

FATIGUE OF BACKUP ROLLS

Length of BuR campaign and dressing amount

Target:

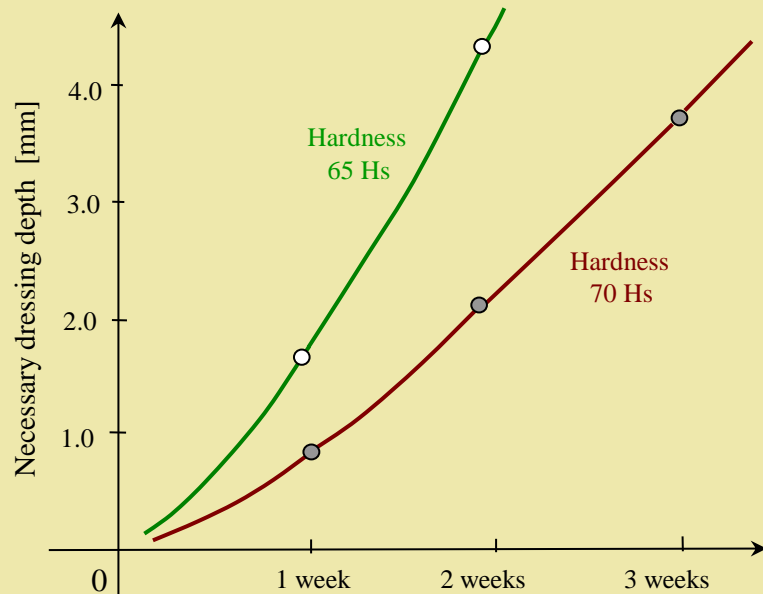
- Determination of proper dressing depth
- Optimum length of campaign of backup roll

Introduction

Proper setting of dressing depth and length of Backup roll campaign is of essential importance!

Short campaign:

Increase of grinding costs!



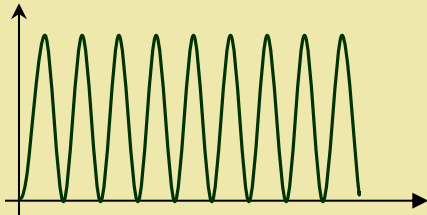
Very long campaign:

Danger of spalling and destroying of the roll!

