When structures start to speak

…AE applications from nuclear power plants to tomatoes

František Vlašic

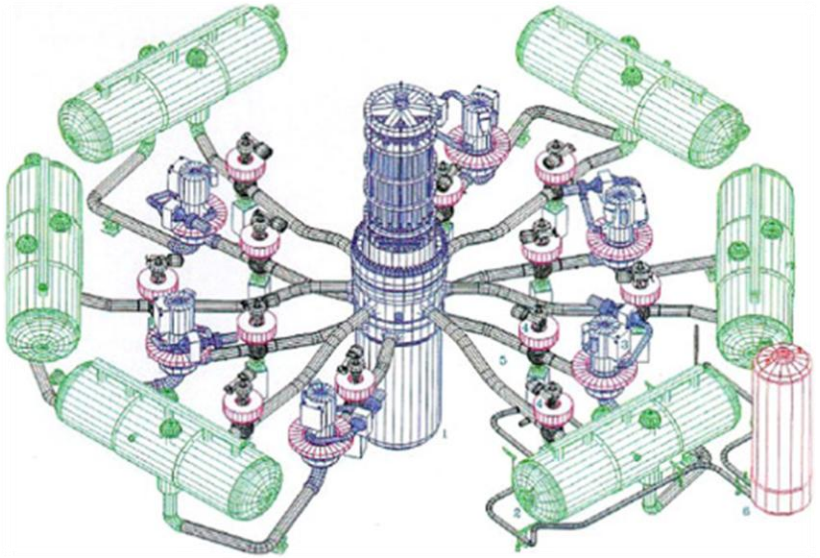
INSTUTTE OF MACHNIE AND INDUSTRIAL DESIGN
Faculty of Mechanical Engineering
BUT

Brno, March, 2026

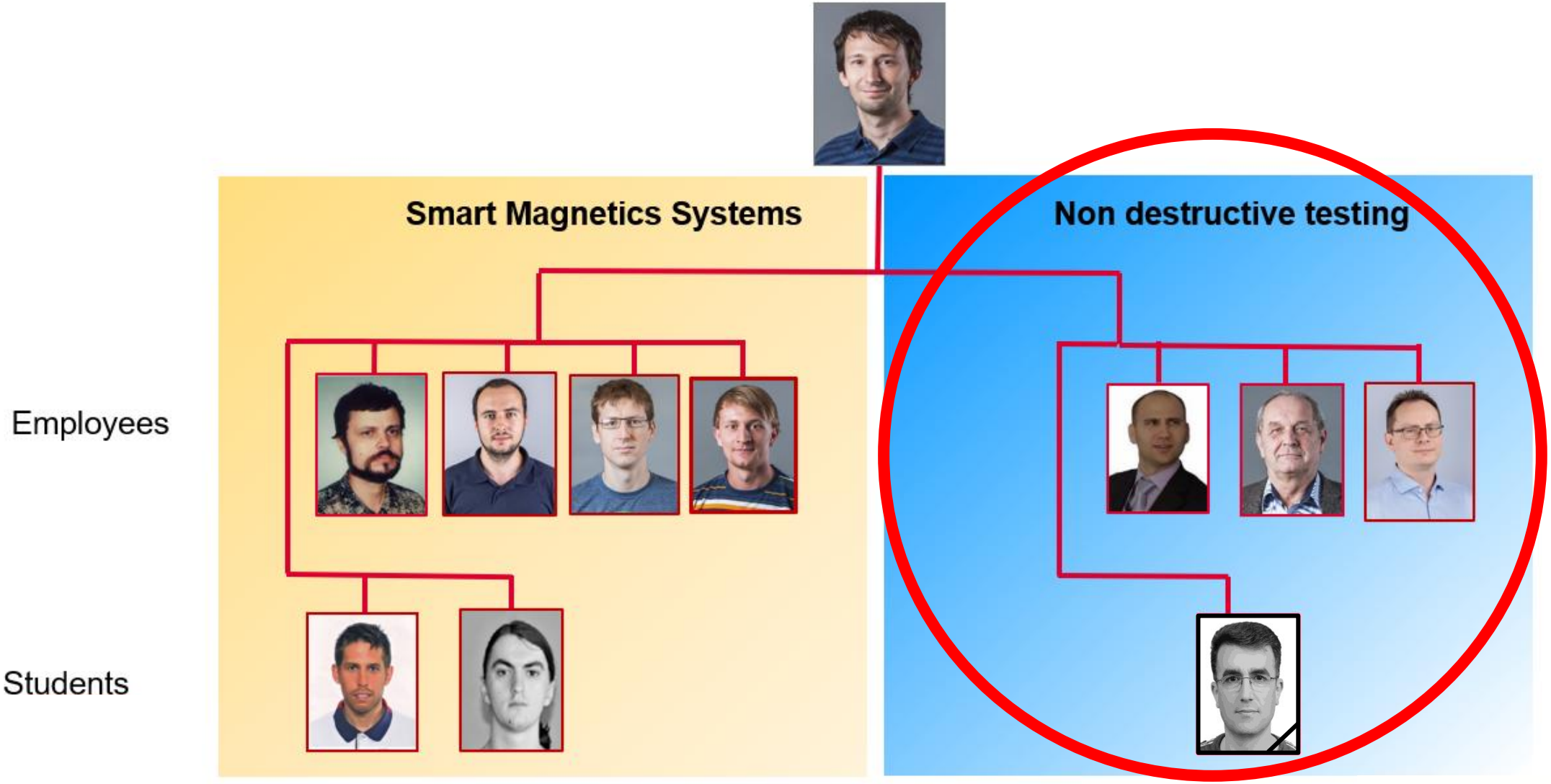
INSTITUTE OF **MACHINE**
AND **INDUSTRIAL DESIGN**

What You Will Hear Today

- Why structures start to speak
- From industry to research
- Selected projects
- Application outside BUT
- Education & PR
- What comes next?



Department of CM Hierarchy

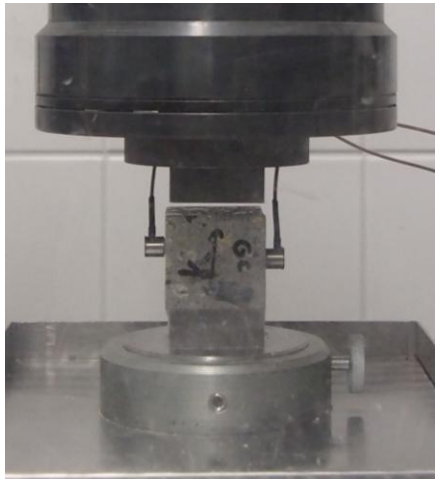


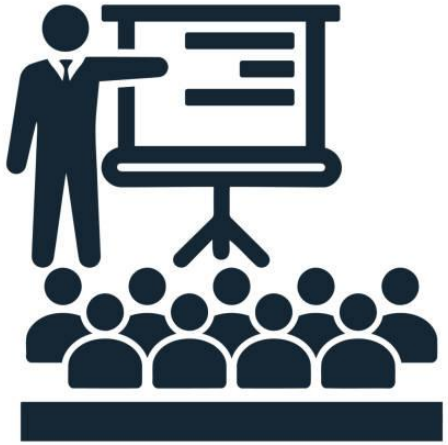
My position

BRNO UNIVERSITY OF TECHNOLOGY
FACULTY OF MECHANICAL ENGINEERING

Department of CM

part-time (0,5)





