

Activities at IMID

Daniel Kvarda, Ing.

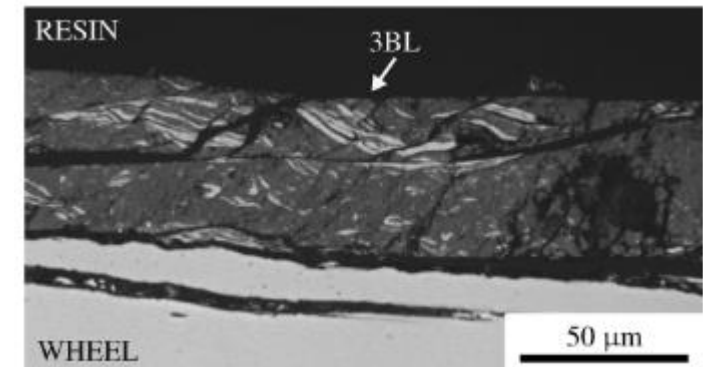
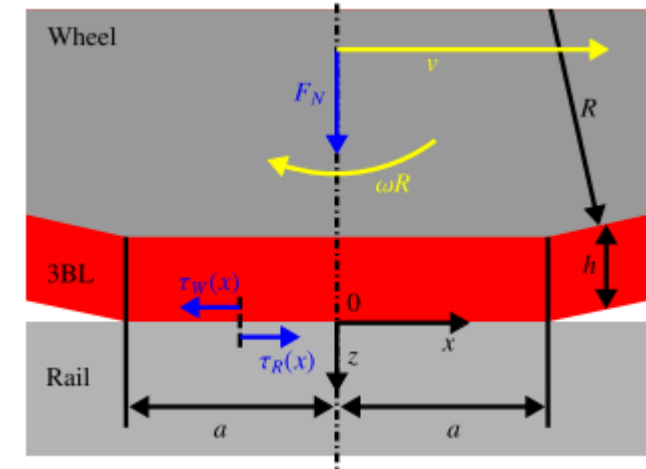
Brno University of Technology
Faculty of Mechanical Engineering
Czech Republic



INSTITUTE OF MACHINE
AND INDUSTRIAL DESIGN

Contents

- Dissertation thesis
- Research activities
- Publications
- Teaching



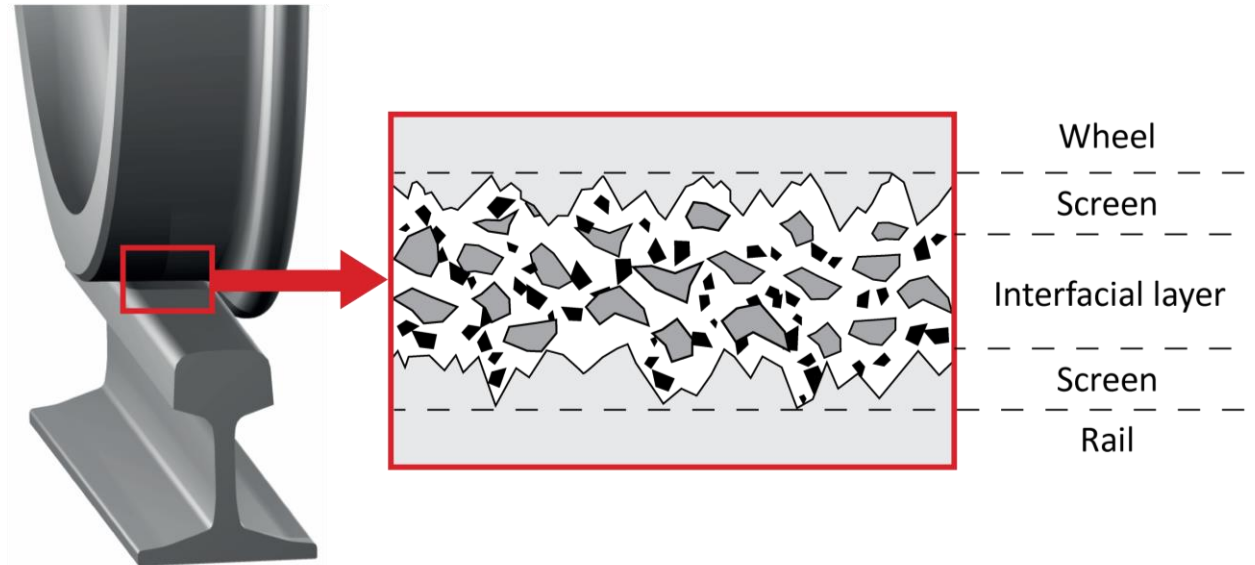
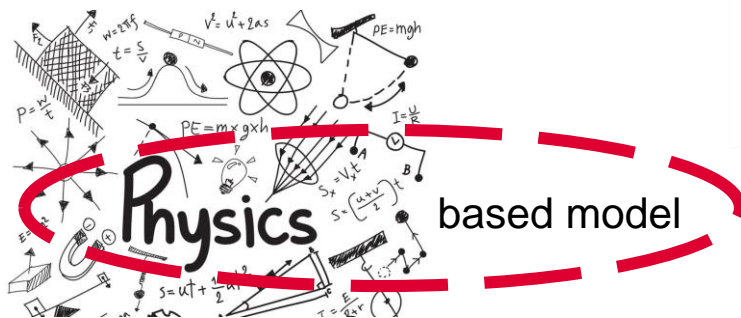
Dissertation thesis

