

AKTIVITY NA ÚK

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ÚSTAV KONSTRUOVÁNÍ
Fakulta strojního inženýrství
VUT v Brně

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ÚSTAV
KONSTRUOVÁNÍ

CONTENT

- **Research activities**
 - Applied research projects
 - Bachelor and Master theses
 - Contractual research
- **Teaching activities**
 - 3CD, 6KM, ZIP, ZRI-A
- **Publications**
- **Other activities**
- **Conferences and promotion**

▪ People 2018

David Paloušek



Josef Nevrlý



Jan Brandejs



Daniel Koutný



Tomáš Koutecký



Aneta Zatočilová



David Škaroupka



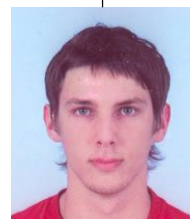
Radek Vrána



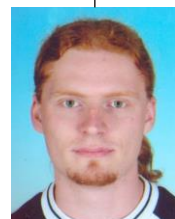
Jakub Hurník



Martin Krčma



Arnošt Vespalec



Jan Suchý



Malý Martin



Ondřej Vaverka



Ondřej Červinek



Petr Krejčířik



Vít Šreibr

RESEARCH ACTIVITIES

- **TAČR Epsilon – Via Alta**
 - Project: Research and development of 3D printers for use in construction industry
 - Design of subassemblies of the printer
 - Prototype noncontact inspection system (ZIP)
Ultrasound distance checking + head rotation

RESEARCH ACTIVITIES

- **ESA GE**

- Project: Additive Design for Aerospace Applications Capabilities in CZ (ADAAC)
- Program: ESA's Support of Space related Activities in the Czech Republic
- **Goals:**
 - Optimization for additive manufacturing
 - Research in limit parameters for additive manufacturing
 - Manufacturing of prototype parts for aerospace

RESEARCH ACTIVITIES

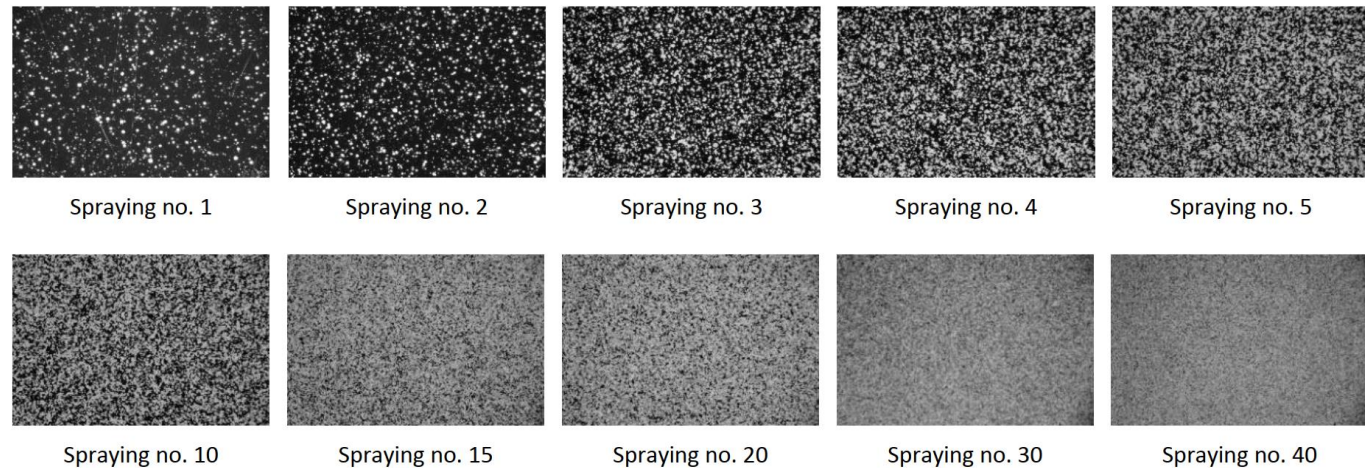
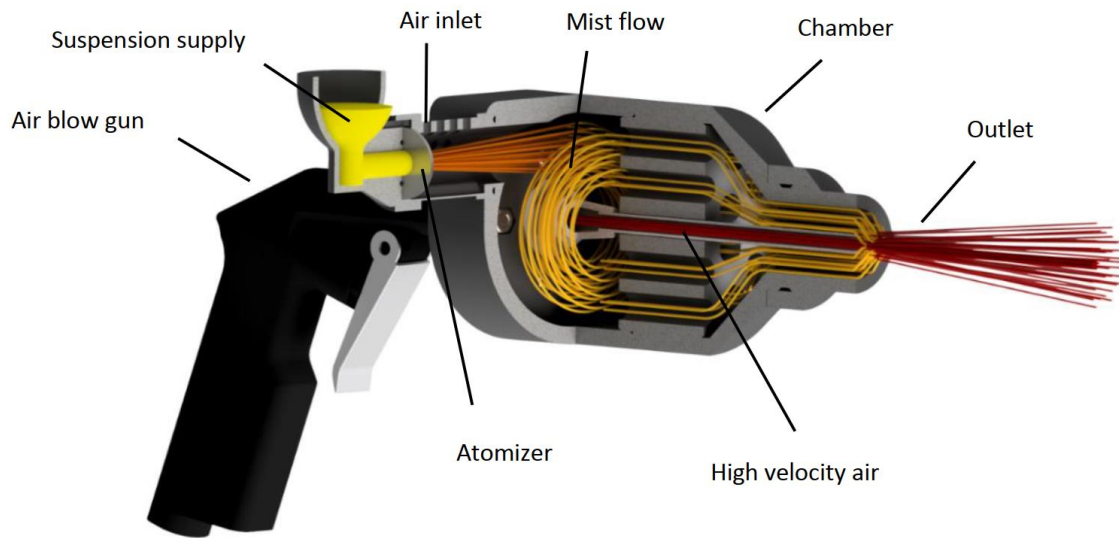
- **TAČR ZÉTA – 2018, 2019**