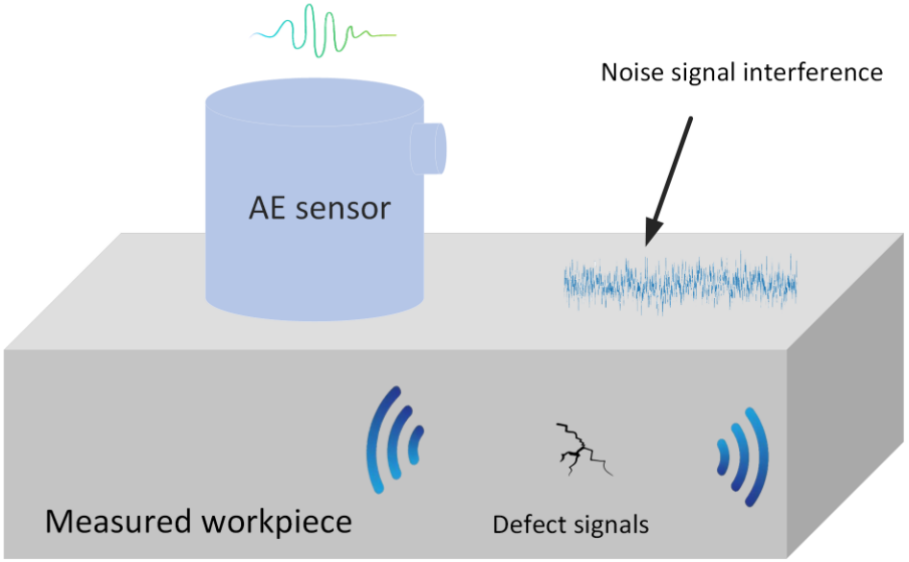
Diagnostics department

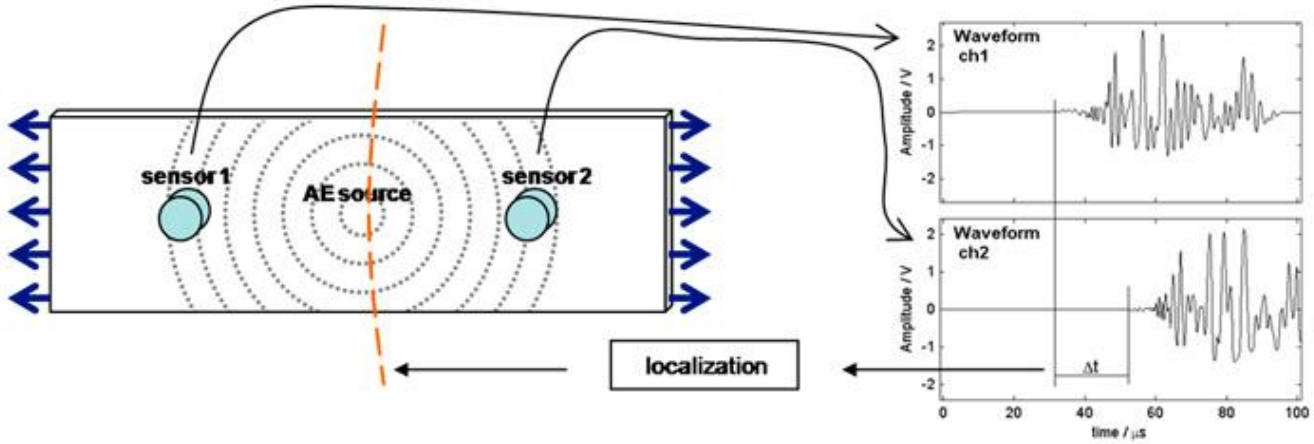
flexitime

Why structures start to speak

Acoustic Emission – Listening to Active Damage

- material releases energy during deformation
- (micro)cracks generate elastic waves
- we detect events in real time
- not after failure – during its birth

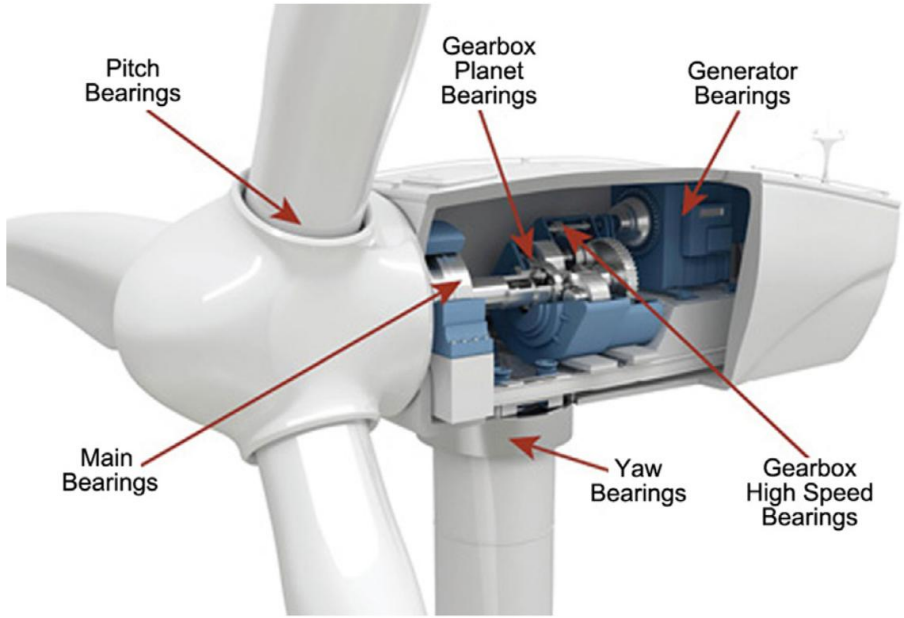




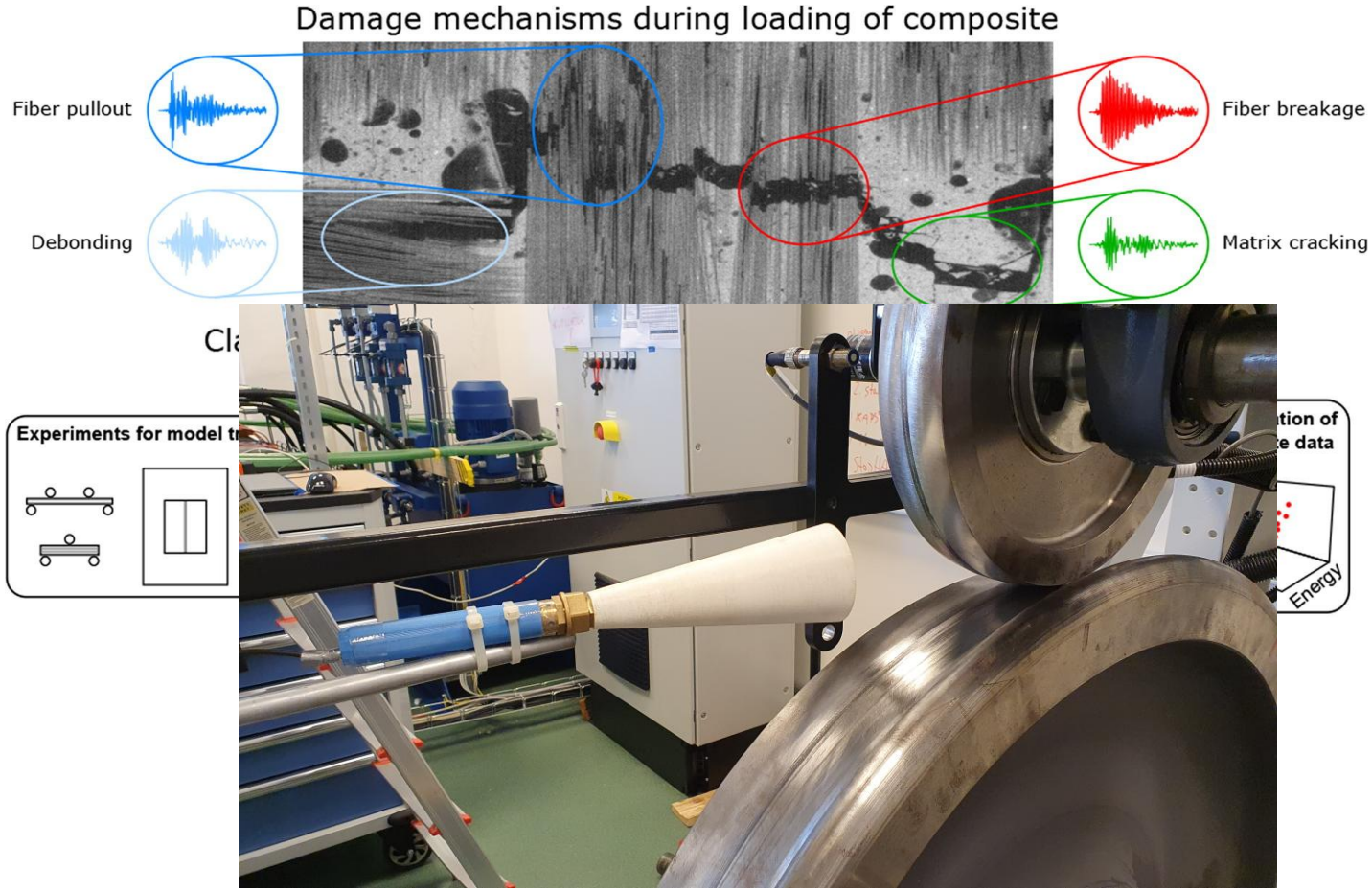
Why structures start to speak

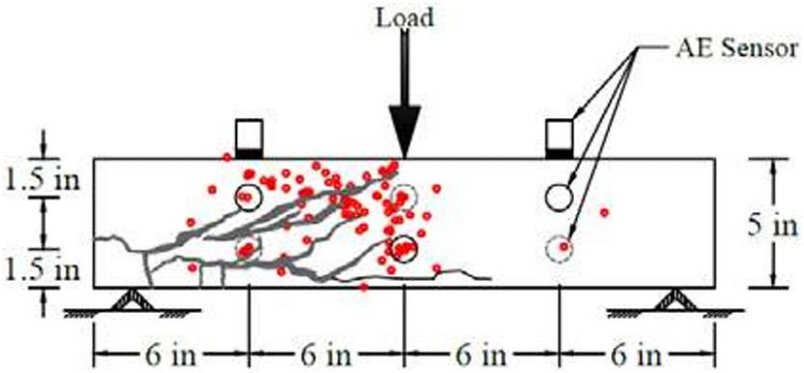
Why acoustic emission?