Influence of third body layer composition on tribological behavior of wheel-rail contact

- Frictional characteristics of contact are dependent on various contact conditions
 - Contamination
 - Friction modification
 - Wear
 - Oxidation, plastic deformations

Use of prediction model

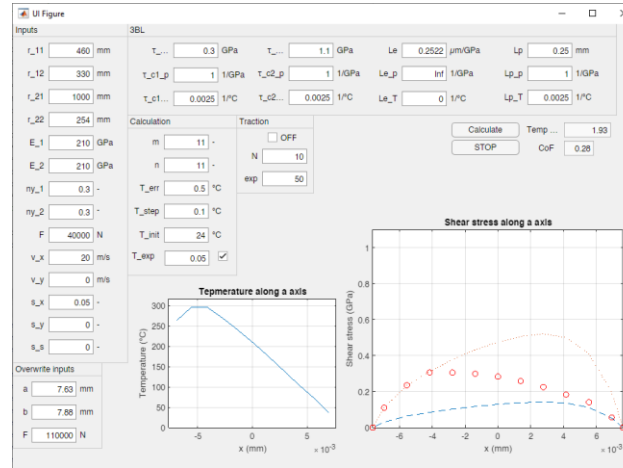
Data fitted model



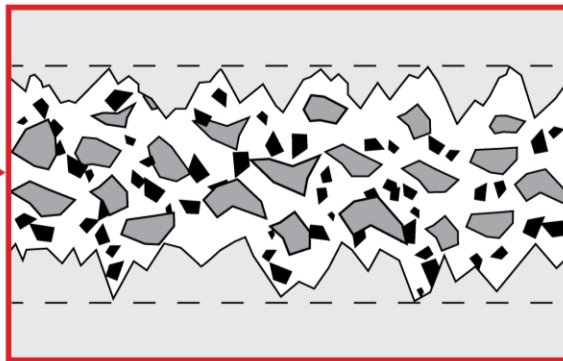
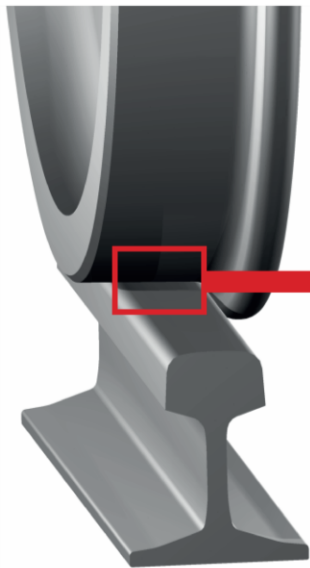
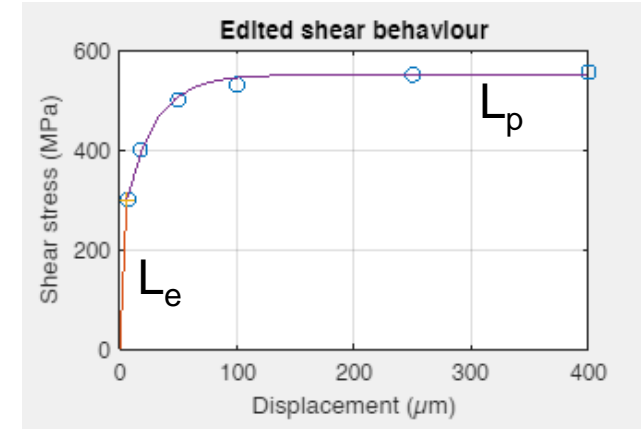
Dissertation thesis

