Aerospace and Defence Forum 2016

An Industry Event Hosted by National Instruments

HAUS 10
Fürstenfeldbruck, Germany

Aerospace and Defence
Forum 2016

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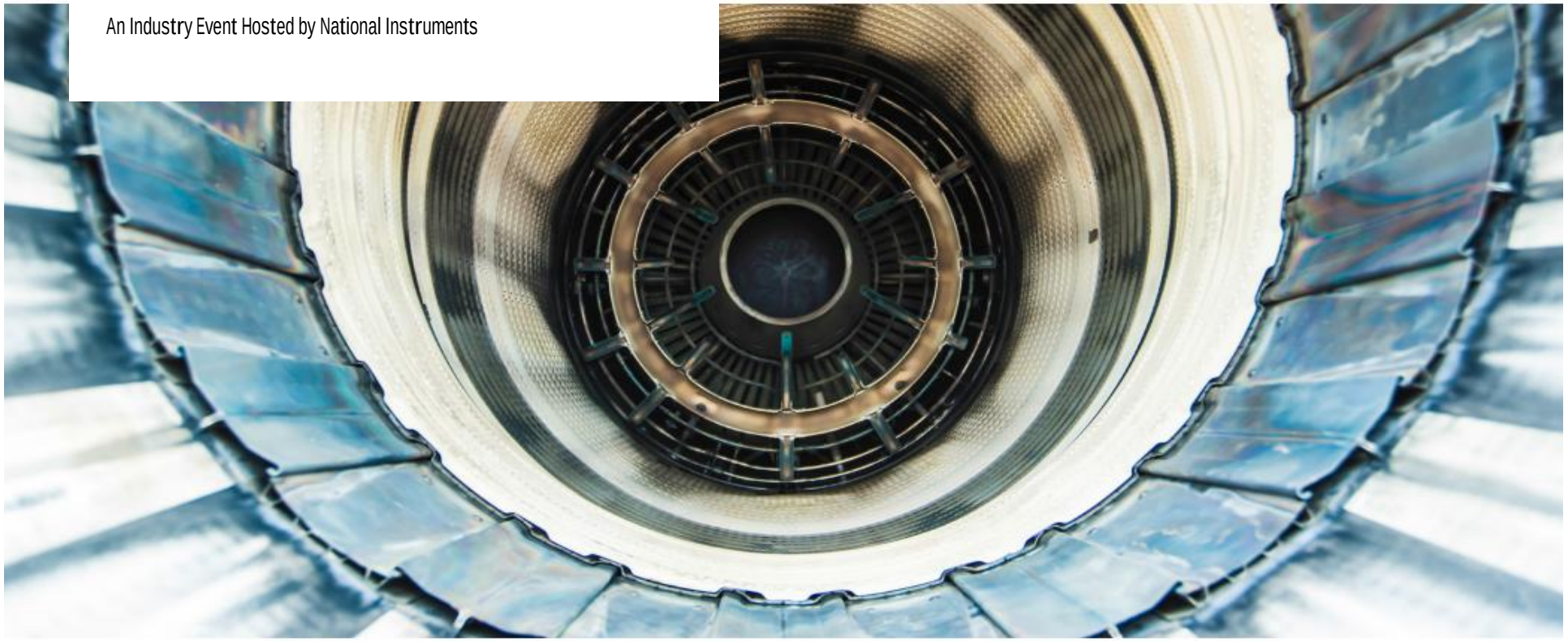
NATIONAL INSTRUMENTS



Test Cells for active Subsystems and Structures in AeroSpace Applications

Dr.-Ing. Thomas Anderl, IABG
Head of Department “HiL & System Test Rigs”

IABG Business Segments Activities

- IABG performs strength, fatigue and functional tests for the entire aircraft as well as for individual assemblies and structural components.
- In our ESA-coordinated space center, we offer comprehensive environmental test campaigns, qualification tests and technical analysis.
- In our Defense & Security division, we operate military simulation & test systems for analyses and conceptions.