- real-time monitoring
- large structures (pressure vessels, pipelines, bearings)
- no need to scan the entire surface
- suitable for remote & continuous monitoring
- early warning capability



Why structures start to speak

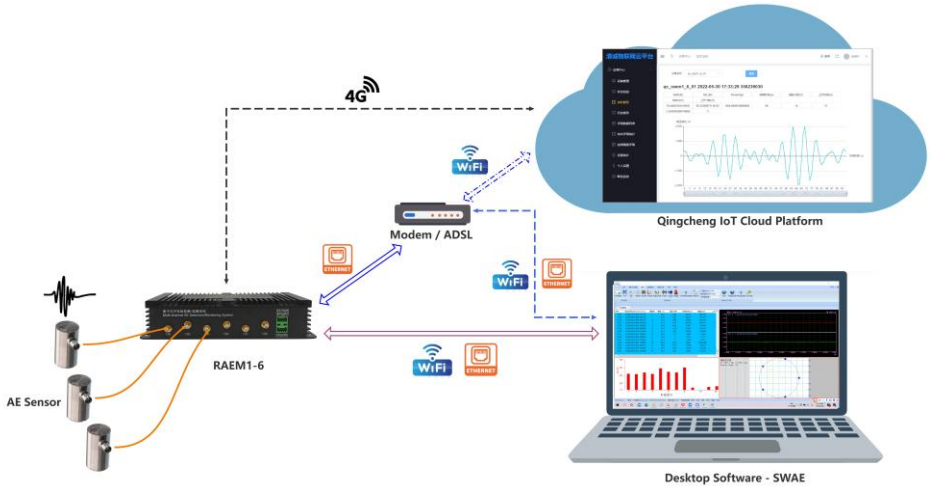




(Lee, 2019)

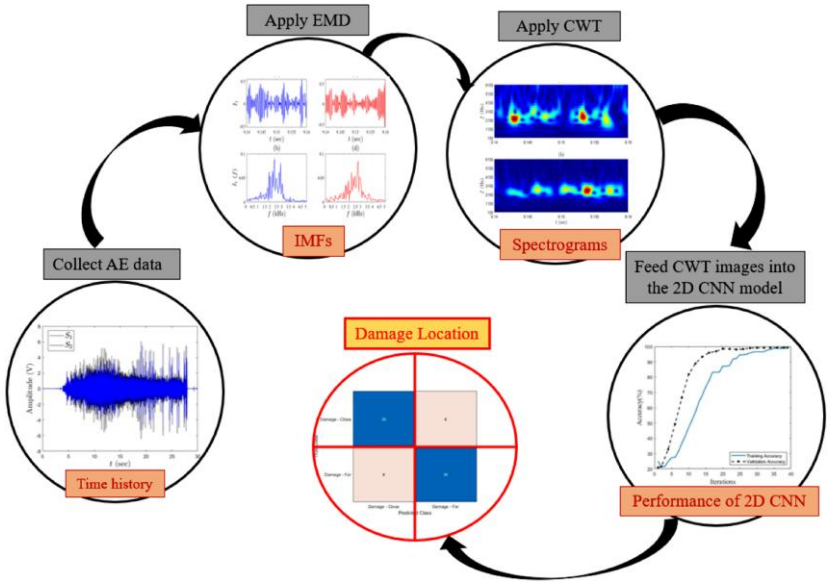
AE in Industry – Key Directions

Remote & Continuous Monitoring



(RAEM1-6 System Diagram)

AI-Assisted Evaluation



(Barbosh, 2022)

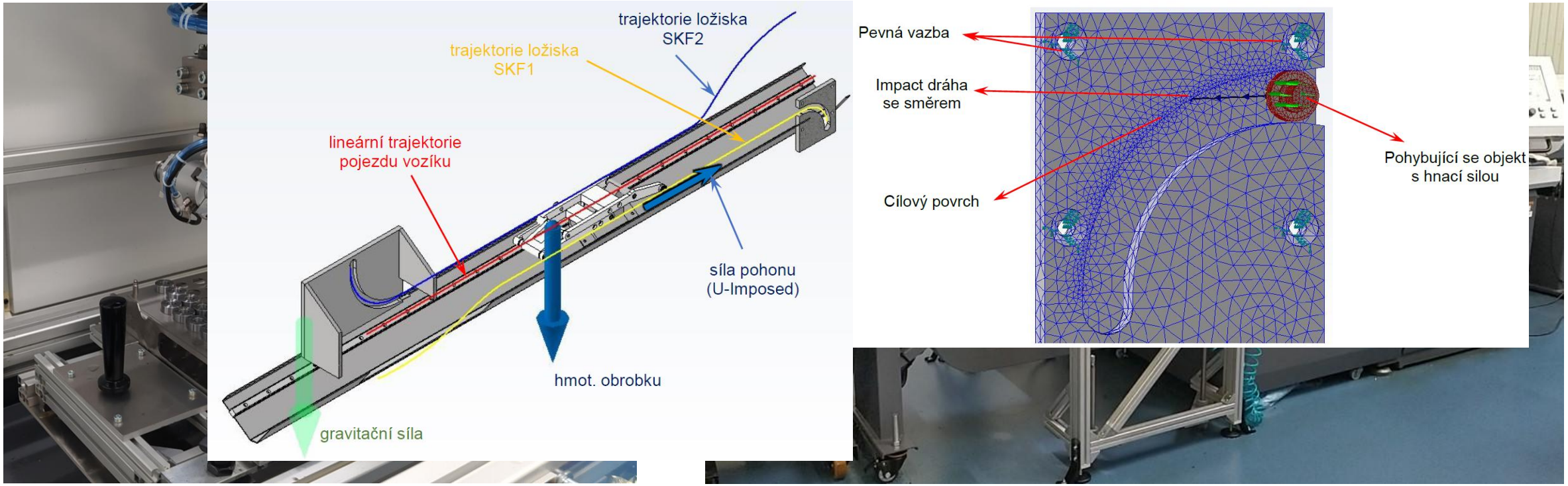
Wireless & Smart Sensors

(RAEM1 – Full Remote System)

From Industry to Research

TACR TREND “New workpiece manipulator for productive CNC lathes”

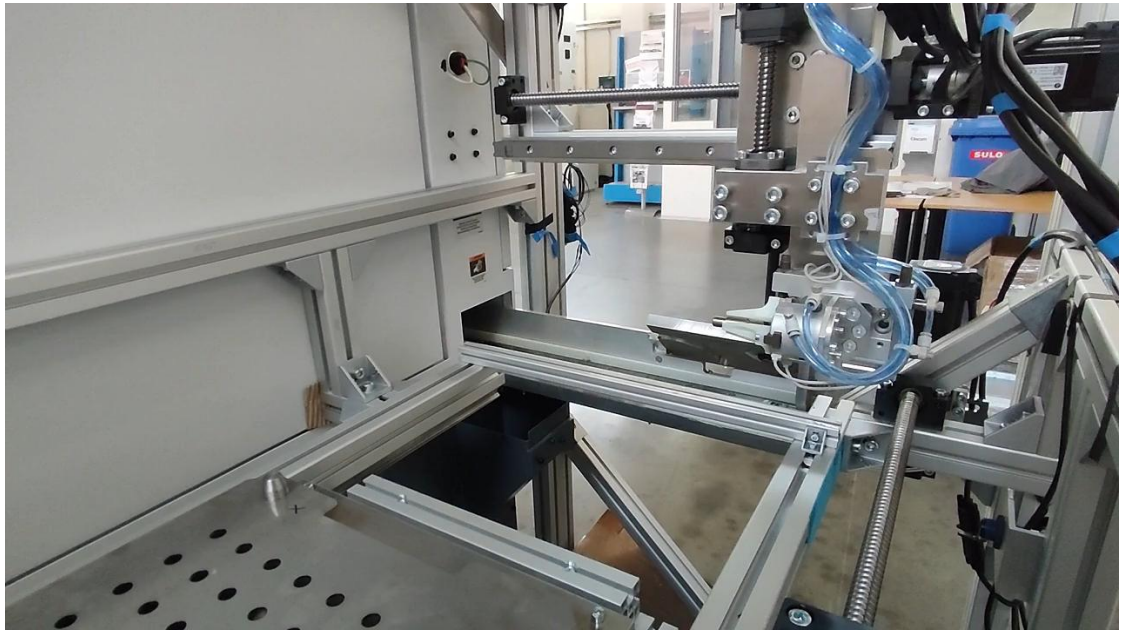
(2021 – 2024)



From Industry to Research

TACR TREND “New workpiece manipulator for productive CNC lathes”

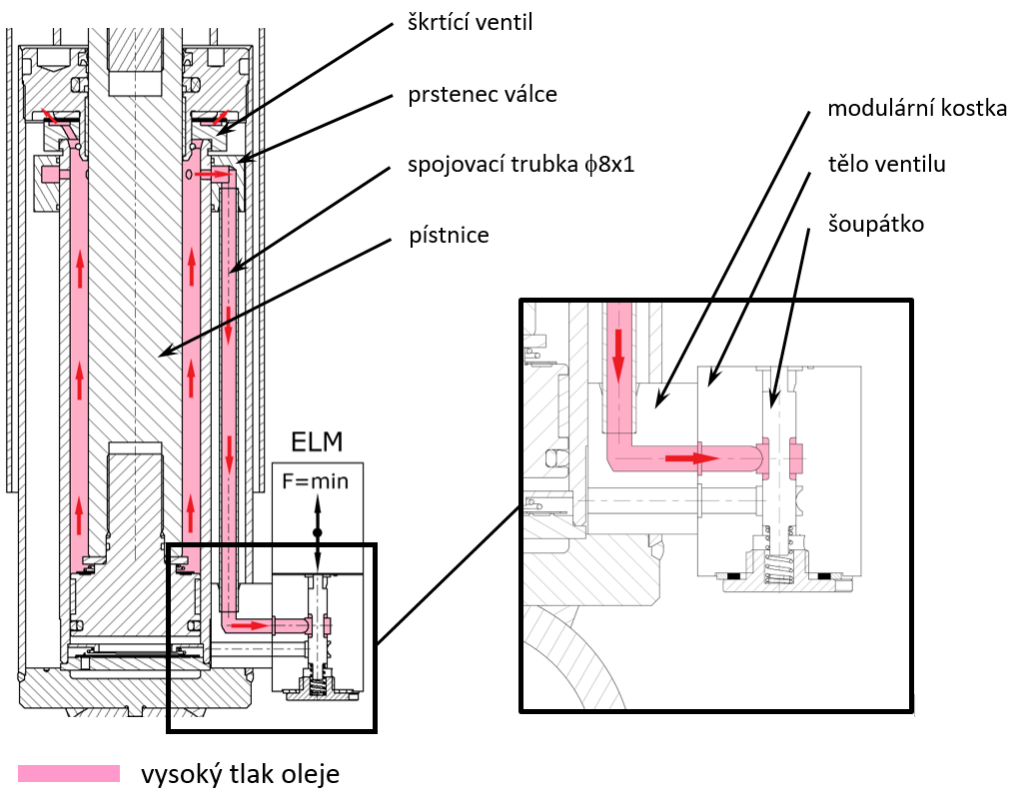
(2021 – 2024)

