Ascertaining of dynamic Derivatives by Windtunnel Experiments as an Instance of the Application of 6-DOF hydraulic Motion-Bases in Aerospace Testing and Design

simtec simulation technology GmbH

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Simtec simulation technology

- Founded in 1989
- Location at Braunschweig Airport, Germany
- Partner of Research Airport Braunschweig

as German CAA (LBA)
Aerodata
DLR
Technical University of Braunschweig

Simtec‘s Fields of Business

- Flight Simulators and Simulator Components (Control Load Systems, Cockpit I/O)
- Pilot Training on the Dornier 228 Full-Flight-Simulator
- Research Activities on Full-Flight Simulator
- Simulator Rides for Entertainment and Marketing Purposes
- Hydraulic Motion Platforms with 6 Degrees-of-Freedom
- Motion Systems for industrial Test Beds

HEXaDRIVE® Motion Bases

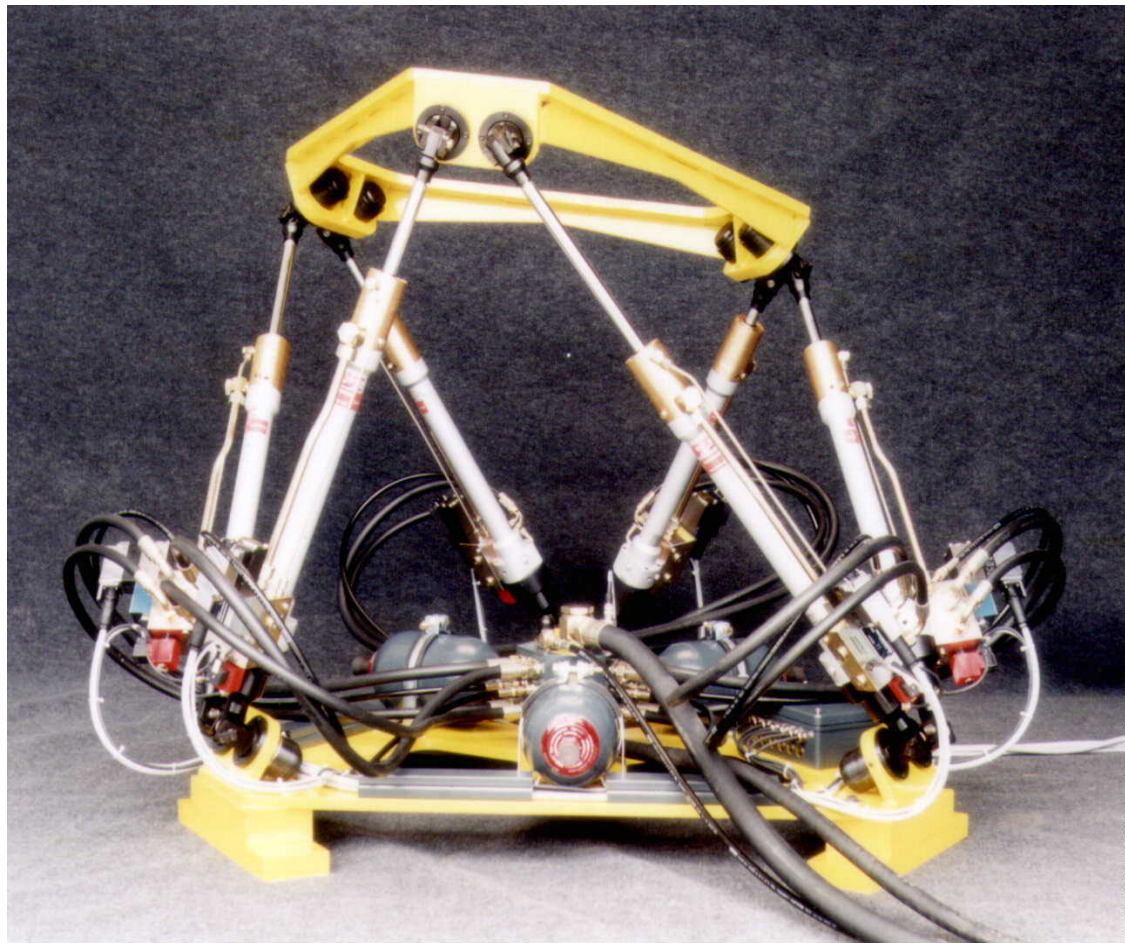
HEXaDRIVE® 10

HEXaDRIVE® Product Family

- hydraulic driven
- Payload Range up to 20 to
- Frequency Range up to 40 Hz

Typical Technical Data

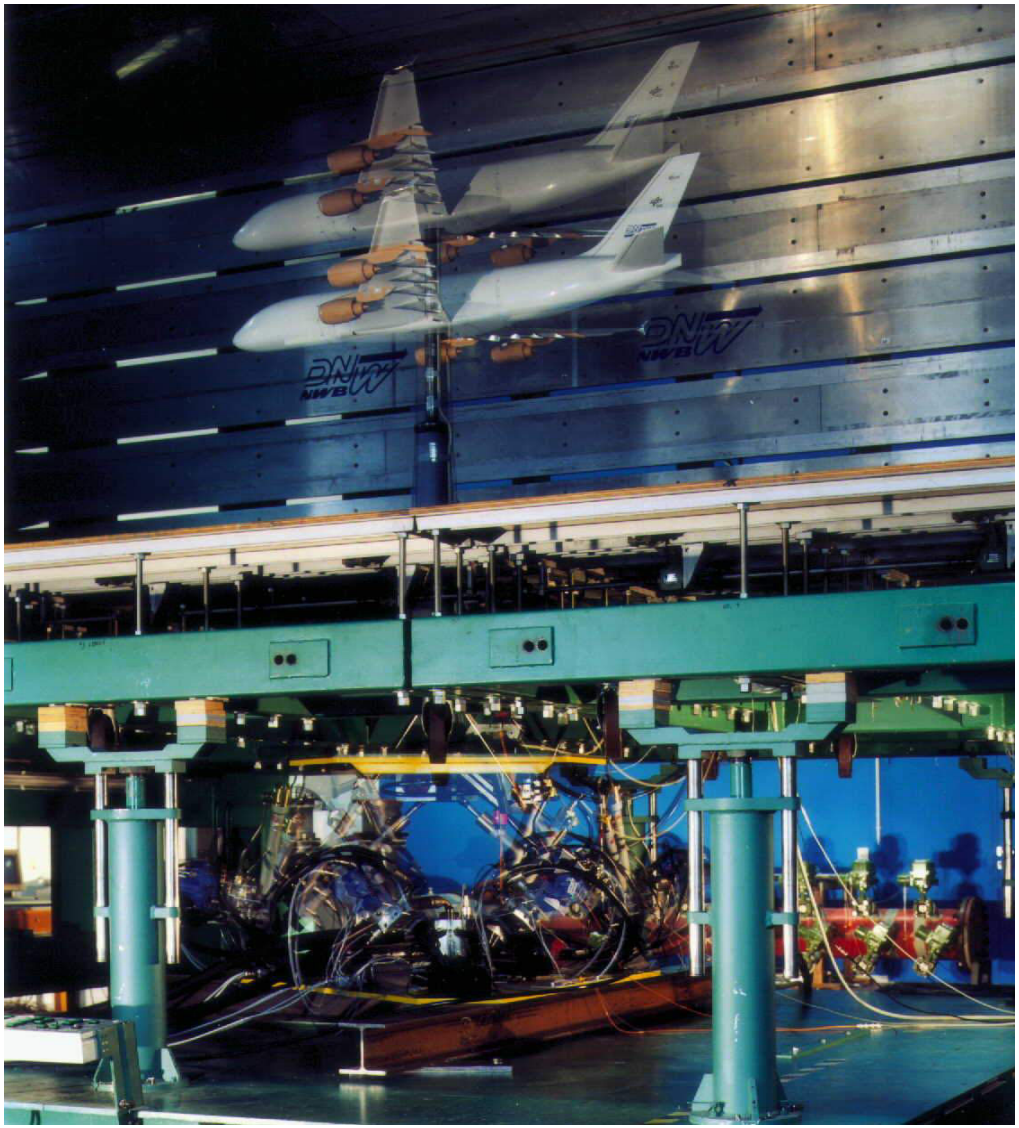
- Payload: 300 kg
- max. Acceleration 4 g
- max. Velocity (Act.) 1 m/s
- max. Frequency 10 Hz