Space

Analysis & conception

- Studies and system analyses
- Test specification, planning and implementation
- Quality management systems

Implementation

- Development, qualification and acceptance tests
- Testing facilities and plants
- Quality assurance systems

Operation

- IABG's National Space Test Centre in Ottobrunn
- ETS (Test facilities ESA) in Noordwijk (NL) as Joint Venture with Intespace (F)

Aeronautics

Analysis & conception

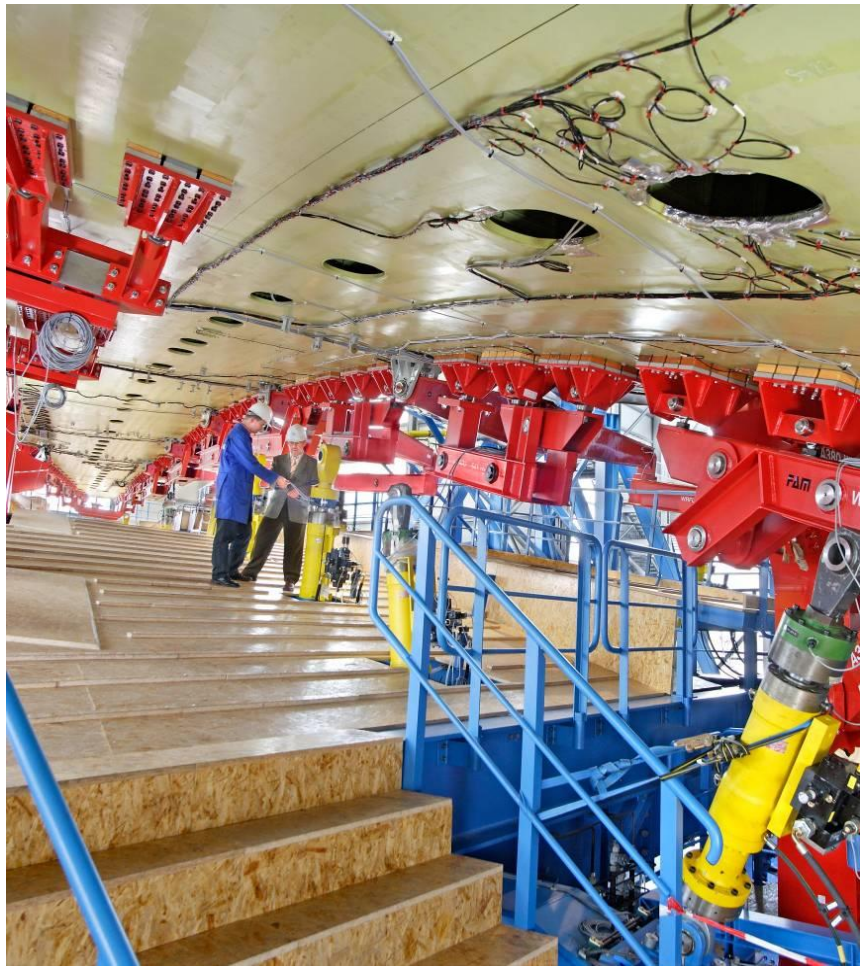
- Structural integrity / fatigue testing including test concepts for structural tests
- Aircraft construction, design and certification
- Contribution to the aviation research project management

Implementation

- Test facilities for structural and fatigue tests of complete airframes or components
- Innovative automation solutions for test systems

Operation

- Test facilities for static and dynamic testing of complete airframes, assemblies and components in Ottobrunn / Dresden / Erding