- Project: Development of a system for parts automated laser inspection measurement
- Partner: REVERSE-TECH s.r.o.
- Aim: Inspect 100% of produced parts by laser scanner and robot
Fast inspection of profile

RESEARCH ACTIVITIES

▪ Bachelor and Diploma theses

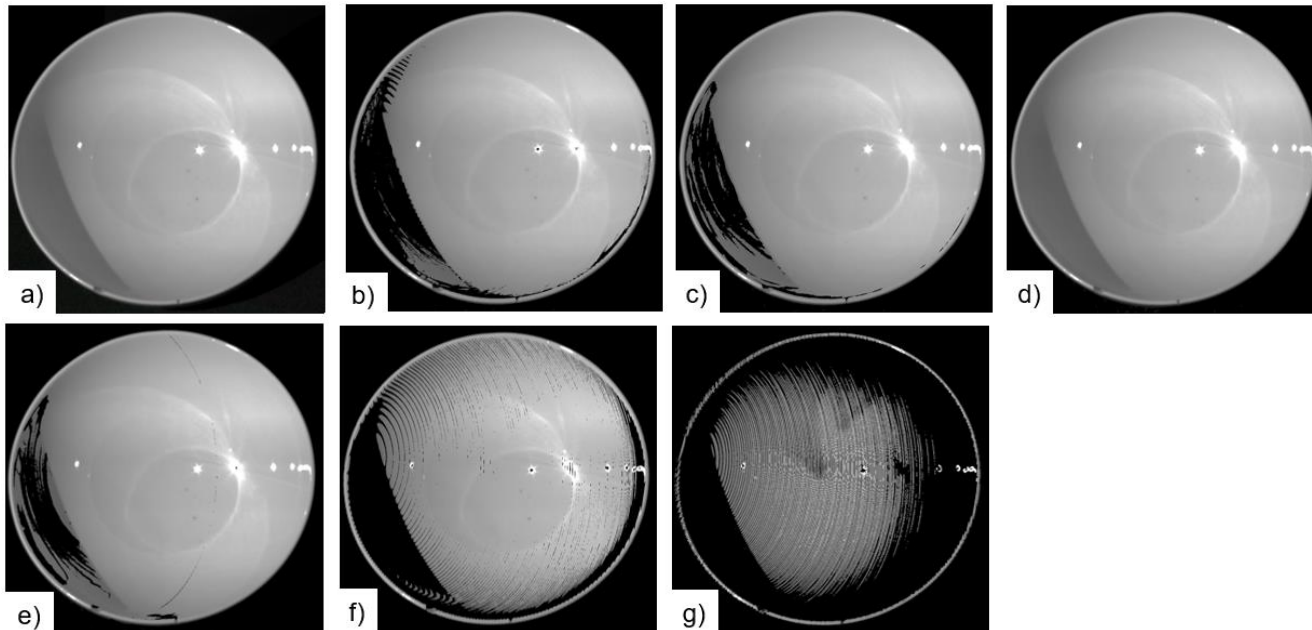
- Titanium dioxide matte coating (Zeman, Hruboš, Franke)
- Thinnest possible layer for accurate and reliable optical scanning
- Layer under 1 μm of thickness
- **1 IF article, 1 conference**



