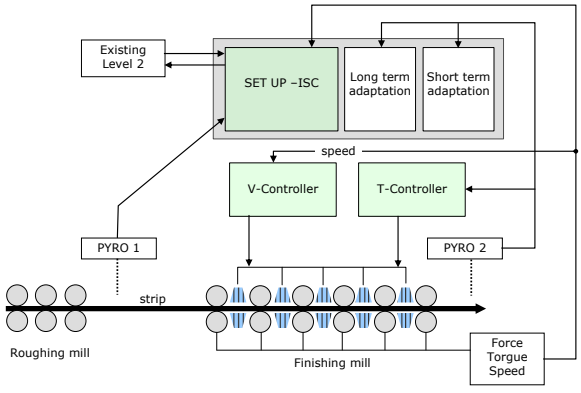
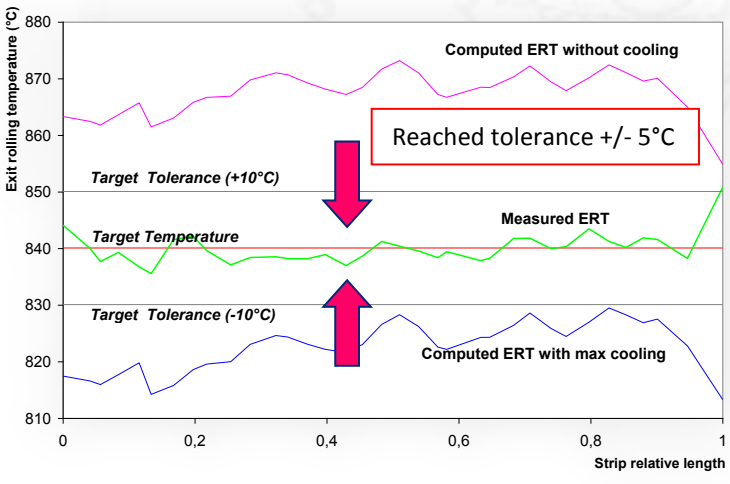
Cooling Strategies and Temperature Control

Control systems to reach target temperature and Computer simulations of hot rolled flat and long products and rolls

- **Hot strip mill Level 2 subsystem for control of the Inter Stand Cooling (Finisher Temperature Control) and on-line prediction of cooling strategies to reach finisher delivery temperature**





Effects of ISC cooling (2000 mm hot strip mill)

- Thin strips (< 4 mm) - deviation ± 7 °C
- Thick strips (> 10 mm) - deviation ± 12 °C
- Increase of rolling speed - cca 30 %