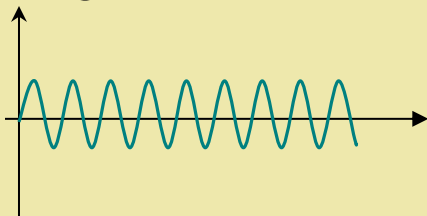


Loads that cause degradation of BuR surface

➤ Hertz contact load



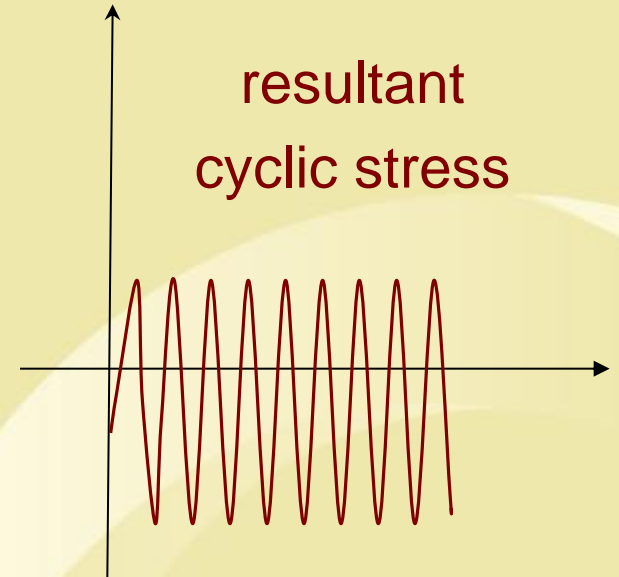
➤ Bending load



➤ Residual stress



resultant
cyclic stress

