

# Introduction of the first year Ph.D. students

**Ing. Daniel Kvarda**

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

Seminar of the Institute of Machine and Industrial  
Design, 18. 10. 2017

# Content

---

Introduction of myself

---

Education

---

Master's thesis

---

Dissertation

---

Teaching and learning

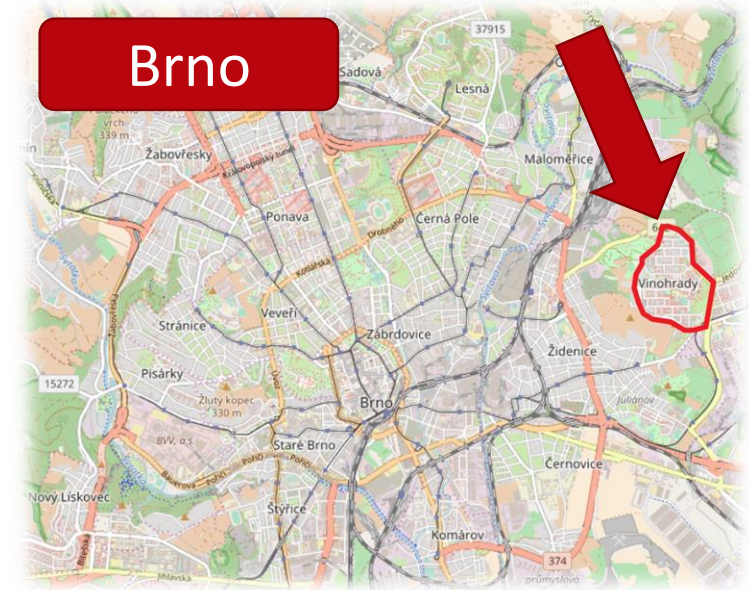


# Introduction



## Daniel Kvarda

- Tribology group – Railway transport
- A2/401



**BUT**

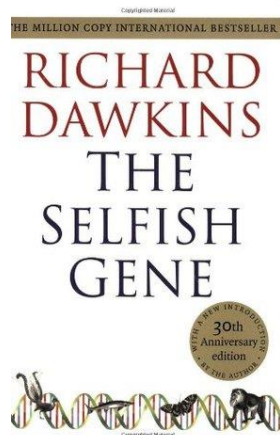
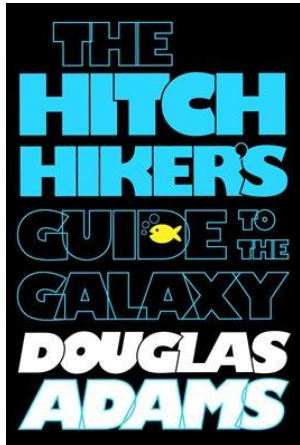
# Introduction



## Daniel Kvarda

- Tribology group – Railway transport
- A2/401

- Guitar
- Reading
- Photography



# Education

## High school

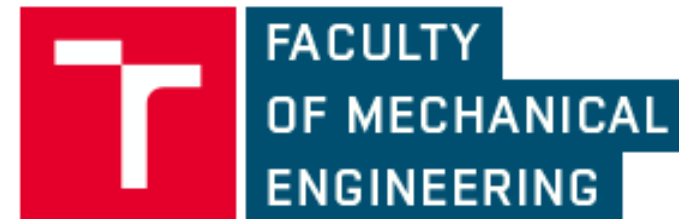
**2007 – 2011:** Secondary Industrial School and High Technical School Sokolská 1, Brno  
Computer graphics and Industrial Design



## University

**2012 – 2015:** Brno University of Technology, Faculty of Mechanical Engineering  
Bachelor's degree - Fundamentals of Mechanical Engineering

**2015 – 2017:** Brno University of Technology, Faculty of Mechanical Engineering  
Master's degree - Mechanical Engineering Design