Example: Structural Test on A350

IABG Test Cell Business

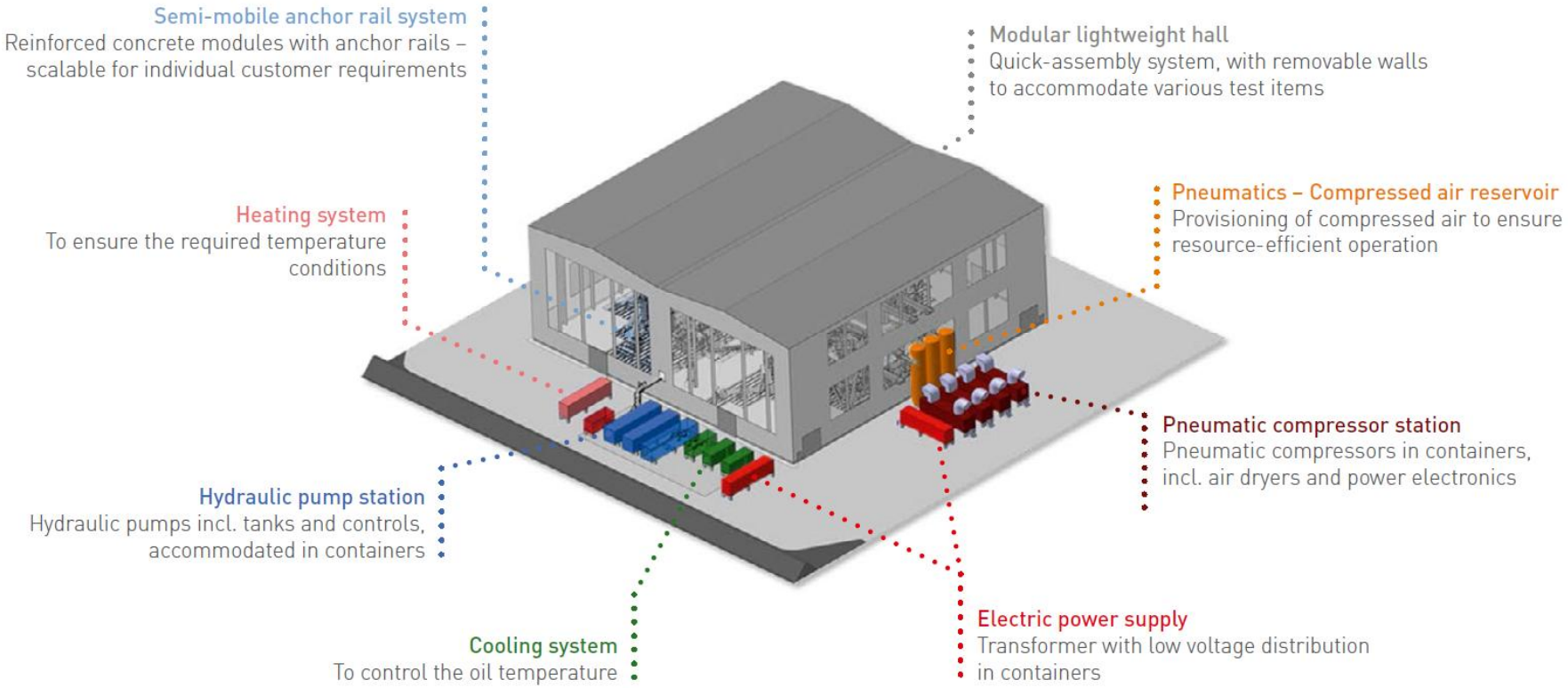
We

- develop test concepts
- plan & realize test facilities and test systems
- operate Tests Cells, test systems and simulations

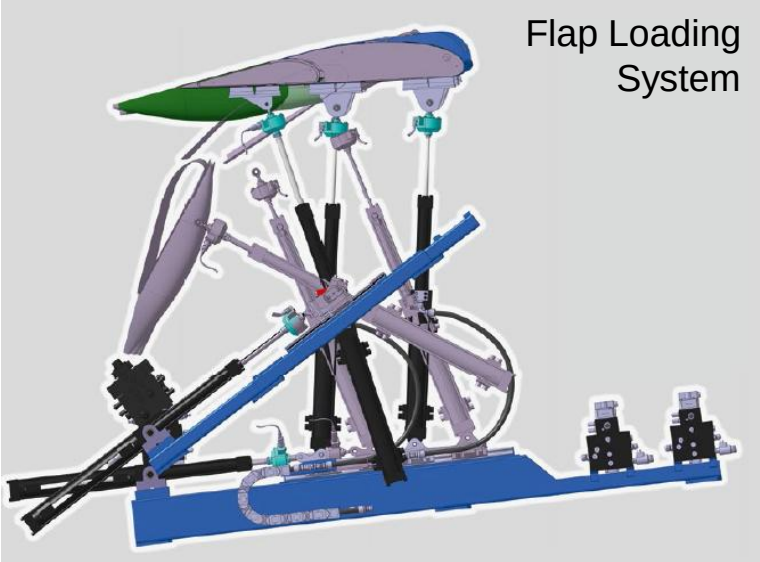
è **With this background, we are engineering and realizing Test Cells for customers.**

