

# JÁ O MNĚ 2018-2020

**Zbyněk Strecker**

Institute of Machine and Industrial Design  
Faculty of Mechanical Engineering  
Brno University of Technology

Brno, 8.4.2020



INSTITUTE OF MACHINE  
AND INDUSTRIAL DESIGN

# ACTIVITIES AT IMID & STAY IN PRC

## CONTENT

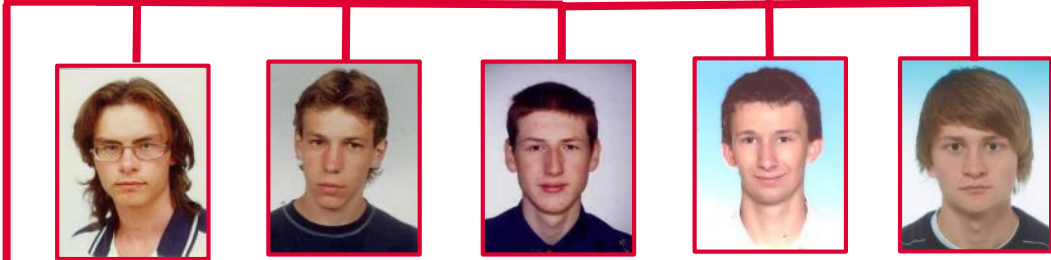
- Research activities
- Other activities
- Teaching
- Stay at Tsinghua University (China)

# RESEARCH ACTIVITIES

## Vibro-acoustics



Brigade commander



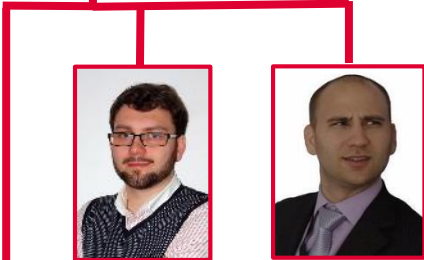
Employees



## Non-destructive testing



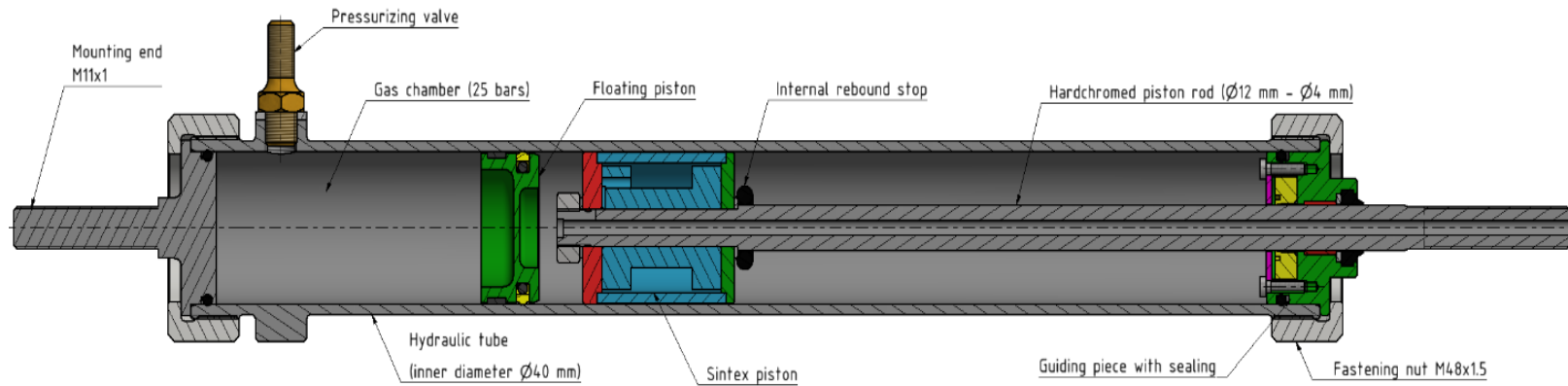
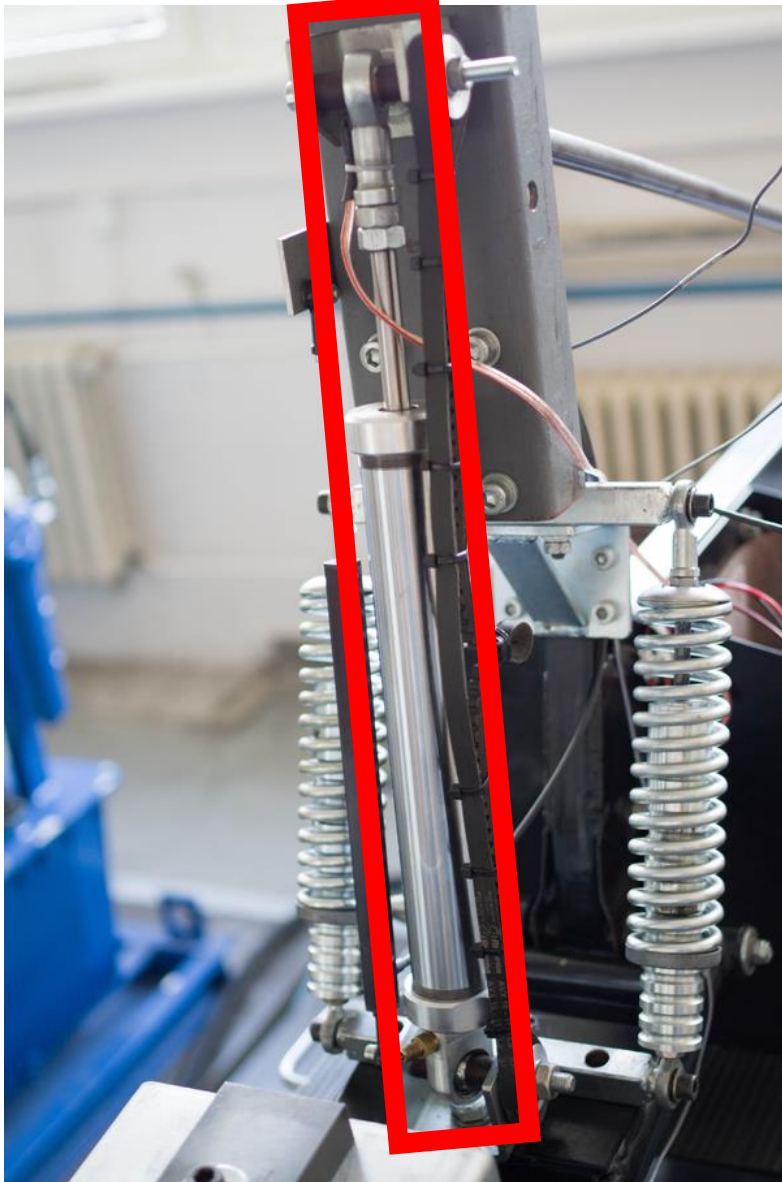
Brigade commander



Employees



# RESEARCH ACTIVITIES - FAST MR DAMPERS



# RESEARCH ACTIVITIES - FAST MR DAMPERS

## Material approach

## Shape approach

1. generation



Ferrite



2. generation



Soft magnetic composites

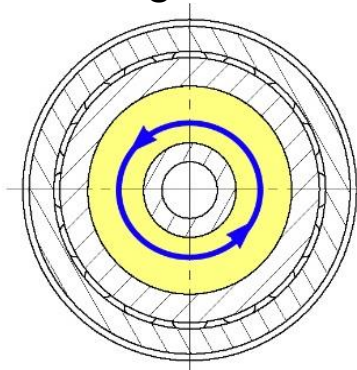


3. generation

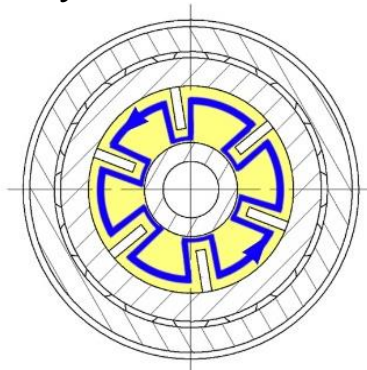


## Basic idea of Shape approach

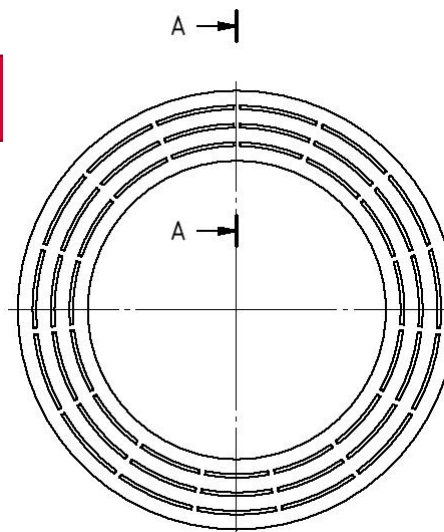
Increase a length where eddy currents has to flow