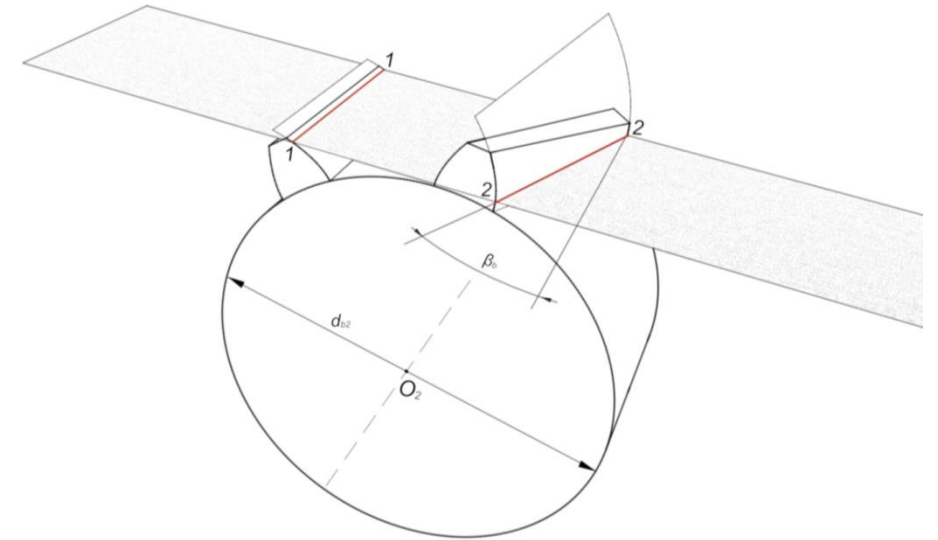
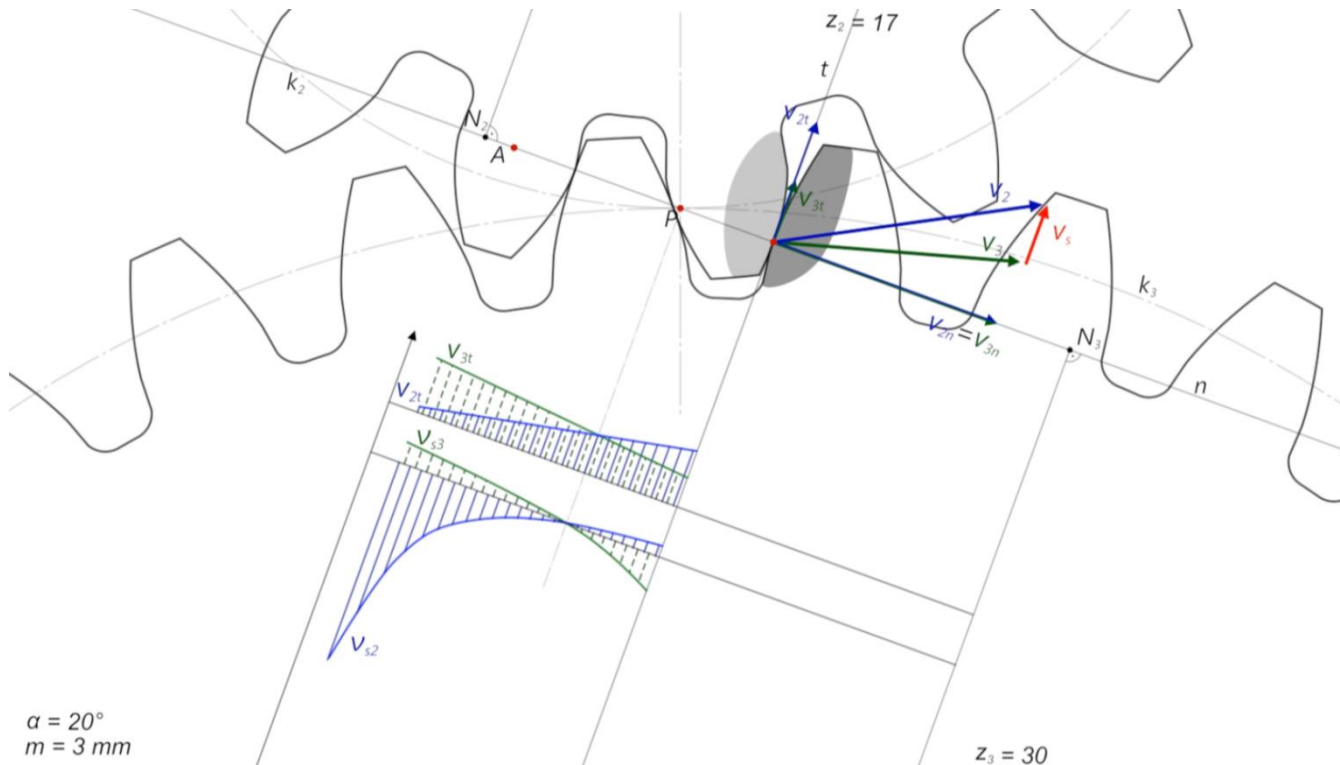


