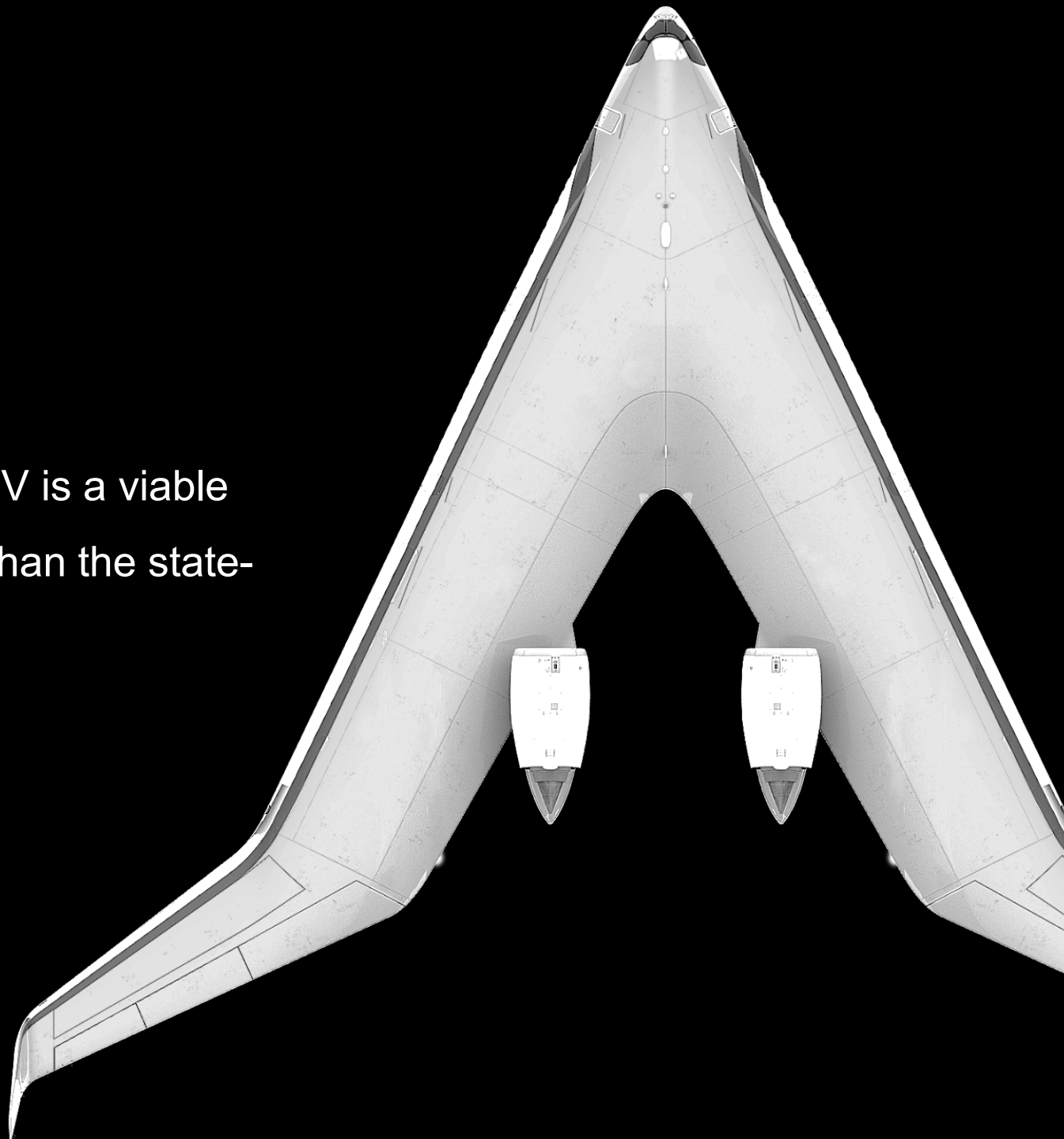


# Flying V

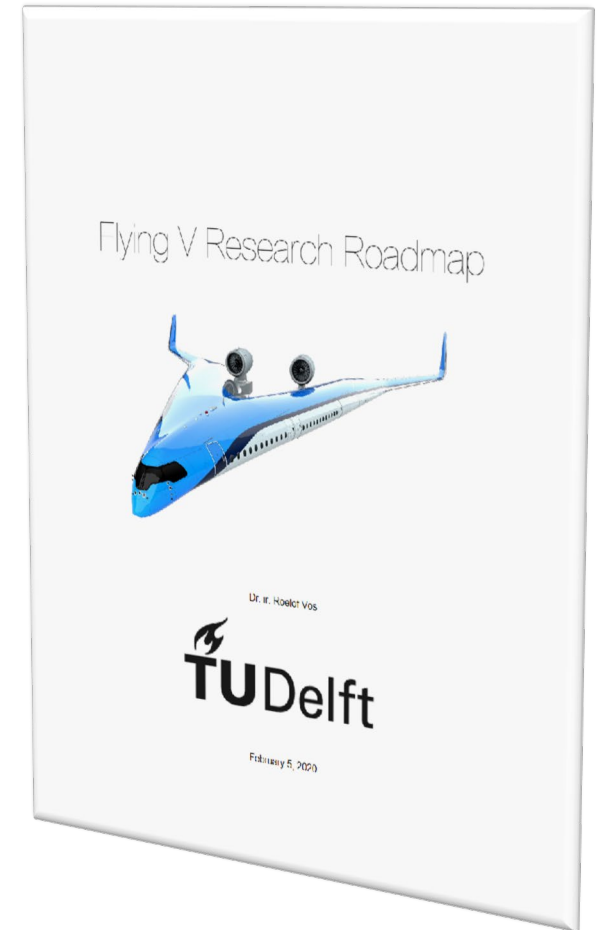
Justus Benad – March 16, 2022

Ambition of Flying V project:

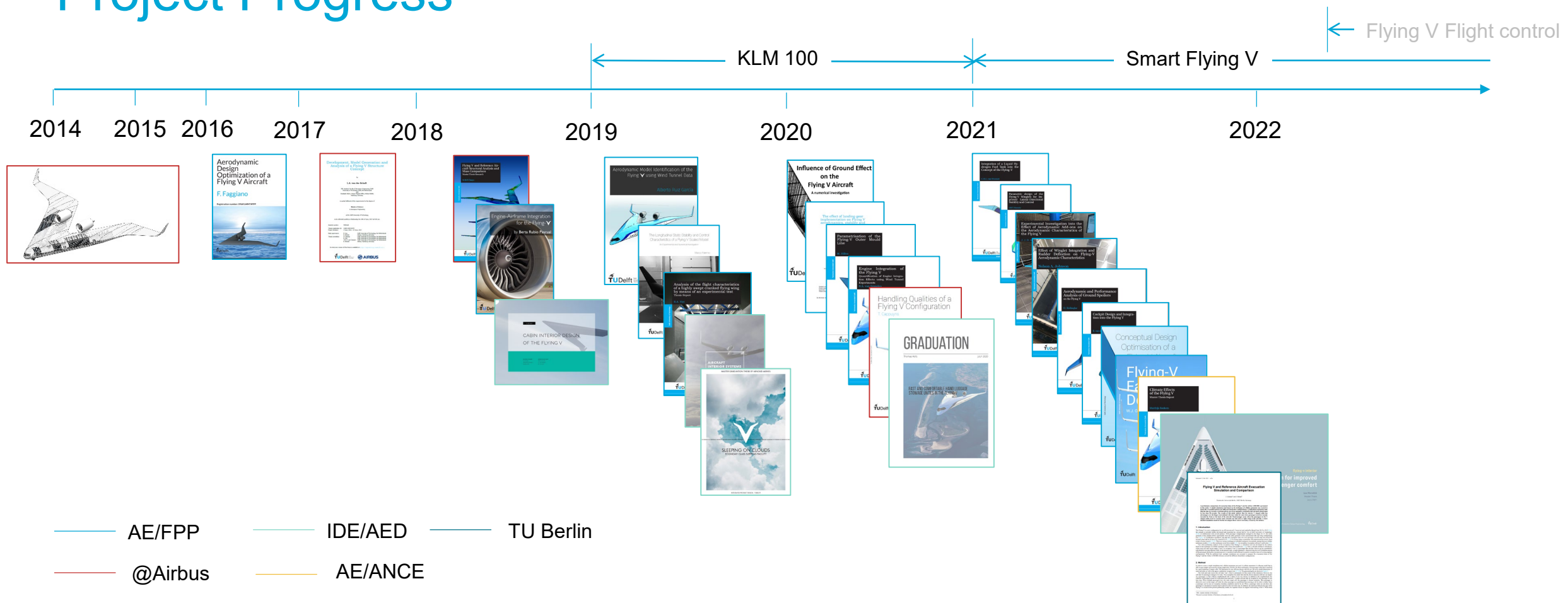
To demonstrate unambiguously that the Flying V is a viable  
and more energy-efficient aircraft configuration than the state-  
of-the-art by 2025