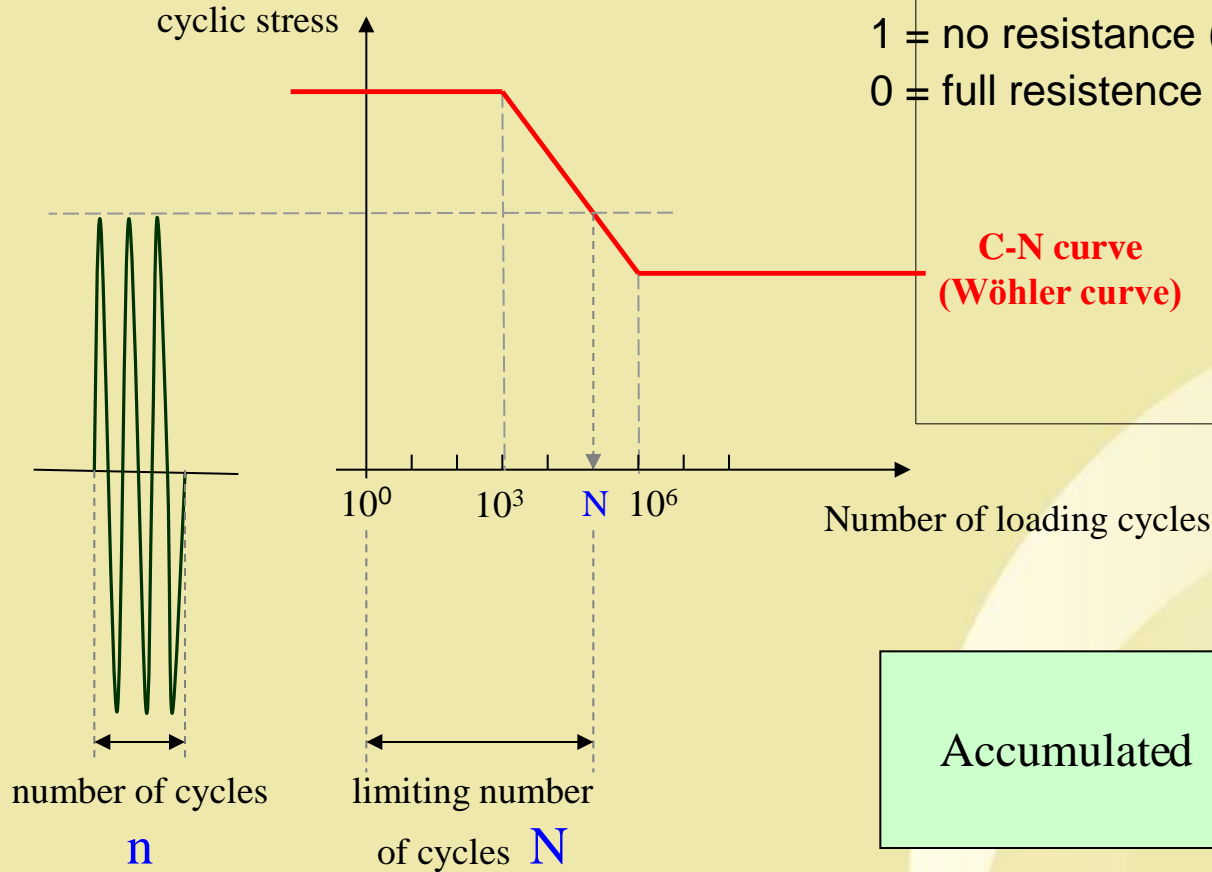


Accumulated damage

Potential of material to resist cyclic loading

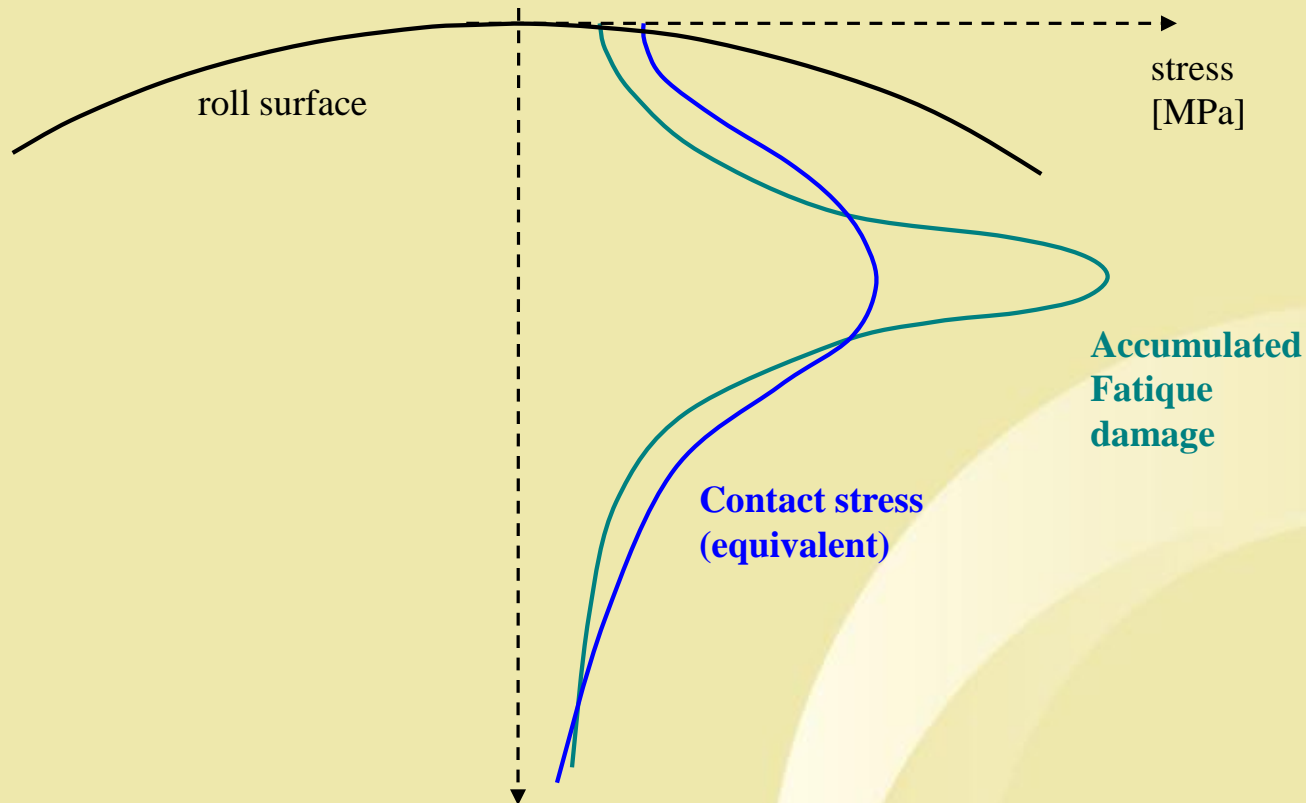
1 = no resistance (initiation of cracks)
0 = full resistance