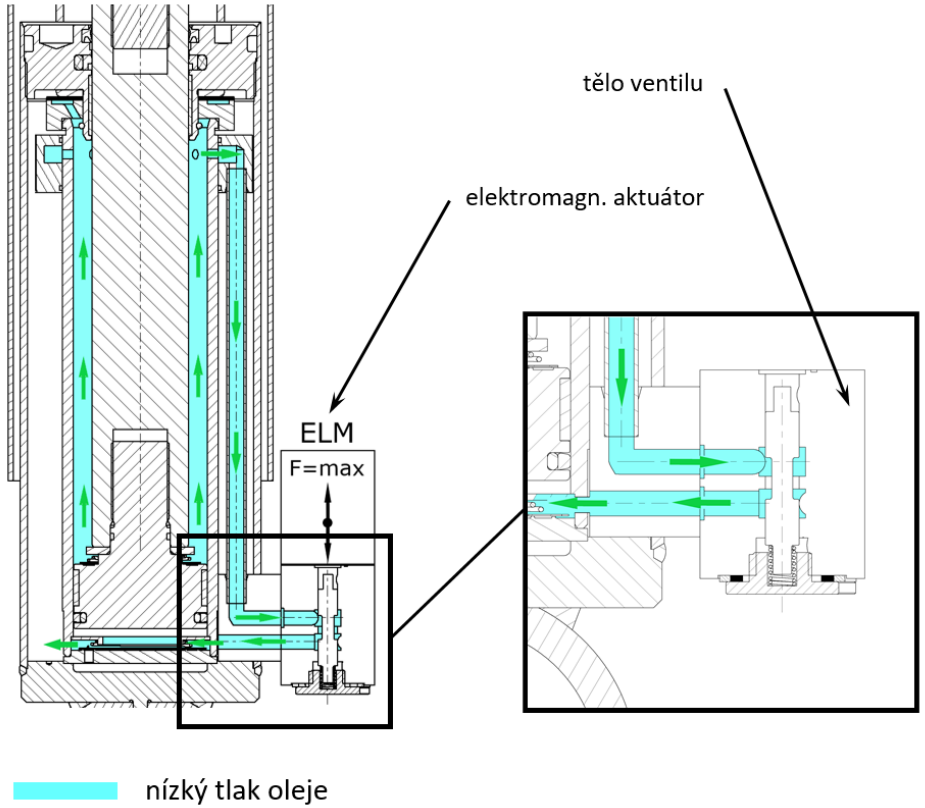


From Industry to Research

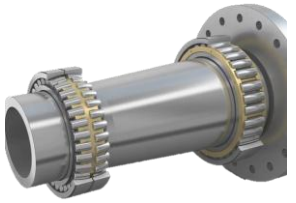
TACR DOPRAVA "Hydraulic semi-active damper for intelligent rail bogie"

(2022 – 2025)



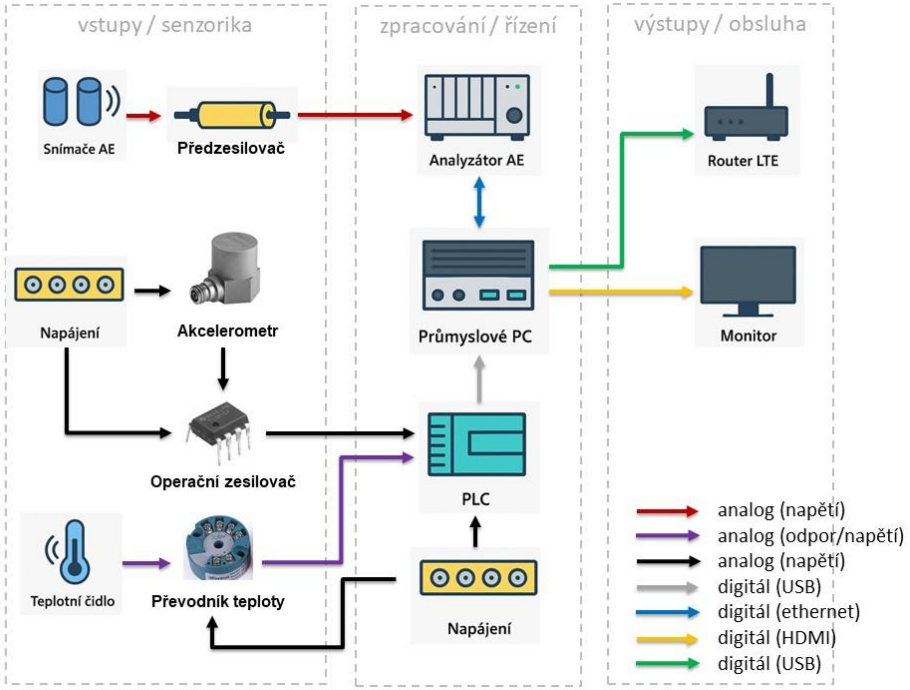


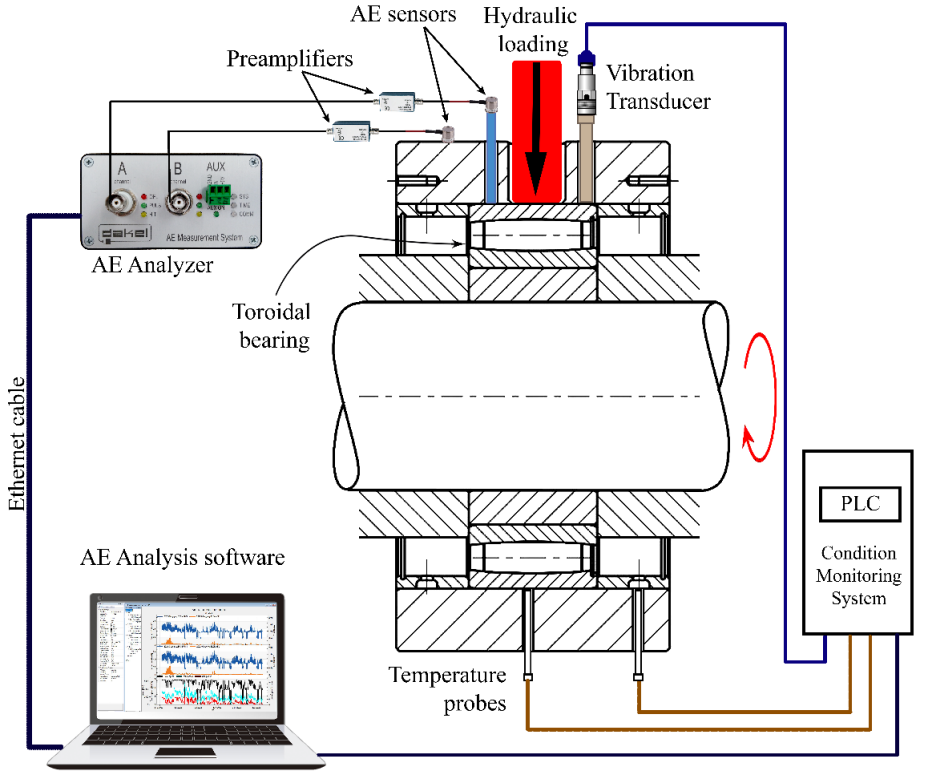
From Industry to Research



NCK MESTEC2 “Large-scale bearings with advanced diagnostics for wind energy ”