# TU Delft Team Flying V

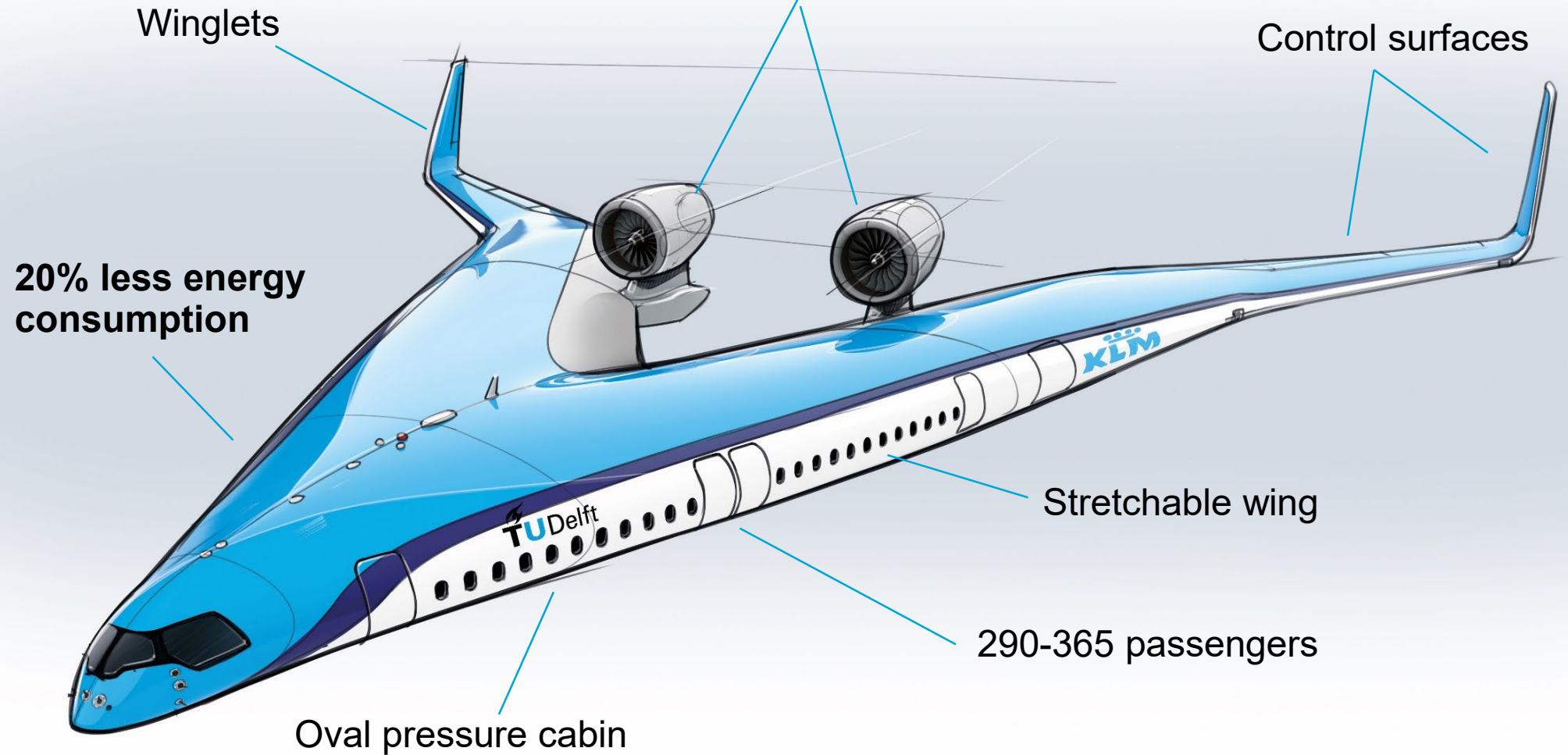


# Project Progress



# Flying V Overview

Complementary to propulsion innovations

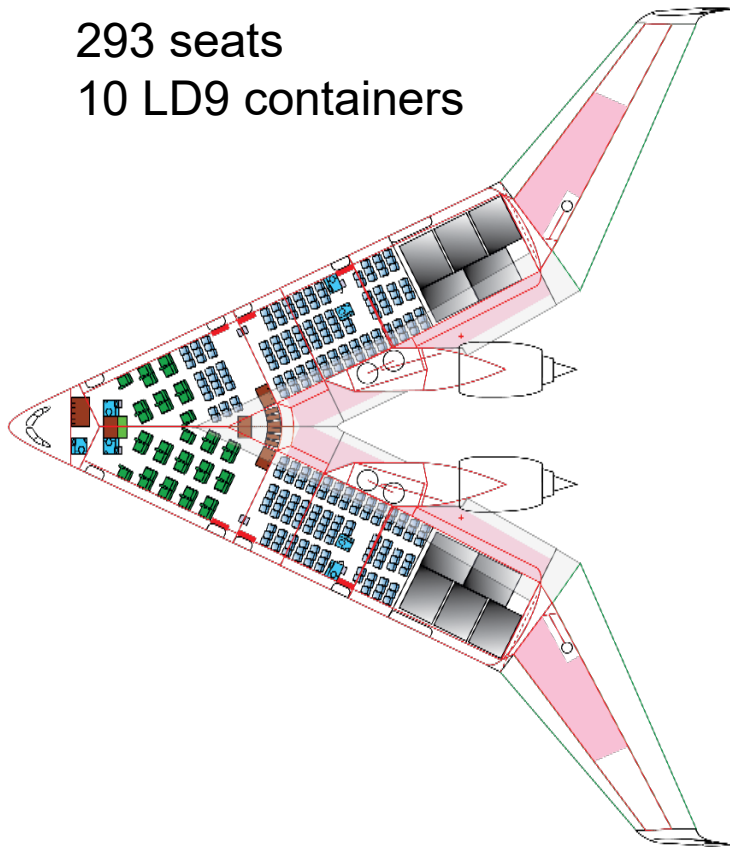


# Family Concept

FV-800

293 seats

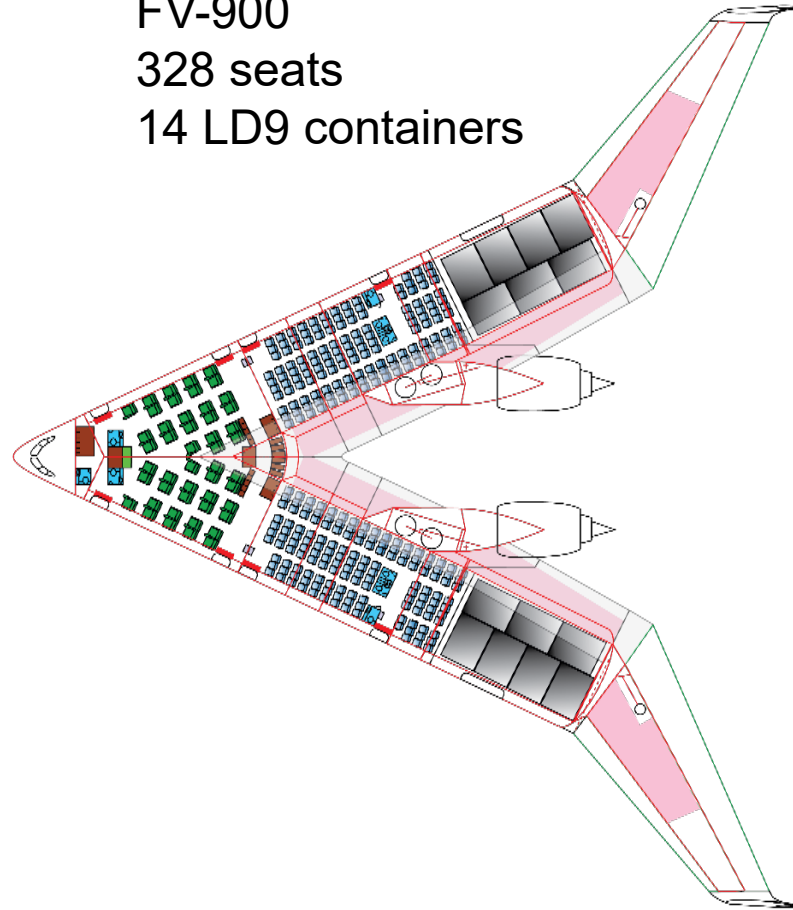
10 LD9 containers



FV-900

328 seats

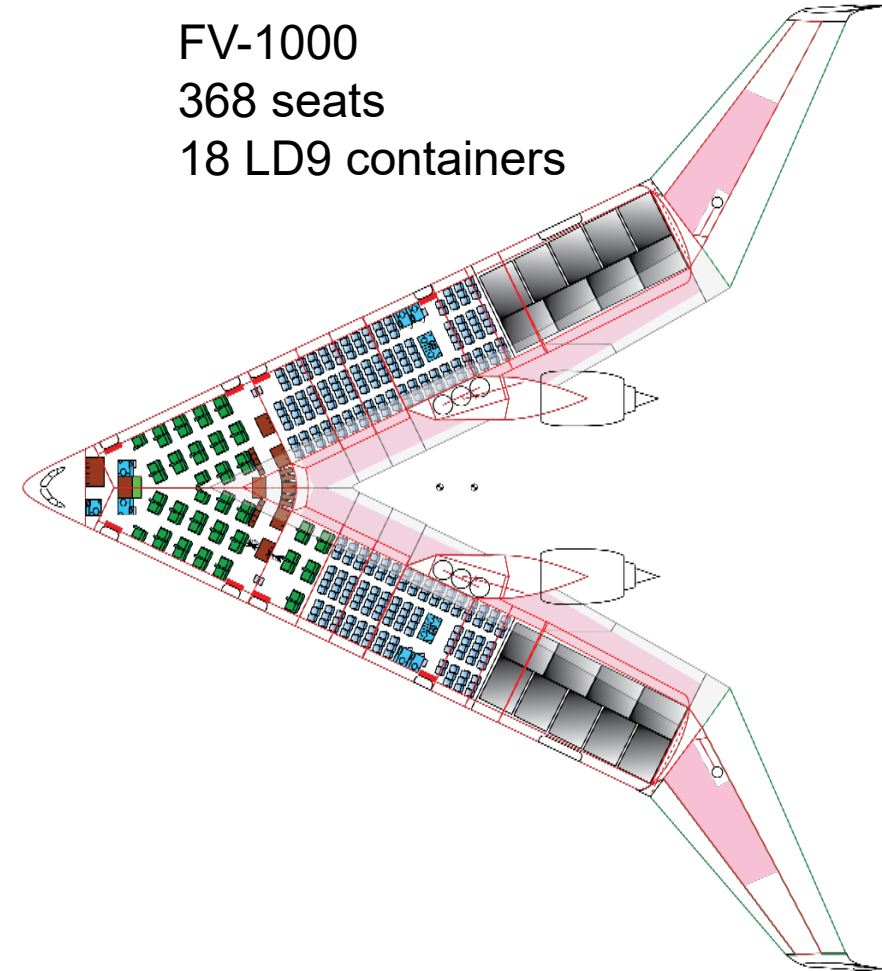
14 LD9 containers



FV-1000

368 seats

18 LD9 containers



# Contents

- Update on Technical Research
  - Flight Dynamics and Control
  - Take-Off Noise
  - Structural Design
  - Interior Design
- The Path Towards Flying V Introduction