**C-N curve
(Wöhler curve)**

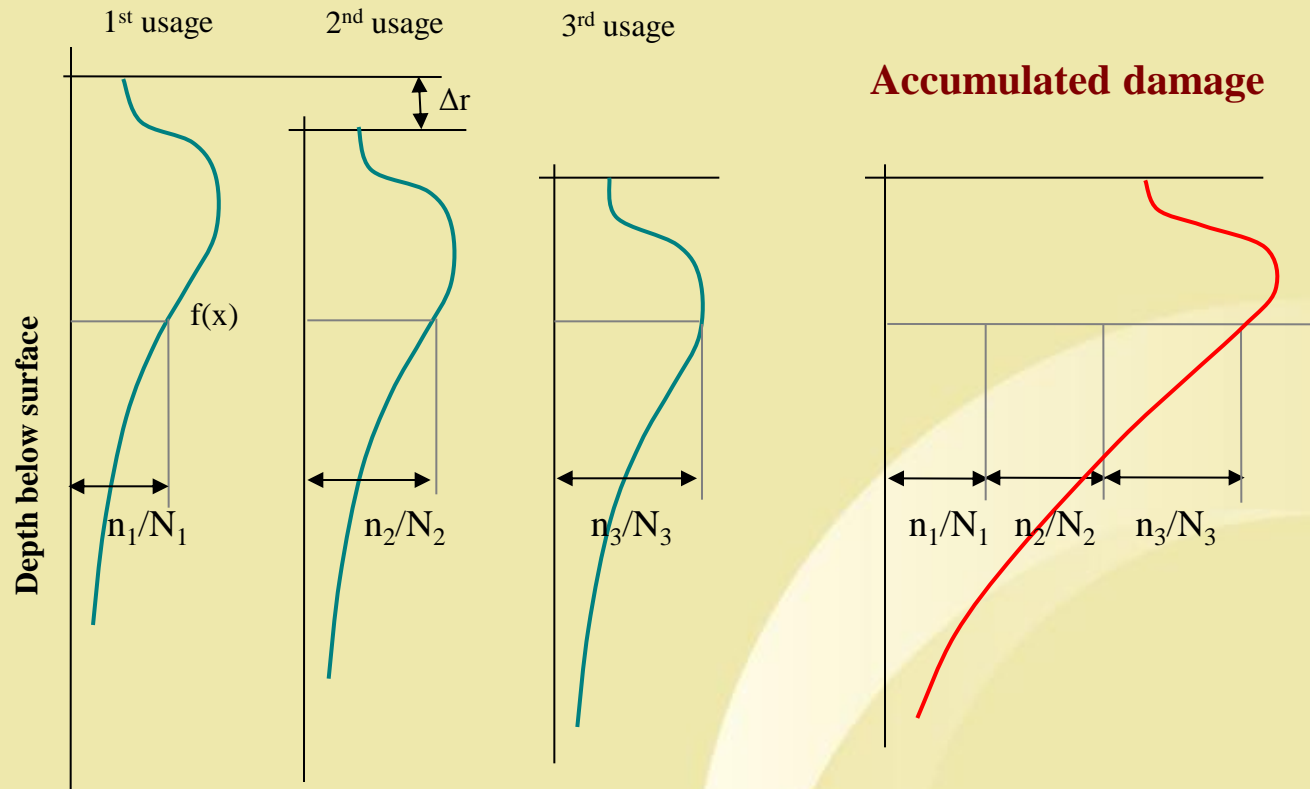


$$\text{Accumulated damage} = \sum_{i=1}^k \frac{n_i}{N_i}$$

Hertz contact load and accumulated damage

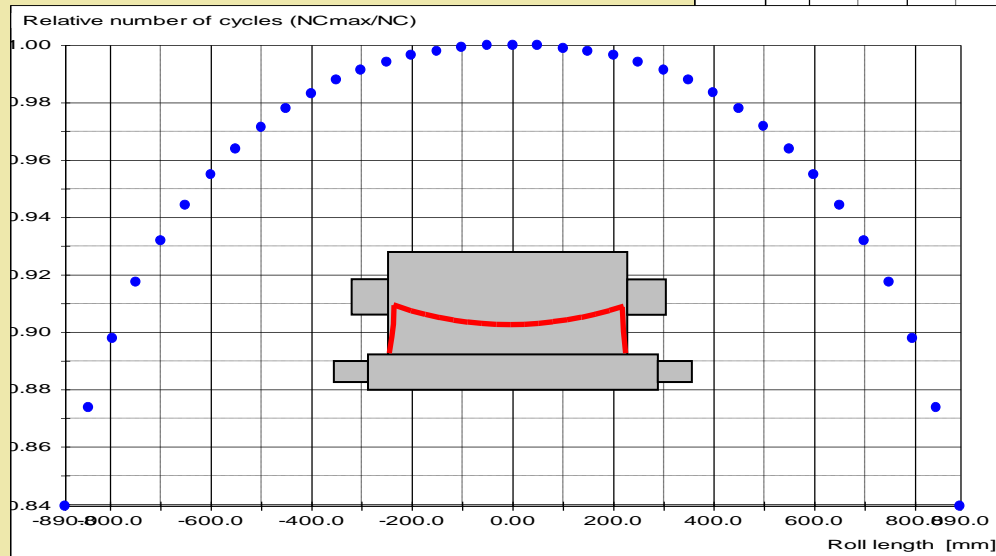
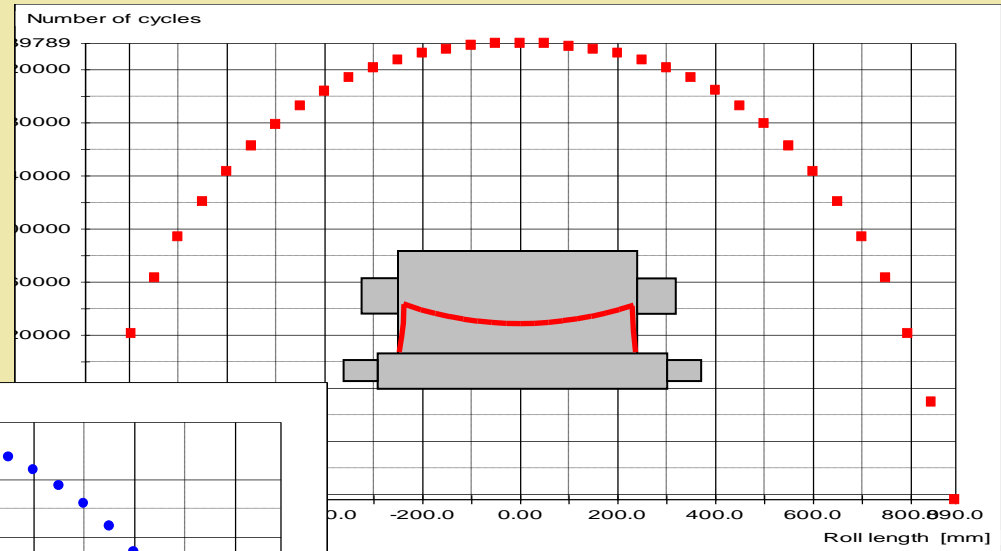


Accumulated damage when dressing



Prediction of the number of loading cycles

Absolute number of cycles



Relative number of cycles

How to prolong the BuR campaign ?

