

Department of condition monitoring in 2018

Ivan Mazůrek

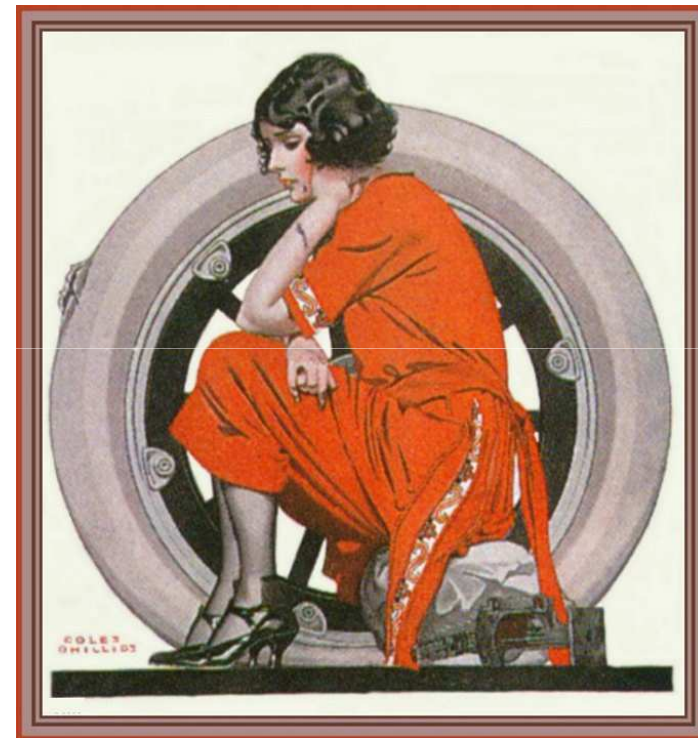
Institute of Machine and Industrial Design
Faculty of Mechanical Engineering
Brno University of Technology