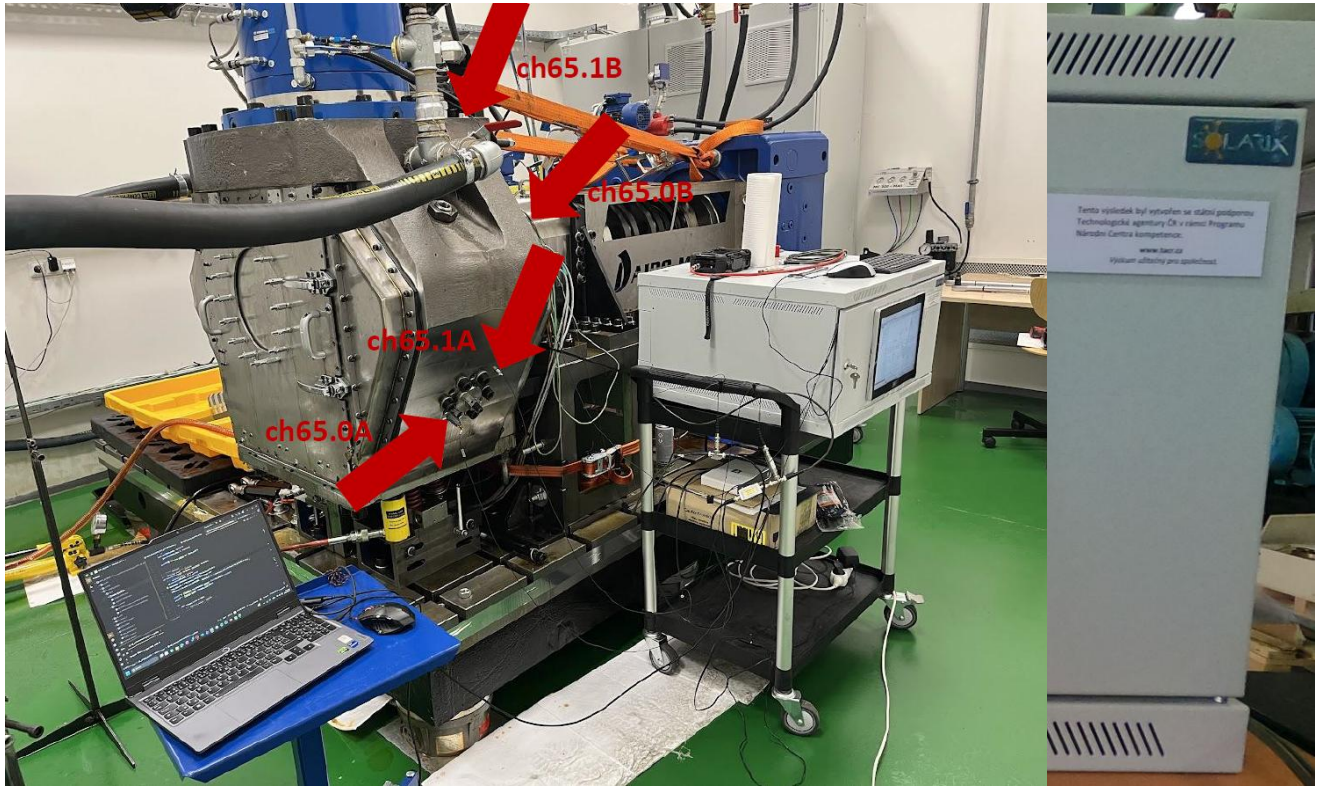
(2023 – 2025)

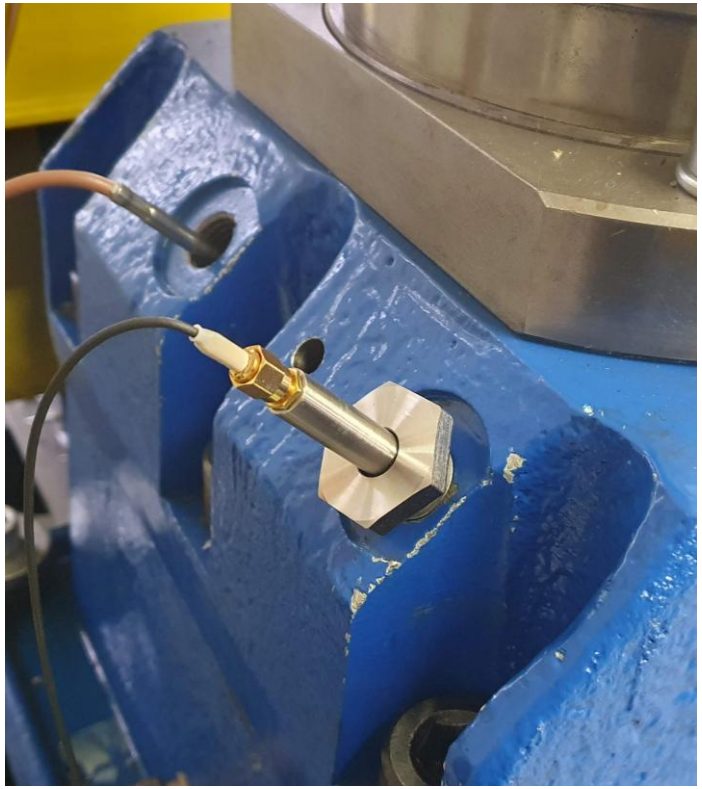




From Industry to Research

NCK MESTEC2 **“Large-scale bearings with advanced diagnostics for wind energy ”**
(2023 – 2025)

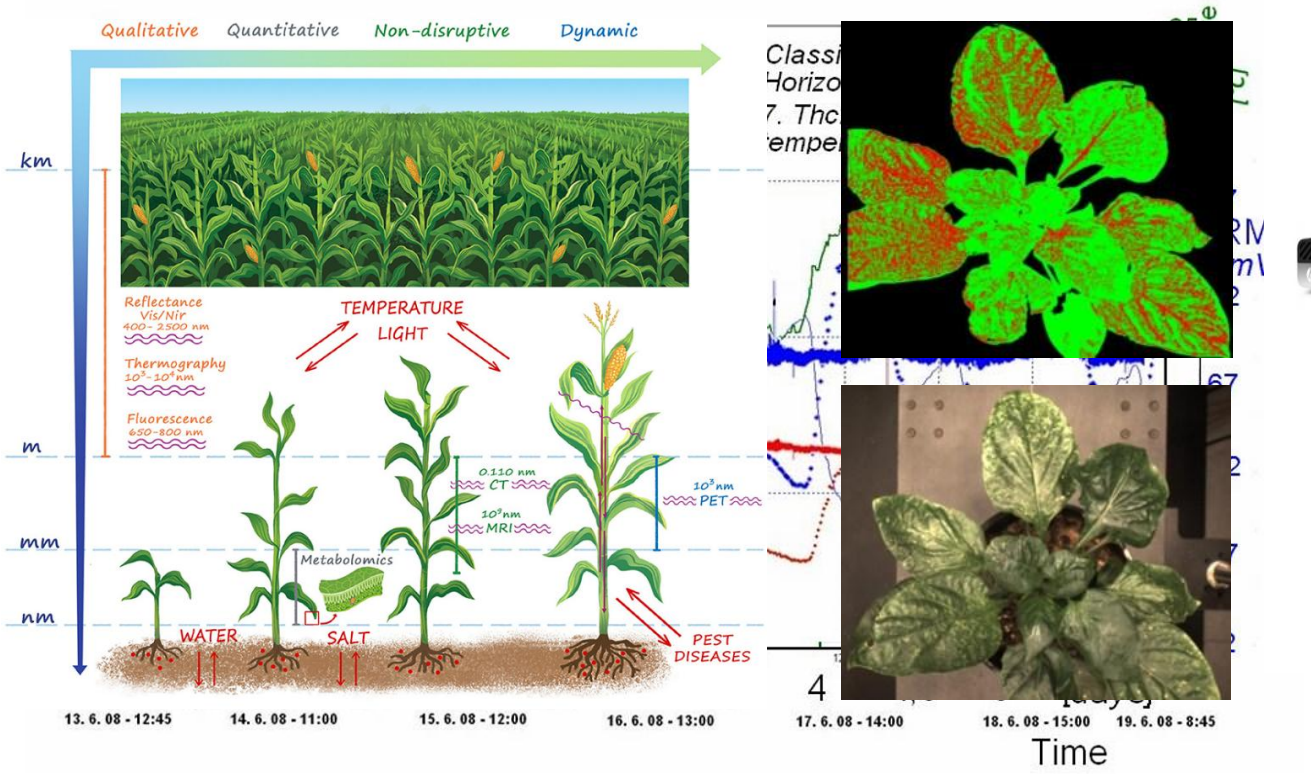


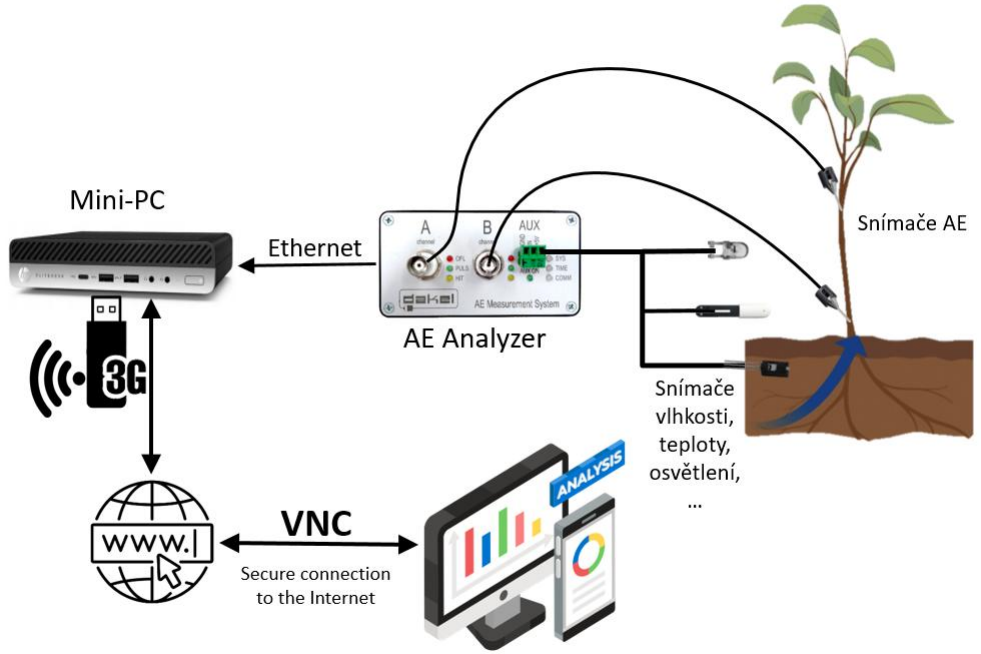


From Industry to Research

TAČR TREND **“Measuring system for monitoring and optimizing plant growth conditions”**