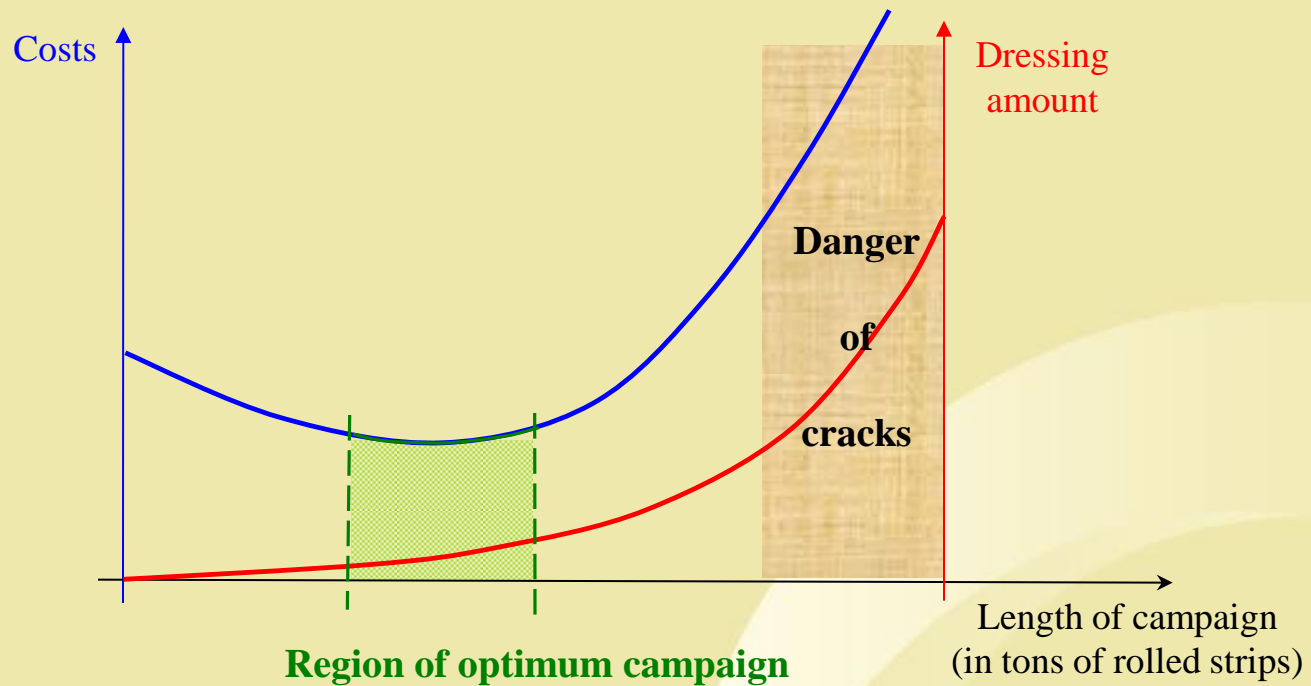
Proper depth of dressing and sophisticated estimation of Backup roll campaign!

Reducing danger of crack initiation by

- proper design of chamfers!
- positive grinding on Backup rolls!