Brno, February 2019



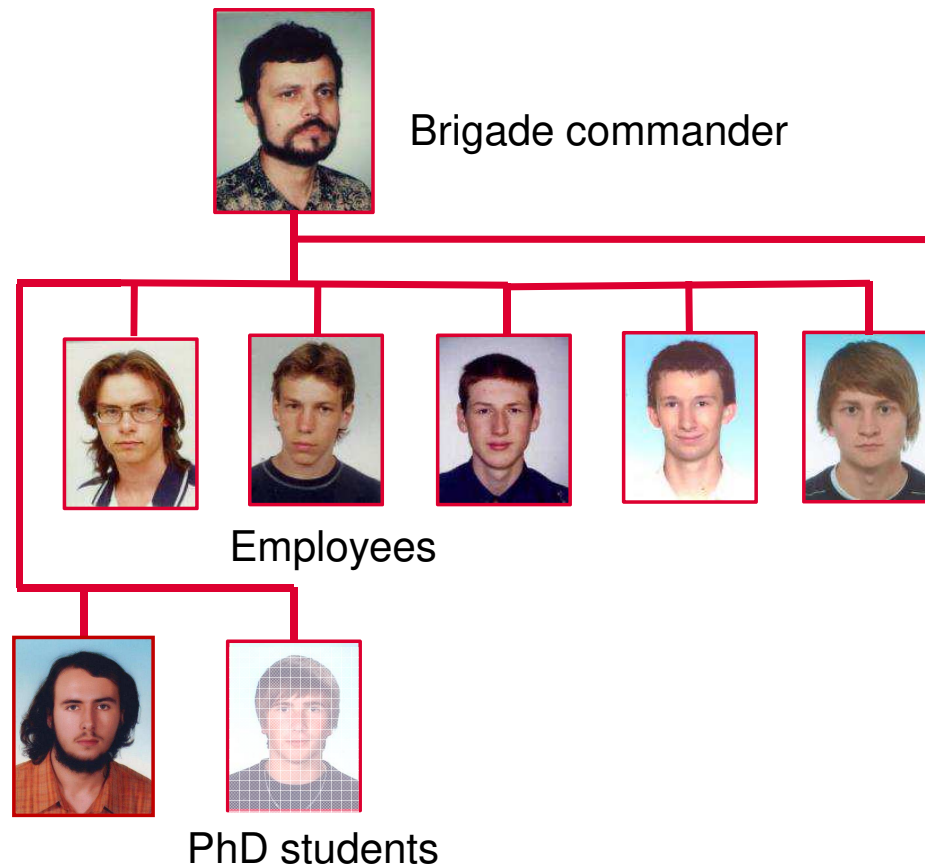
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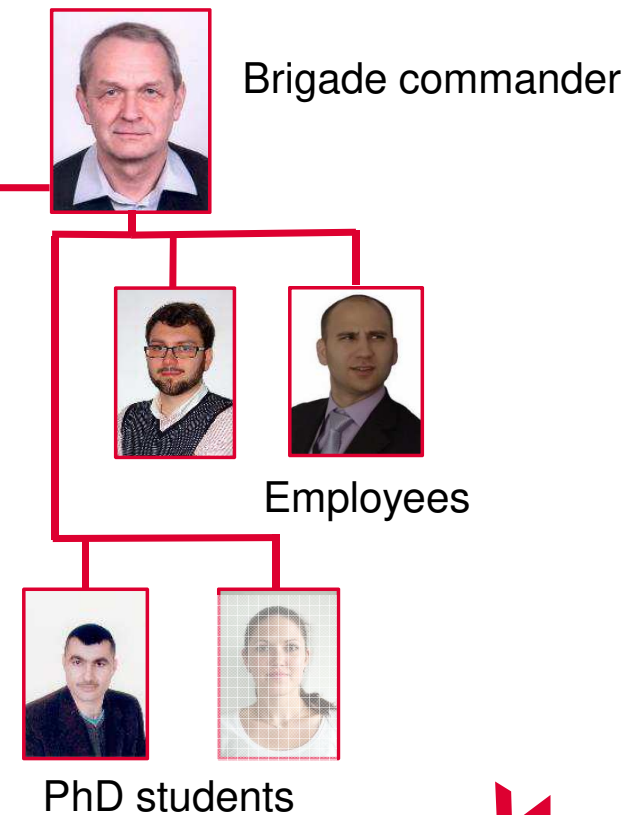