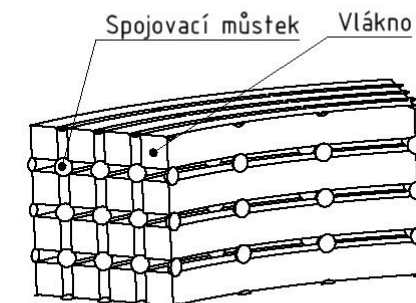
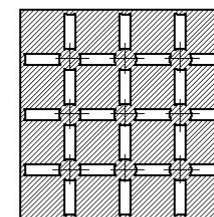
Eddy currents



Eddy currents



ŘEZ A



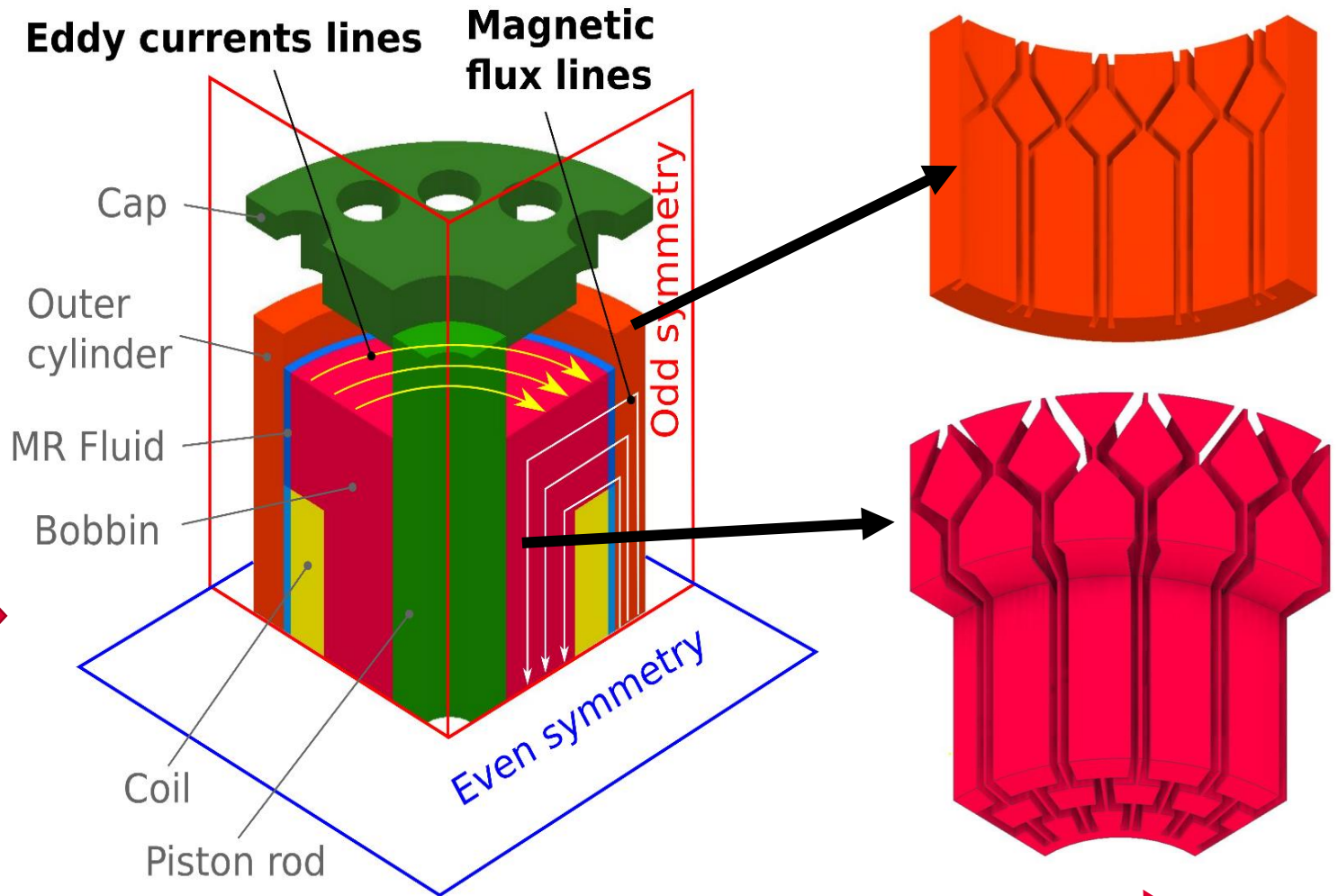
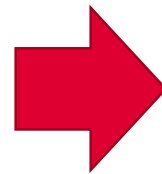
# RESEARCH ACTIVITIES - FAST MR DAMPERS

## New generation of magnetic circuits

Transient magnetic model

3D metal printing

Final geometry



# RESEARCH ACTIVITIES - FAST MR DAMPERS

## New generation of magnetic circuits

Type of piston	Primary response time (ms)	Secondary response time (ms)	Magnetic flux density (T) (2 A, air in the gap)	Weight (g)	Dynamic force range (-)
Solid piston (11SMn30)	6.2	30.9	0.174	208	5.73
SMC piston	1.06	1.3	0.154	193	4.03
Grooved piston (11SMn30)	1.36	1.75	0.17	177	5.33
Structured piston (Fe)	1.32	1.68	0.18	156	5.12