(2024 – 2026)

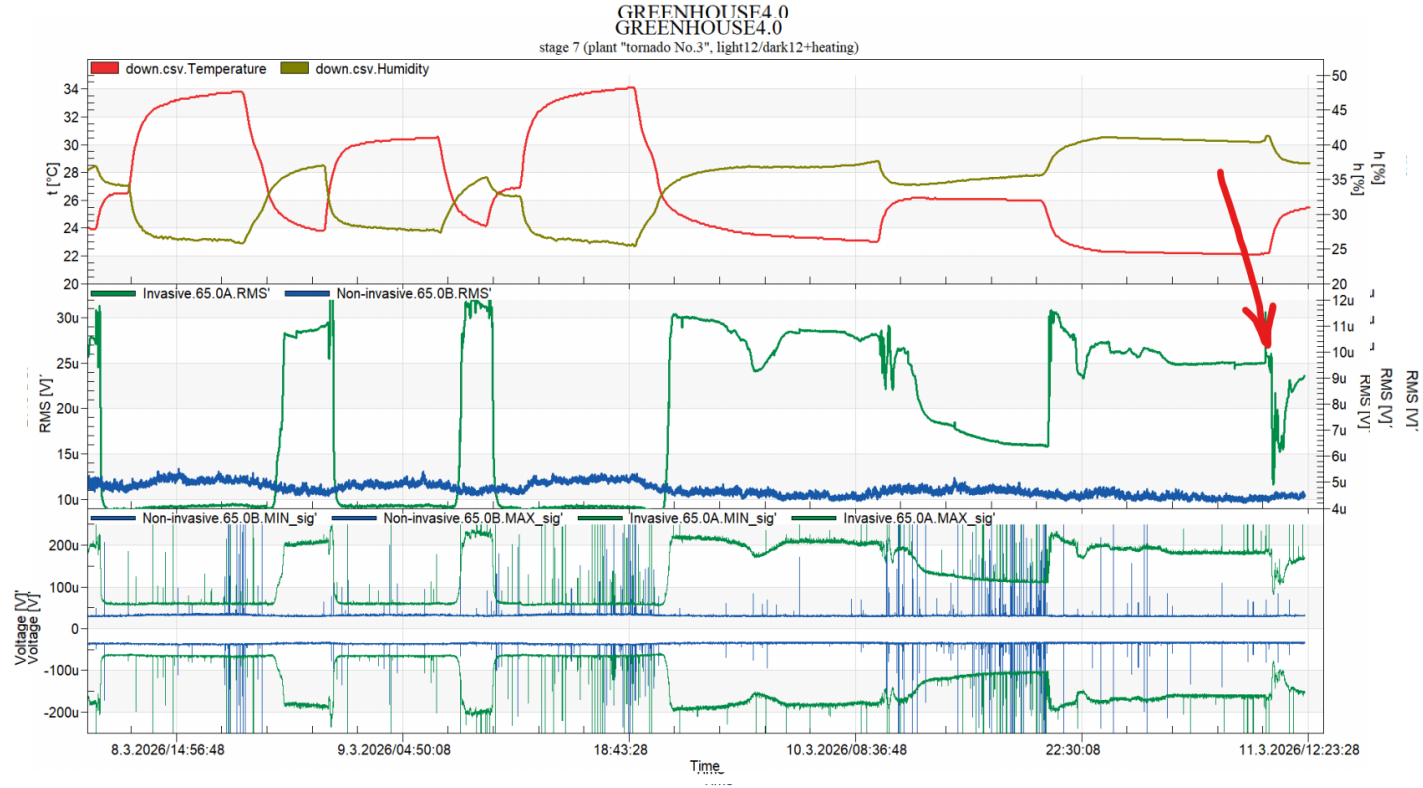




From Industry to Research

TAČR TREND “Measuring system for monitoring and optimizing plant growth conditions”

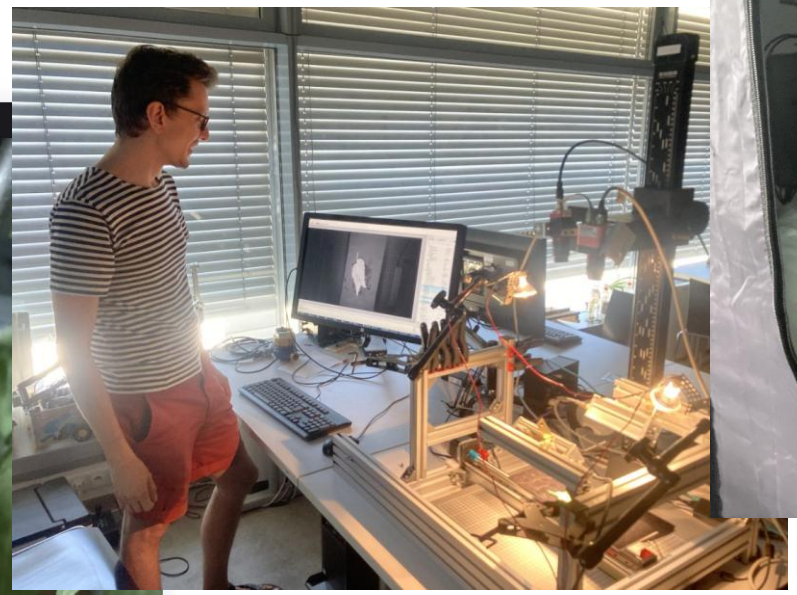
(2024 – 2026)