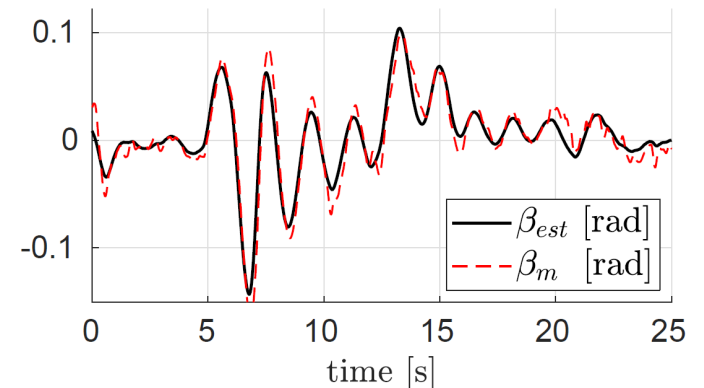
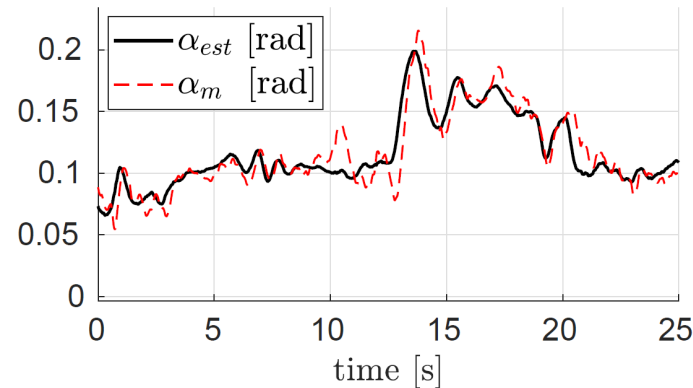
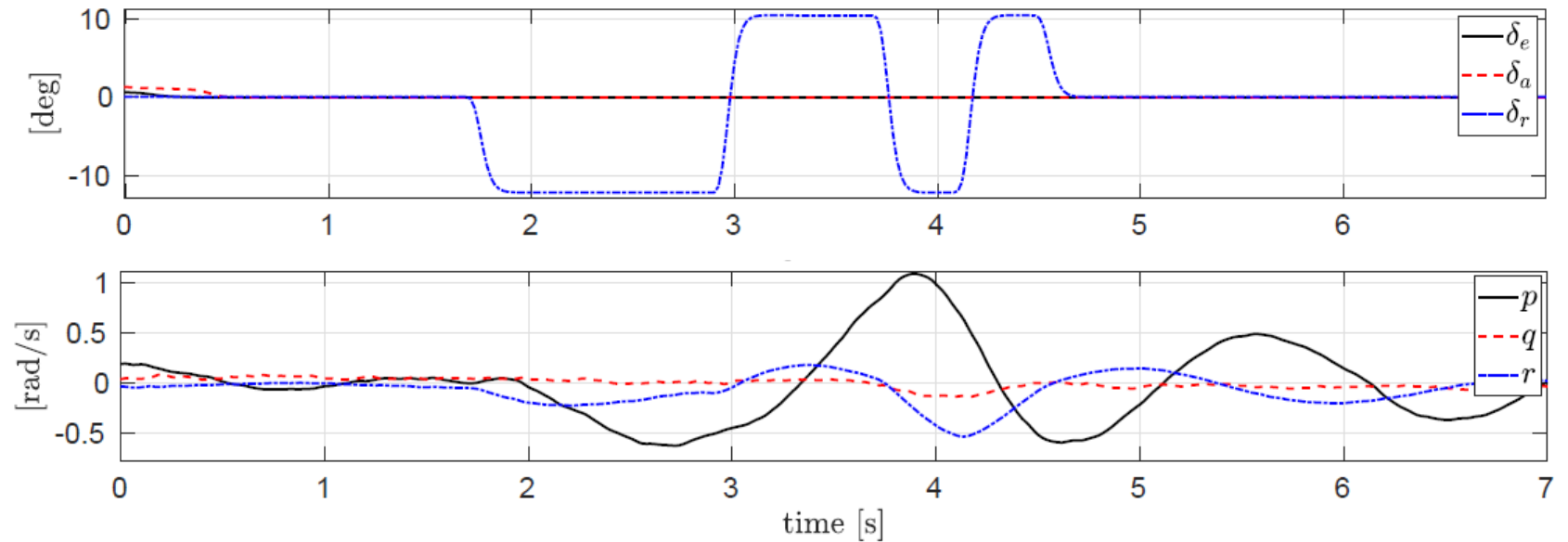
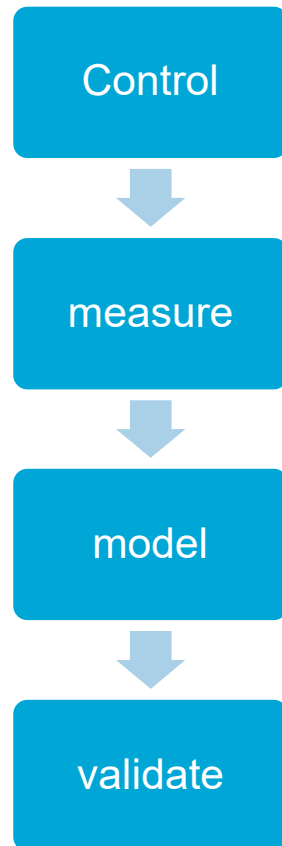