Numerical model

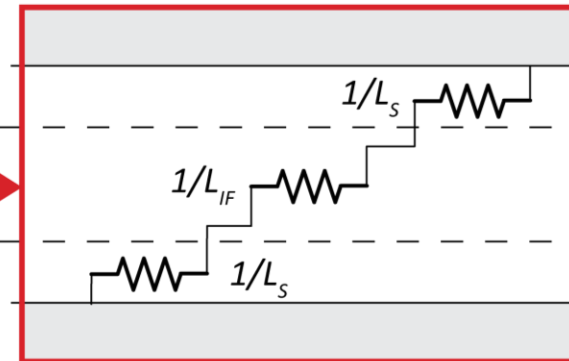
- Based on Kalker's simplified theory
- Change of flexibility parameter
- Influence of pressure
- Influence of temperature rise



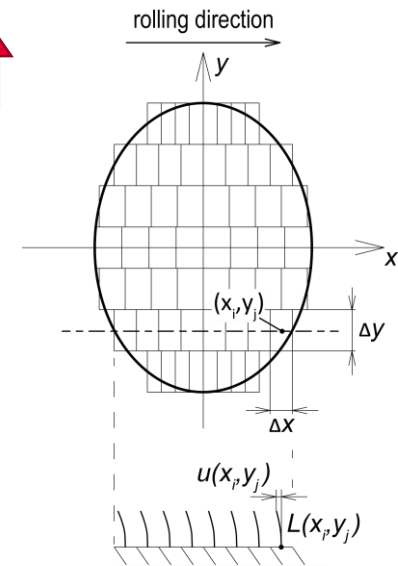
- Voce strain hardening law



Wheel
Screen
Interfacial layer
Screen
Rail



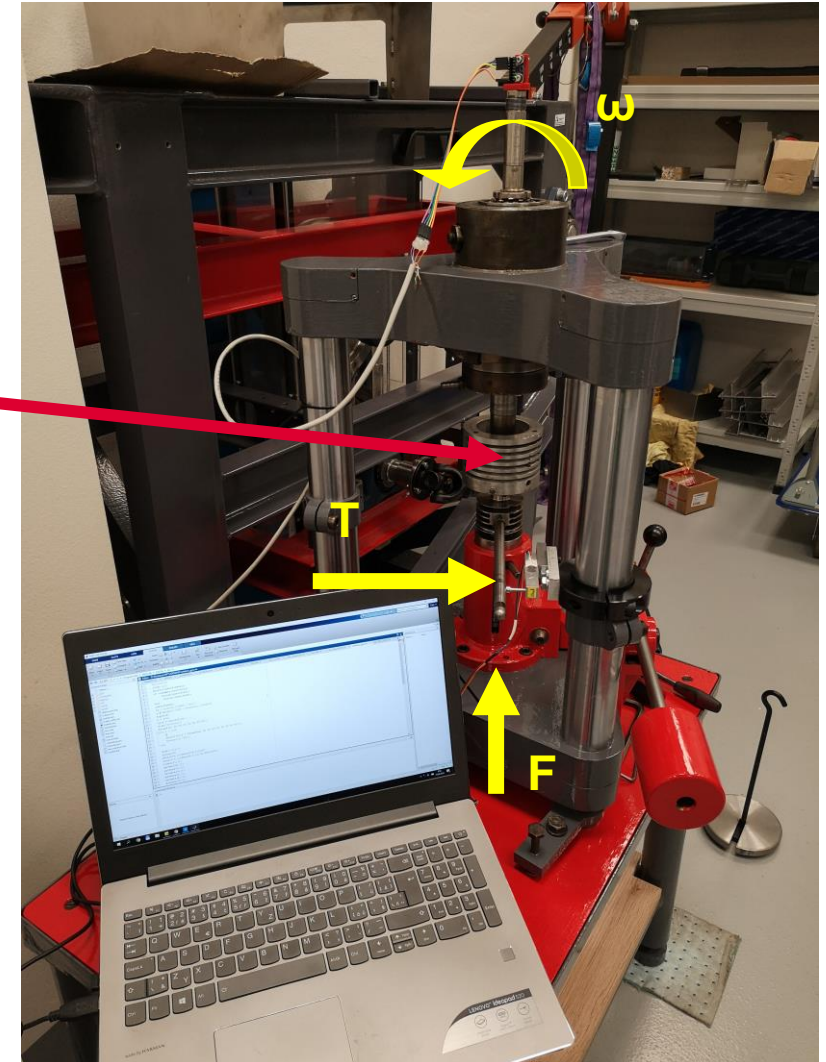
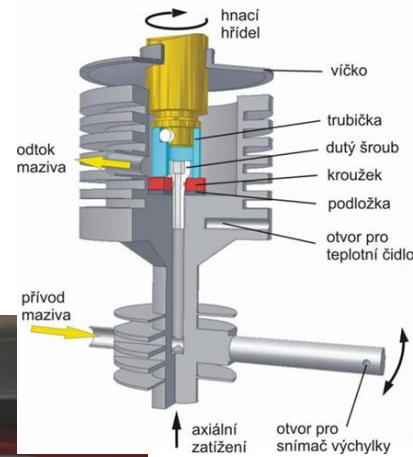
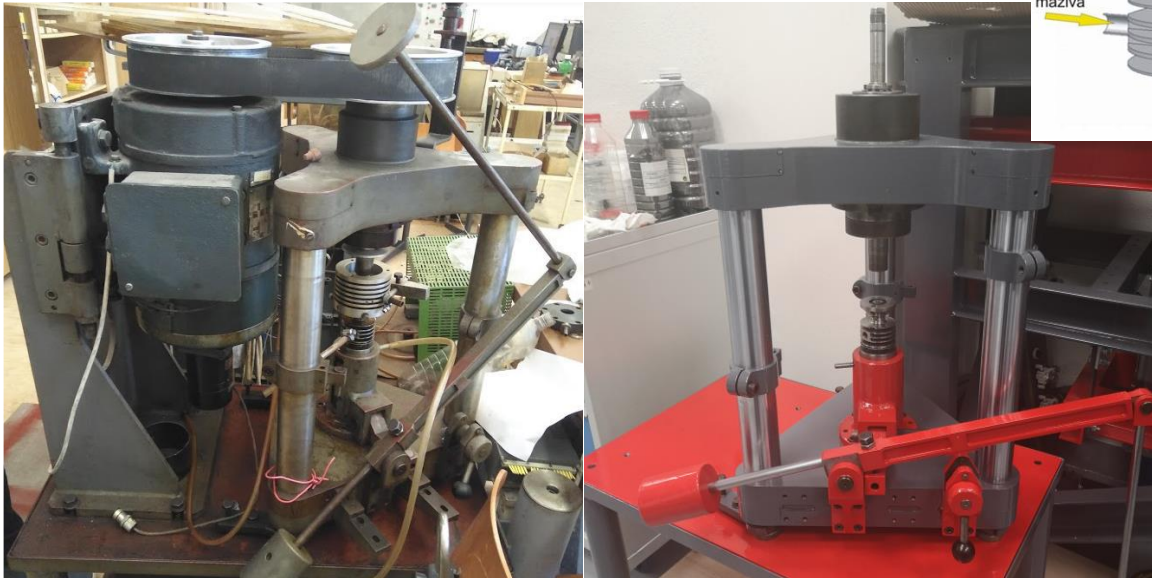
$$\tau = L \cdot u$$