Typical Applications in 6-DOF

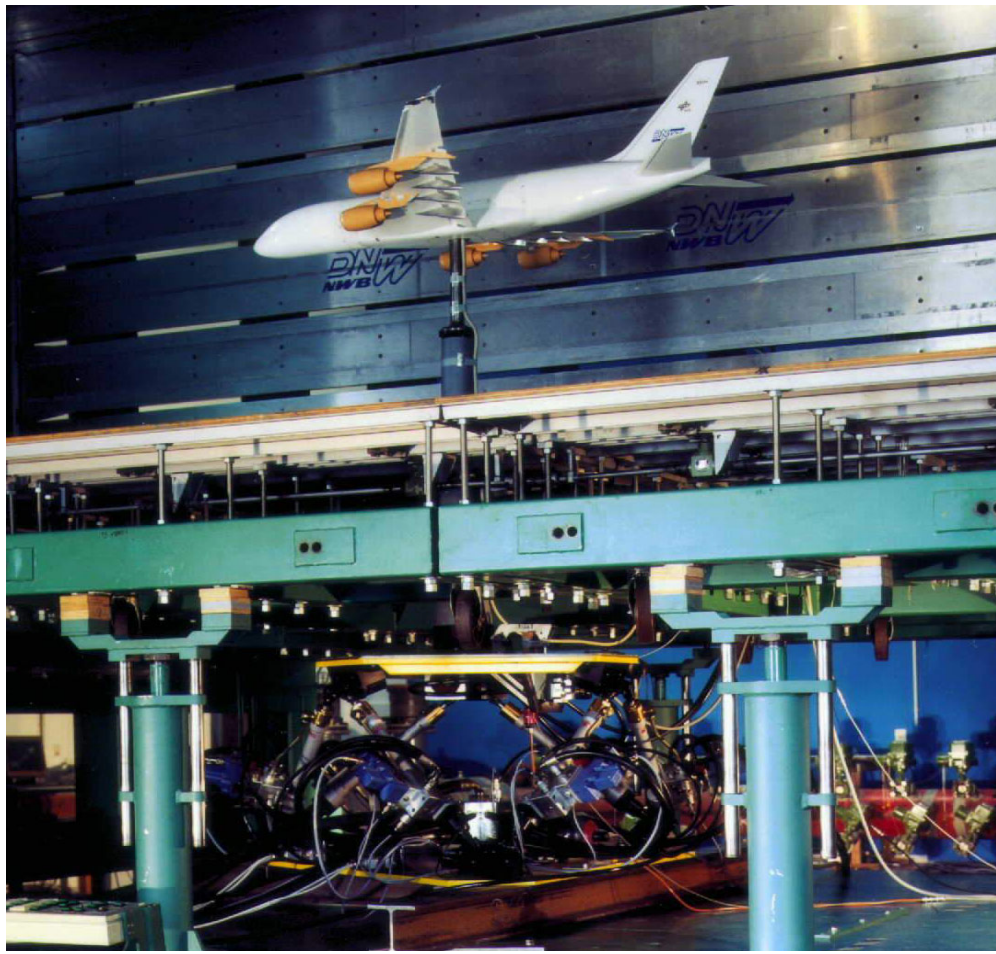
- High Accuracy Positioning of Payload
- Dynamic Movement of Payload on given Trajectories
- Sinusoidal Oscillations (e.g. Windtunnel Testing)
- Vibration Spectras (e.g. Durability and Comfort Tests)
- Provision of defined Forces and Momentums simultaneously with moving (e.g. with 2 HEXaDRIVE®-Systems)
- Reproduction of prior recorded Acceleration Data Sets (e.g. Flight Data, Ride Data)

