**
- Reduced mass by **40%**
- Unfortunately **lacked** computational resources for finer mesh sizing (**2 cores, 10 different cases**)

*Obtained permission to share the above images

ANDI ZHOU

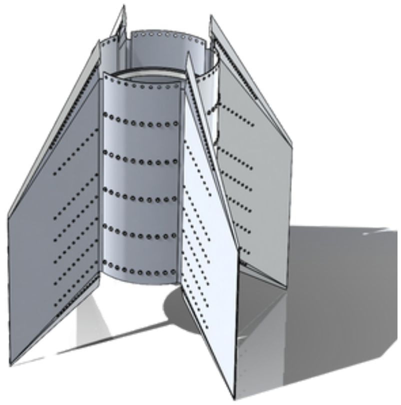
M.S.E AEROSPACE ENGINEERING AT THE UNIVERSITY OF MICHIGAN

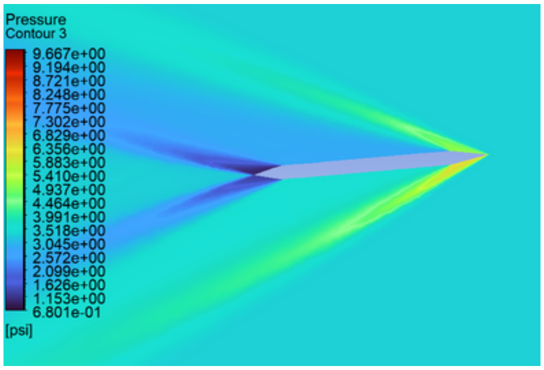
andi.zhou1324@gmail.com

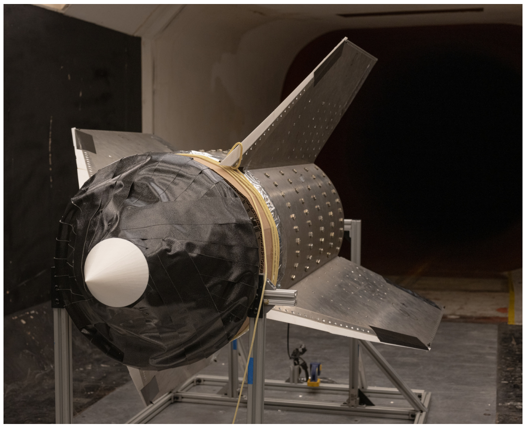
linkedin.com/in/andizhou1324

(734) 881- 4192

ROCKET FINS - MASA







What?

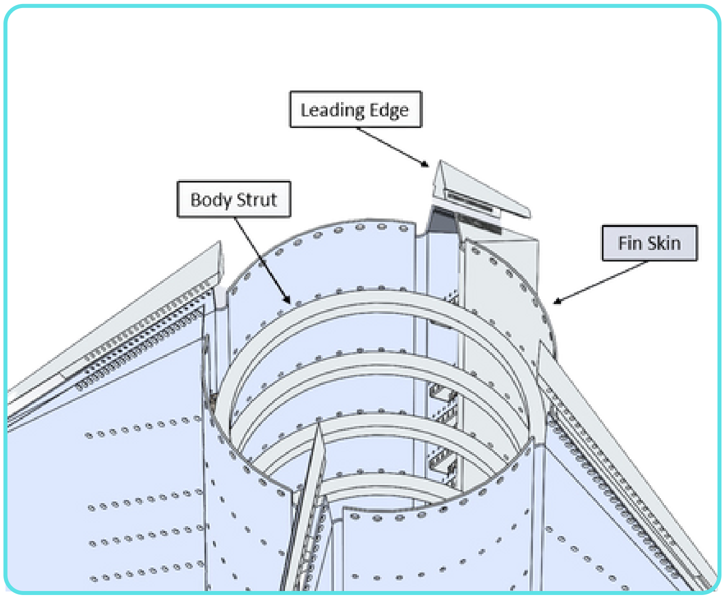
- Led the **design** and rapid **prototyping** of a supersonic (Mach 4) capable rocket fin assembly
- Must withstand **950 lbs** of force in cantilever
- Must be **3-ft wide** in span to ensure rocket stability