CHAIN OF COMMAND

Vibro-acoustics brigade



Non-destructive testing brigade



SCIENTIFIC SECTIONS

MR technology



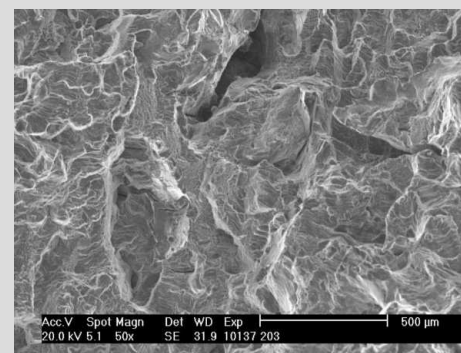
Vibro-acoustics



Automotive suspension diagnostics



Non-destructive testing



PUBLICATIONS

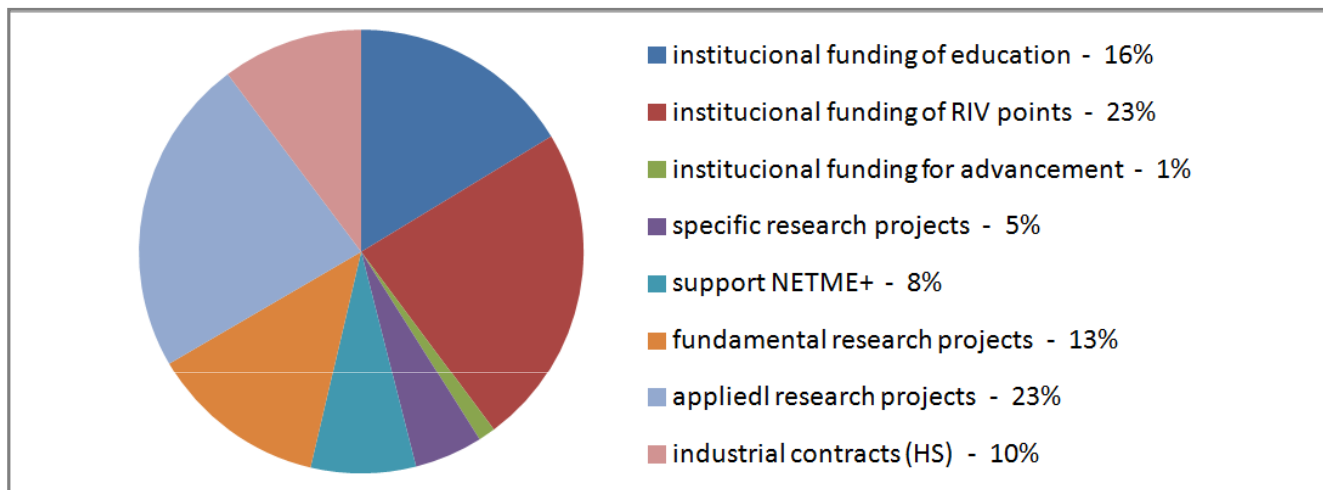
- KUBÍK, M.; MACHÁČEK, O.; ROUPEC, J.; STRECKER, Z.; NOVÁK, P.; MAZŮREK, I. Transient magnetic model of magnetorheological damper and its experimental verification. In ICMME 2017. MATEC Web of Conferences. MATEC web of Conferences, 2018. p. 1-5. ISSN: 2261-236X.
- MACHÁČEK, O.; KUBÍK, M.; STRECKER, Z.; ROUPEC, J.; NOVÁK, P.; MAZŮREK, I. Axial and Pressure Thrust Stiffness of Metal Bellows for Vibration Isolators. In MATEC Web of Conferences. MATEC Web of Conferences. 2018. p. 1-5. ISSN: 2261-236X.
- KRATOCHVÍLOVÁ, V.; VLAŠIC, F.; MAZAL, P.; PALOUŠEK, D.; PANTĚLEJEV, L. Analysis of fatigue processes of SLM materials by acoustic emission. International Journal of Microstructure and Materials Properties, 2018, vol. 17, no. 3, p. 193-205. ISSN: 1741-8410.
- KRATOCHVÍLOVÁ, V.; VLAŠIC, F.; MAZAL, P.; KOUTNÝ, D. FATIGUE PROPERTIES OF ADDITIVELY MANUFACTURED COPPER ALLOY. In Metal 2017 - 26th International Conference on Metallurgy and Materials, Conference Proceedings. TANGER LTD., 2018. p. 1593-1598. ISBN: 9788087294796.
- KUBÍK, M.; MACHÁČEK, O.; MAZŮREK, I. Magnetorehological fluid seal with minimum friction torque. In ENGINEERING MECHANICS 2018. Engineering Mechanics 2018. Praha: Institute of Theoretical and Applied Mechanics of the Czech Academy of Sciences, 2018. p. 445-448. ISBN: 978-80-86246-88-8. ISSN: 1805-8256.
- MACHÁČEK, O.; KUBÍK, M.; ROUPEC, J.; STRECKER, Z.; MAZŮREK, I. MICRO-FLUIDIC SYSTEM WITH GROOVED POLE PIECES OF MAGNETIC CIRCUIT. In ENGINEERING MECHANICS 2018. Engineering Mechanics 2018. 24th INTERNATIONAL CONFERENCE. Prague: Institute of Theoretical and Applied Mechanics of the Czech Academy of Sciences, 2018. p. 521-524. ISBN: 978-80-86246-88-8. ISSN: 1805-8256.