Dissertation thesis


Experimental device for measuring shear properties

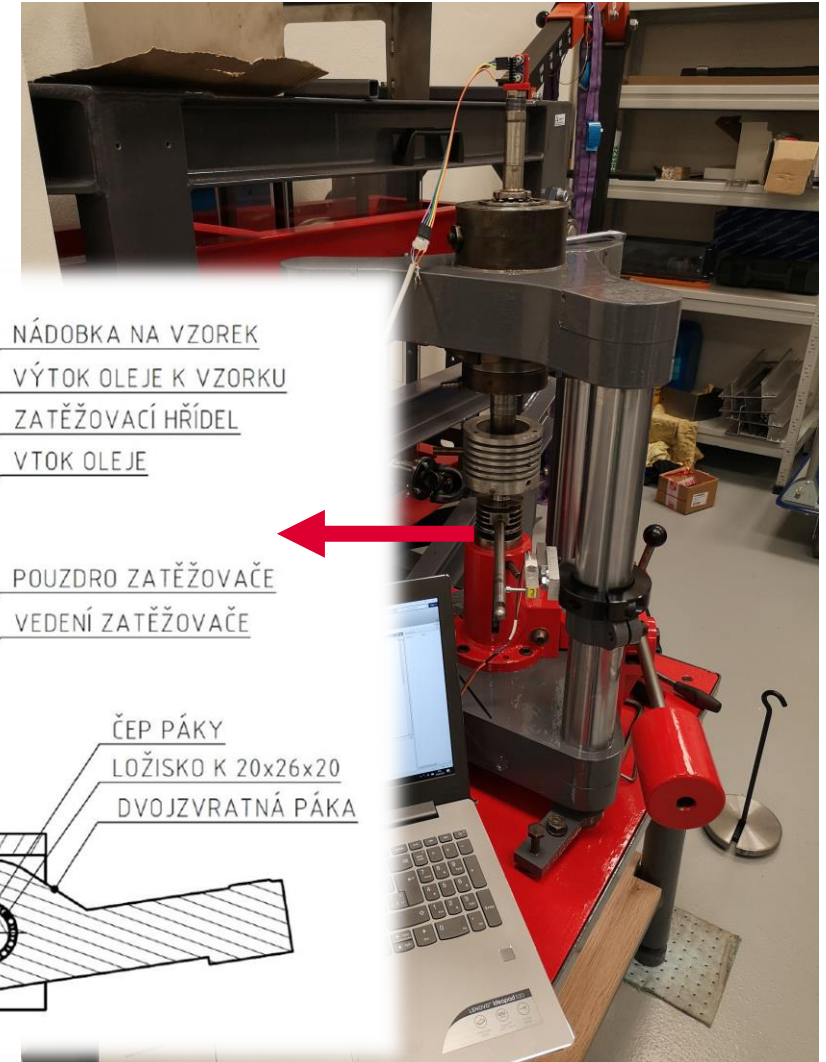
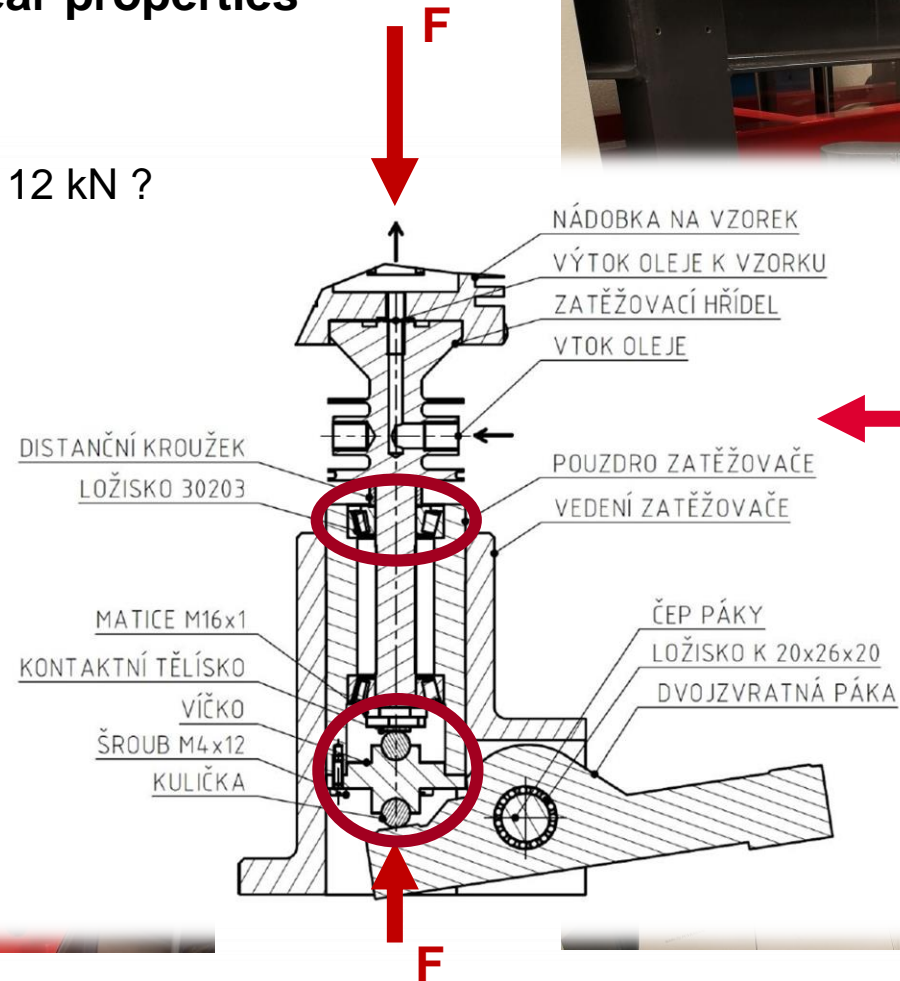
