Design of a Commercial Supersonic Transport Aircraft

Adin Goldberg, Joynob Kaoshar, Ryan Rex, Caleb Wein, Connor Klauss, Connor Raley, Nick Gomezjurado
Advisors: Drs. Bowcutt, Baeder and Ifti

A. James Clark School of Engineering

Marketing and Pricing

- 1st fleet production cost is **$150B** (RDT&E +flyaway)
- **500** flights per year target
- Tickets are sold in 2 classes
  - Comfort (26) : **$5.0K**
  - Premium (4) : **$6.2K**

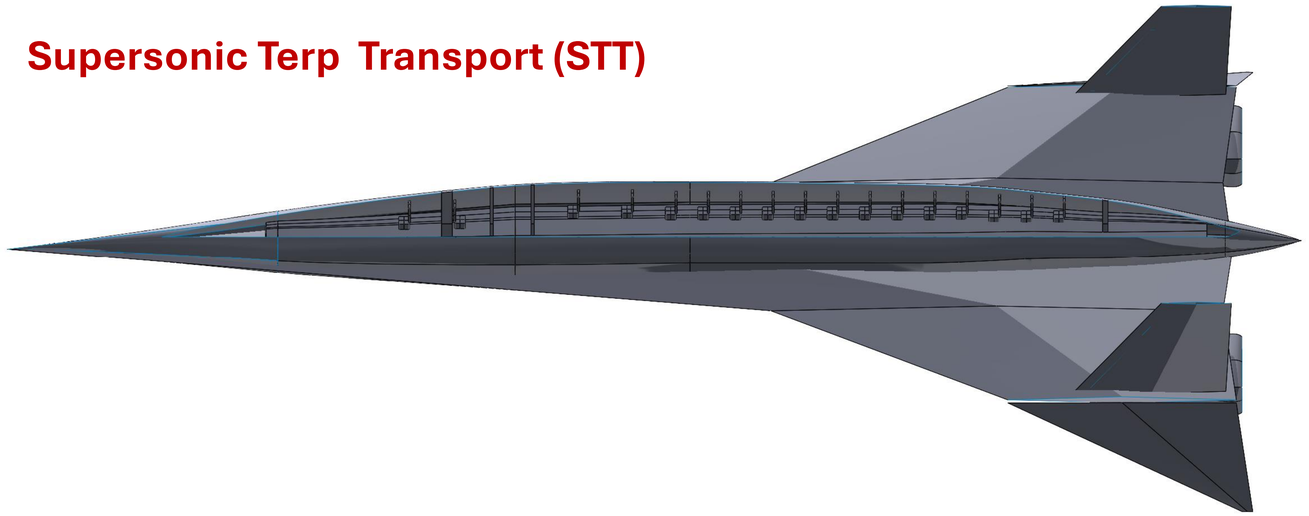
Propulsion System

- **4 Turboramjet** engines propel the vehicle
- Acts as a low bypass turbofan engine at low speeds (Mach 0-2.3)
- Transitions to ramjet engine mode at high speeds (> Mach 2.3)

Mission

- Design a vehicle that can fly transpacific **(Los Angeles to Tokyo)**
- Carry **30** passengers
- Travel Mach **3.6** speeds and **80,000 ft** in altitude

Supersonic Terp Transport (STT)



Thermal Protection

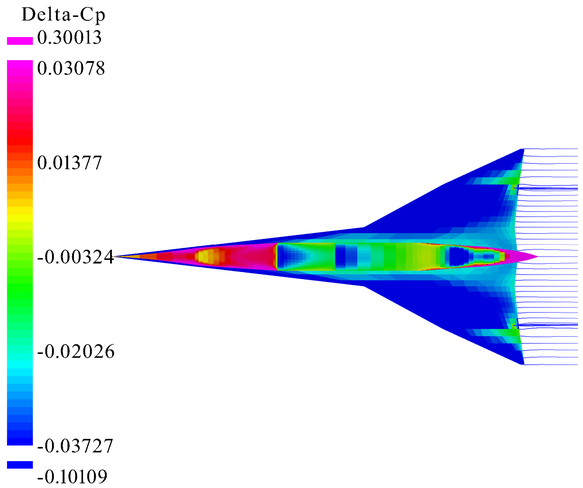
- Solid **Inconel** Nose cap and Wing leading edges to support high stagnation heating loads
- **Min-K** ceramic insulation to protect passengers and fuel from skin friction heating on Ti-9 outer shell

Structure

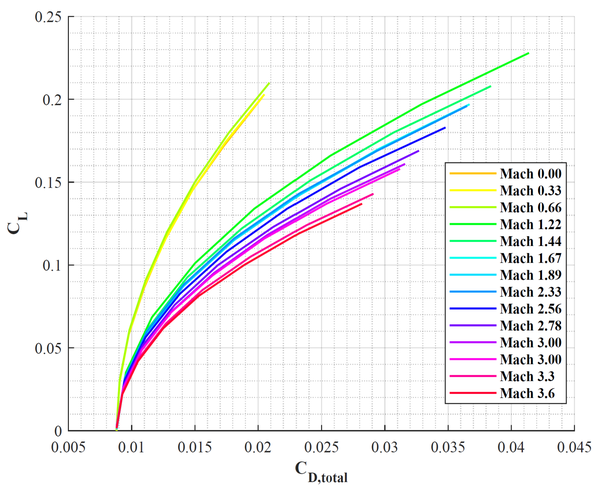
- Al-7075 internal structure
- Ti-9 outer shell

Aerodynamic Analysis

- Performed with VSPAERO



Pressure at Mach 3.6 & 2° angle of attack



Vehicle Trajectory

- **4800 NM** covered within **3 hours**
- Propellant Mass Fraction **48.3%.**