PUBLICATIONS

- VÍTEK, P.; STRECKER, Z.; ROUPEC, J. DESIGN OF FAST MAGNETORHEOLOGICAL DAMPER USING SELECTIVE LASER MELTING TECHNOLOGY. In ENGINEERING MECHANICS 2018. Engineering Mechanics 2018. Praha: Institute of theoretical and applied mechanics of the Czech academy of Sciences, 2018. p. 905-908. ISBN: 978-80-86246-88-8. ISSN: 1805-8256.
- HALAMA, J.; KLAPKA, M.; MAZŮREK, I. Experimental Methodology for Acoustic Diagnostics of Shock Absorbers. Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, 2018, vol. 66, no. 5, p. 1119-1125. ISSN: 1211-8516.
- SKŘIVÁNKOVÁ, V.; VLAŠIC, F.; MAZAL, P. ODEZVA AKUSTICKÉ EMISE NA ÚNAVOVÉ POŠKOZOVÁNÍ ADITIVNĚ VYROBENÉHO A ODLITÉHO MATERIÁLU. In Defektoskopie 2018 / NDE for Safety 2018. Brno: Vysoké učení technické v Brně ve spolupráci s Českou společností pro NDT, z.s., 2018. s. 277-285. ISBN: 978-80-214-5684-6.
- FIALA, J.; MAZAL, P.; VLAŠIC, F.; SKŘIVÁNKOVÁ, V. KOERCITIVNÍ SÍLA A ÚNAVA FEROMAGNETICKÉHO MATERIÁLU. In Defektoskopie 2018 / NDE for Safety 2018. Brno: Vysoké učení technické v Brně ve spolupráci s Českou společností pro NDT, z.s., 2018. s. 203-208. ISBN: 978-80-214-5684-6.
- 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, vol. 10, no. 11, p. 1-8. ISSN: 1687-8140.
- MAHMOUD, H.; MAZAL, P.; VLAŠIC, F. Метод акустической эмиссии для неразрушающего контроля пневматических цилиндров. NDT world, 2018, roč. 21, č. 4, s. 64-67. ISSN: 1609-3178.

CAPITAL SOURCES

Total budget in 2018:



Launched and continuing projects in 2018

- GAČR – (1 x Strecker, 1 x Roupec)
- TAČR Alfa – (1 x Mazal)
- TAČR Epsilon – (1 x Mazal, 1 x Mazůrek)
- MPO Trio – (3 x Mazal, 1 x Mazůrek)
- HS >100K – (2 x Mazůrek, 1 x Klapka, 1 x Mazal, 1 x Roupec)

NEW PROJECTS

New projects in 2019

- JOBNAC – NCK TAČR – R&D of Near Future Vehicle Components for Rail, Road and Off-Road Transport – Strojírna Oslavany a.s. – (Mazůrek)
- MESTEC – NCK TAČR – Advanced components and devices – ModularTest s.r.o. České Budějovice – (Klapka)
- E-mobility and sustainable materials and technologies EMMAT under the International Academic Partnership Programme – NAWA (Poland) – (Kubík)
- HS Škoda Auto a.s. – Tool kit for shift test 2 – (Mazůrek)
- HS Strojírna Oslavany s.r.o. – Experimental research of shock absorbers – (Mazůrek)



MOBILITY PROGRAM – MICHAL KUBÍK

- Mentor **prof. Janusz Goldasz** (BWI group, Cracow University of Technology)
- FE modeling of MR valve including magnetic hysteresis
- Project International Academic Partnerships (budget 480 000 Kč)
- Publication Multi-physics model of magnetorheological damper including magnetic hysteresis in progress
- Measurement BWI magnetorheological damper for Ferrari (primary response time 3.2 ms)



Cracow University
of Technology



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SLM PRINT OF MAGNETIC CIRCUITS