RESEARCH ACTIVITIES

- **Bachelor and Diploma theses**

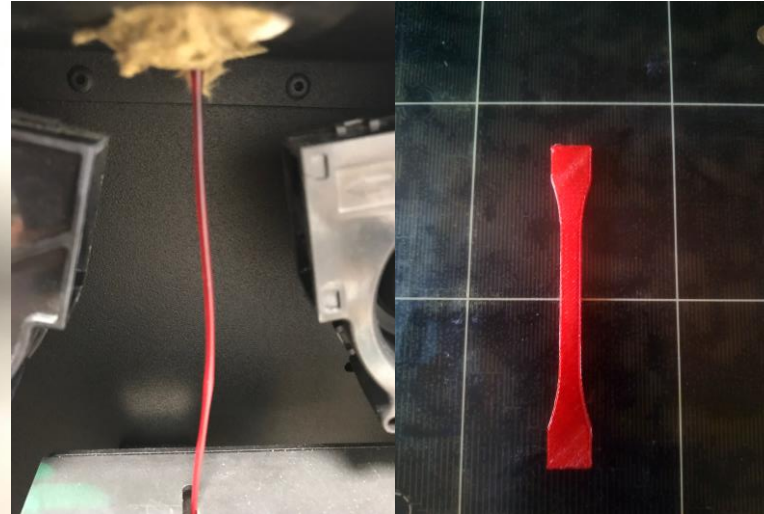
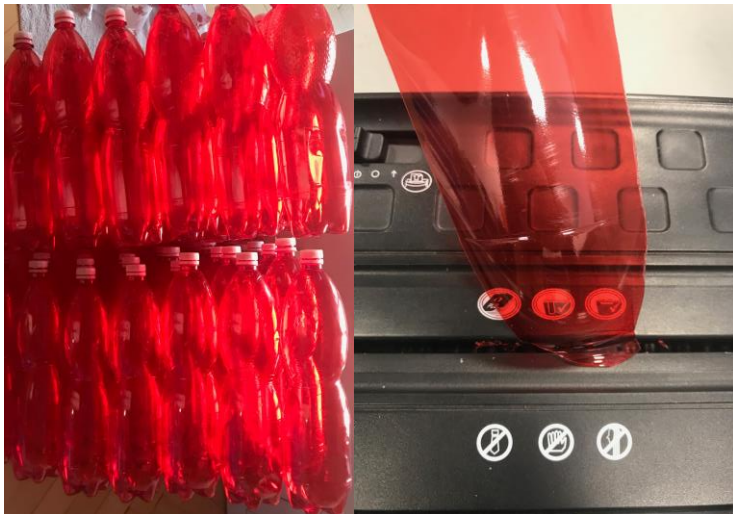
- Structured light 3D scanner (Romanovský, Bátorla),
Laser scanner (Franke)
- Advanced patterns against reflections
- **2 functional samples**



RESEARCH ACTIVITIES

- **Bachelor and Diploma theses**

- Extrusion of filament for 3D printing (Tomčová, Grygar, Sedláček)
- ABS, PET and PLA recycling
- Comparison of recycled and virgin material (mechanical properties)
- Unstable diameter of filament



RESEARCH ACTIVITIES

- **Contractual research**

- **Companies:** NovaTech CZ s.r.o., ITW PRONOVIA s.r.o., R-PRO CZ s.r.o., ENCZ a.s., Honeywell s.r.o., SYSCAE s.r.o.
- Cooperation with CT Lab (CEITEC)
- 3D scanning, Inspection, Reverse engineering