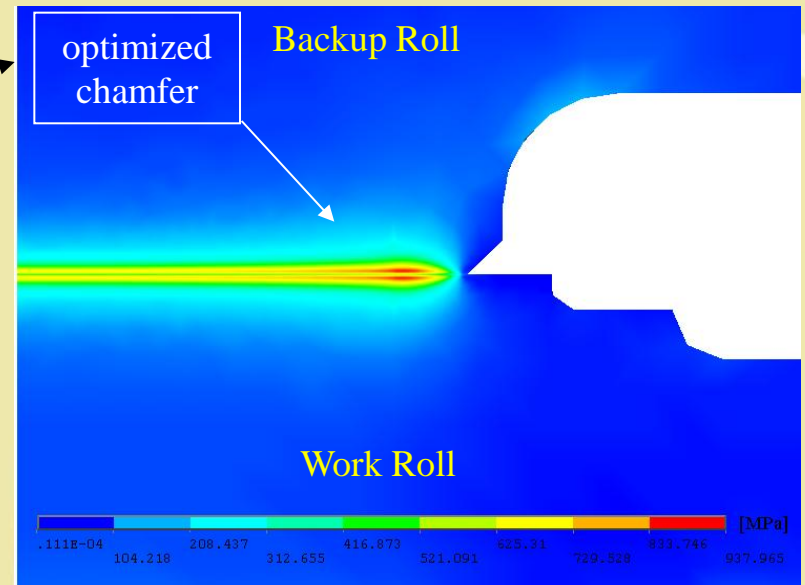
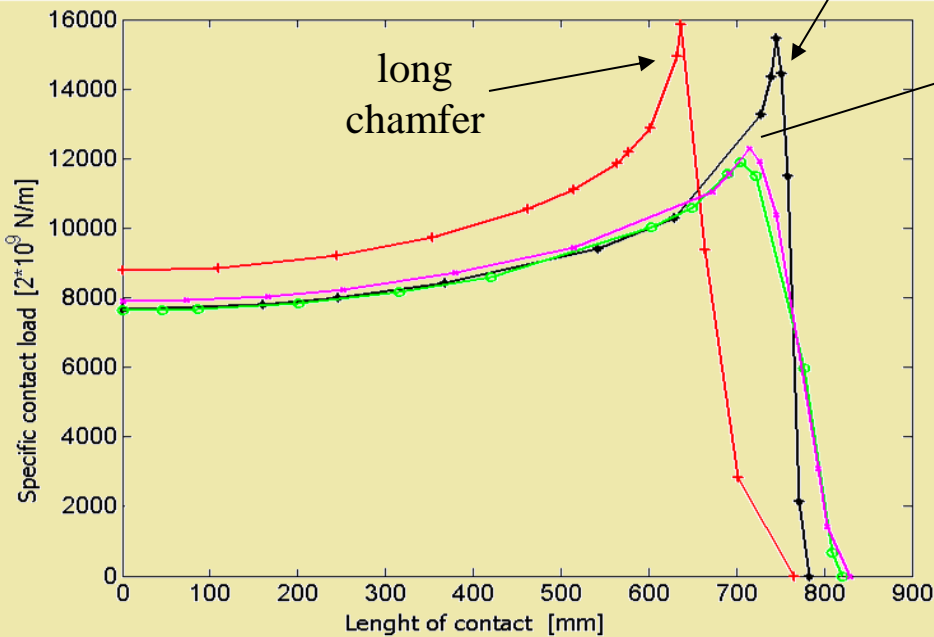
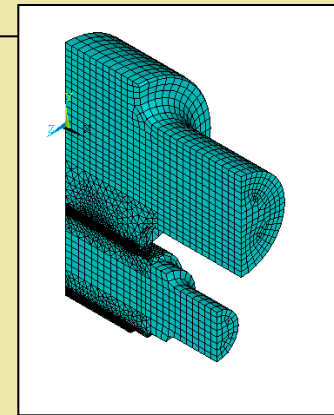
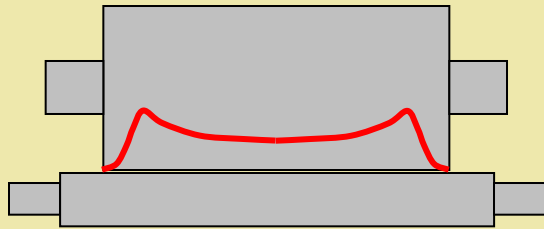
Nondestructive Testing!

Optimum Length of BuR campaign

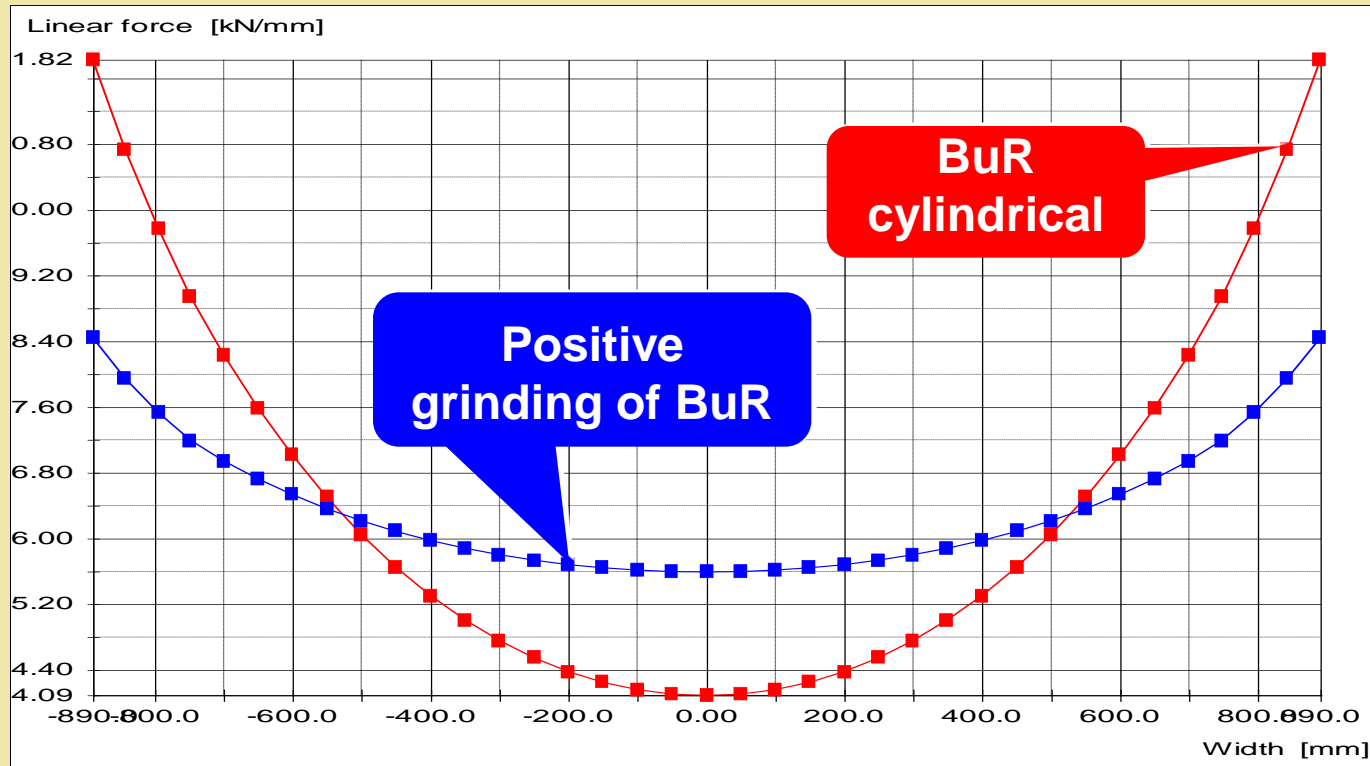
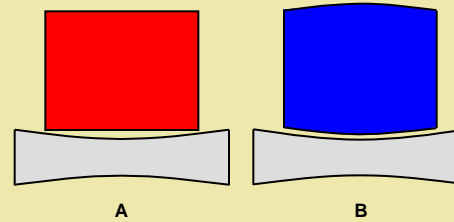