Structured magnetic cores

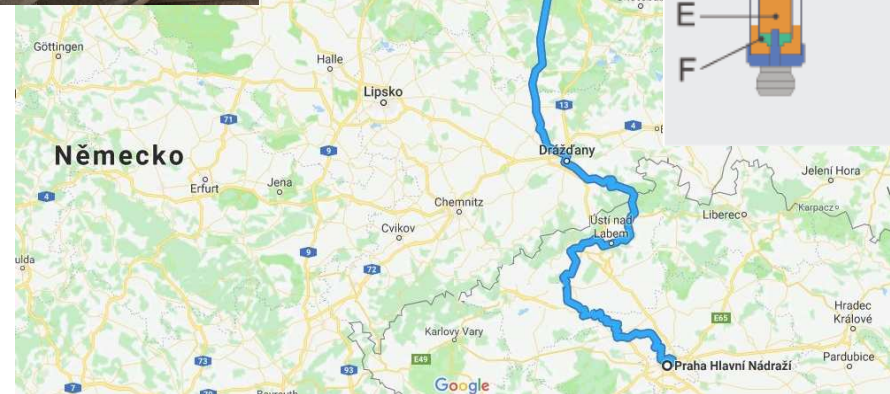
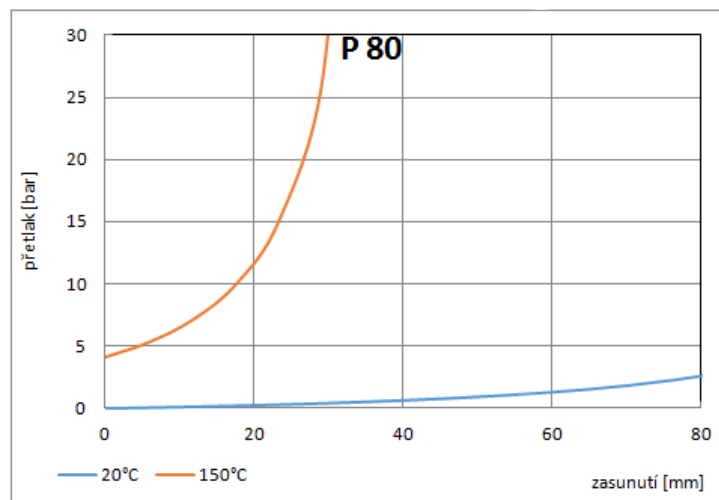
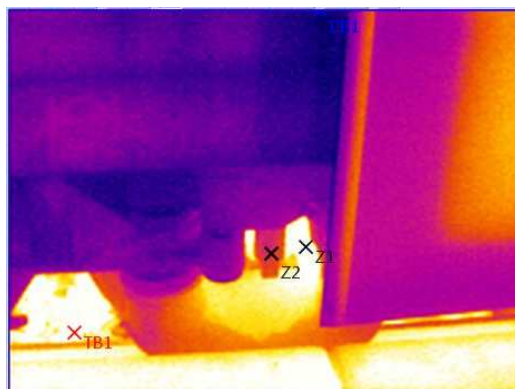
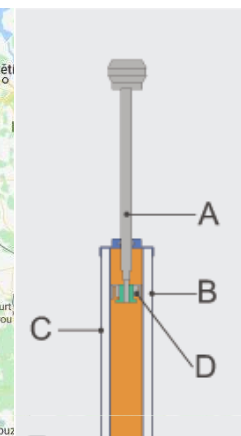
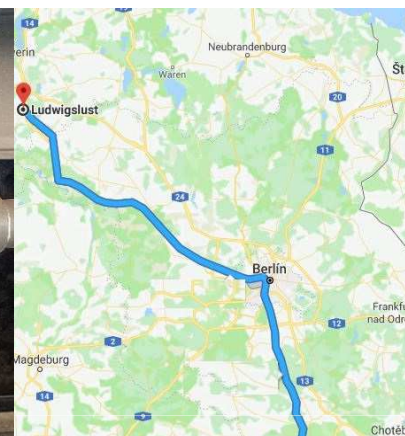
- Low eddy-current losses
- Fast response time
- Low weight (low inertia)
- Czech patent CZ307249
- Europatent application
- Competence centres – 3D print of structured rotor for electromotor with low inertia