Modular Test Infrastructure (MOTIF)

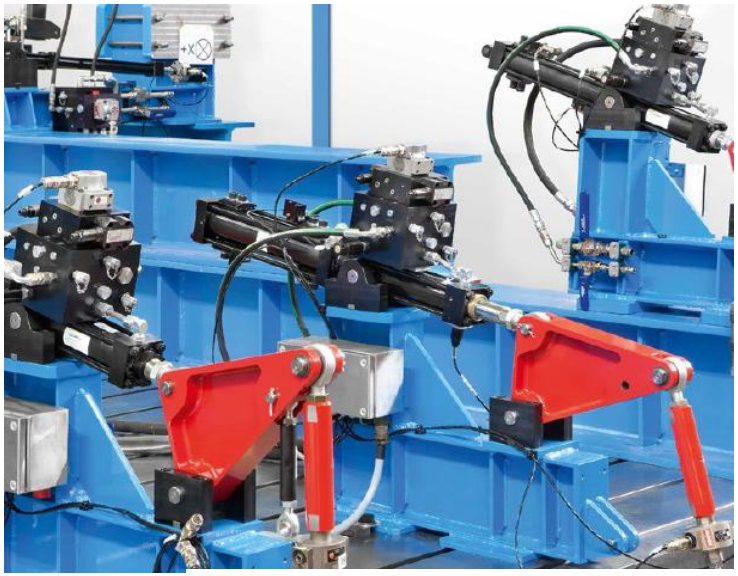
- flexible
- scalable
- mobile
- cost-efficient



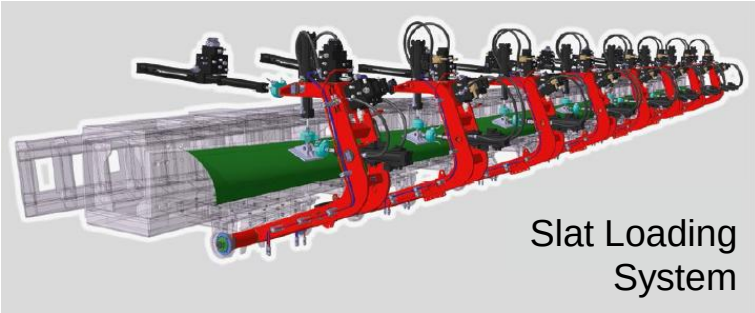
Iron Bird Loading Systems – examples



Flap Loading System



Spoiler Loading Systems



Slat Loading System

- Mechanical setup and Interfaces
- Actuators & Sensors
- Automation System / Load Control Functions

Drop Tests Cell for Landing Gears

Performace Portfolio

- Drop tests on aircraft landing gears
- Roll tests, fatigue tests, slide tests, brake tests,
- frequency response tests, tyre burst tests, tire tests
- Driving over baffle plates and bumps