HEXaDRIVE® in Windtunnel Tests



Test Setup

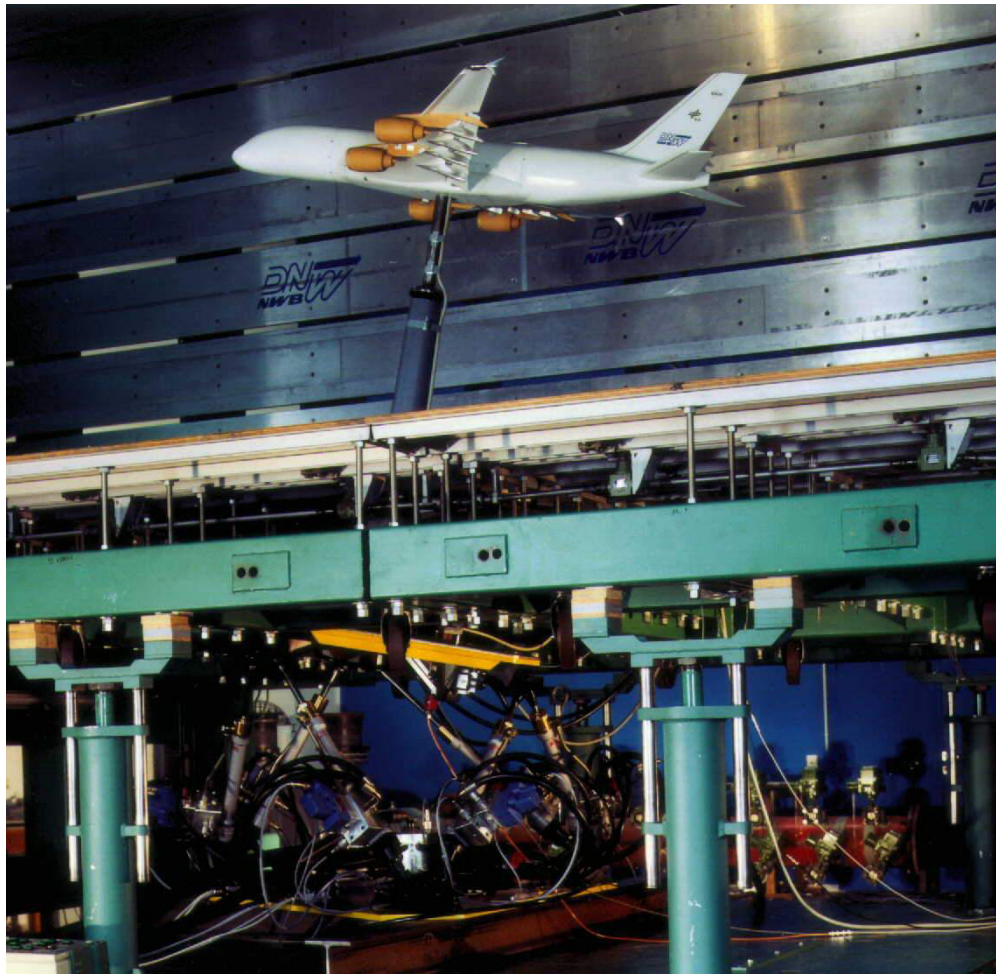
HEXaDRIVE® as Model Support for Positioning and Moving Purposes



Provided Positions (Static)

- **Pitch**
  (Angle of Attack)