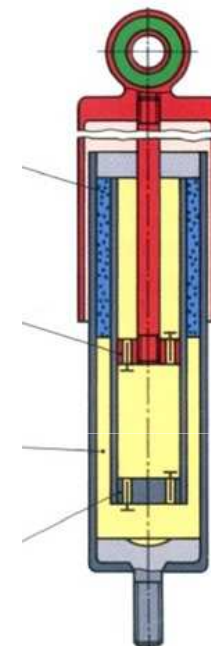
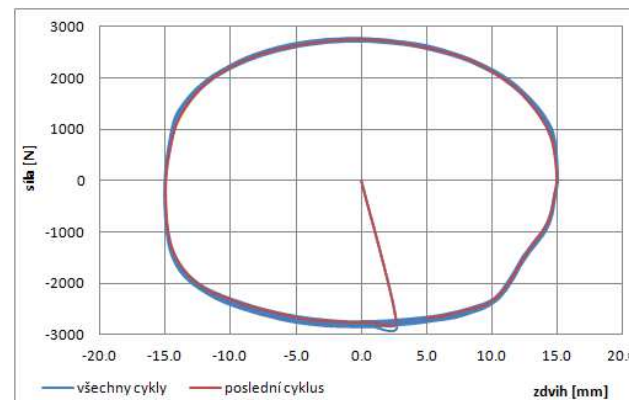
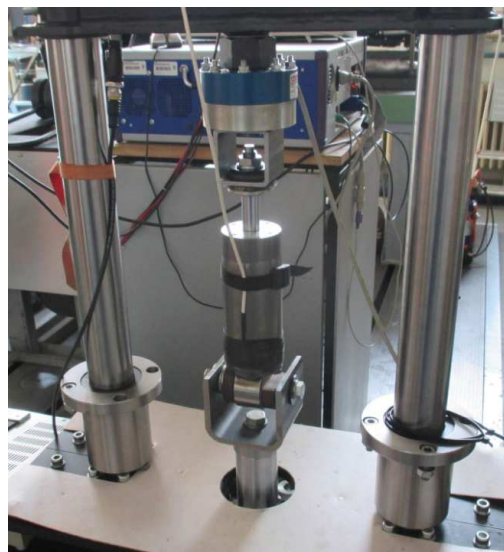
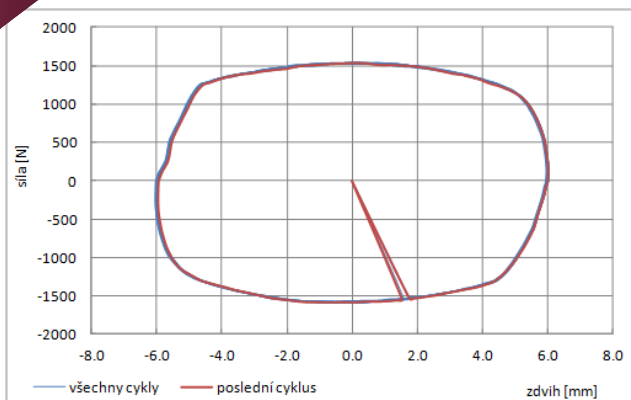
Type of piston	Primary response time (ms)	Secondary response time (ms)	Magnetic flux density (T) (2 A, air in the gap)	Weight (g)	Dynamic force range (-)
Solid piston (11SMn30)	6.2	30.9	0.174	208	5.73
SMC piston	1.06	1.3	0.154	193	4.03
Grooved piston (11SMn30)	1.36	1.75	0.17	177	5.33
Structured piston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

HYDRAULIC SHOCK ABSORBER P80

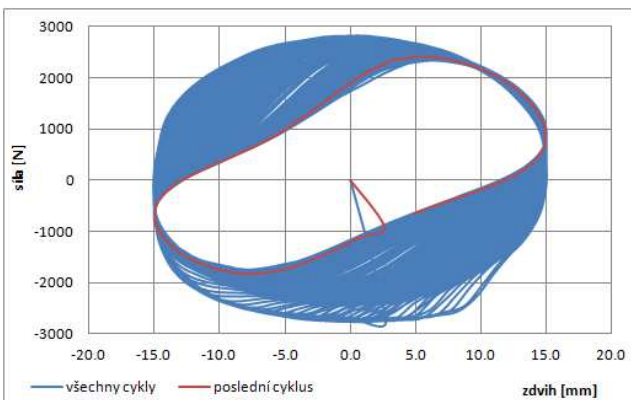
čas měření	místo	strana	vůz	P80 L (°C)	P8 (°C)	P80 P (°C)	okolí (°C)
8:40	Praha	pravá	1	23	24	26	23
9:50	Ústí nad Labem	pravá	1	30	28		26
10:20	Děčín	levá	1	32	33		26
11:20	Bad Schandau	pravá	2	27	26	26	23
11:55	Dresden	levá	2	26	24	27	23
13:35	Berlin Süd.	levá	2	30	26	30	20
13:40	Berlin HBF	levá	2	30	28	32	21
14:30	Wittenberge	levá	2	35	36	37	30
14:50	Ludwigslust	pravá	2		30		22
15:40	Ludwigslust	pravá	3		30		22
16:55	Berlin	levá	3	31	28	32	22