- Region of optimum campaign**
- length of campaign where costs are minimized
 - reasonable depth of dressing
 - low rise of cracks

Analysis of Chamfers

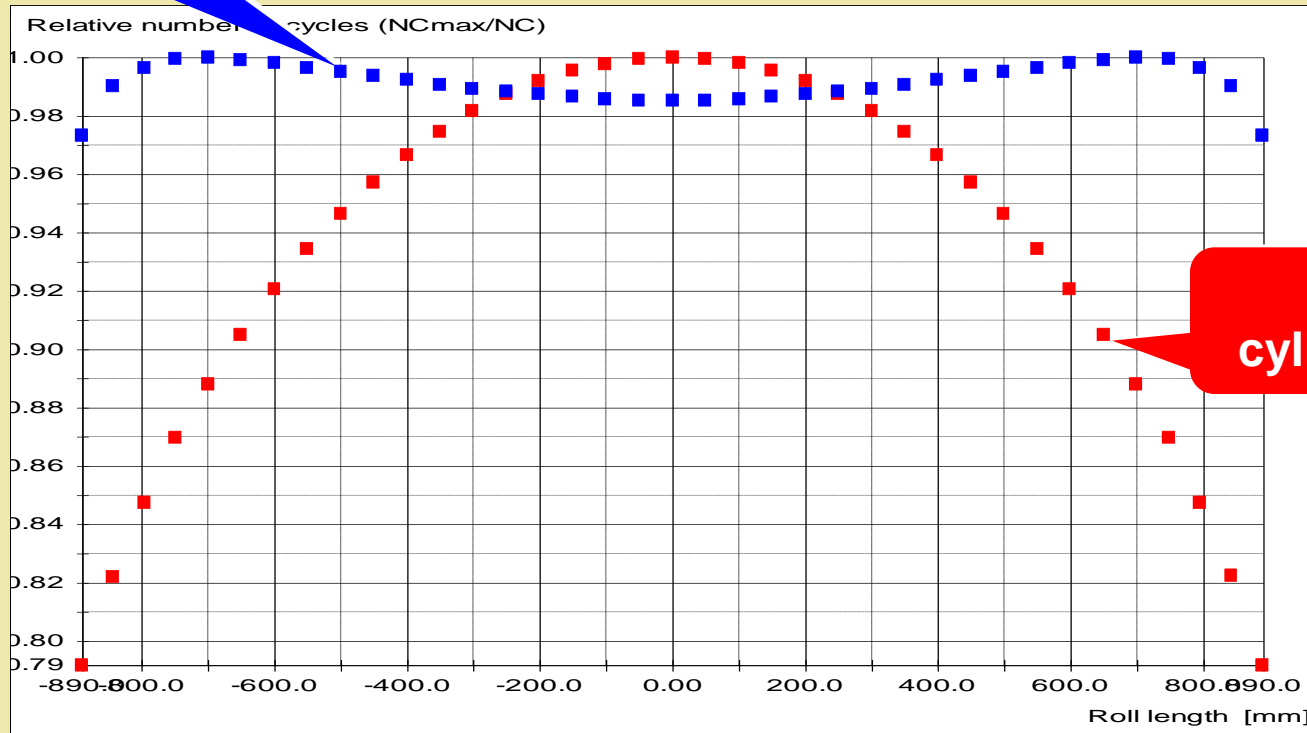
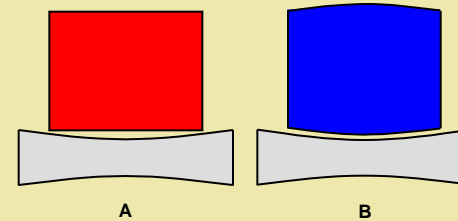