# Eight more successful test flights!



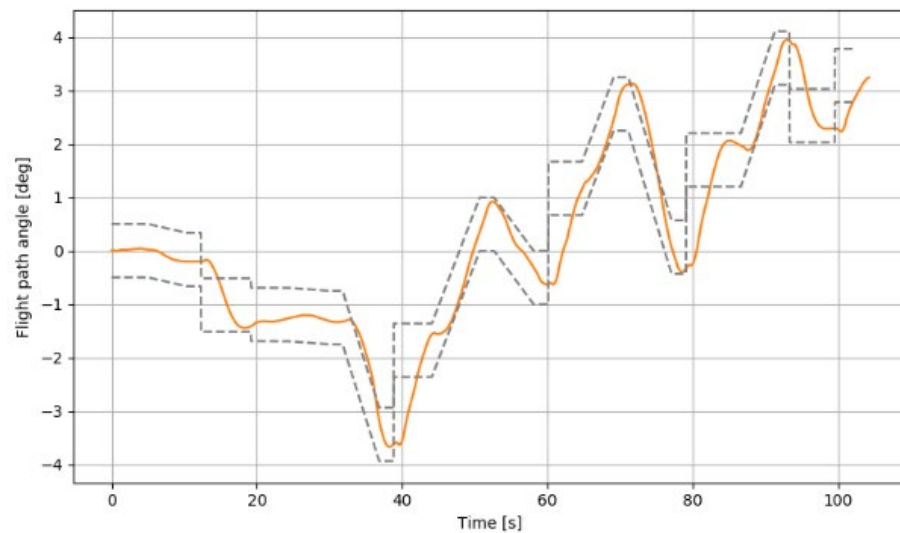


# Flight Dynamic Model Identification



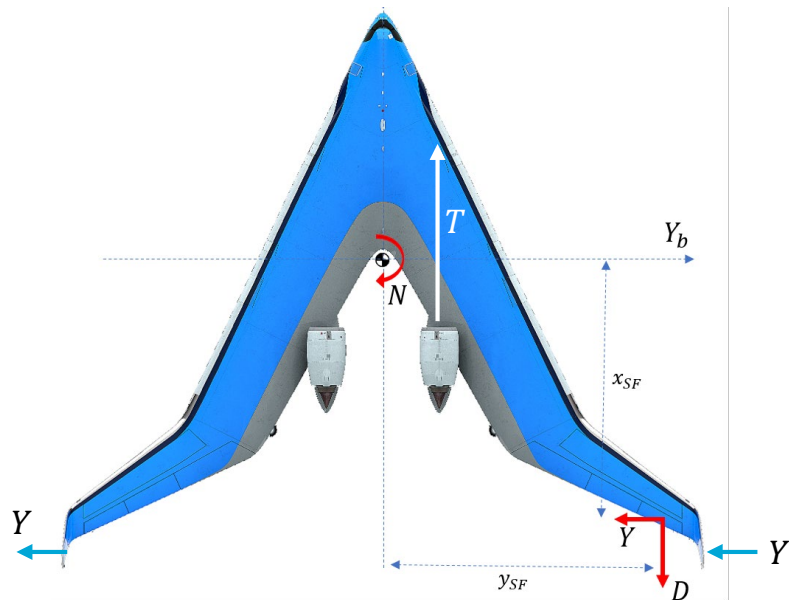
# First simulator tests successfully completed

- Longitudinal handling qualities evaluation in cruise
- No stability augmentation applied
- Two control-allocation schemes were evaluated
- Acceptable handling qualities were reported

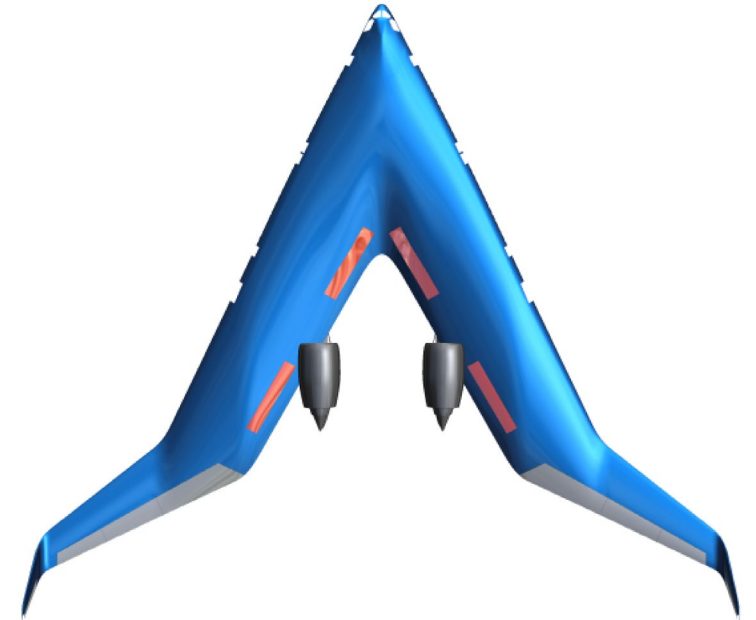
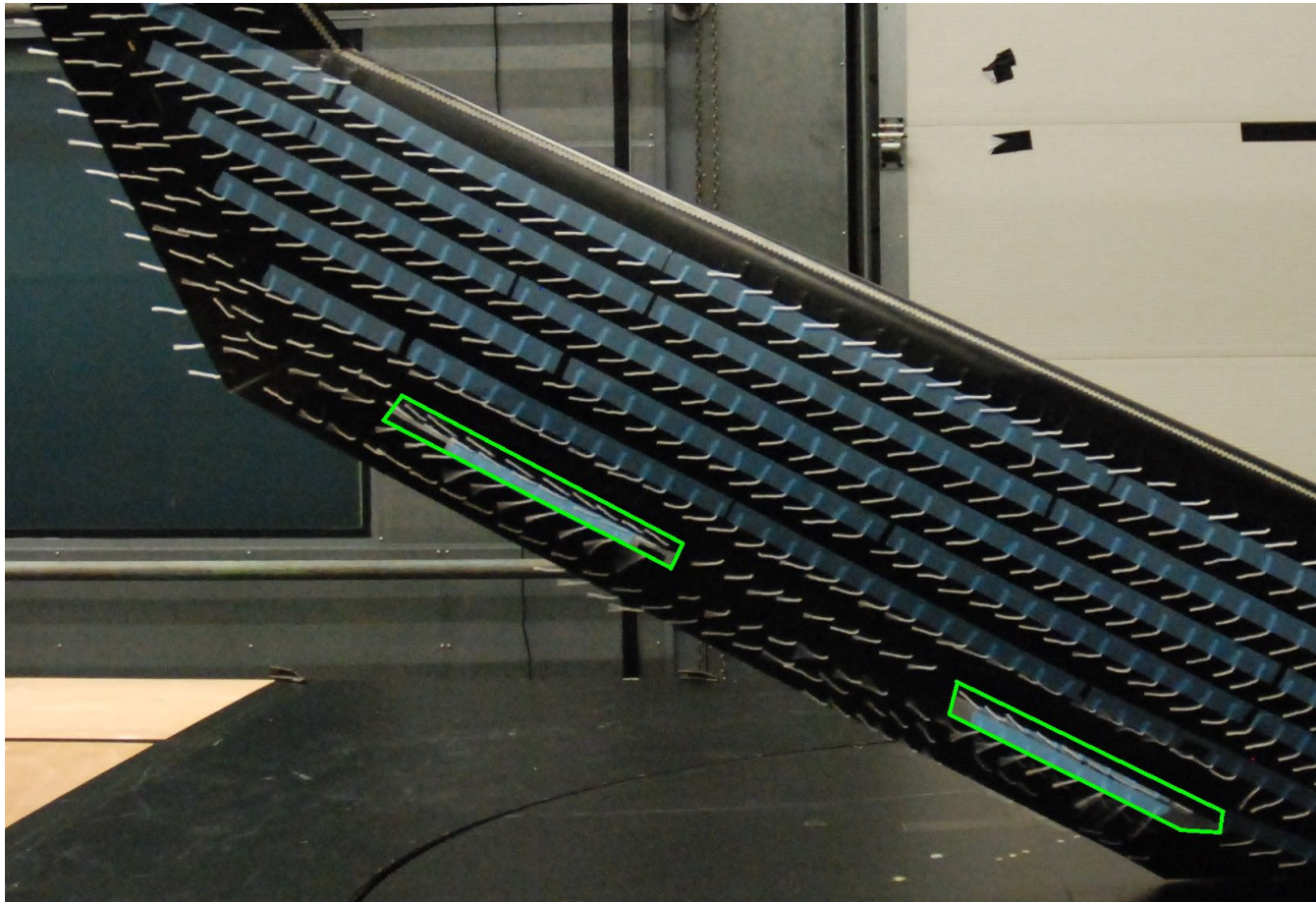