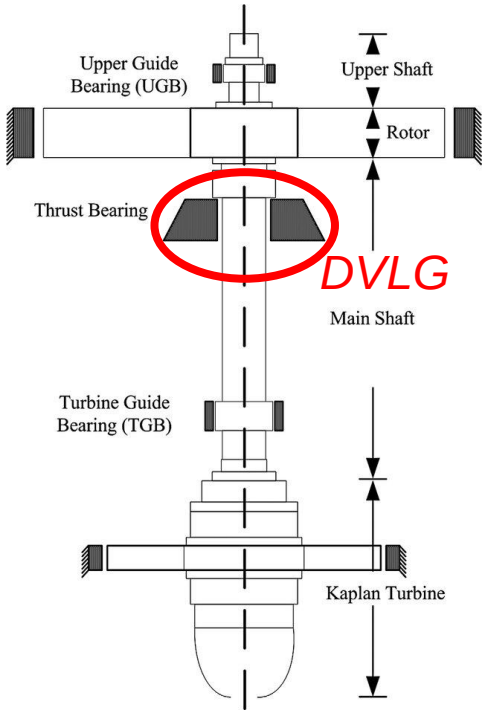
From Industry to Research

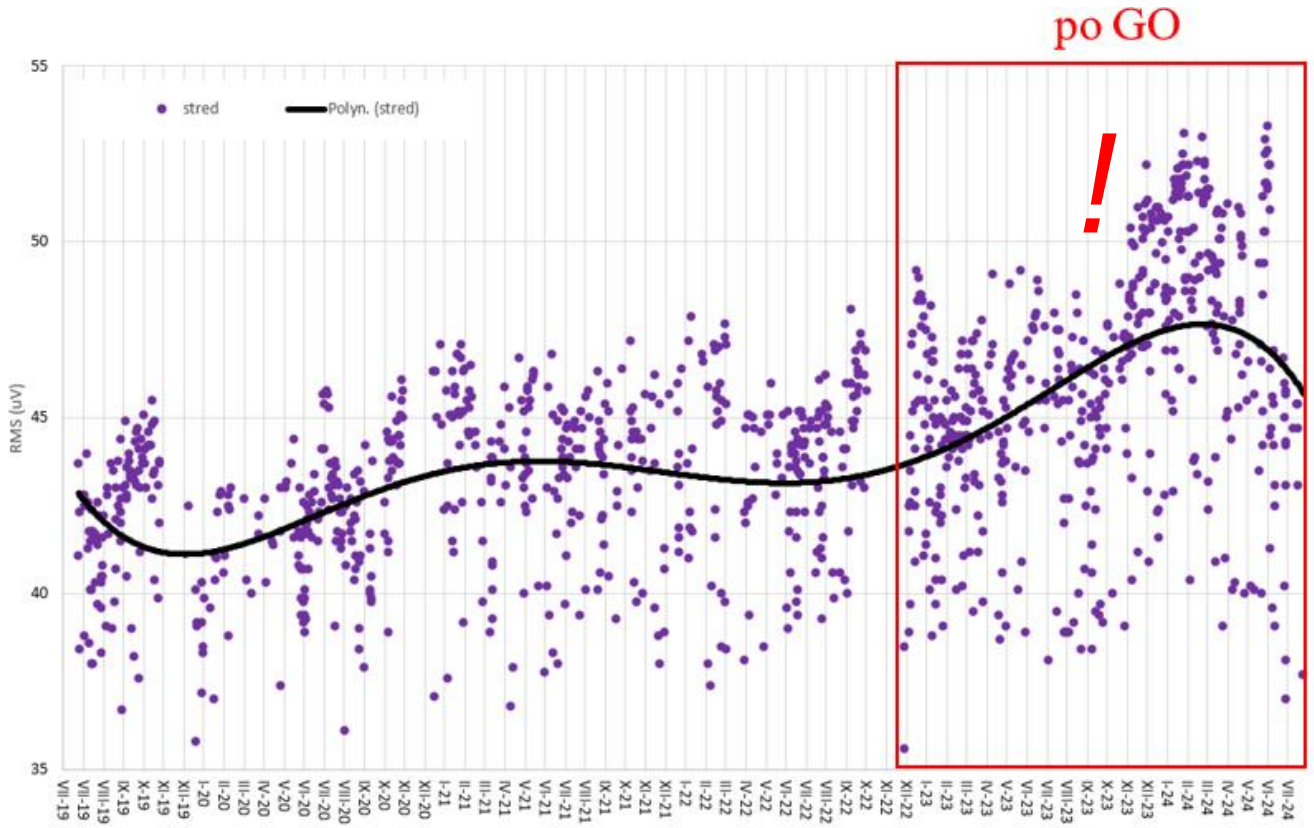
TAČR TREND “Measuring system for monitoring and optimizing plant growth conditions”

(2024 – 2026)