# Shape approach – new generation of magnetic circuit

## New generation of magnetic circuits

Transient magnetic model

3D metal printing

Final geometry



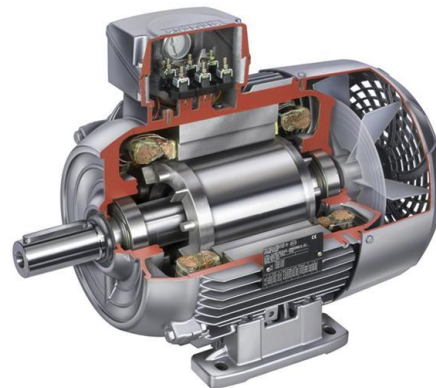
Potential applications

Better magnetic properties

Lower Hysteresis losses

Lower Weight

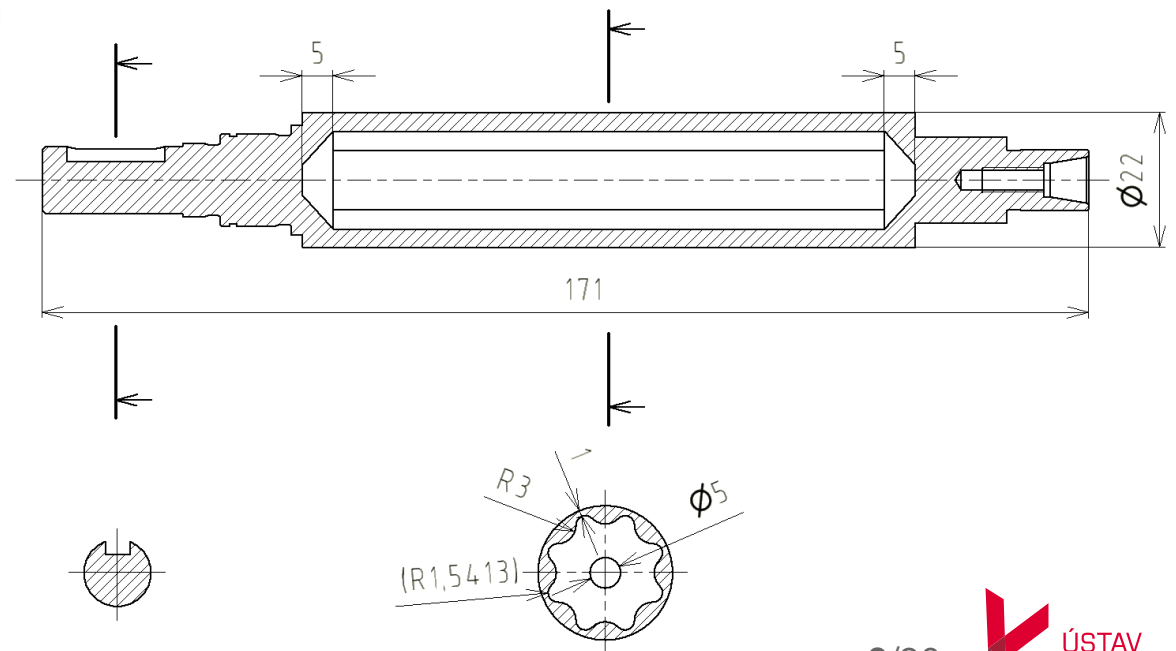
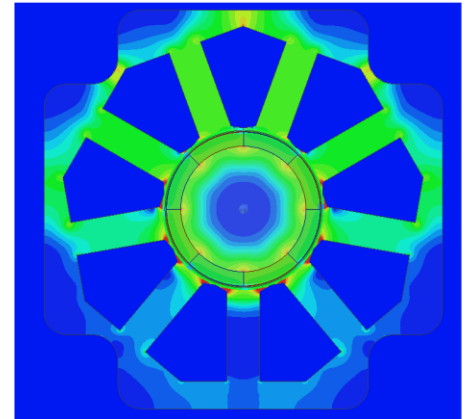
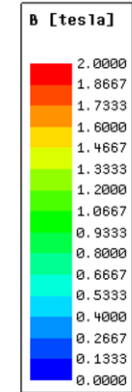
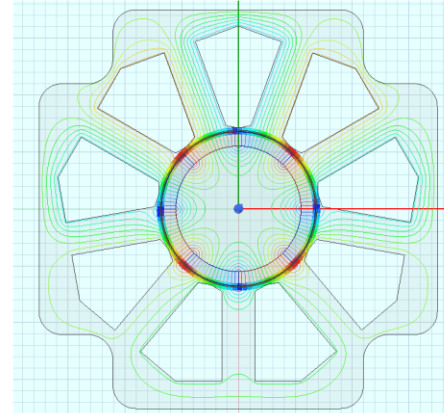
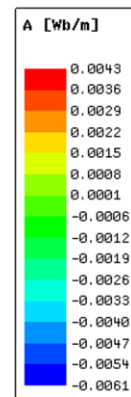
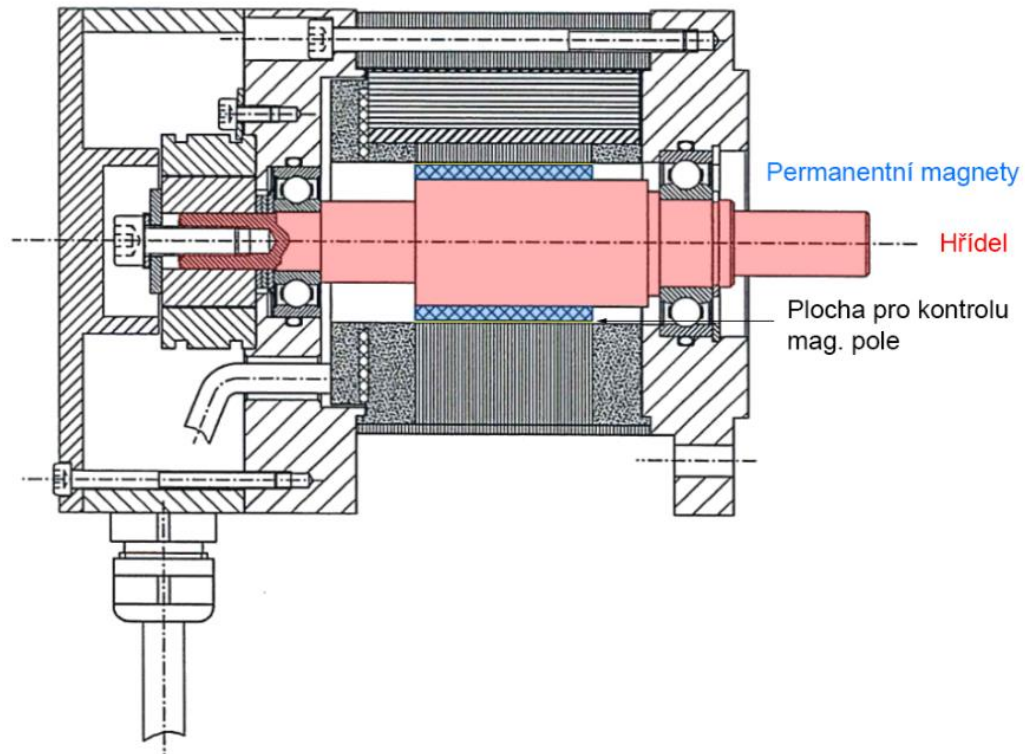
Better cooling





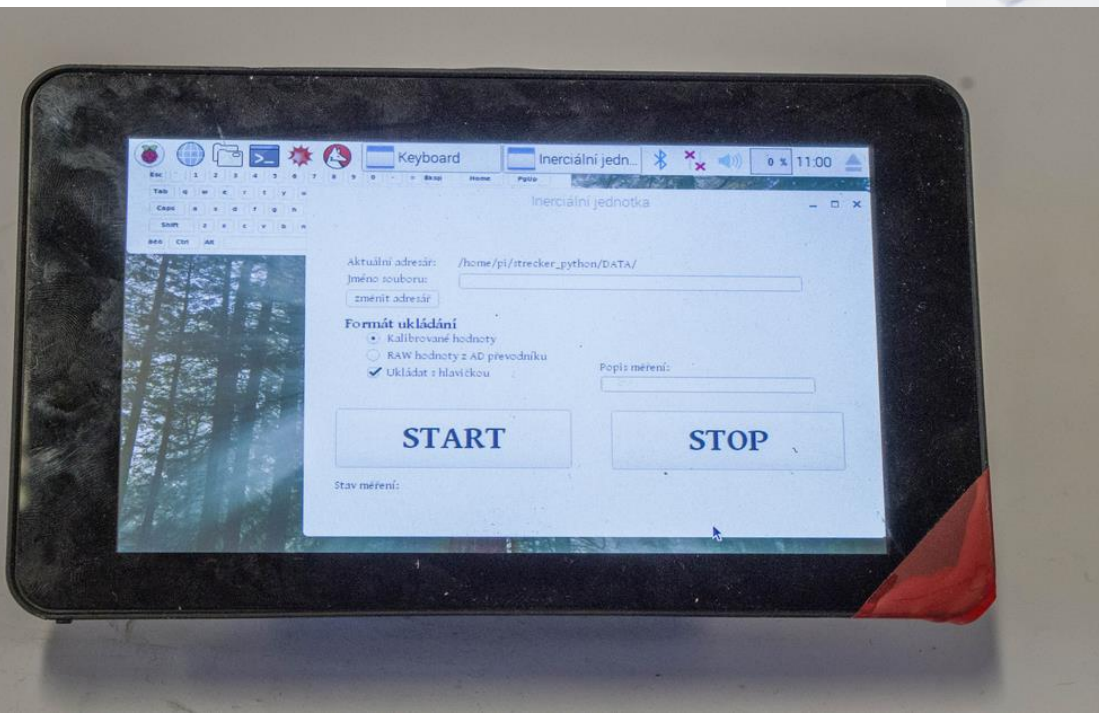
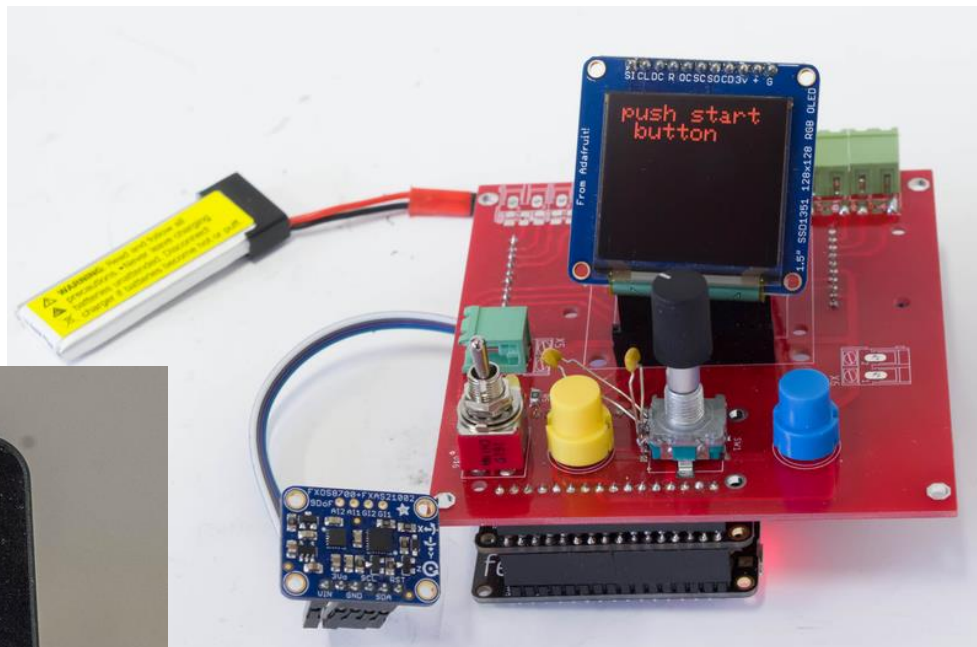
# RESEARCH ACTIVITIES – PROJECTS PARTICIPATION