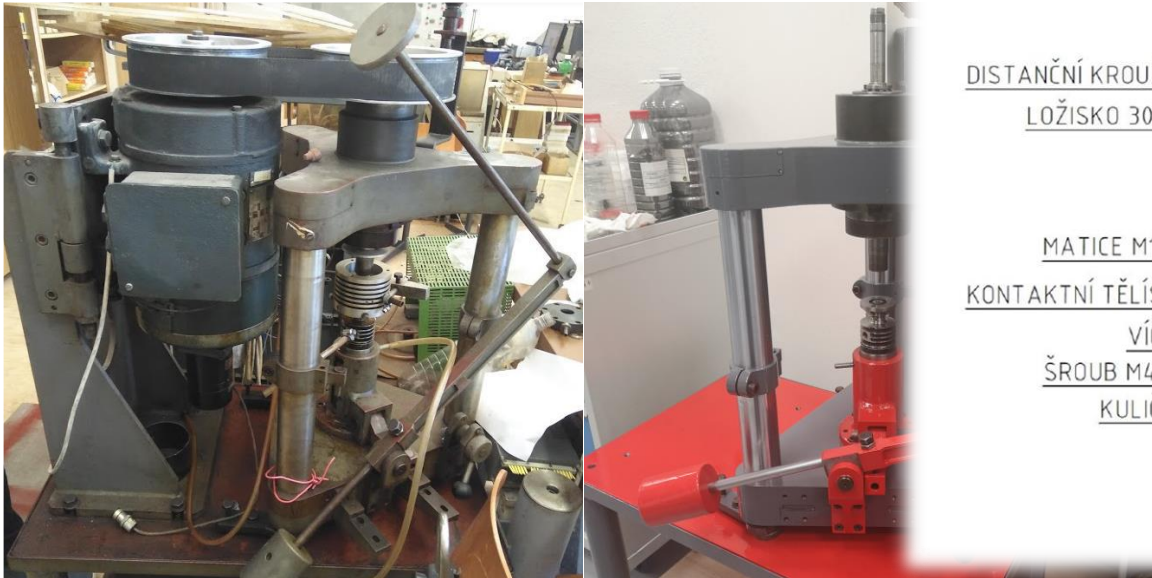
- High pressures
- Loading force max. 12 kN
- Modular – ring-on-ring, 4-ball test, ...



