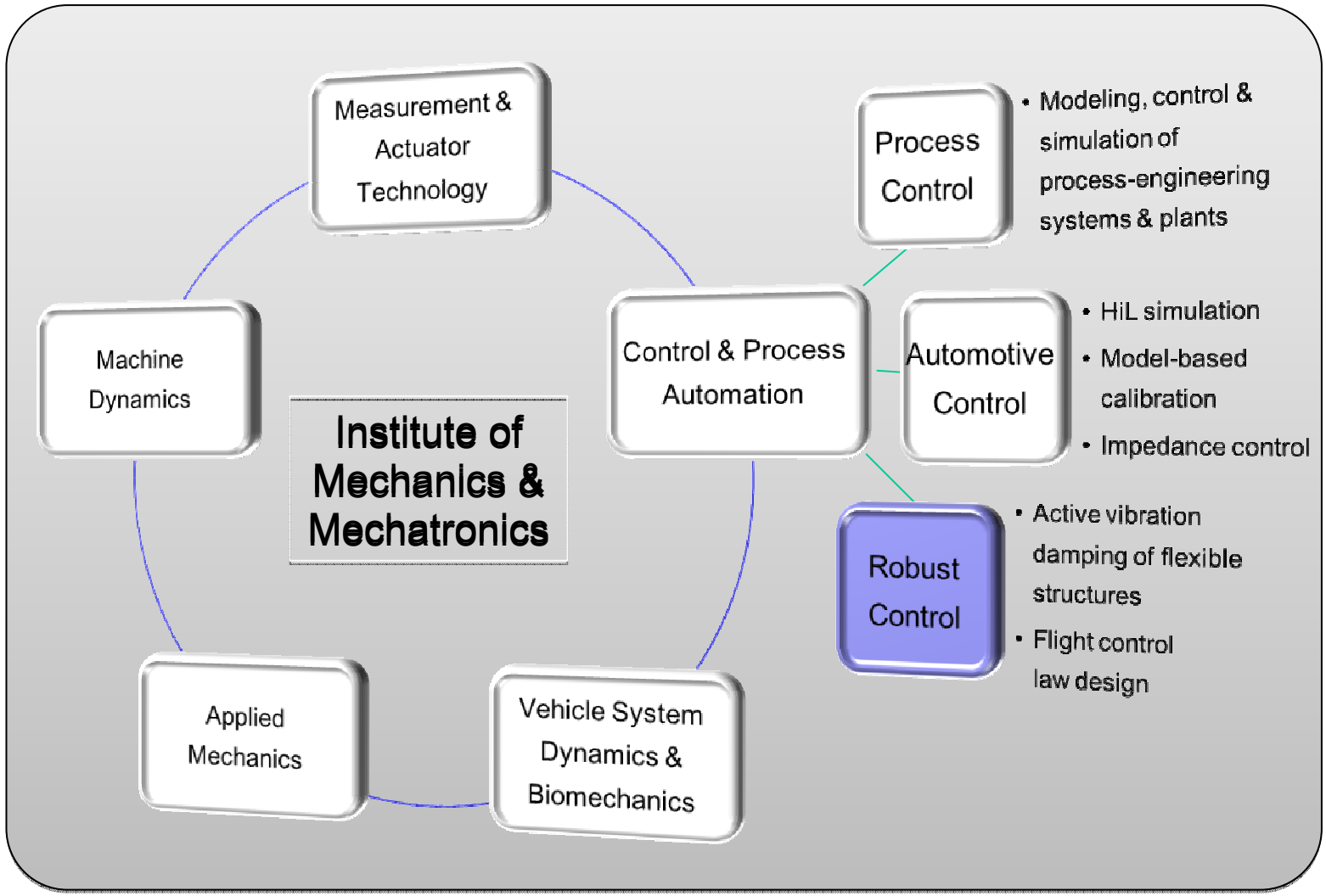
Vienna University of Technology

State of the Art Competence in Active Control for Flexible Aircraft Structures

Martin Kozek

Institute of Mechanics and Mechatronics
Division of Control and Process Automation
Wiedner Hauptstrasse 8-10, 1040 Vienna,
AT

Who We Are: Organizational Units & Research Focus



Core Competencies – Div. of Control & Process Automation

- Robust Control – Methodical Core Competencies:
  - Optimal placement of actuators & sensors at flexible structures
  - Robust control design methods
    - H-infinity-optimal control design via μ-synthesis
    - Uncertainty modeling, μ-analysis
    - Validation, simulation

- Additional Competencies
  - Direct actuation of large flexible structures via Piezo-actuators
  - HiL simulation, model-based calibration technologies
  - Impedance Control
  - Model Predictive Control
  - System Identification
  - Design of Experiments

- Extensive experience in national and international research projects with industrial partners (AIRBUS, Daimler, Liebherr, Siemens, TTTech, etc.)

Reference Project EU FP7: ACFA 2020

ACFA 2020 – "Active Control for Flexible 2020 Aircraft"

- Control concepts for **Blended-Wing-Body** aircraft, ca. 500 pax
- 13 international partners (e.g. AIRBUS, EADS-IW, DLR, ONERA, ALENIA, TU Munich, TU Prague,…)
- TUV: Task leader for **Robust Feedback Control Design**
- Control goals are simultaneously:
  - **Flight control** (stability augmentation, handling qualities),
  - **Loads alleviation** (static & dynamic): active damping of aeroelastic vibration modes
  - Improvement of **ride comfort**
- Optimal placement of actuators & sensors
  - conventional & novel control surfaces
  - proof-mass-actuators

Topics of interest

Potential methodological cooperation

- Robust control in aeronautics: flight control, load alleviation, comfort improvement
- General robust vibration control
- System analysis, optimal actuator / sensor placement

Related topics in the 3rd Aeronautics and Air Transport Call FP7

- **7.1.1. Greening of Air Transport**
  - **7.1.1.1. Green aircraft**
    - **Systems and Equipment**
    - Aerostructures
- **7.1.3. Ensuring Customer Satisfaction and Safety**
  - **7.1.3.1. Passenger Friendly Aircraft**
    - **Noise and Vibration**
- 7.1.4. Improving Cost Efficiency
  - 7.1.4.2. Aircraft Operational Cost
    - Flight Physics
    - Aerostructures

Thank you for your attention!