Barrel

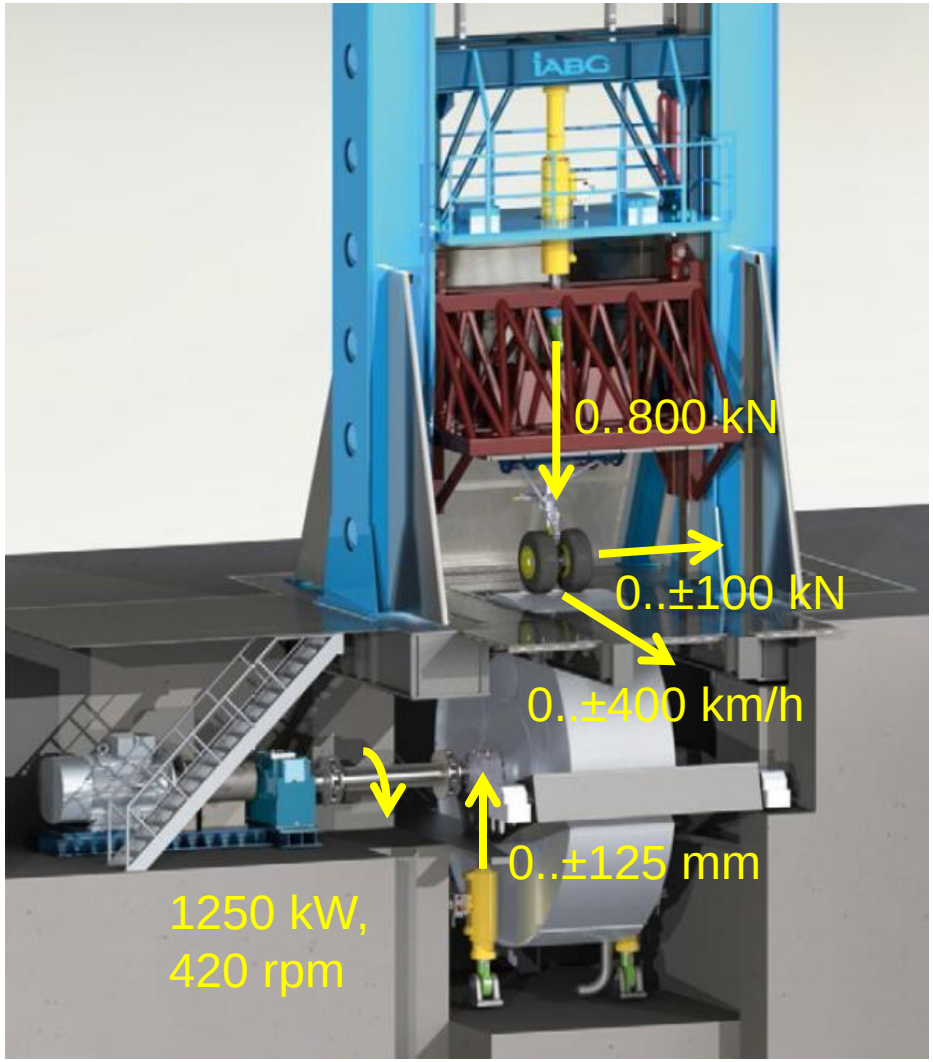
- Maximal circumferential speed 400 km/h
- ⌀ 4,0 m, Width 1,5 m, 29.500 kgm²
- 4Q-drive 130 kW (drive and brake)
- Surface: Grinded steel or coated with friction layer