Optimalization of Roll Grinding



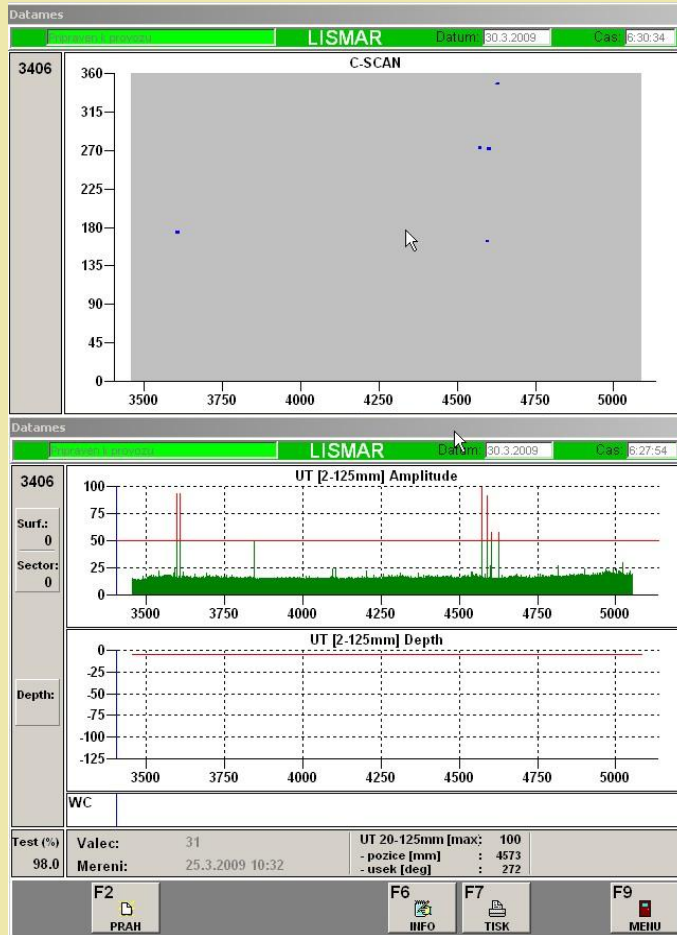
Optimalization of Roll Grinding

Positive grinding of BuR



BuR cylindrical

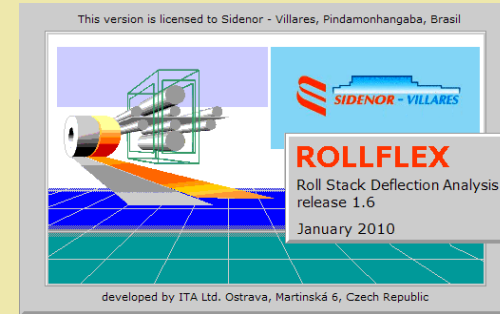
Testing - Depth of Grinding



Software solutions improving your Backup rolls performance

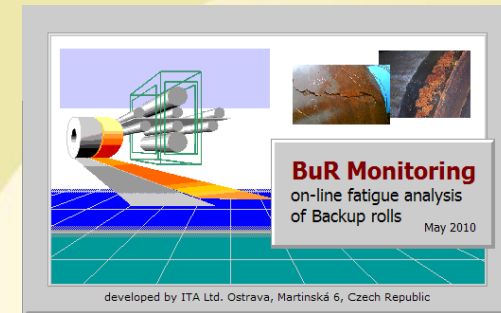
ROLLFLEX

Software package for off-line roll stack deflection analysis coupled with prediction of fatigue damage of Backup rolls.



BuR Monitor

Software module for on-line monitoring of residual fatigue life of Backup rolls resulted from real process loading and coupled with prediction of proper depth of dressing.



Specialized software solutions make such kind of analyses quite simple !

Thank You
for
Your Attention!