## NCK-MESTEC



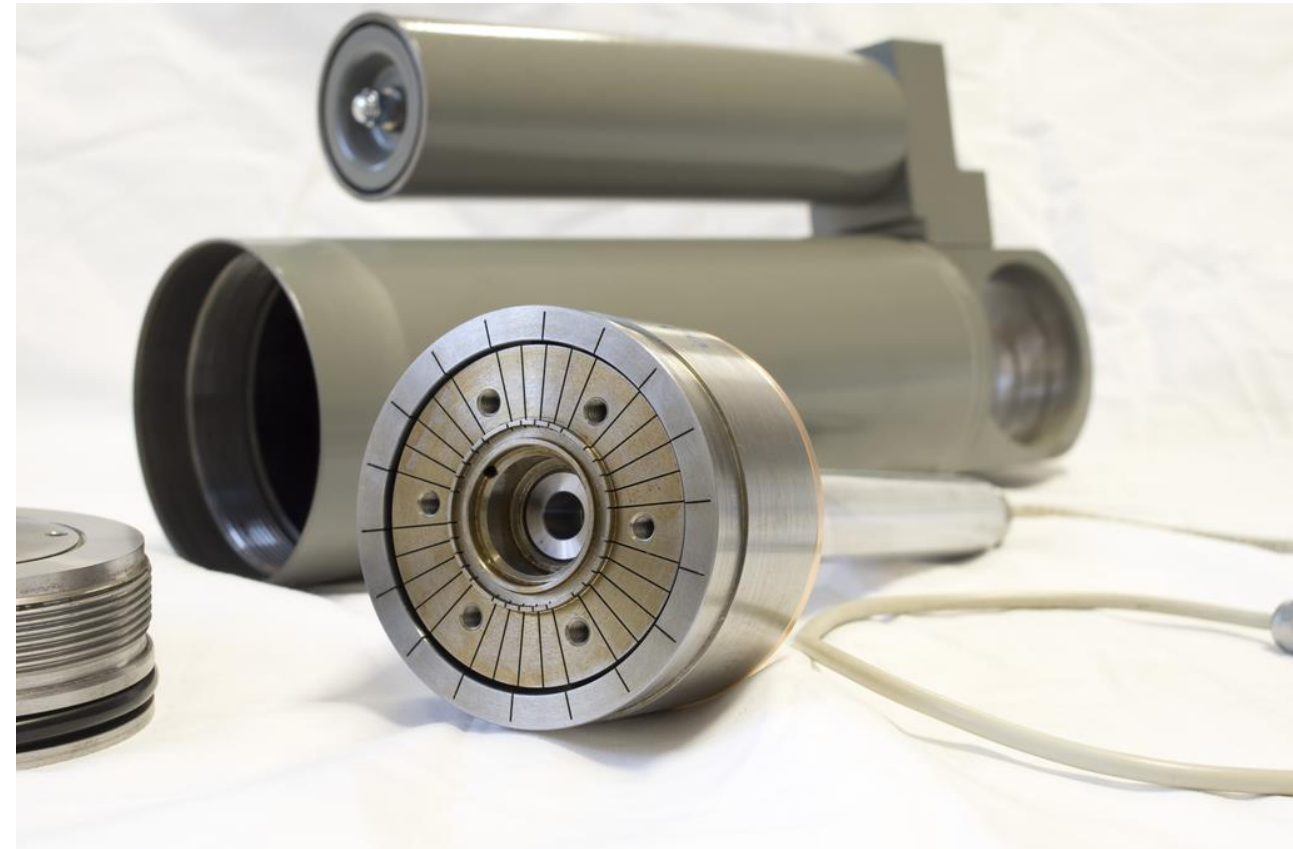
# RESEARCH ACTIVITIES – PROJECTS PARTICIPATION

## TAČR – Elektronický tester tlumení náprav automobilů



# RESEARCH ACTIVITIES – PROJECTS PARTICIPATION

## MPO - Vývoj MR systému tlumení pro podvozky kolejových vozidel



# RESEARCH ACTIVITIES – PROJECTS PARTICIPATION

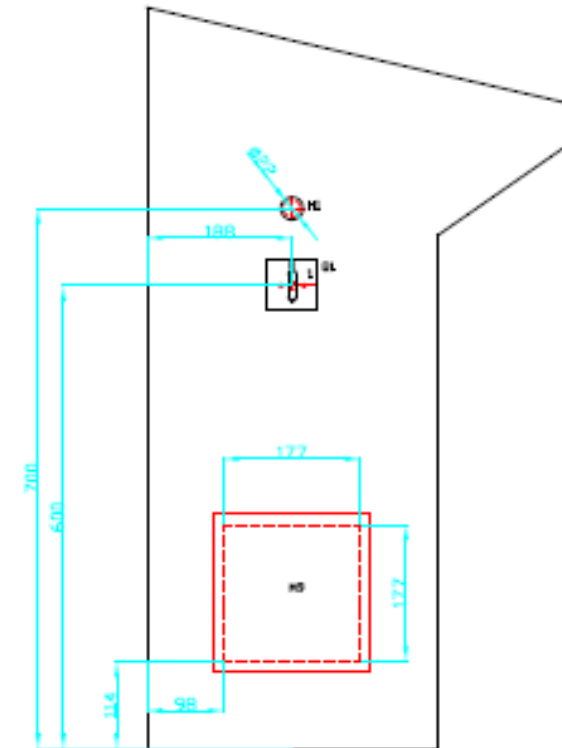
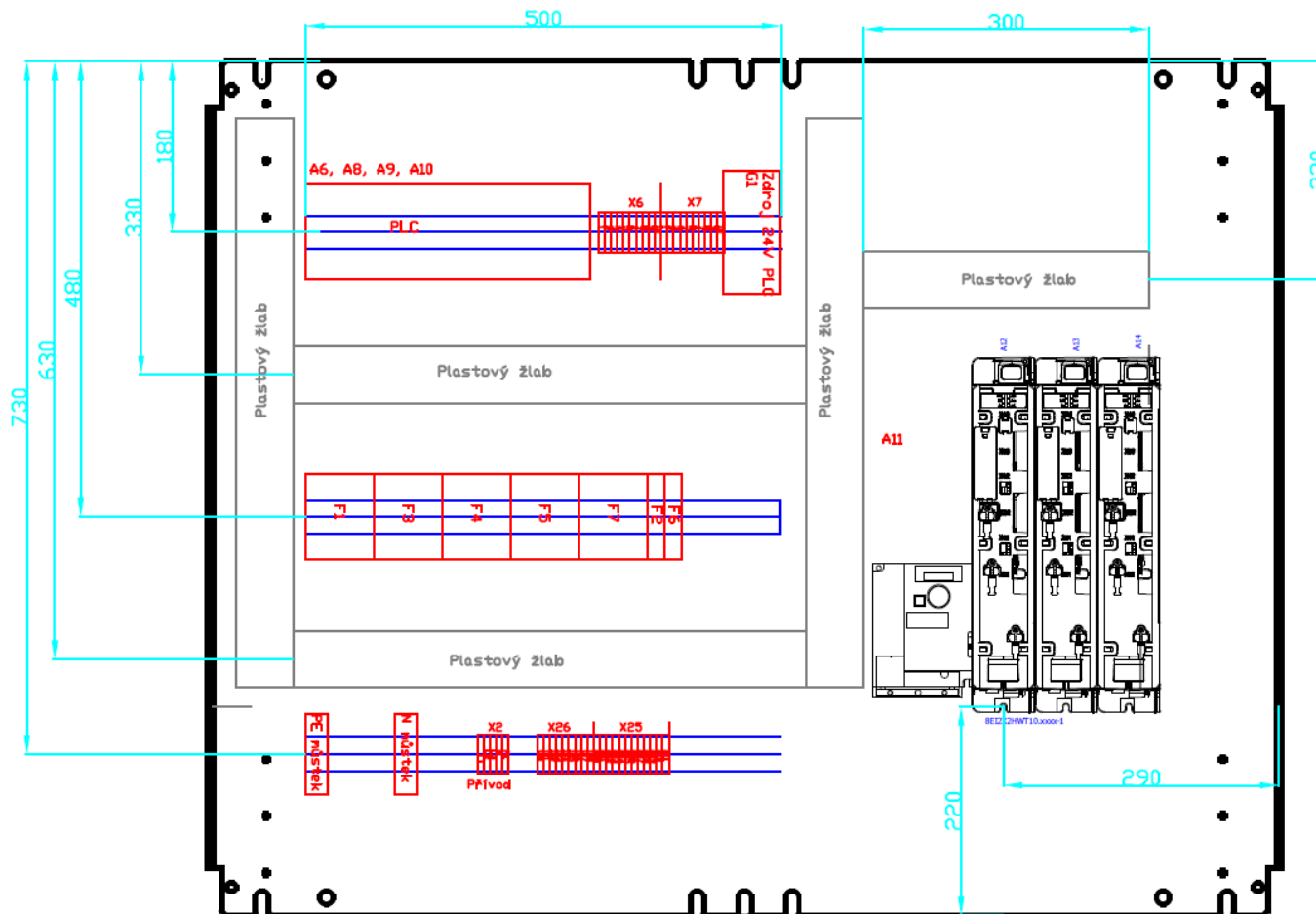