# Split Flaps for Yaw Control

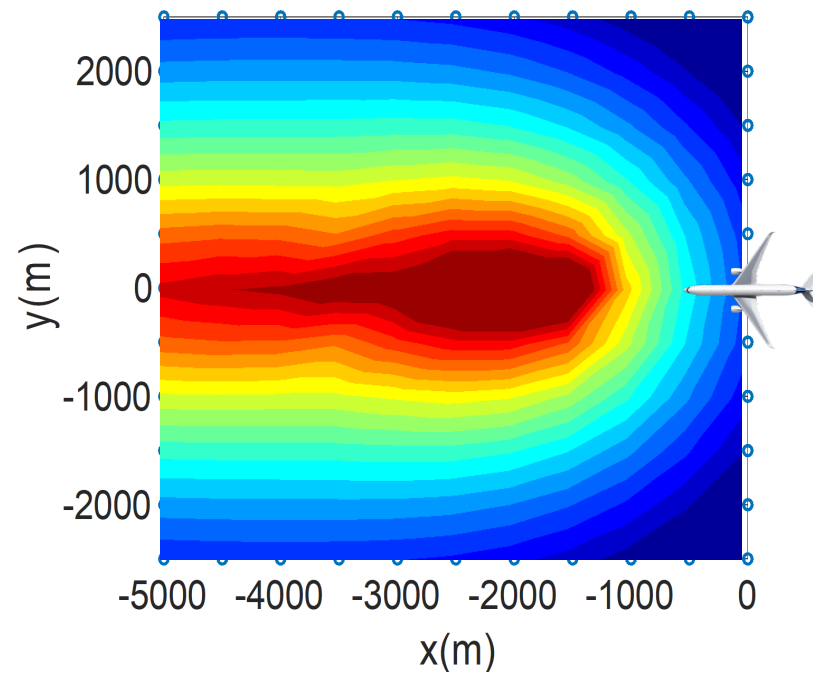
- Split “elevon” / “drag rudders” tested
- Improves directional control
- Worst case: OEI + low speed