Dissertation thesis

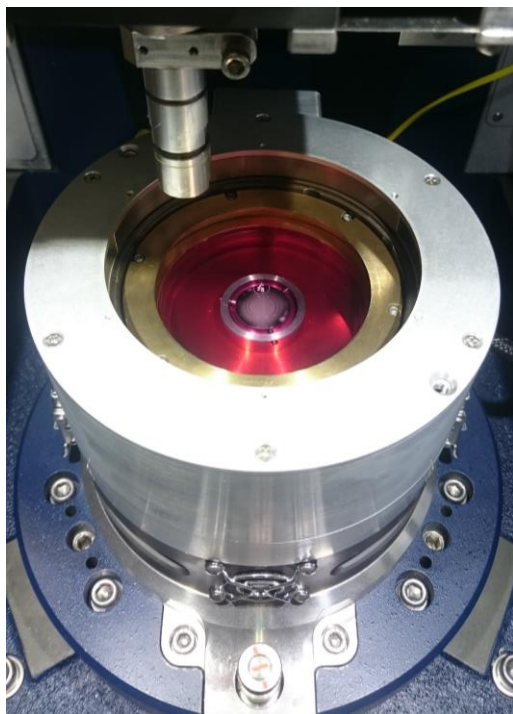
Experimental device for measuring shear properties

- High pressures (up to 1 GPa, $S > 150 \text{ mm}^2$)
- Loading force max. 12 kN  > 12 kN ?
- Modular – ring-on-ring, 4-ball test, ...



Research activities

Jihlavan a.s.