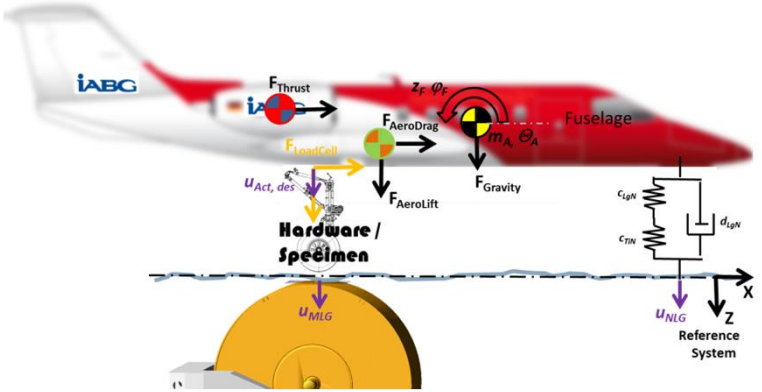
Maximal barrel loading

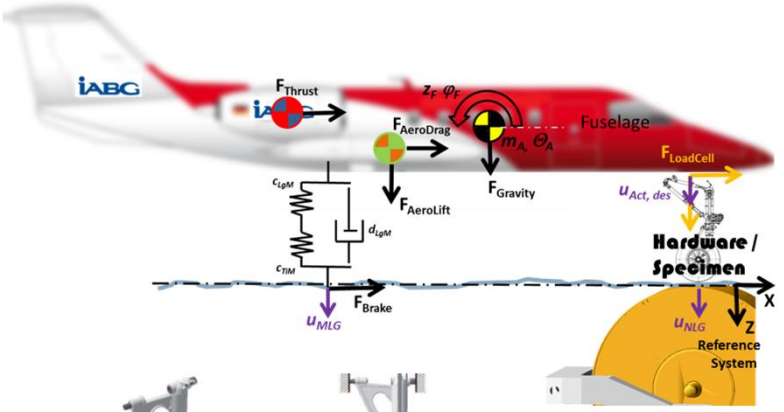
- Vertical 560 kN, Lateral (axial) 200 kN (circumferential) 400 kN
- Drop mass (max.) 14.000 kg
- Drop height (max.) 11 m
- Sinking speed 7..10 m/s

Drop Tests for Landing Gears

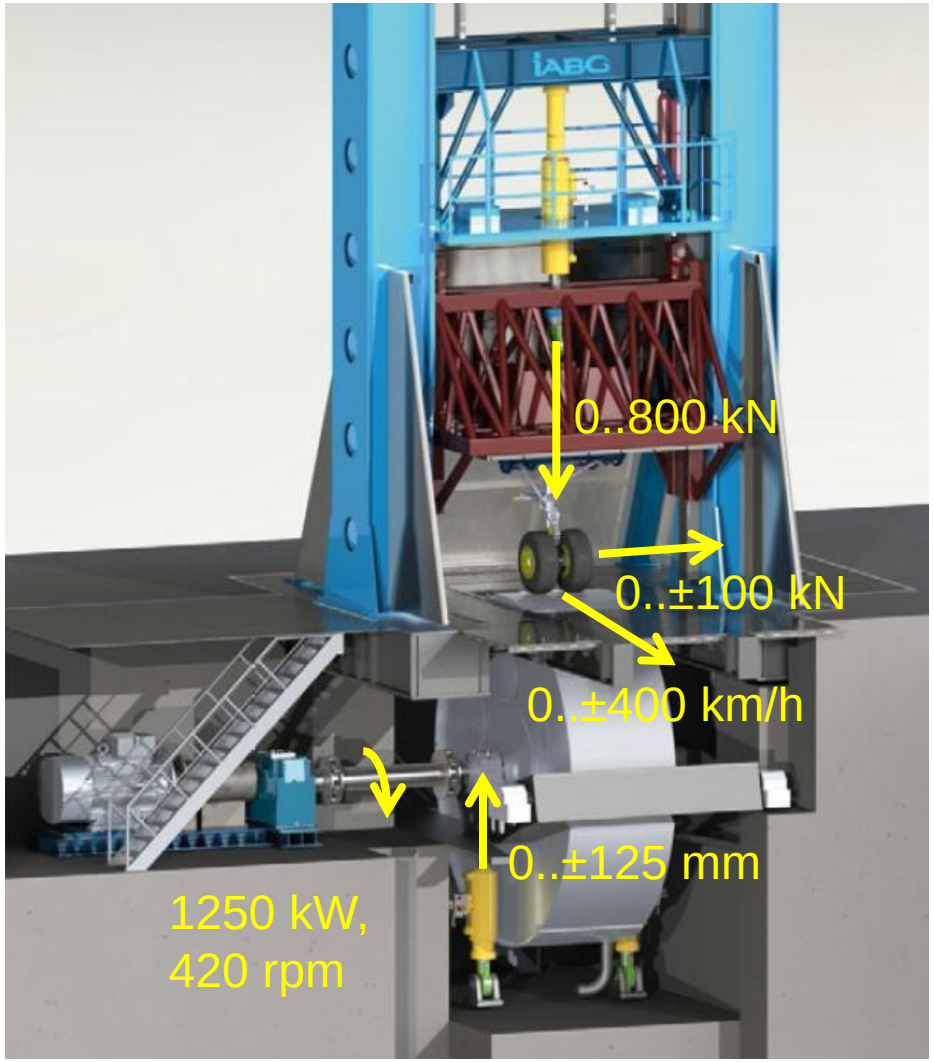
Advanced Landing Gear Test Cell







Advanced Landing Gear Test Cell



Operation Modes

- **Landing gear vertical dynamics**
  - with fixed drum
  - with free rolling wheel
- **Braking Maneuvers with controlled vertical loads**
  - at initial speeds values
  - at initial speeds with obstacles
  - at initial speeds with synthetic road excitation
- **Brake System interaction during landing/taxiing maneuver with measured road excitation**
- **Rolling during landing/taxiing maneuver with synthetic lateral excitation of the wheel**