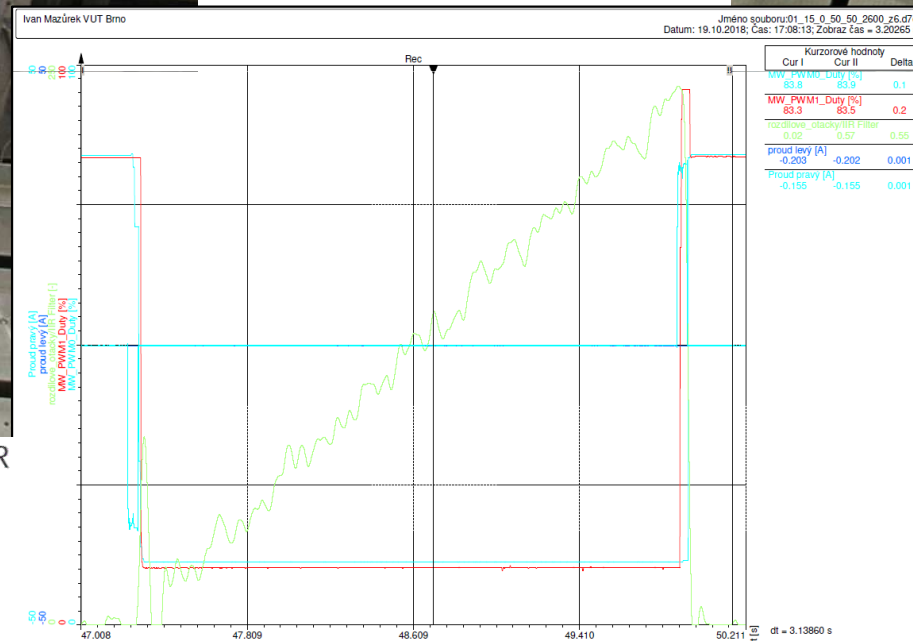
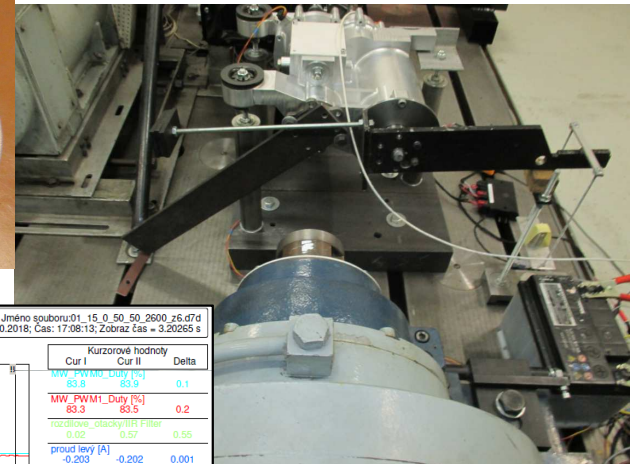
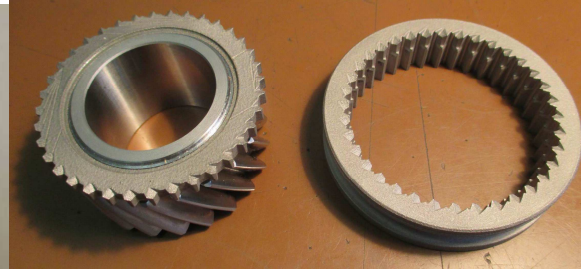
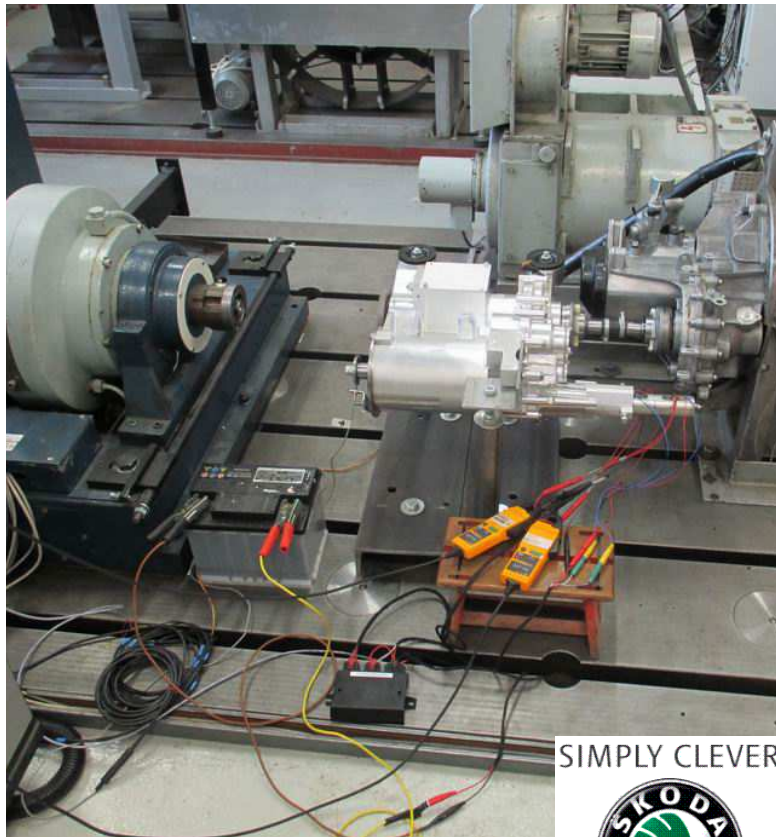
HYDRAULIC SHOCK ABSORBER P80