# Spoilers to Dump Lift

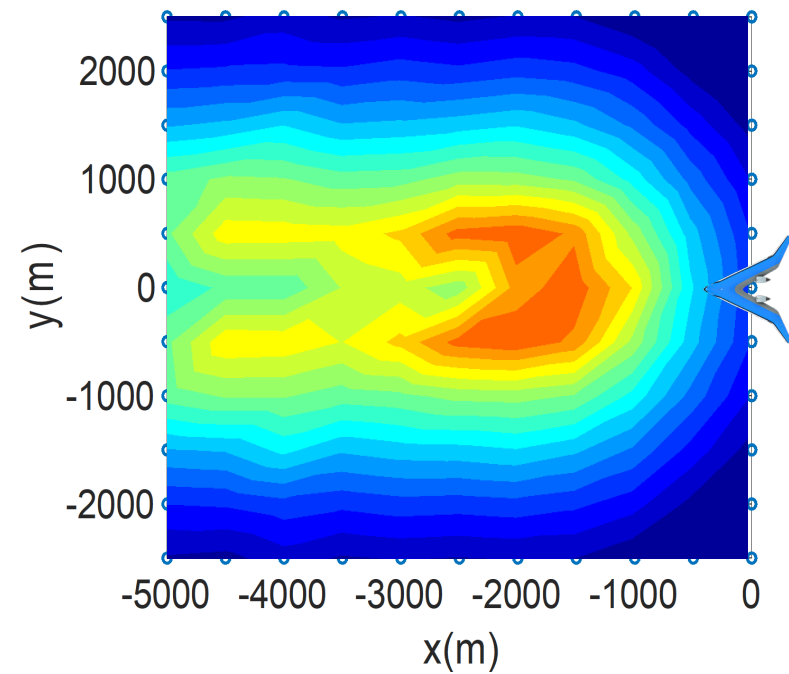


# Sound Exposure Level during Take-Off

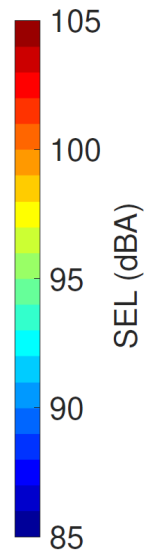


Boeing 787-9

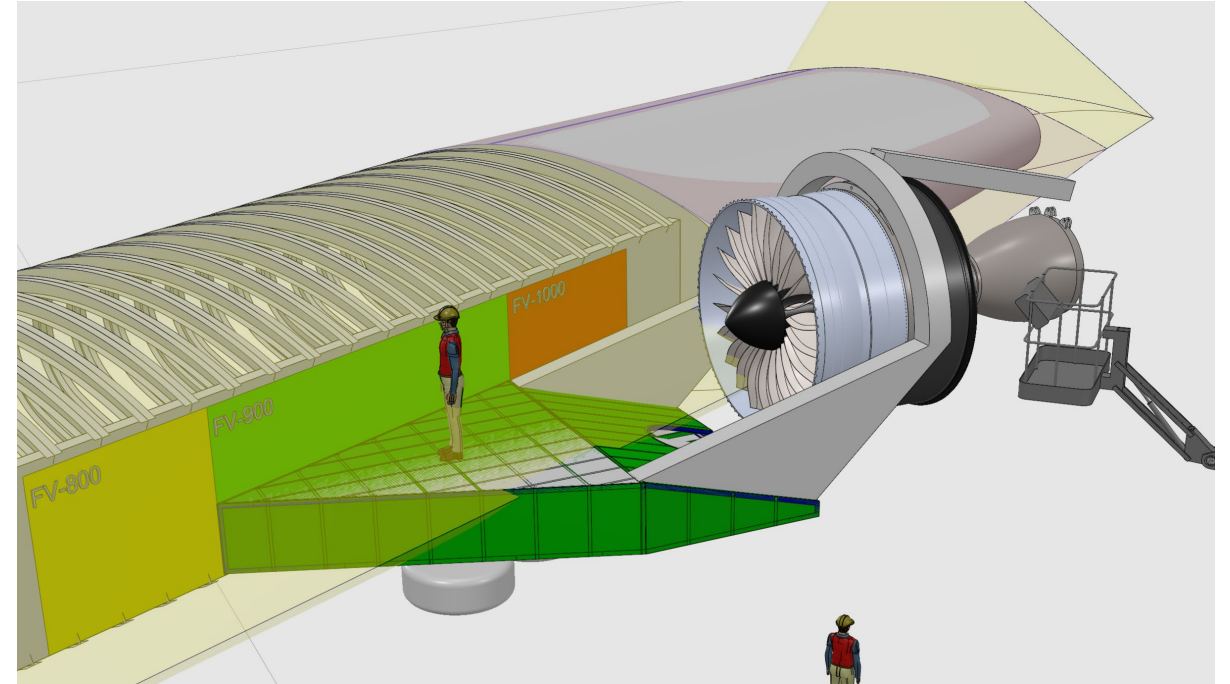
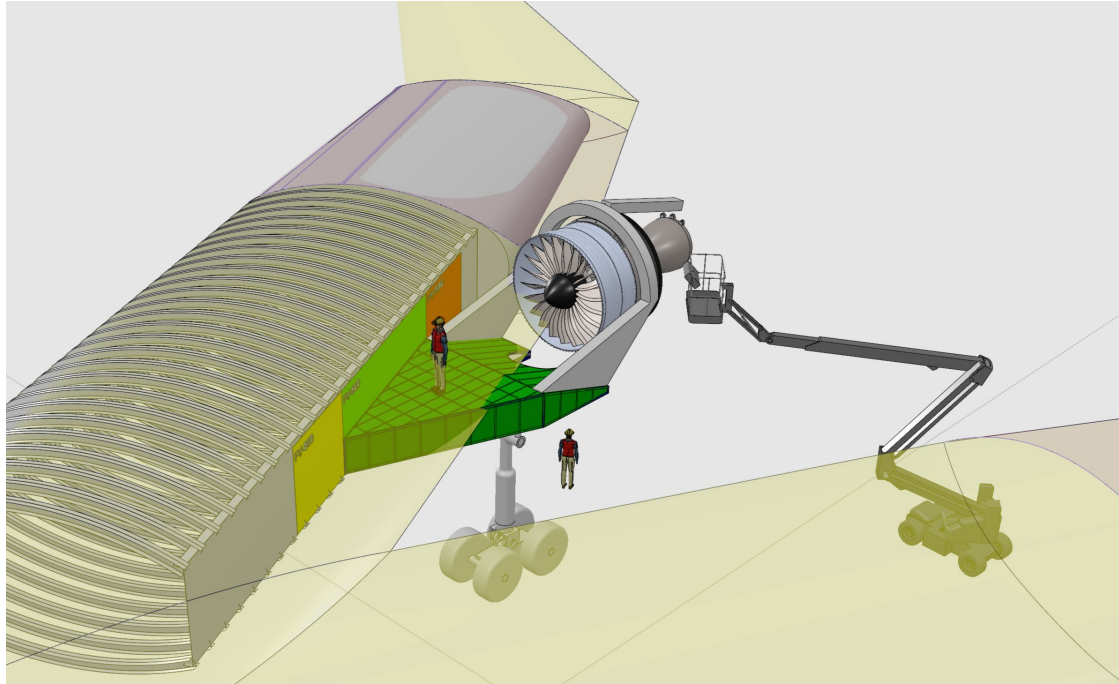
Same Thrust!