# RESEARCH ACTIVITIES – PROJECTS PARTICIPATION



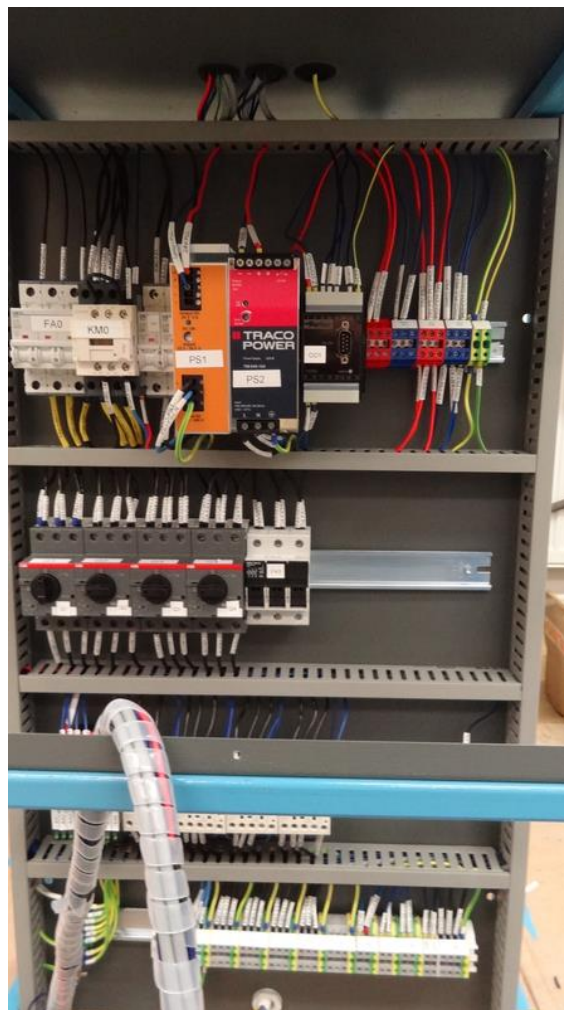
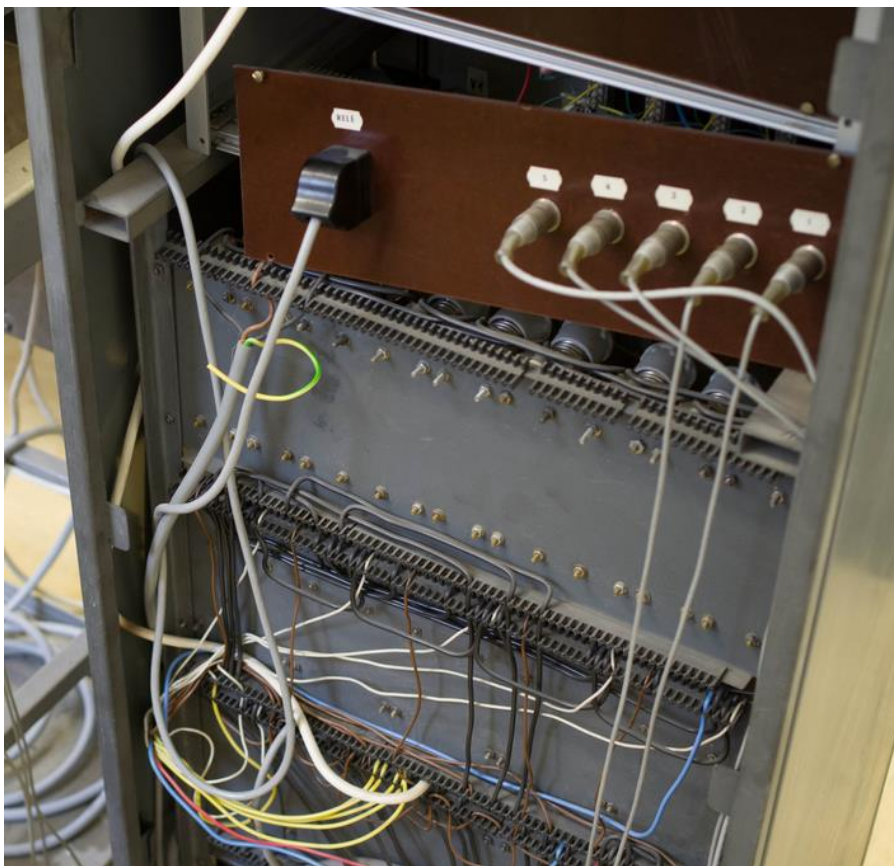
# SUPPORT ACTIVITIES – PROJECTS PARTICIPATION