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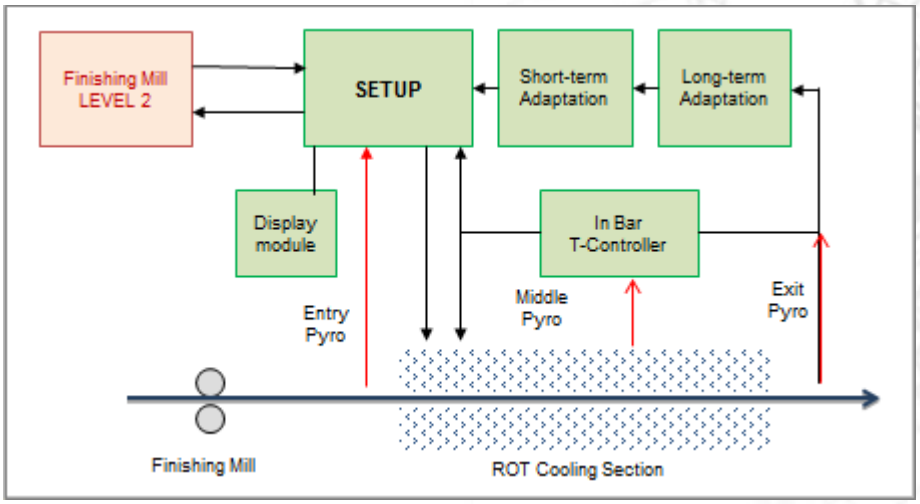
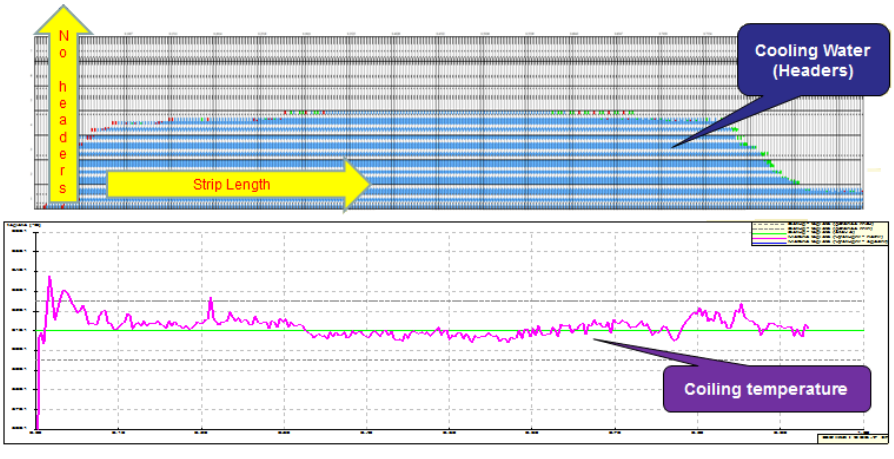
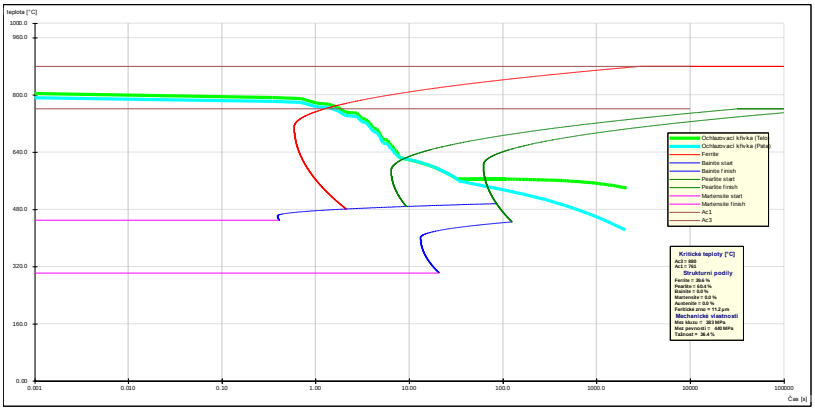
Control systems for HSM run out table cooling (Laminar Cooling) to reach coiling temperature

