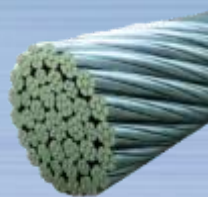


Redaelli

Strain Age Control

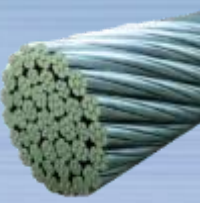
M.Meleddu

Amsterdam 22-06-2016



Redaelli

External actions



Which elements are in common in all the applications?

☐ **TENSILE + BENDING STRESS**

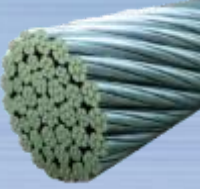
(load, D/d ratio, cycles)

☐ **INCREASE OF TEMPERATURE**

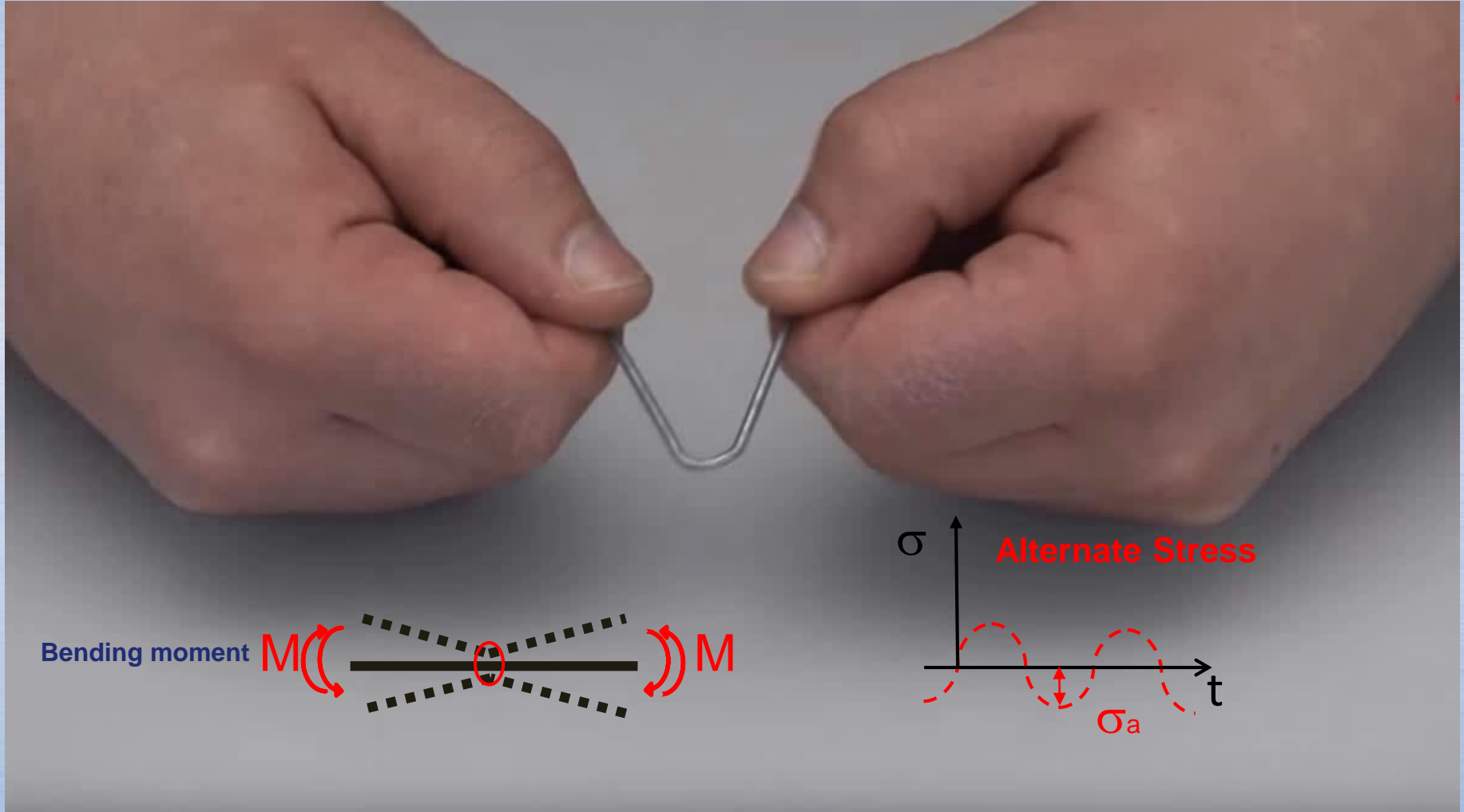
(load, friction, AHC, cycles)