## TAČR – Vývoj 3D tiskárny na beton



# SUPPORT OF RESEARCH PROJECT

## Design of new switchgear Axmat/Ermat



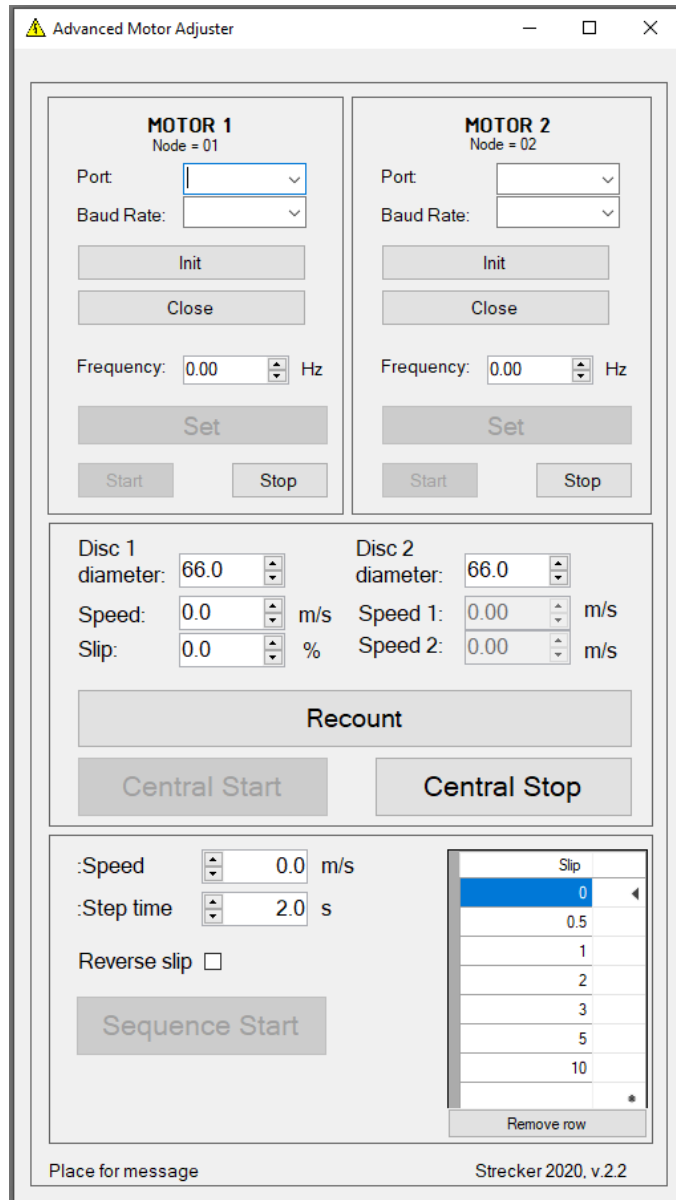
# CONTRACTUAL RESEARCH

## Motorpal – vibration test of injector



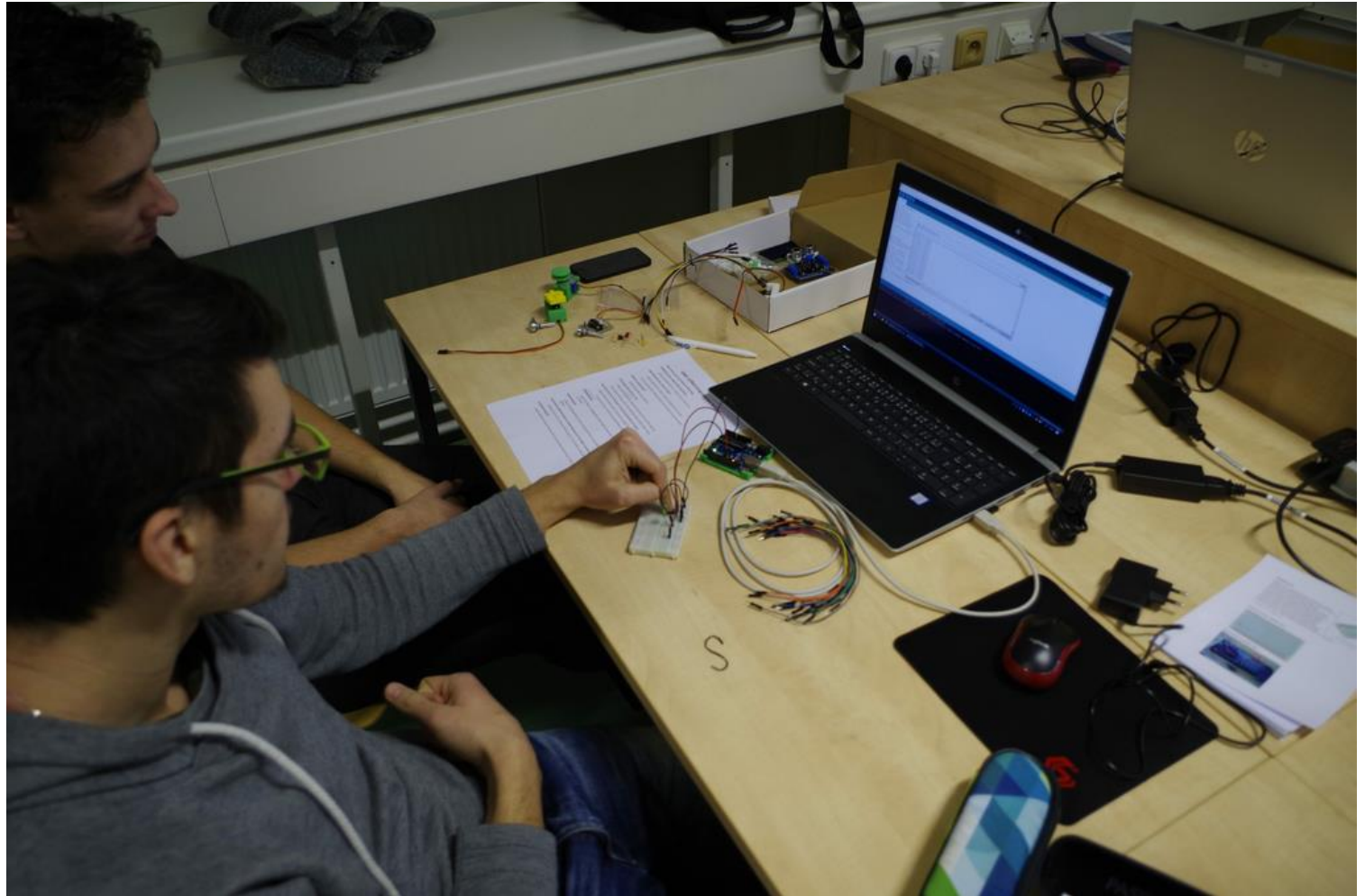


# SUPPORT OF IMID (LAST WEEK)



# TEACHING ACTIVITIES

- ZAE – Machine and proces control
- ZEM – Measurement and experiment
- ZDI – Diagnostics systems
- ZIP – Mechanical design project
- Supervising bachelor thesis (2x)
- Supervising masters thesis (2x)



# PUBLICATIONS

- STRECKER, Z.; KUBÍK, M.; VÍTEK, P.; ROUPEC, J.; PALOUŠEK, D.; ŠREIBR, V. Structured magnetic circuit for magnetorheological damper made by selective laser melting technology. SMART MATERIALS & STRUCTURES, 2019, roč. 28, č. 55016, s. 1-13. ISSN: 0964-1726. – **IF3.543**
- STRECKER, Z.; ROUPEC, J.; MAZŮREK, I.; MACHÁČEK, O.; KUBÍK, M. Influence of response time of magnetorheological valve in Skyhook controlled three-parameter damping system. Advances in Mechanical Engineering, 2018, roč. 10, č. 11, s. 1-8. ISSN: 1687-8140. **IF1.024**
- patent  
STRECKER, Z.; ROUPEC, J.; MAZŮREK, I.; VYSOKÉ UČENÍ TECHNICKÉ V BRNĚ: *Ventil für eine magnetorheologische Flüssigkeit*. EP3092421A1, patent. (2018)
- patent  
KUBÍK, M.; STRECKER, Z.; ROUPEC, J.; MAZŮREK, I.; MACHÁČEK, O.; PALOUŠEK, D.; KOUTNÝ, D.; Vysoké učení technické v Brně: *Skelet jádra tvořeného pruty z feromagnetického materiálu*. 307249, patent. (2018)
- **§10 (vyhláška 50 1978) - Pracovníci pro samostatné projektování a pracovníci pro řízení projektování**

# Stay at Tsinghua University / Beijing 11/2019

Publications

interest of prof.  
Wei ->  
visit at BUT

Invitation to China  
(Overseas  
outstanding  
talents)



- Duration of internship: 1 month
- Covered costs:
  - Fly tickets
  - Accommodation
  - Scholarship