ST-OS
strojírna oslavany



GEARBOX TESTS FOR THE ELECTRIC DRIVE OF THE REAR AXLE OF THE ŠKODA OCTAVIA



Moment na spojce	Počet pokusů	Úspěšnost
Nm	-	%
1.95	100	100%
3.40	100	100%
3.75	236	97%
3.90	85	82%
4.10	50	0%

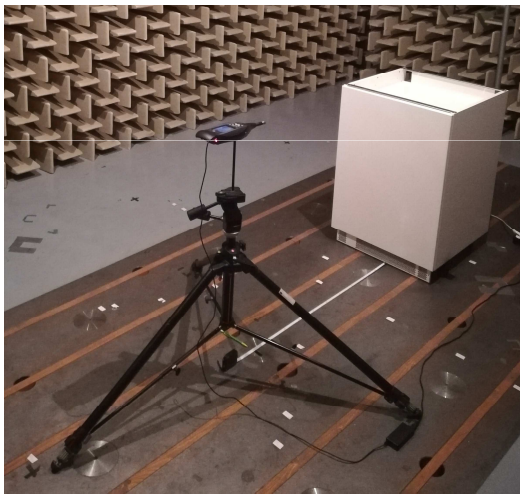
MK2

ACOUSTIC SECTION

Contractual research - SIEMENS A.G., ISAN radiátory s.r.o., GCE s.r.o.

Counseling and making of expert opinions – Altron s.r.o., Network group.

Applied research – cooperation with department of tribology on acoustic noise of the rail vehicles.



Snímek 14

MK2

možná lepší fast response?

Milan Klapka; 2.1.2018

2 x GENERAL ELECTRIC F110-GE-400



THANK YOU FOR ATTENTION

Ivan Mazůrek

mazurek@fme.vutbr.cz



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KONSTRUOVÁNÍ

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