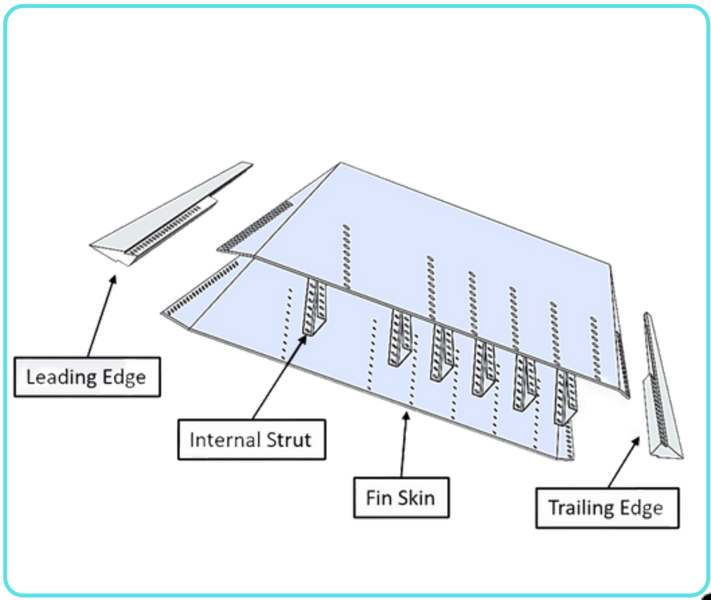
How?

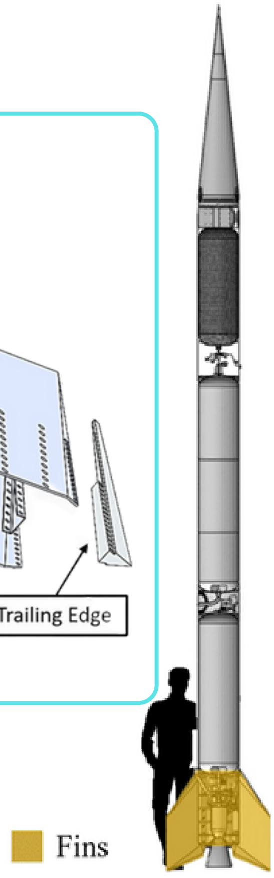
- Used sheet metal/surface features in **SolidWorks** for design
- Optimized aero-thermal with **ANSYS Fluent**
- Optimized aero-structure using **ANSYS Static/Transient Structural**
- Utilized in-house manufacturing **(CNC Mill, sheet metal roller/ bender)** for rapid prototyping

Results

- Completed assembly in 2 months
- Achieved a **thermal-structural safety factor** of **2**
- Obtained aerodynamic data through full-scale **wind tunnel** testing
- Optimized design cycle, decreased time by **70%**







ANDI ZHOU

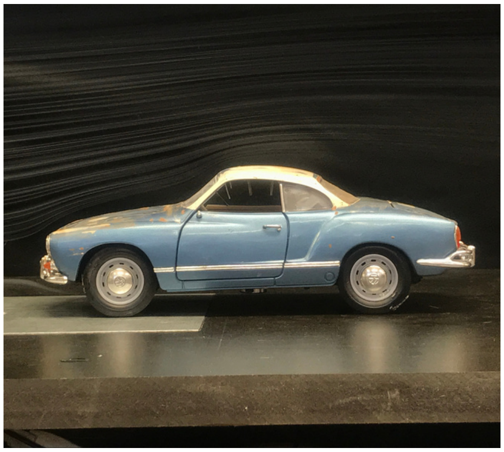
M.S.E AEROSPACE ENGINEERING AT THE UNIVERSITY OF MICHIGAN

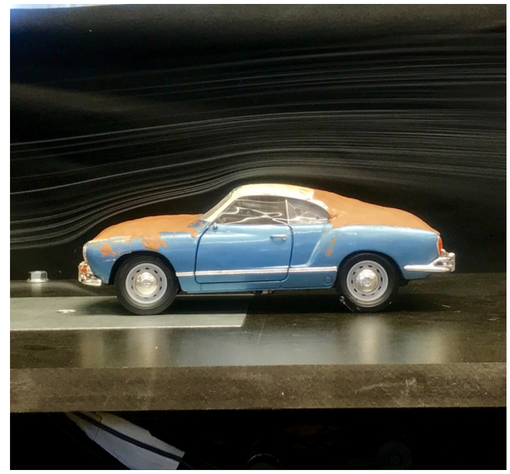
andi.zhou1324@gmail.com

linkedin.com/in/andizhou1324

(734) 881- 4192

EXPERIMENTAL VEHICLE AERODYNAMIC - TU BERLIN





What?

- Analyze aerodynamic characteristics of a scaled-down 1962 Volkswagen Karmann Ghia using an open-return **wind tunnel**
- Modified the model based on test data to decrease the drag coefficient

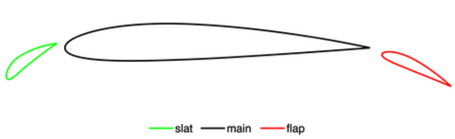
How?