Functions, Control & Monitoring System

Requirements

Concept

Core Functions

Controllers
- § Displacement/ Force
- § Speed / Torque

Measured Signals
- § Test Cell Signals
- § Specimen Loads & Deflections

Plane Vibration Model

Test Cell Automation

Design & Implementation

Integration

Validation

DIAdem

Mechanics

Fluid Power

Electrics/Electronics

Functions

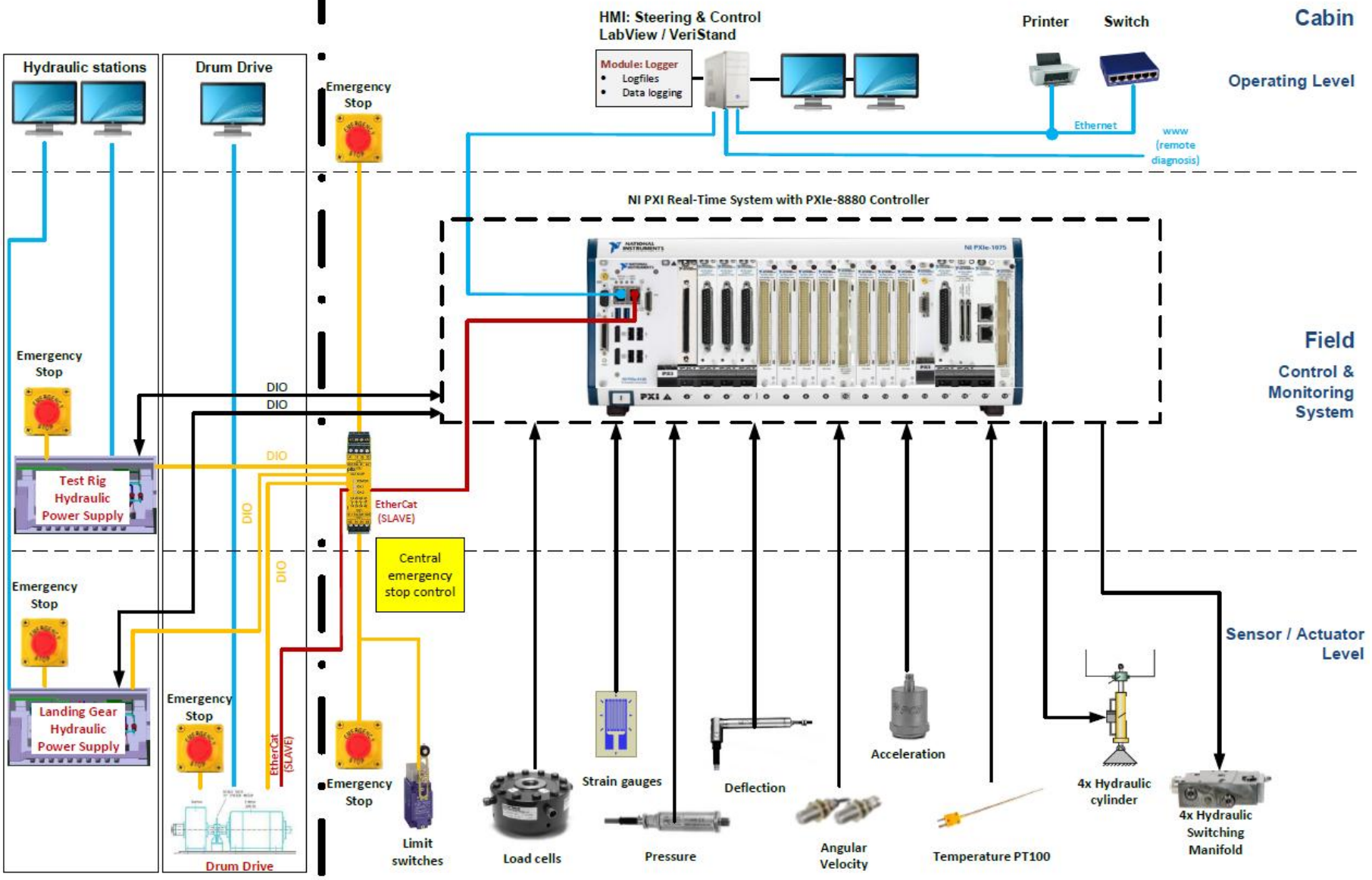
NI PXI Real Time HW

NI VeriStand

INERTIA