Nanotech-Europe s.r.o.



Ceitec – Ing. Remešová



Publications

2018



KVARDA, D.; GALAS, R.; OMASTA, M.; HARTL, M. An Investigation on Adhesion Behavior of Solid Particles in Water Contaminated Wheel-Rail Contact. In *2018 International Symposium on Rail Infrastructure Systems Engineering (i-RISE 2018). Proceedings*. MDPI, 2018. s. 1145-1148. ISSN: 2504-3900.



GALAS, R.; KVARDA, D.; OMASTA, M.; KŘUPKA, I.; HARTL, M. The role of constituents contained in water-based friction modifiers for top-of-rail application. *Tribology International*, 2018, vol. 19, no. 1, p. 87-97. ISSN: 0301-679X.

2019

Article in press

Shi, L. B.; Li, Q.; Kvarda, D.; Galas, R.; Omasta, M.; Wang, W. J.; Liu, Q. Y.. Study on the wheel/rail adhesion restoration and damage evolution in the single application of alumina particles. *Wear*, 2019. ISSN: 0043-1648



REMEŠOVÁ, M.; TKACHENKO, S.; KVARDA, D.; MENELAOU, M.; ROČŇÁKOVÁ, I.; ČELKO, L.; KAISER, J. Effects on morphology, thickness, hardness and friction properties of anodized AA 1050.



Part 2



KVARDA, D. – Shear behavior of contaminated wheel-rail contact.

Teaching

1K

Machine Design Fundamentals

ZKP

Team Project

ZAW

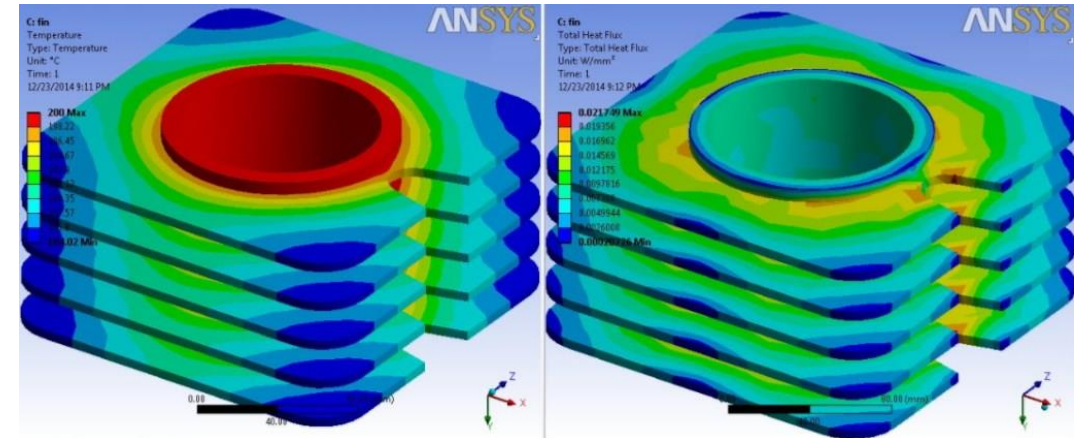
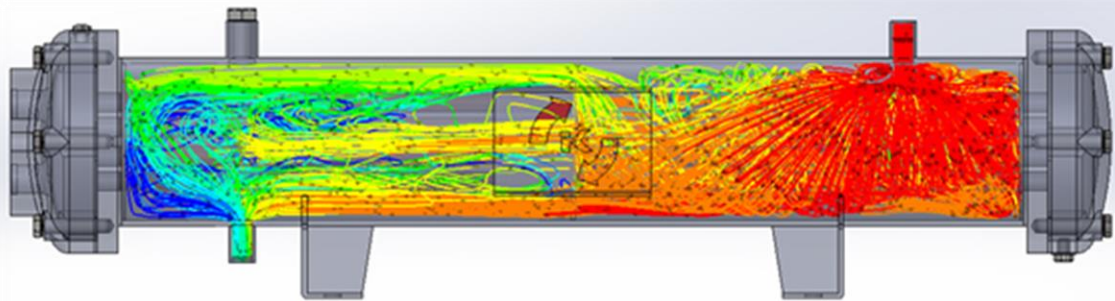
Finite Element Method - ANSYS Workbench

ZSY-A

Finite Element Method - ANSYS Classic

- bachelors

} masters



Thank you for your attention

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www.ustavkonstruovani.cz