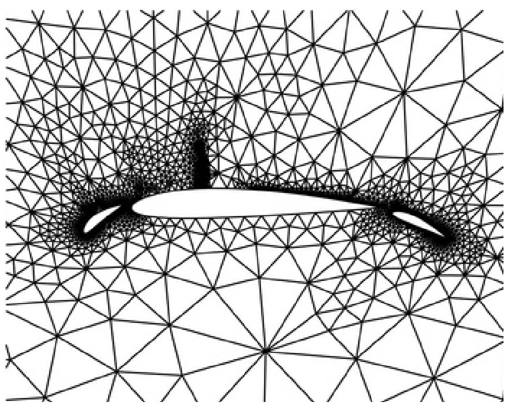
- Utilized clay for rapid shape modification
- Used **pressure taps**, **force scale** and **wake measurement** methods to quantify vehicle lift and drag

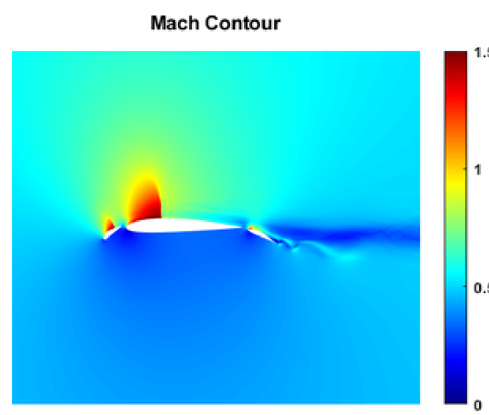
Results

- Delayed flow separation, confirmed via smoke visualization
- Decreased drag coefficient from 0.57 to 0.43; a total of **25%**

CUSTOM CFD SOLVER - AEROSP 623 CFD II







What?

- Implemented from the ground up a **finite volume solver** capable of solving the inviscid **Navier-Stokes equation**

How?

- Employed a combination of **MATLAB** and **C++**
- Read various **literature** to expand solver capabilities

Results

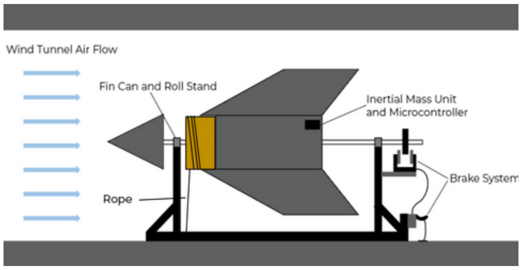
- Successfully implemented solver
- Added **adaptive meshing** capabilities
- Added **Discontinuous Galerkin (DG)** Finite Element Method
- Varied solver order to achieve **shock capturing**

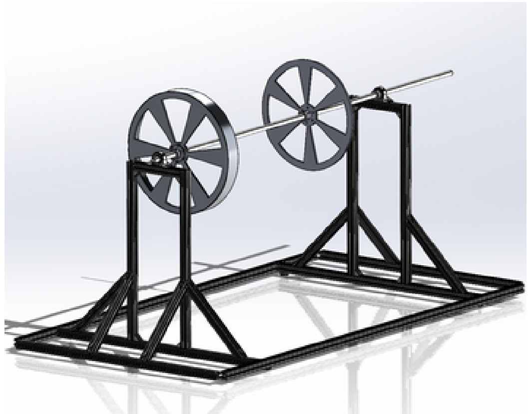
ANDI ZHOU

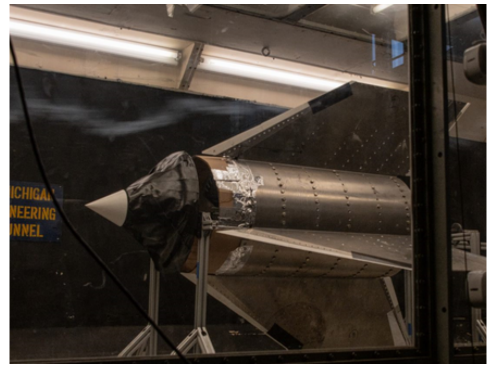
M.S.E AEROSPACE ENGINEERING AT THE UNIVERSITY OF MICHIGAN

andi.zhou1324@gmail.com
linkedin.com/in/andizhou1324
(734) 881- 4192

WIND TUNNEL/STATIC TEST FIXTURE - MASA







What?

- Analyzed the rotational torque induced by aerodynamic forces in the **wind tunnel**
- Constrained translation but allowed for rotation about its central axis
- Must be able to be converted into a **static test stand** (withstand 950 lbf)
- Must withstand a windspeed of **180 mph**

How?

- Used **Solidworks** for design
- Employed **Intertial Mass Unit** (IMU) for rotational measurement
- Used **dial indicator** for static deformation measurement
- Post-processed data in **MATLAB**

Results

- Quantified angular acceleration as a function of airspeed
- Validated FEA simulations with an error margin **below 20%** (partially)
- Approximated their relationship as a **second order ODE**
- Visualized aerodynamic flow during rotation via smoke screen