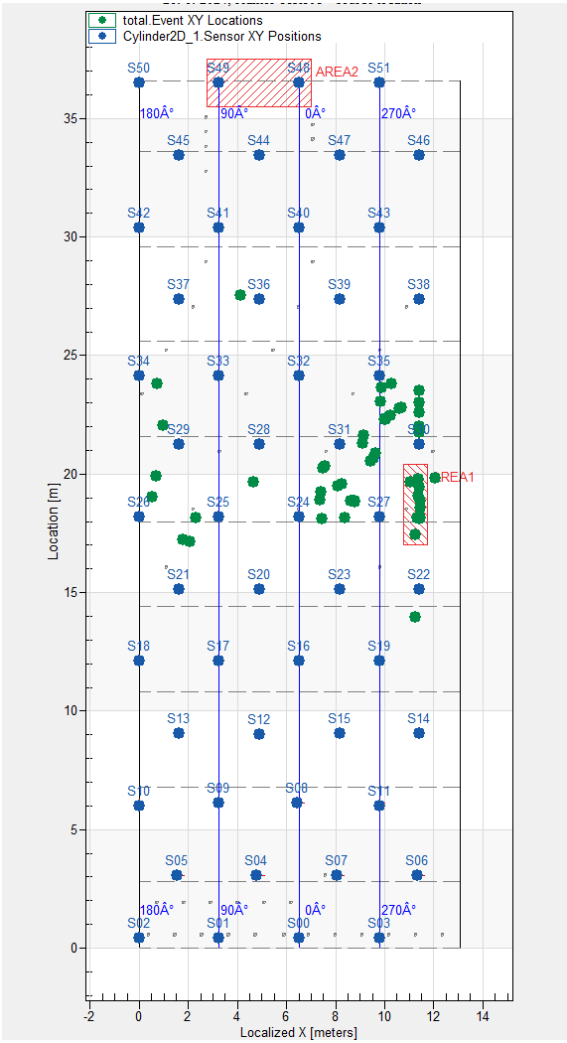


Application of AE outside BUT

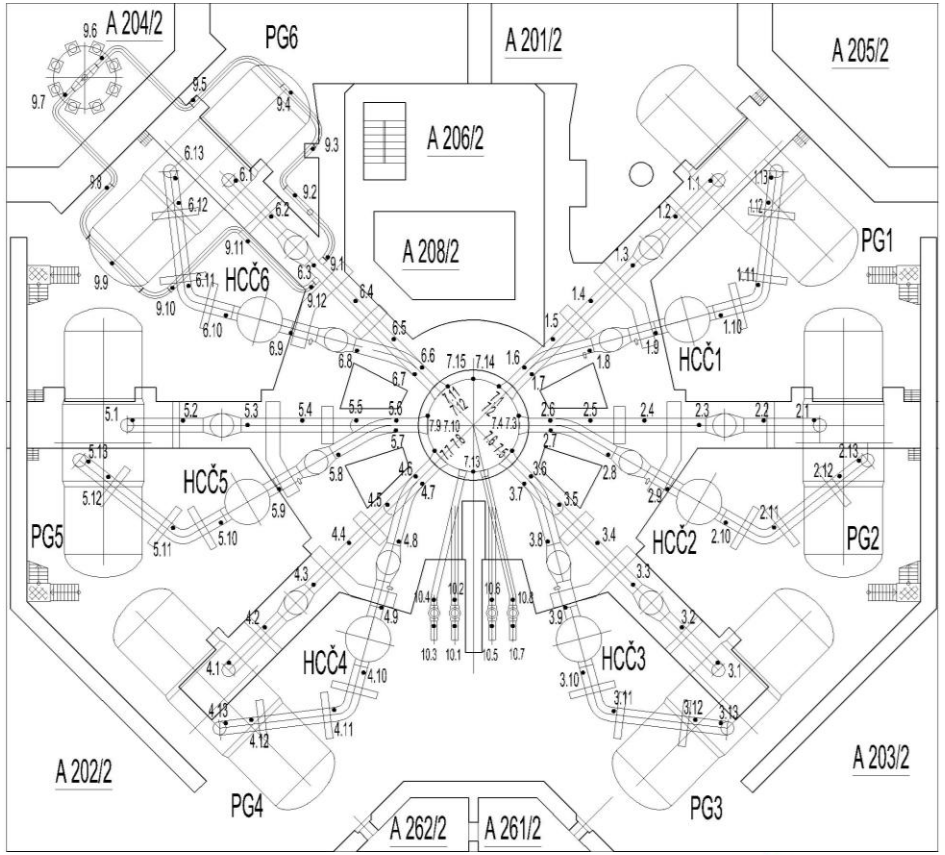




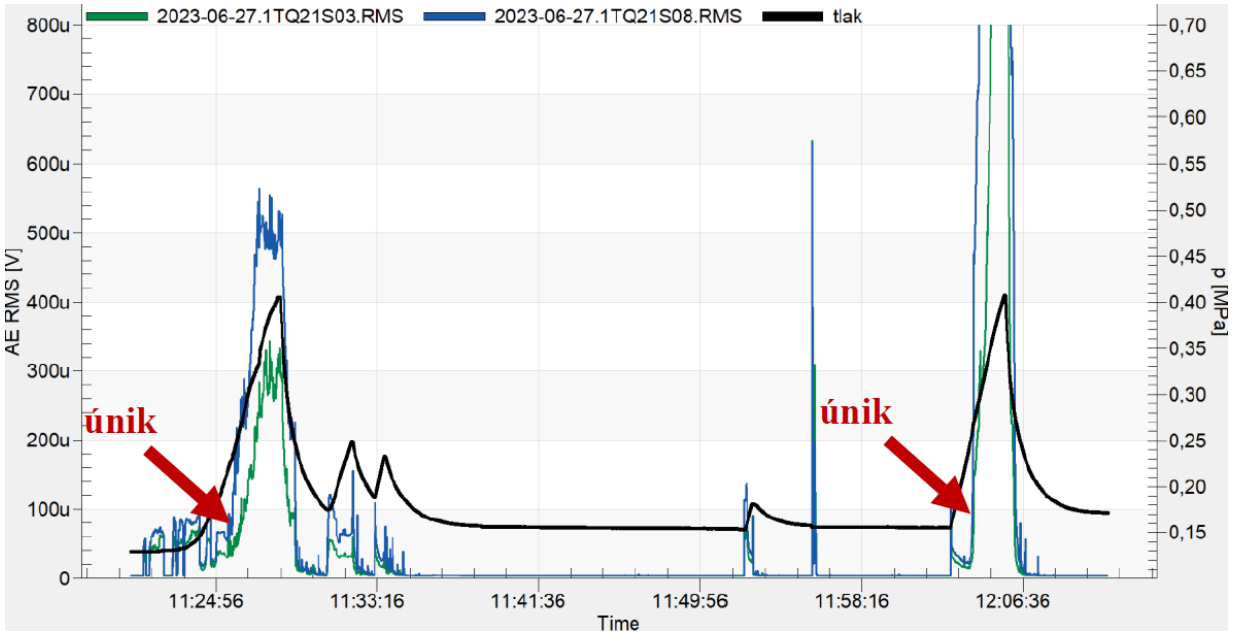
Application of AE outside BUT



Application of AE outside BUT

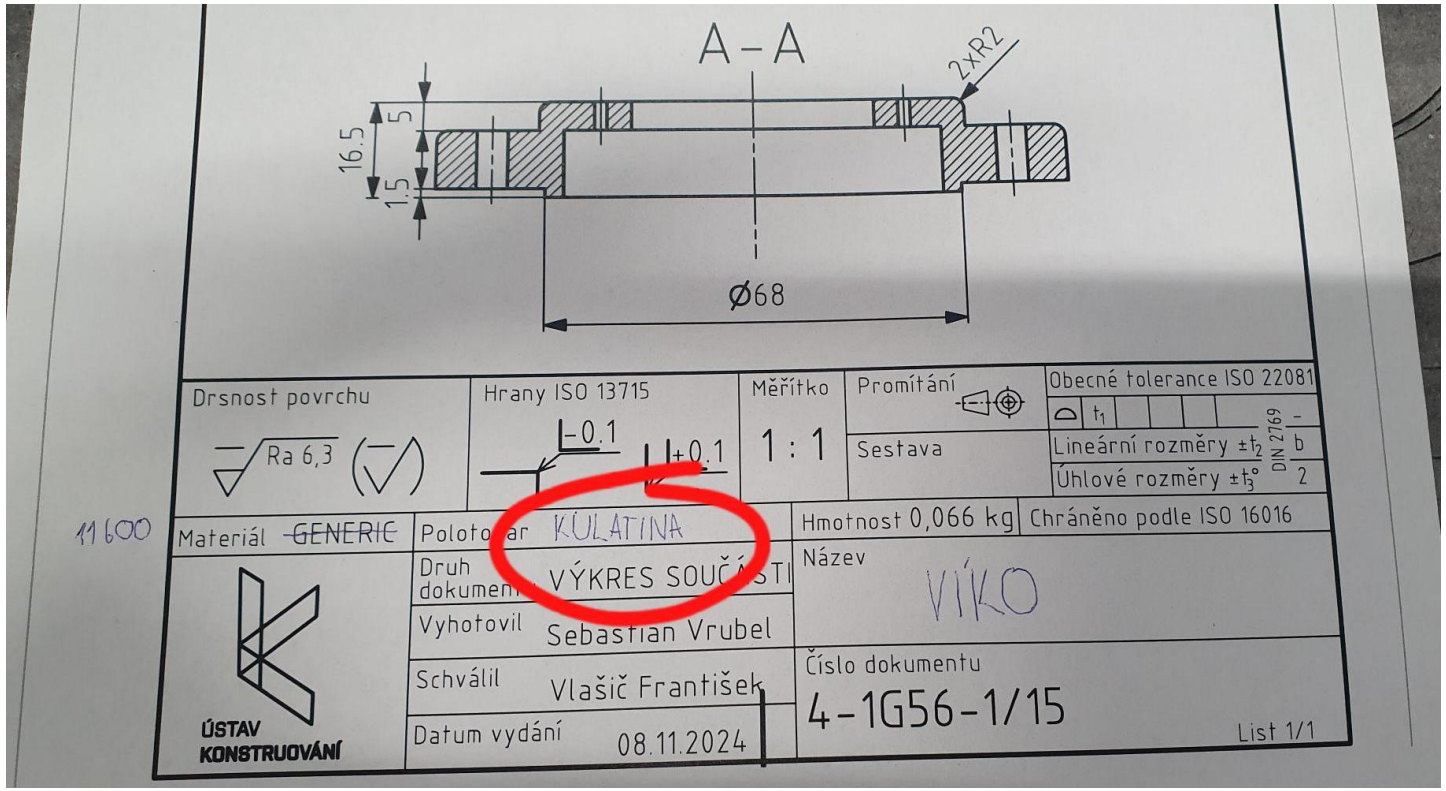


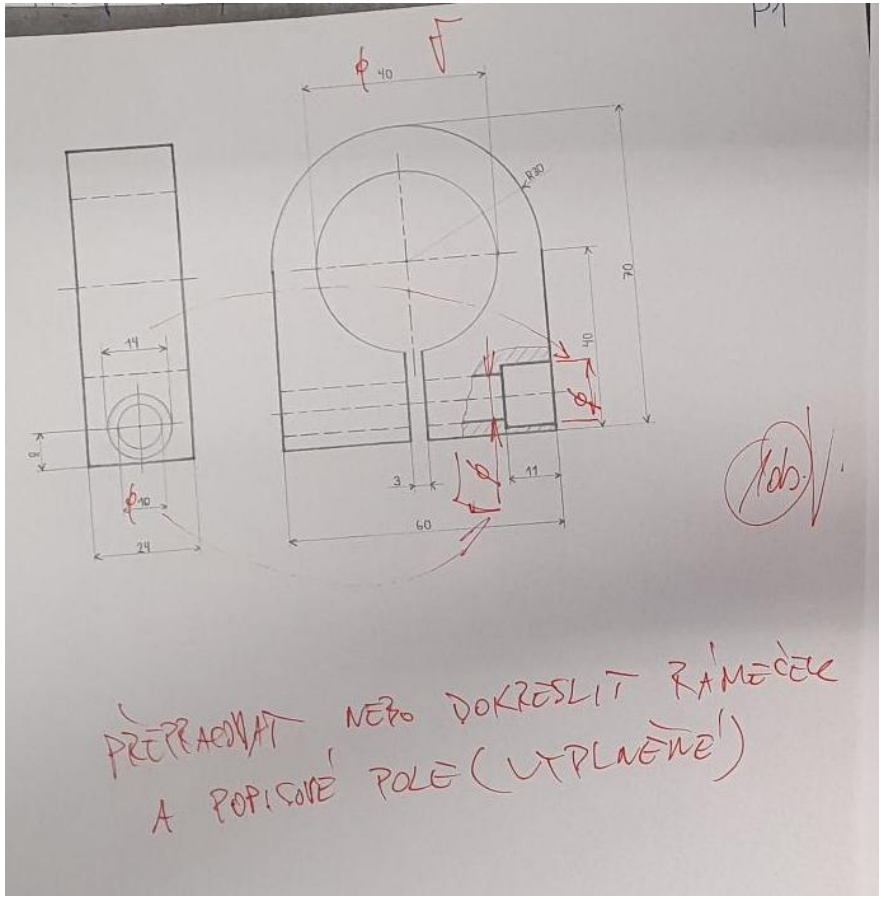
Application of AE outside BUT



Education

1K / 2K





Education

ZIP

Optimalizace návrhu udržitelného produktu: Technologičnost konstrukce, modularita a servis

František VLAŠIC

ÚSTAV KONSTRUOVÁNÍ
Fakulta strojního inženýrství
VUT v Brně

PR

MSV 2023

Ultrazvukový detektor netěsností

FLUCTUS

ÚSTAV KONSTRUOVÁNÍ

Na co je možné detektor použít?

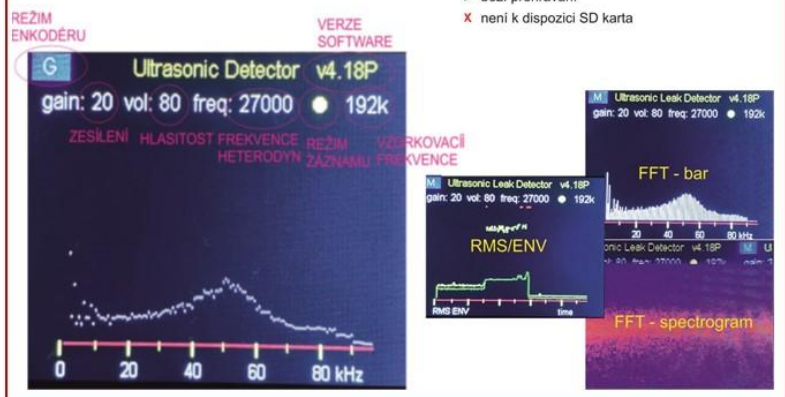
- spoje a příruby
- pneumatické hadice a vedení
- jednoduché pneumatické prvky (válce, ventily…)
- pneumatiky a systémy vzduchových tlumičů

Nastavení parametrů přístroje:

Nastavení	Individuálně	MENU
Brightness – jas displeje		Ano
Gain – zesílení přístroje	G	Ano
Volume – hlasitost sluchátkového výstupu	V	Ano
Heterodyne – frekvence heterodynu	F	Ano
Sample rate – vzorkovací frekvence signálu	SR	Ano
Mode – režim zobrazení	M	Ano
Info – zobrazení informace o přístroji		Ano
EEPROM read – načtení uživatelského nastavení z EEPROM		Ano
Factory default – načtení továrního nastavení		Ano
EEPROM write – zapsání aktuálního nastavení do EEPROM		Ano
Delete all records – smazání všech záznamů na SD kartě		Ano
Set record number – nastavení čísla nového záznamu		Ano

Indikace režimu záznamu:

- v tomto režimu není záznam/přehrávání povoleno
- stop v režimu záznam/přehrávání
- běží záznam
- běží přehrávání
- není k dispozici SD karta



KONTAKTY:
Odbor technické diagnostiky
Milan.Klapka@vutbr.cz
Frantisek.Vlasic@vutbr.cz
VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ FAKULTA STROJNÍHO INŽENÝRSTVÍ

What comes next???

Thank you for your attention

František Vlašic

Frantisek.Vlasic@vutbr.cz

INSTITUTE OF **MACHINE**
AND **INDUSTRIAL DESIGN**

www.**ustavkonstruovani**.cz