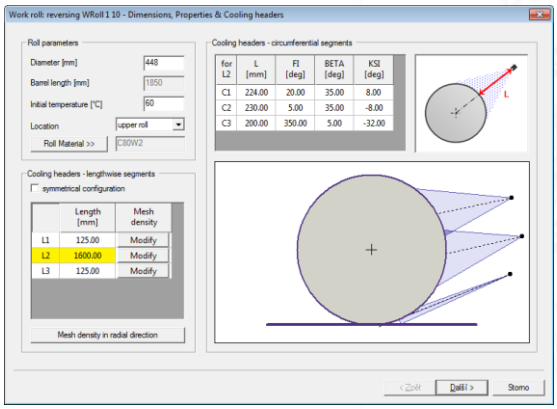


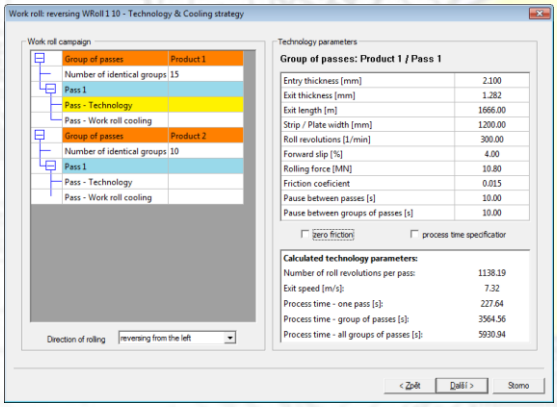


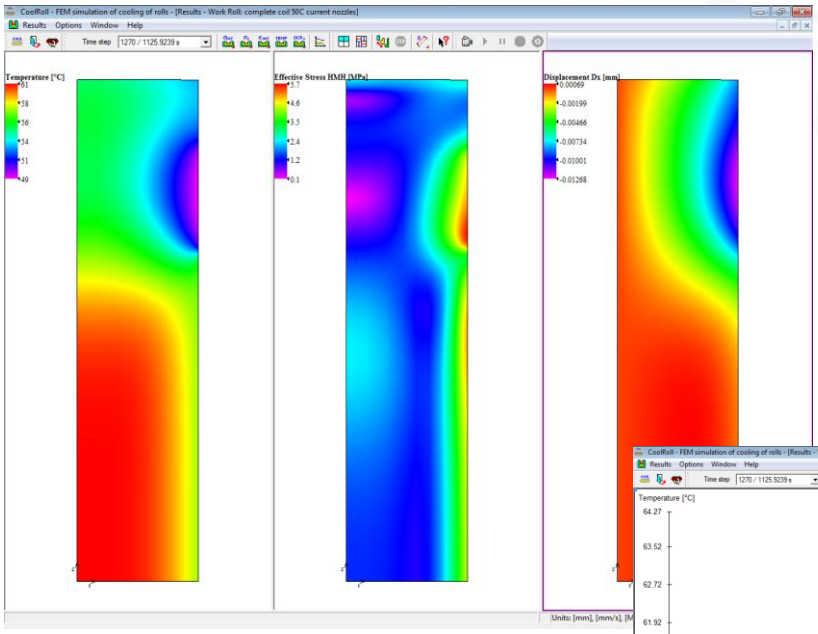
- Keeping of coiling temperatures ± 15 °C with differences of Exit Rolling Temperature 150 °C
- Good agreement in predicted yield stress and tensile strength
- Simulations – development of cooling technologies
- Extensive monitoring possibilities



CoolRoll – FEM based off-line software for computer simulation of cooling of work rolls

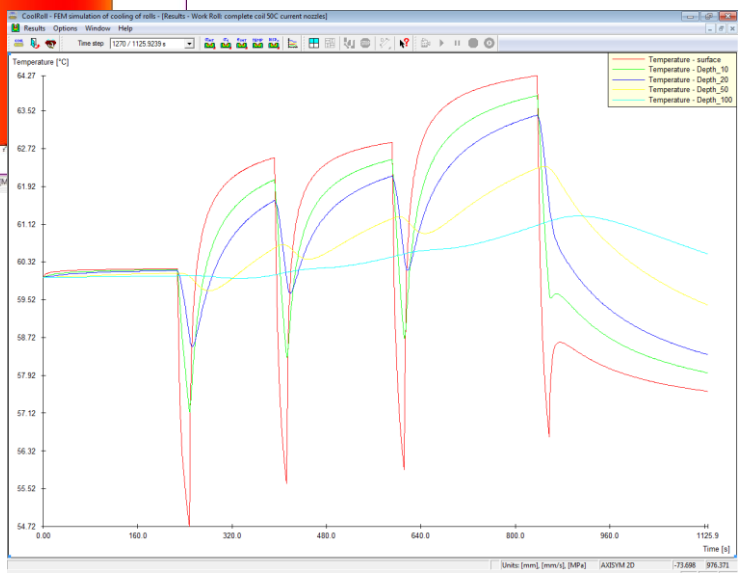






CoolRoll model features

- fully automatic creation of the FEM model
- roll is divided into lengthwise segments
- each lengthwise segment has its own circumferential distribution of nozzles
- editor of the roll campaign



Results of computer simulation

- temperature profiles across the roll in specified times
- time - temperature curves in specified points of the roll
- thermal camber of the roll
- thermal elastic stresses and strains

Design of sectional cooling of work rolls to reach target strip profile