NATIONAL INSTRUMENTS LabVIEW

Control & Monitoring System Architecture



Summary

- IABG provides test cells for aerospace applications.
- The control, measurement and data acquisition platform is realized with National Instruments tools and products.

Thank you for your attention – we're looking forward to a discussion!

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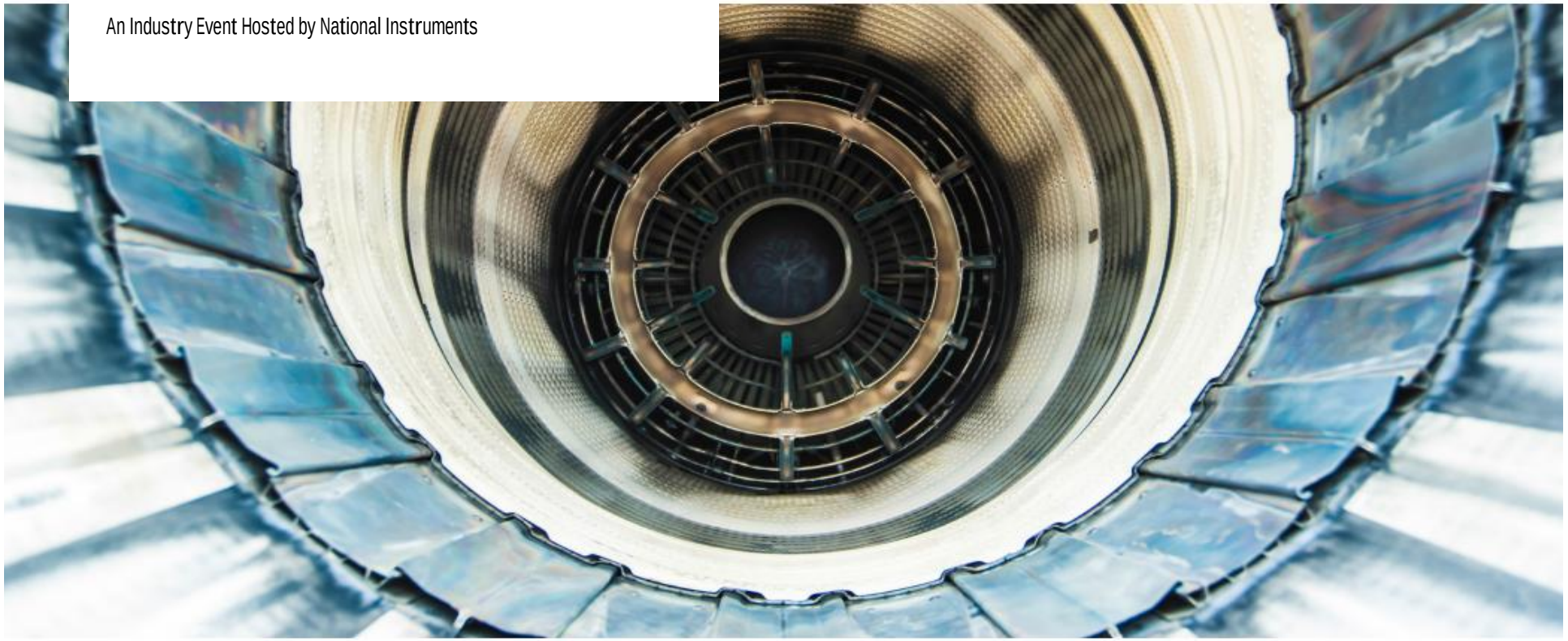

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