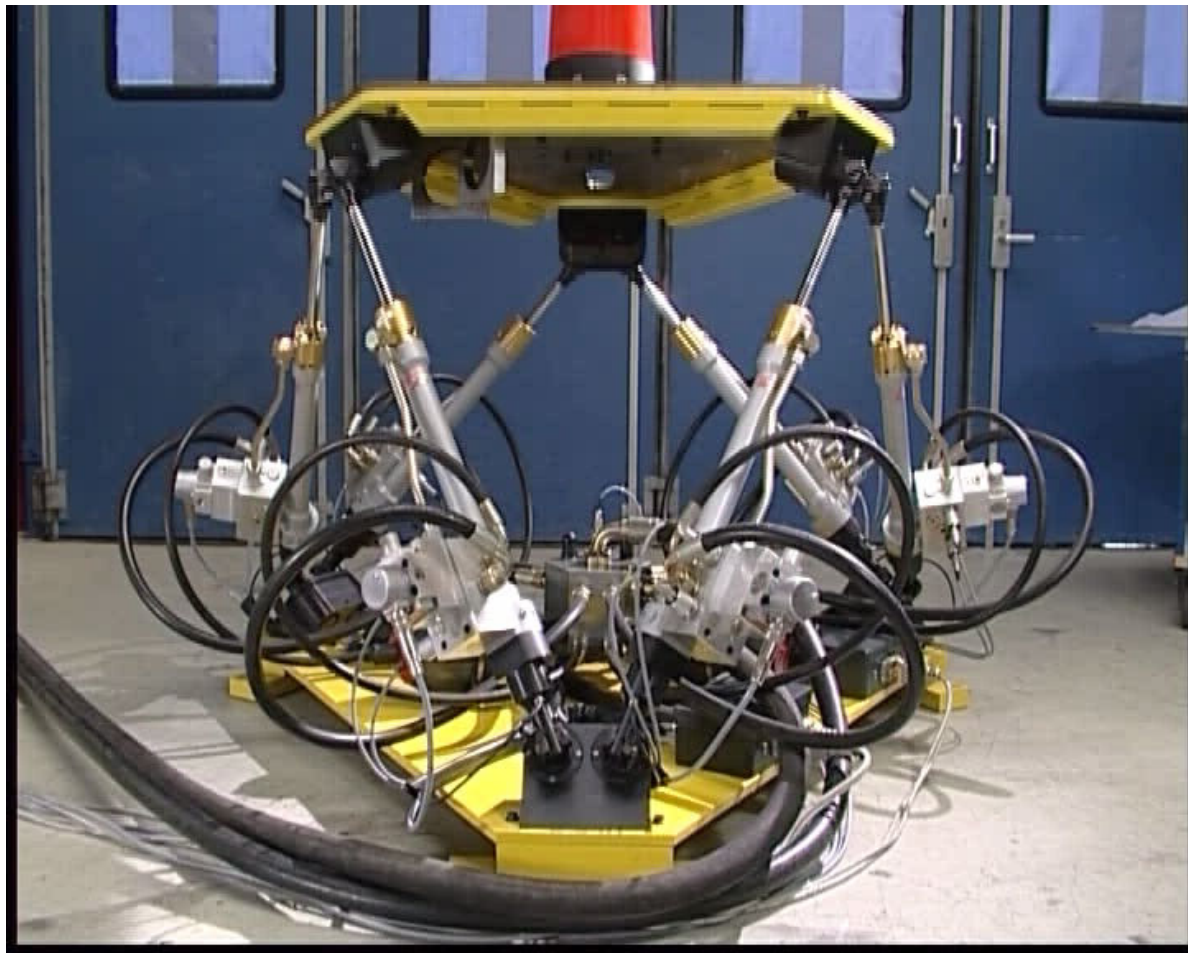
- **Yaw**
  (Side Slip Angle)



Provided Movements (Dynamic)

At different Angles of Attack:

- **Heave (Body Fixed)**
- **Lateral (Body Fixed)**
- **Yaw (Body Fixed)**



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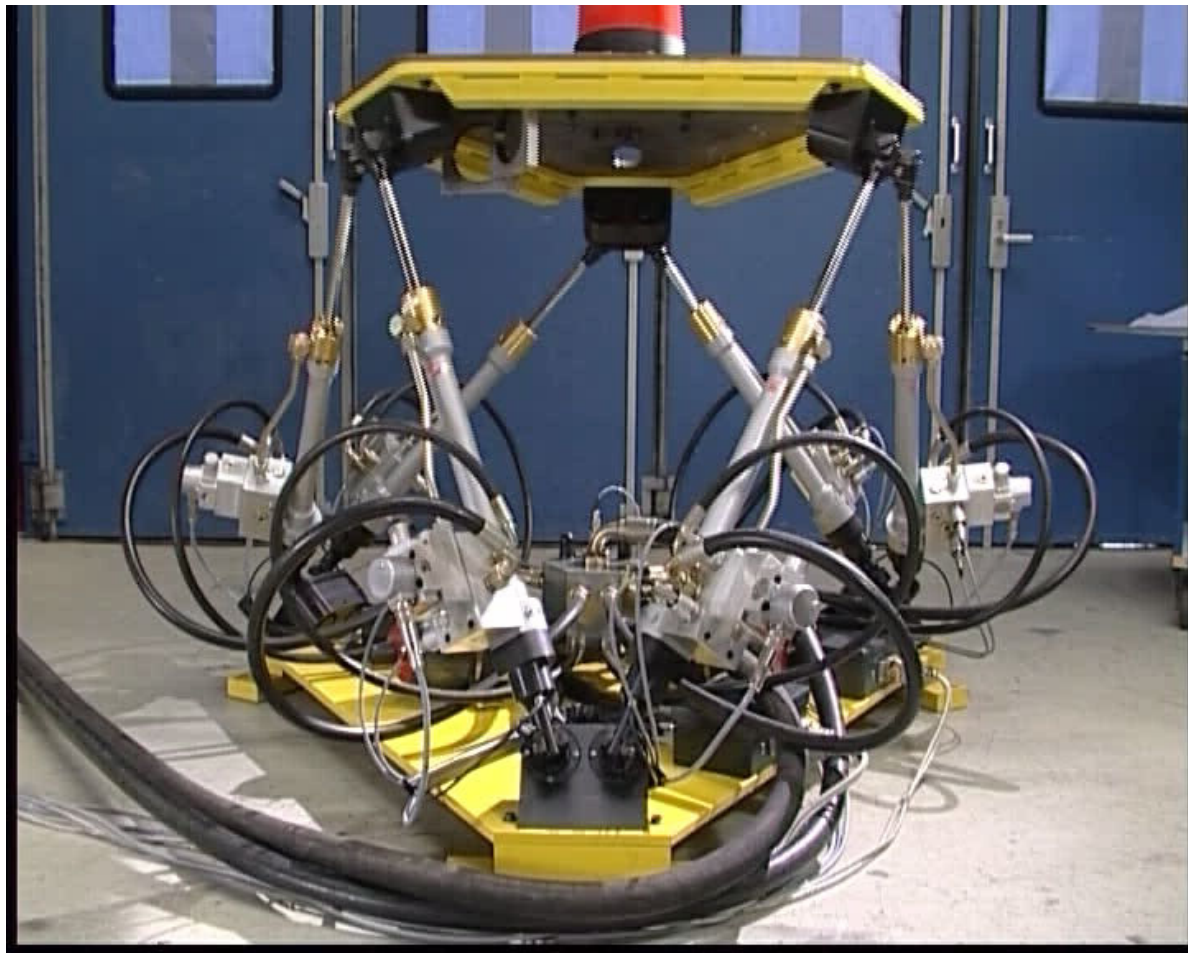