# Bachelor's thesis

## Animation of cylindrical gears meshing

**Supervisor:** prof. Ing. Martin Hartl Ph.D.

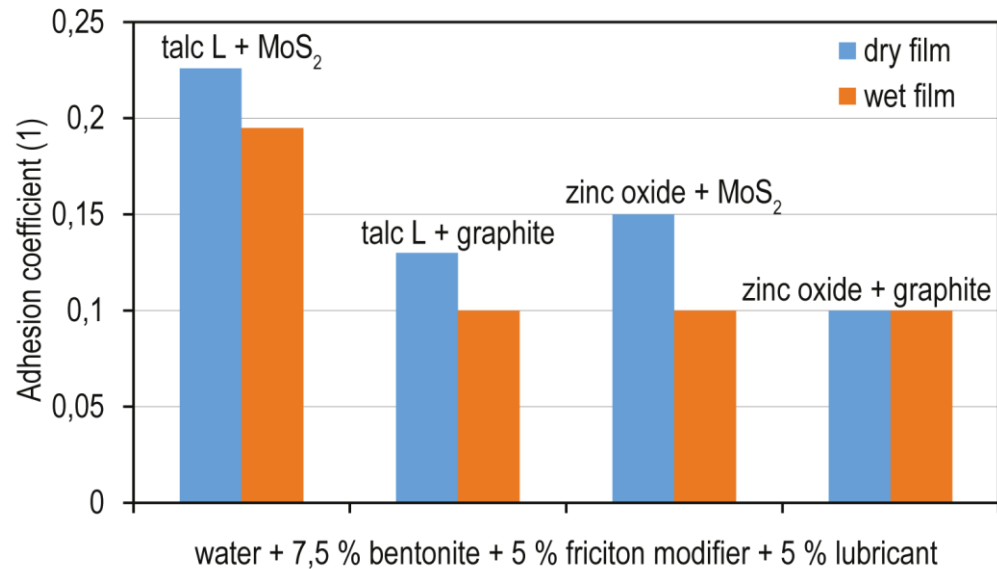
- Animations for teaching purposes
- Meshing relations, geometric, kinematic and force effects



## Influence of friction modifiers composition on traction in wheel-rail contact

**Supervisor:** Ing. Radovan Galas

- Adhesion behaviour of different water-based FM compositions
- Influence of water evaporation



**Average adhesion coefficient of four different friciton modifier compositions.**



### The role of constituents contained in water-based friction modifiers for top-of-rail application

Radovan Galas<sup>\*</sup>, Daniel Kvarda, Milan Omasta, Ivan Krupka, Martin Hartl

Faculty of Mechanical Engineering, Brno University of Technology, Technicka 2896/2, 616 69 Brno, Czech Republic

#### ARTICLE INFO

**Keywords:**  
Adhesion coefficient  
Friction layer  
Friction modifier  
Wheel-rail tribology

#### ABSTRACT

Top-of-rail friction modifiers (FMs) represent an up-to-date approach to managing adhesion in the wheel-rail interface. The aim of this study was to investigate the role of typical water-based FM constituents in terms of adhesion and film formation. The ball-on-disc apparatus was employed to reach a rolling-sliding contact. The friction behaviour of various complex substances with different compositions was investigated in terms of adhesion and wear. The results showed that less complex substances, e.g. free of particles for friction modification, can provide required adhesion. Moreover, adhesion was not markedly decreased when the contact was overdosed. The performance of water-based substance/FM is greatly affected by evaporation of water. Surface analysis showed that substances are able to reduce wear and surface damage.

### Accomplishments

- Conference of diploma theses, Faculty of Mechanical Engineering, BUT – 1st place in Engineering analysis
- Prize of the Industrial Enterprise, Faculty of Mechanical Engineering, BUT – Awarded by Honeywell

# Master's thesis

## 2nd RISEN ECR Workshop

Valencia, Spain – Universitat Politècnica de Valencia

- Collaboration of Ph.D. students in railway research
- Symposium on Rail Infrastructure Systems Engineering (i-RISE 2017)