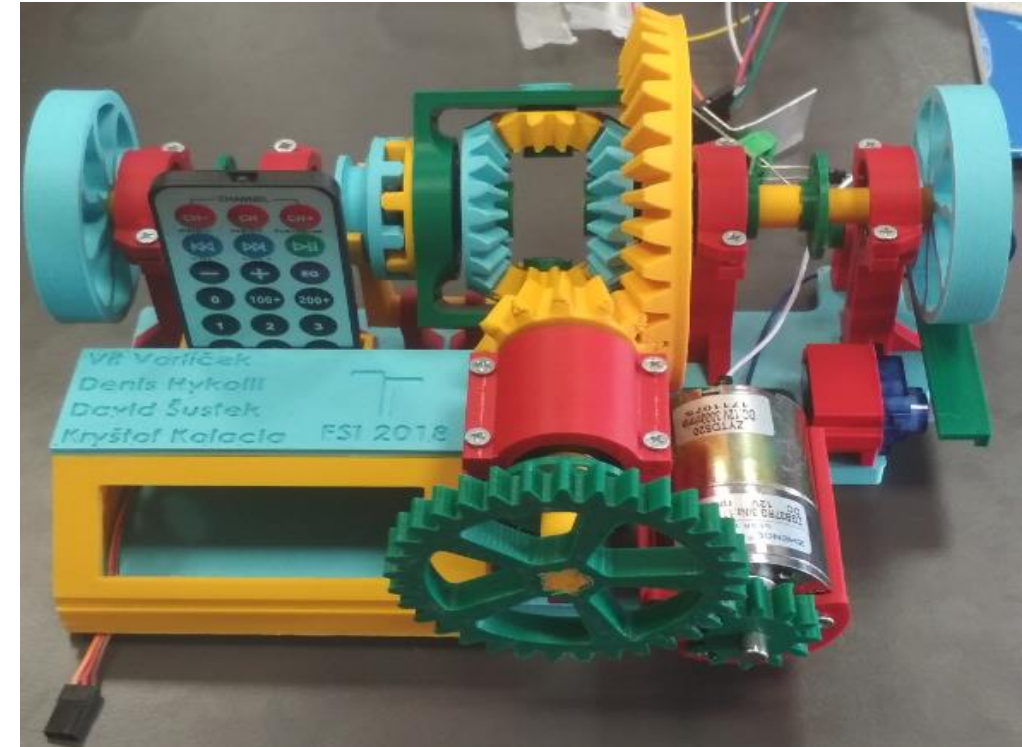
RESEARCH ACTIVITIES

- **Contractual research**
 - Inspection by ASME standard
 - Flatness per unit; Surface profile; Free state
Unequally disposed tolerance zone

TEACHING ACTIVITIES

▪ 6KM – Machine Design – Mechanisms, 3D Print and Solidworks

- Logical next step from 3CD and 4KC
- Solidworks and 10 3D printers (Prusa, UP Mini)
- Creativity of students
- Inovations
 - 5 new printers Prusa i3 MK3S, repair of UP Mini printers
 - From ABS to PLA material
 - Arduino, servos, stepper motors, DC motors
- Examples of projects
- Total number of projects (in 4 years): approx. 170



TEACHING ACTIVITIES

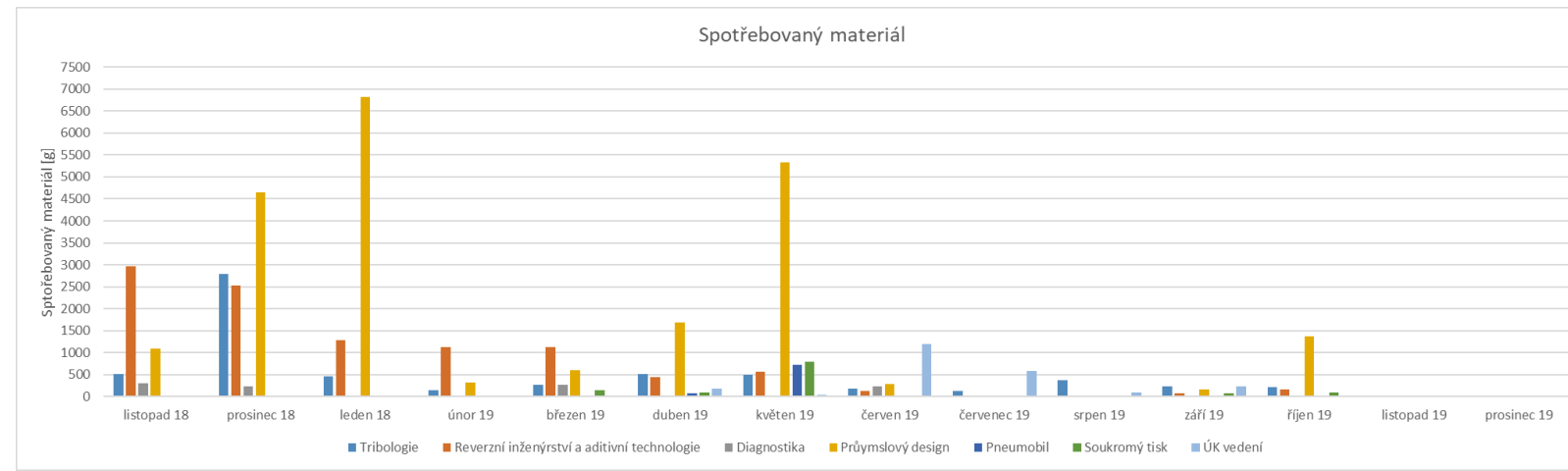
- **ZRI-A – 3D optical digitization and inspection of machine parts**
 - Lectures, seminars and laboratories
 - New lectures – Introduction to the shape acquisition, Quality control, Structured light, Automation,
 - Modification of seminars – Matlab for practical examples of image processing
- **3CD – CAD**
- **ZIP – Mechanical Design Project**
 - Rotational 3D laser scanner (2017)
 - Non-contact online inspection of 3D print (2018)
 - Test frame for large scale 3D printing (2019)