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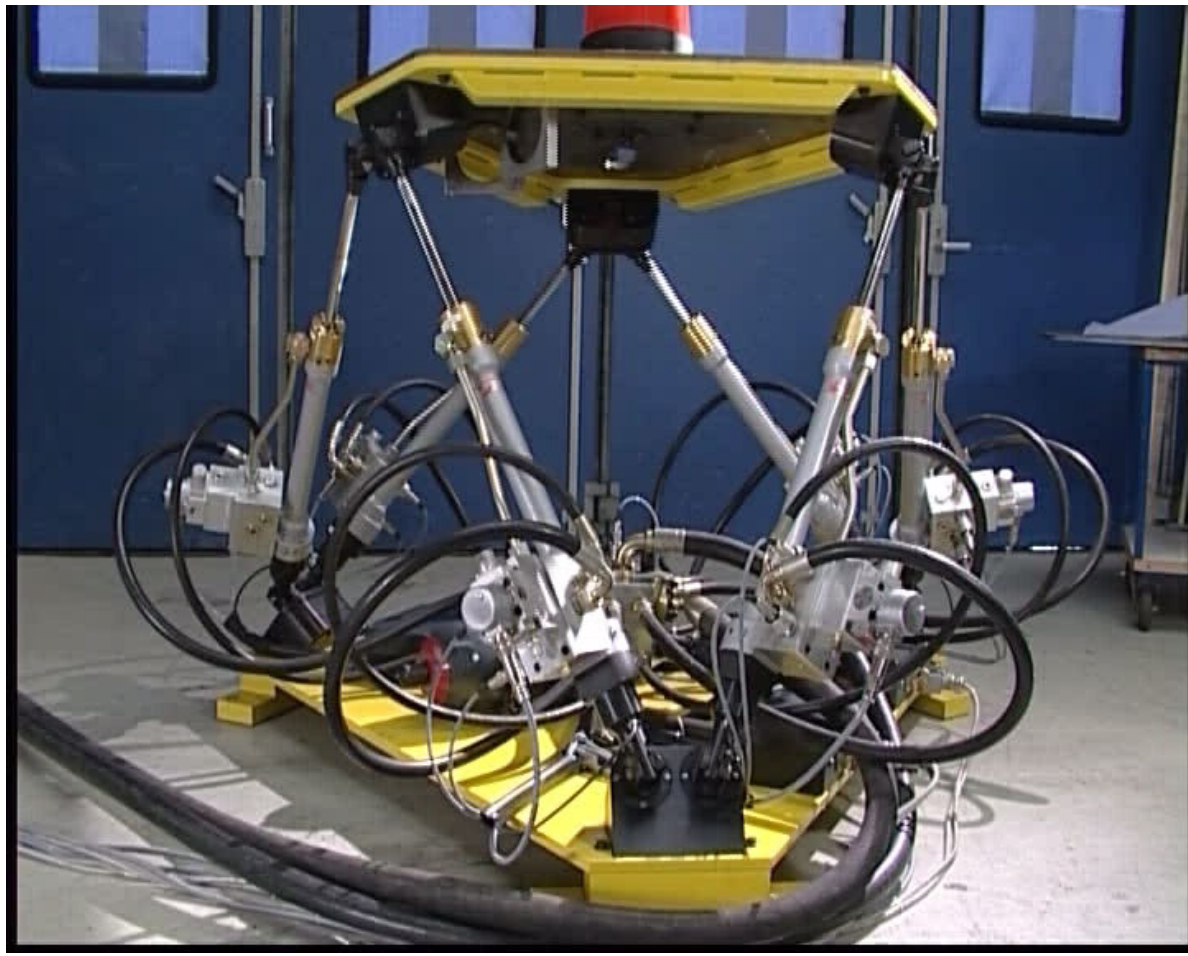

Benefits

- **Handling Qualities and corresponding aerodynamic Parameters of future Aircrafts can be determined at an early Stage of Design Process**
- **Results are needed for Development Simulators and Training Simulators**
- **Reduction of Costs and Time during Development Process**
- **Reproduction of nearly arbitrary Movements in 3D-Space**
- **Validation of numerical Results (e.g. CFD)**

Summary

- Simtec owns over 10 years Experience in 6-DOF Motion-Base Development and Application
- HEXaDRIVE® Motion-Bases provide nearly arbitrary movements in 3D-Space (static and dynamic)
- HEXaDRIVE® Motion-Bases already improve the Design Process of future Aircraft as shown
- Still Potential for further Improvements

Closing Words

Now it‘s up to you !!!

Let us know / Tell us how we can improve
your Testing procedures

How can you use this versatile Tool