Introduction of the first year Ph.D. students, 18. 10. 2017



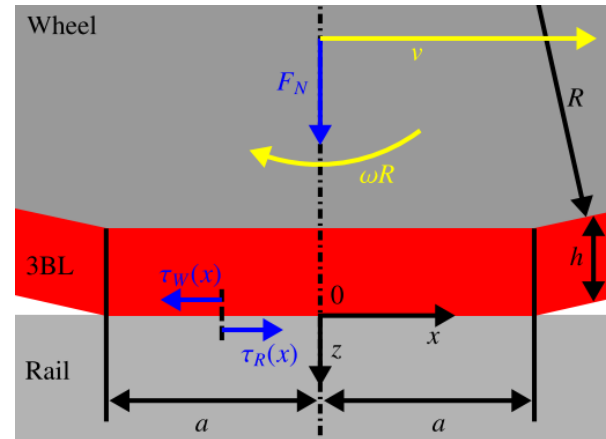
# Dissertation

## Tribology of the wheel-rail contact

**Supervisor:** prof. Ing. Martin Hartl Ph.D.

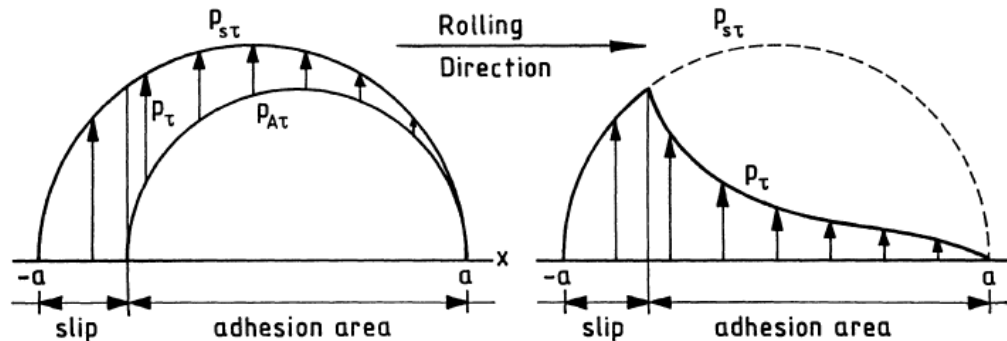
**Supervisor – specialist:** Ing. Milan Omasta Ph.D.

- Boundary friction in wheel rail contact
- Interfacial layer comprised of different materials
- Mathematical model of frictional behaviour



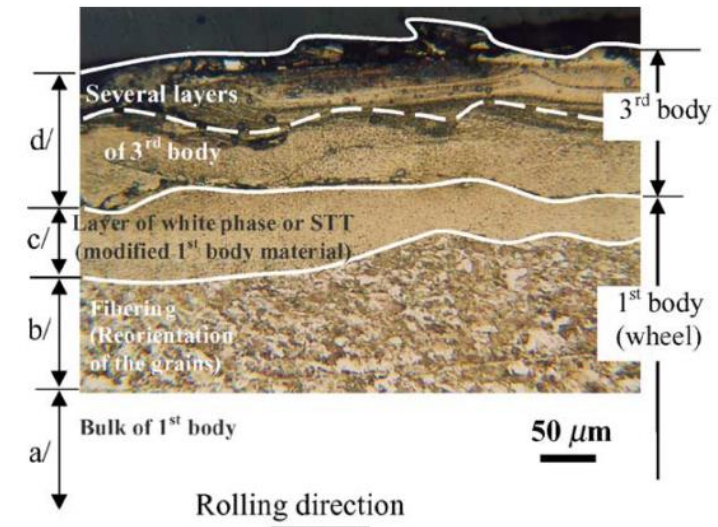
Sketch of contact problem.

*Meierhofer, 2014*



Tangential traction in wheel-rail contact.

*Kalker, 1990*



Cross section view of a wheel with third body layer.

*Descartes, 2005*

# Teaching and learning activities

## Teaching

- ZSY-A – Finite Element Method – ANSYS Classic
- 1K – Fundamentals of Machine Design
- 3CD - CAD

## Learning

- 9MOP - Methodologies of Scientific Work
- 9VPR - Research Project and Its Management
- 9AJ - English for Doctoral Degree Study
- 9EHD - Elasto hydrodynamics
- 9EXT - Experimental Methods in Tribology





Thank you for attention

**Ing. Daniel Kvarda**

[Daniel.Kvarda@vut.cz](mailto:Daniel.Kvarda@vut.cz)

<http://uk.fme.vutbr.cz/>