OTHER ACTIVITIES

■ 3D printers for ÚK

- 3D printers for employees and students of ÚK
- ROSTU (Nábyteček) project
- 8 printers Ultimaker and online system 3D PrinterOS for prints management
- Material used: 44,5 kg, approx. 20 kg from March 2019, payments applied
- **What can we offer:**
 - Training for new employees
 - Petr Krejčířík can give advices
 - In case of problems or wishes inform me or Petr
- 1 Kč/g for departments
- 1,46 Kč/g for private prints



PUBLICATIONS

- HRUBOŠ, David, Tomáš KOUTECKÝ a David PALOUŠEK. An experimental study for determination of an application method and TiO₂ powder to ensure the thinnest matte coating layer for 3D optical scanning. *Measurement* [online]. 2019, 136(March 2019), 42-49 [cit. 2019-10-25]. DOI: 10.1016/j.measurement.2018.12.058. ISSN 02632241. Dostupné z: <https://linkinghub.elsevier.com/retrieve/pii/S026322411831203X> (IF 2,8)
- KOUTECKÝ, T., T. ZIKMUND, D. GLITTOVÁ, D. PALOUŠEK, J. ŽIVČÁK a J. KAISER. X-ray micro-CT measurement of large parts at very low temperature. *Review of Scientific Instruments* [online]. 2017, 88(3), 1-6 [cit. 2019-11-25]. DOI: 10.1063/1.4979077. ISSN 0034-6748. Dostupné z: <https://www.ncbi.nlm.nih.gov/pubmed/28372440> (IF 1,6)
- KOUTECKÝ, Tomáš, Jakub ZEMAN, Daniel KOUTNÝ a David PALOUŠEK. Effect of titanium dioxide mixture concentration on matte coating and 3D scanning accuracy. In: *Proceedings - ASPE 2016 Annual Meeting: 31st Annual Meeting of the American Society for Precision Engineering, ASPE 2016*. Portland, United States, 2016, s. 333-338. ISBN 978-188770672-8. **(Conference)**
- KOUTECKÝ, T., D. PALOUŠEK a J. BRANDEJS. Sensor planning system for fringe projection scanning of sheet metal parts. *Measurement* [online]. 2016, 94(December 2016), 60-70 [cit. 2019-11-25]. DOI: 10.1016/j.measurement.2016.07.067. ISSN 02632241. Dostupné z: <https://linkinghub.elsevier.com/retrieve/pii/S0263224116304377> (IF 2,8)

OTHER ACTIVITIES

- **Conferences and promotion of ÚK**
 - Passive component – about 3D print (**April 2017**)
 - FabLabNet
 - Fab City Summit Paris (**July 2018**)
 - FabLab Tematic meeting Ljubljana (**September 2018**)
 - Prototyp + competition of designers (**November 2018**)
 - Conference Low Cost 3D Hamburg (**November 2017**)
 - Presentation at elem. school in Olomouc (**June 2017**)
 - 120 let VUT (**May 2019**)



OTHER ACTIVITIES

- **Conference ASPE (American Society for Precision Engineering), October 2016**
 - **TiO₂ matting coatings for 3D optical scanning**



DĚKUJI VÁM ZA POZORNOST

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