# Stay at Tsinghua University / Beijing 11/2019



清华大学车辆与运载学院

SCHOOL OF VEHICLE AND MOBILITY, TSINGHUA UNIVERSITY

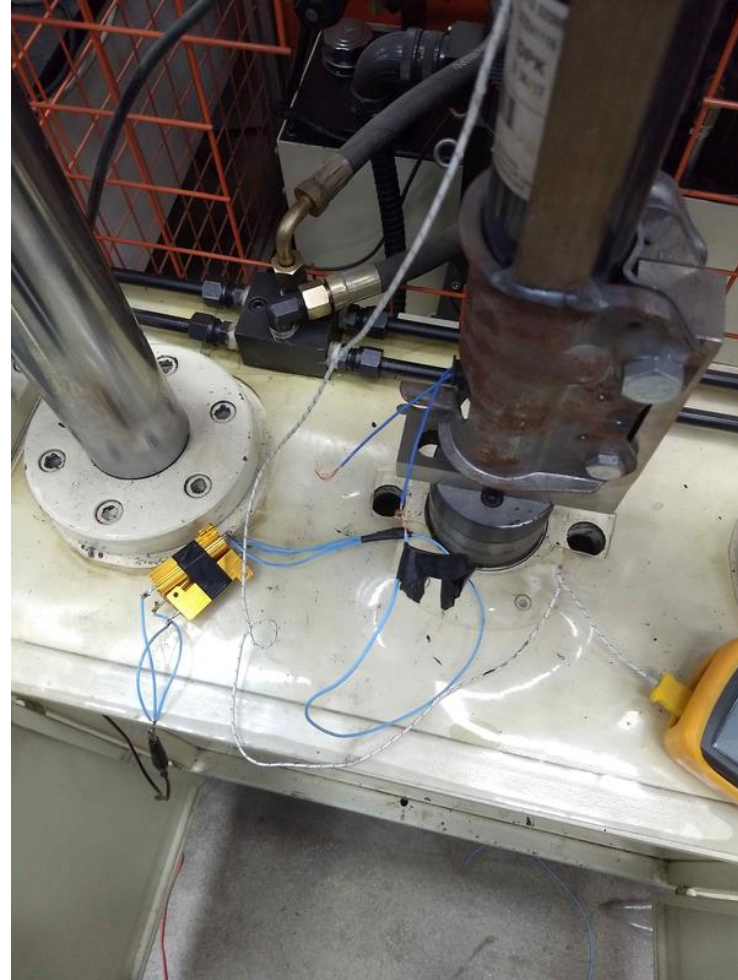
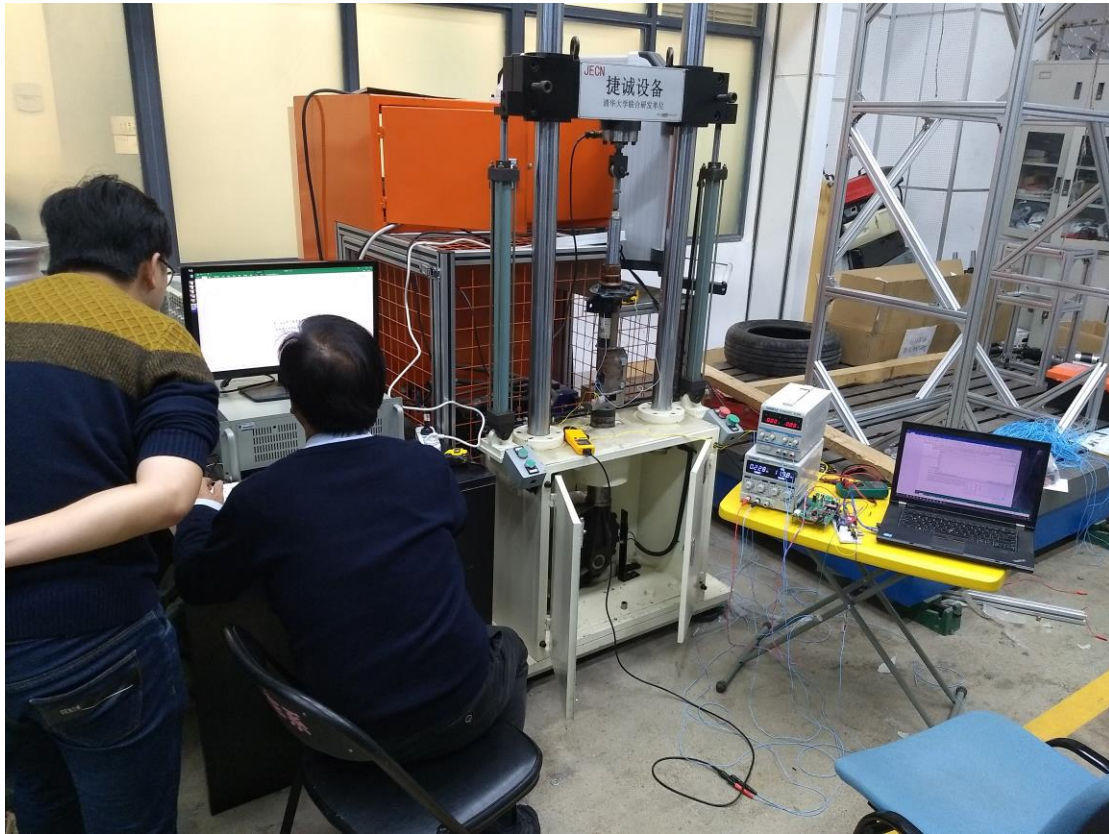


汽车安全与节能国家重点实验室

State Key Laboratory of Automotive Safety and Energy

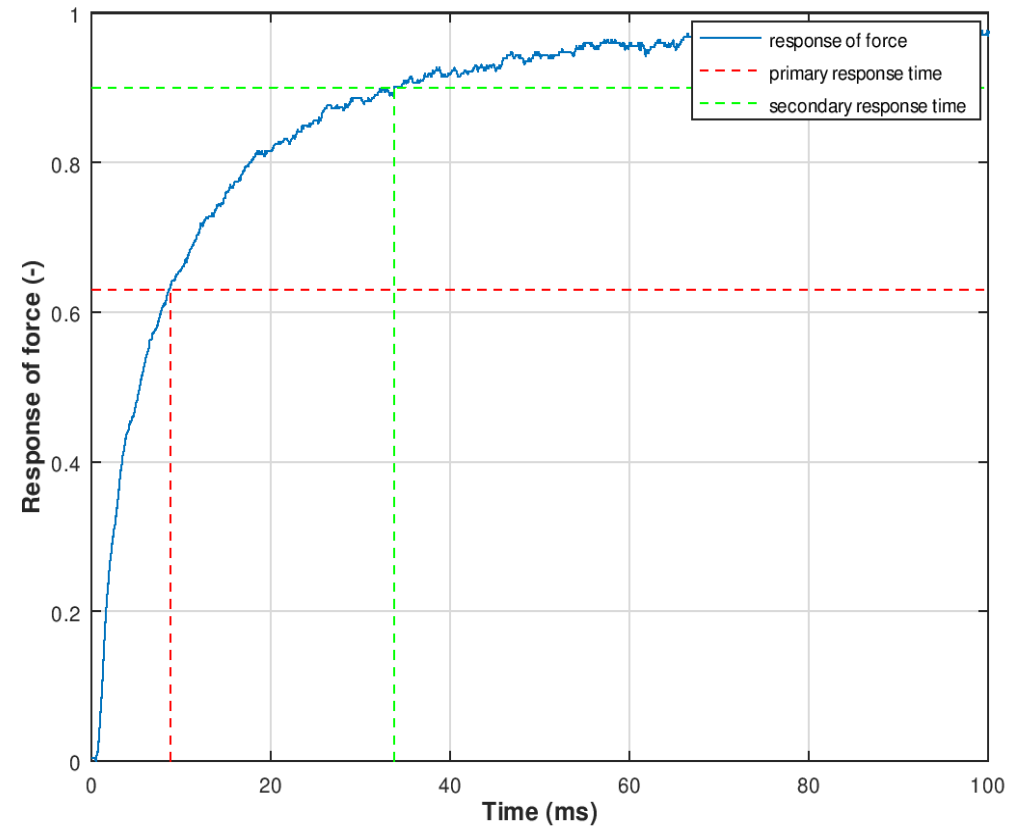
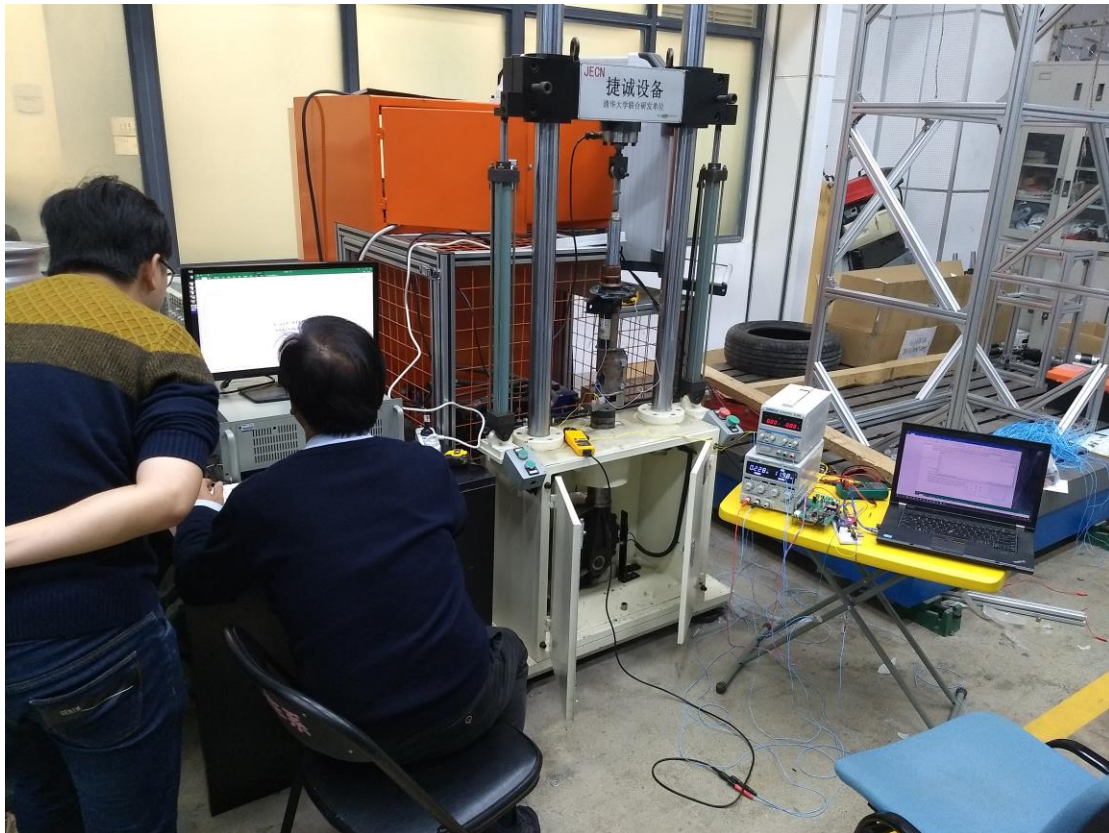
# Stay at Tsinghua University / Beijing 11/2019