Flying V - 900

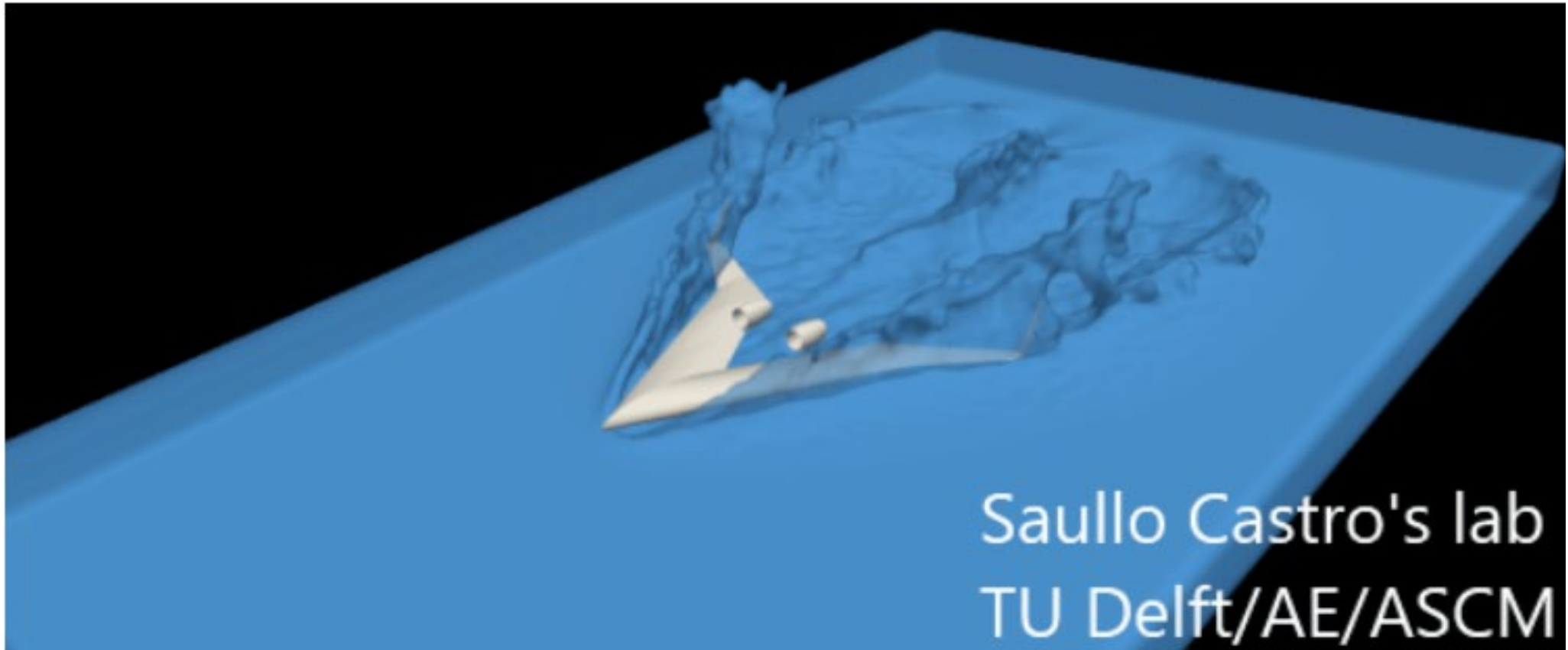


# Design of Integrated Pylon + Landing Gear Structure

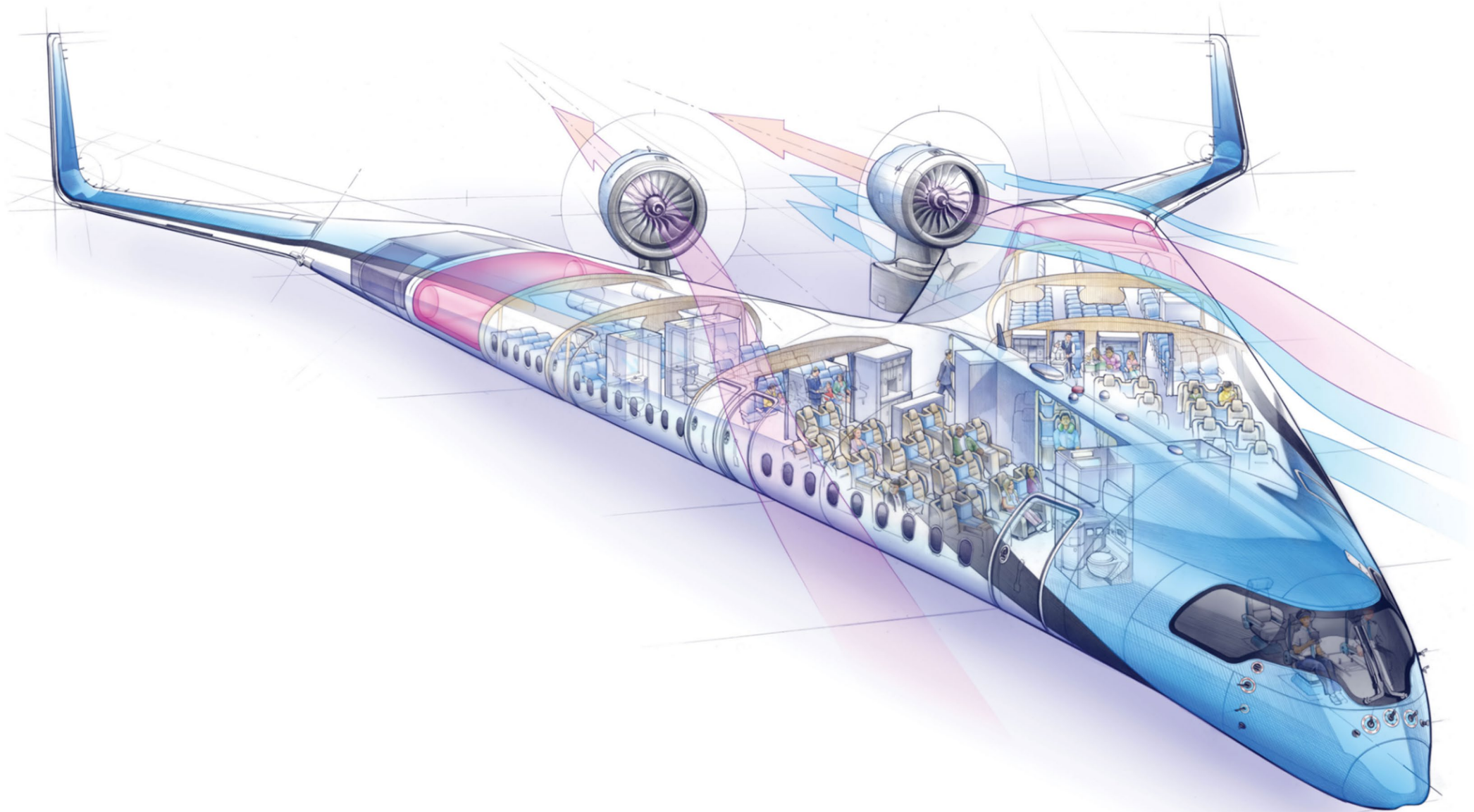


Structures – aerodynamics – maintenance – system integration

# Design for Crashworthiness

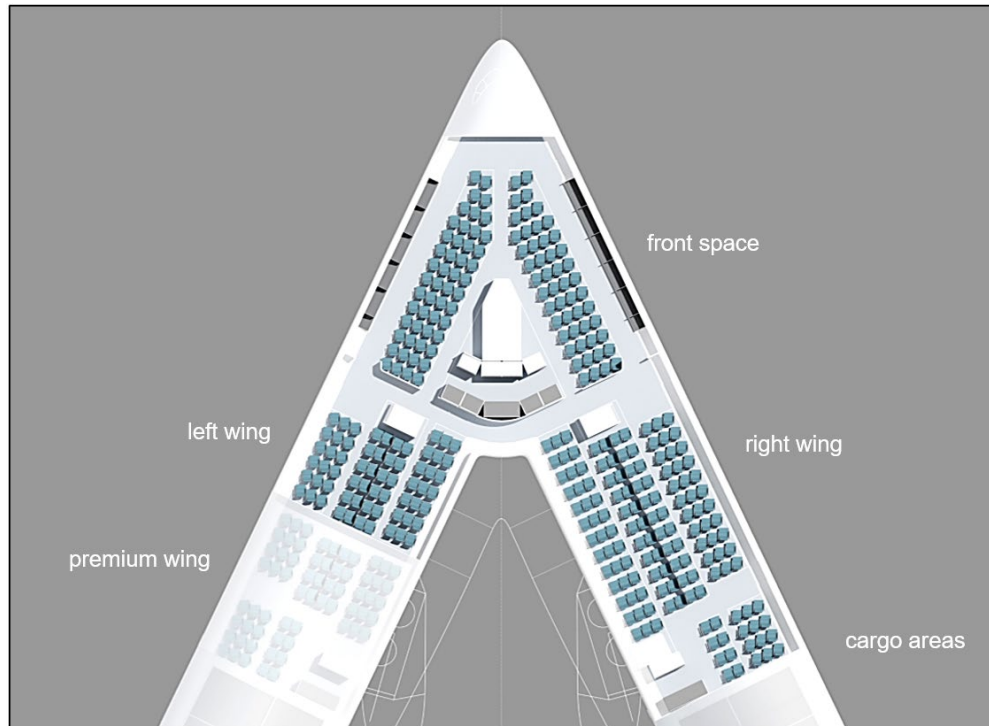


# Further steps: Analyzing the Hydrogen Flying V





# Interior Design



# The Path Towards Flying V Introduction



## 2029-2033 Preliminary Design of Production Version

- Design of OML/structure/landing gear/flight controls/ systems/cabin
- Wind tunnel testing
- Structural test of components
- System Integration
- Production plan
- Factory design

## 2025-2029 Verification of performance and tools

- High-speed wind-tunnel test
- Low-speed wind-tunnel test
- Subscale flight test
- Fuselage fatigue test
- Wing limit-load test

## 2021-2025 Design and Research

- Interior and exterior design
- Control law design
- Low-speed / high-speed aerodynamics
- Structural design and analysis
- Cabin design and analysis
- Design of subscale test article (1:5)
- Overall aircraft design

**2025: Conceptual Design Freeze**

**2029: Performance verified**

**2033 Preliminary Design Freeze**

**2037 Prototype finished**

**2041 Type Certification**

## 2037-2041 Performance verification and certification

- Certification flight testing
- Performance verification
- Production of tooling
- Prototype repairs
- Detailed design modifications

## 2033-2037 Manufacturing and Full-Scale Testing

- Detailed design of structure and systems
- Design of production tooling
- Manufacturing of prototype aircraft
- Iron-bird for system integration
- Full scale structural tests
- Design of flight simulator