- Measurement of response time of MR damper



# Stay at Tsinghua University / Beijing 11/2019

- Measurement of response time of MR damper



# Stay at Tsinghua University / Beijing 11/2019





# Stay at Tsinghua University / Beijing 11/2019









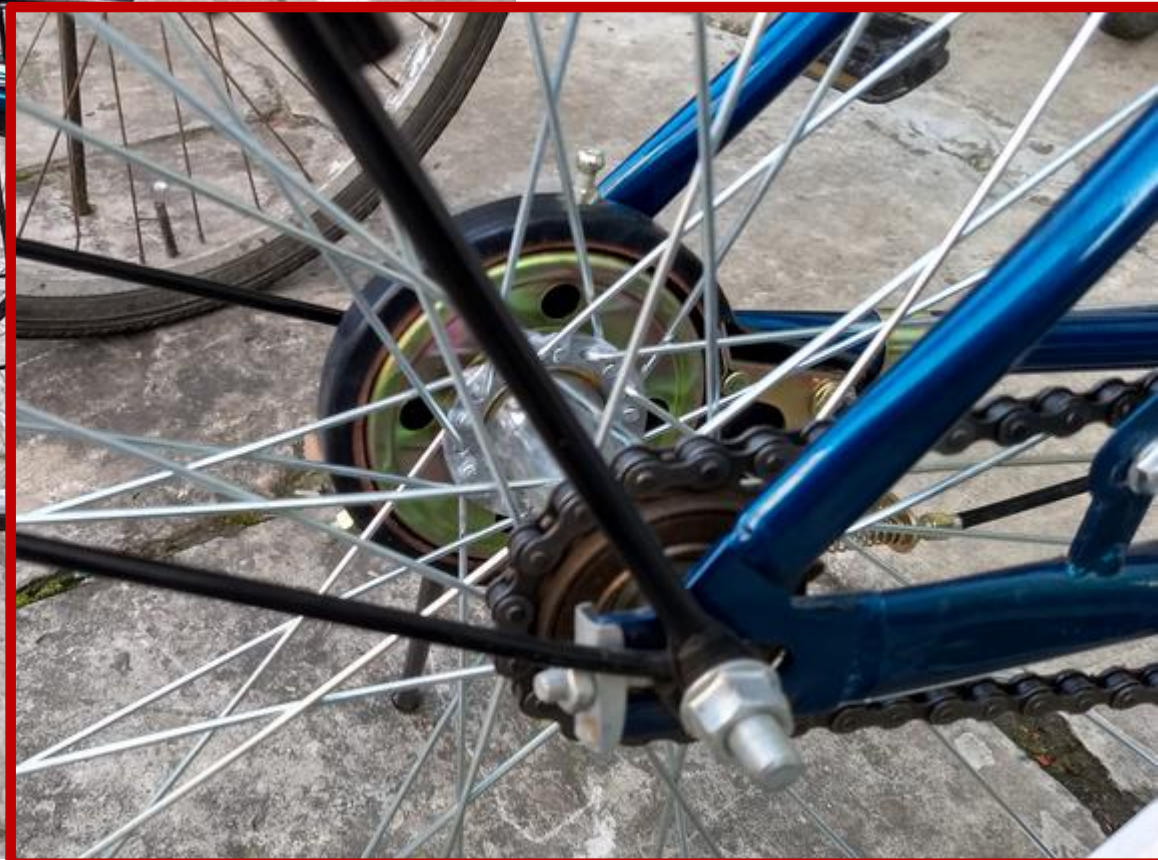




安全免押 扫码骑行

美团 App 扫码骑行  
青桔



















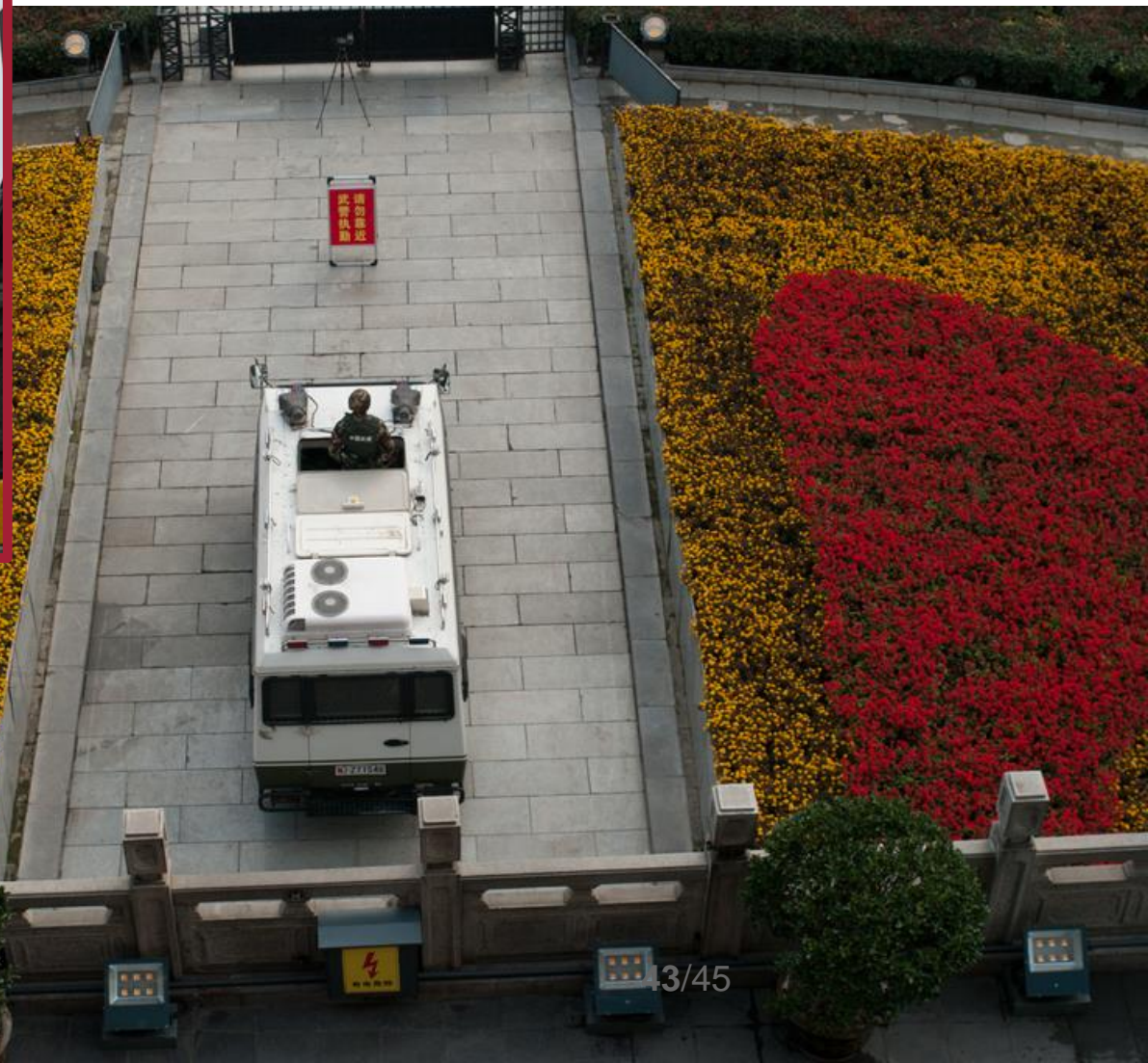














# THANK YOU FOR YOUR ATTENTION

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INSTITUTE OF MACHINE  
AND INDUSTRIAL DESIGN

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