Today we speak about these 2 main influencing parameters

Basic concepts on wire fatigue

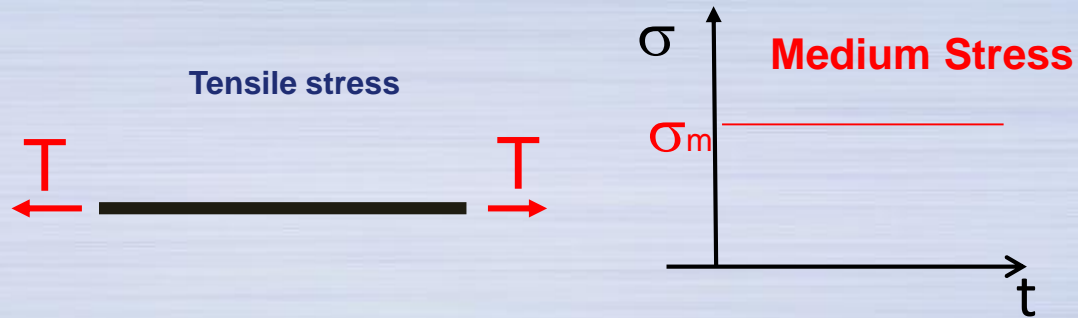


Did you ever happen?

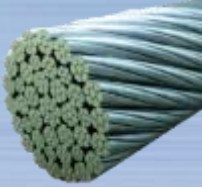


Basic concepts on wire fatigue

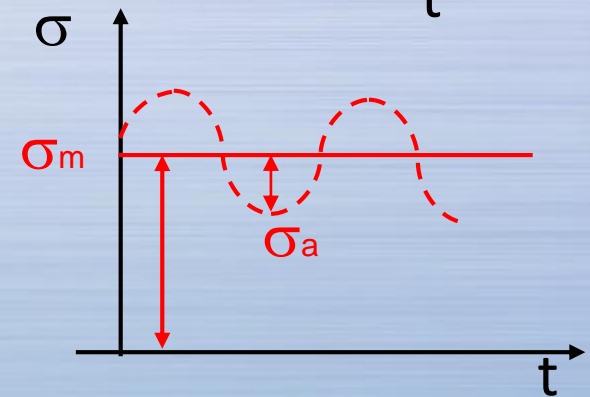
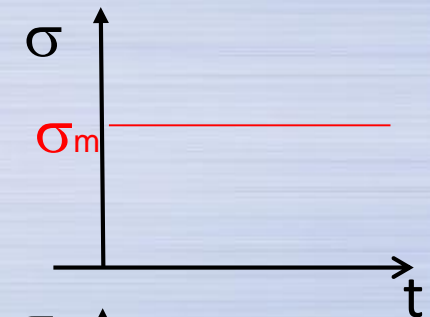
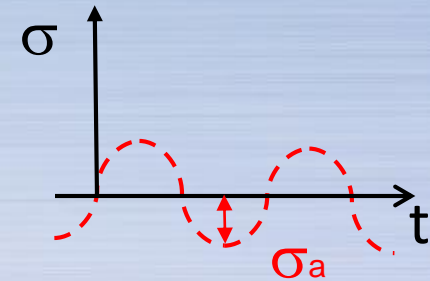
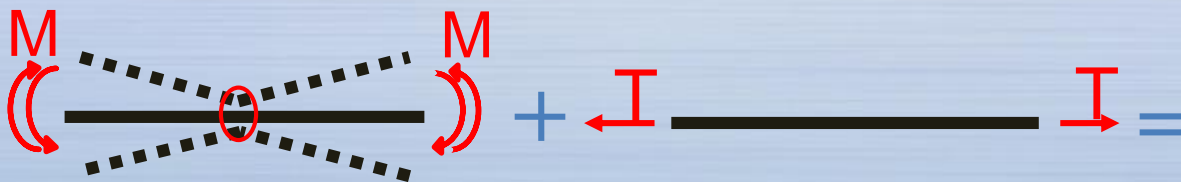
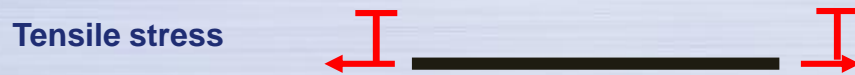
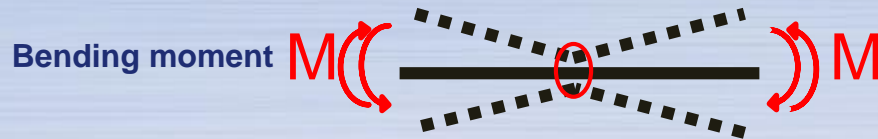
But we are not satisfied: we want to stress more our wire...



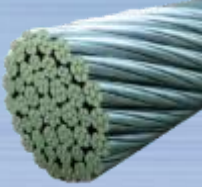
Basic concepts on wire fatigue



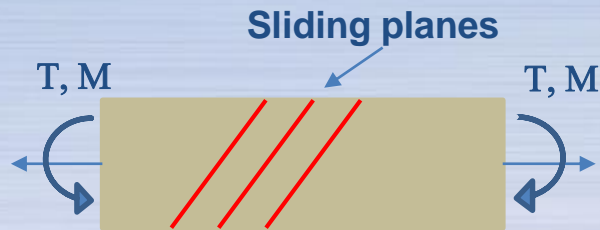
If we combined the 2 actions



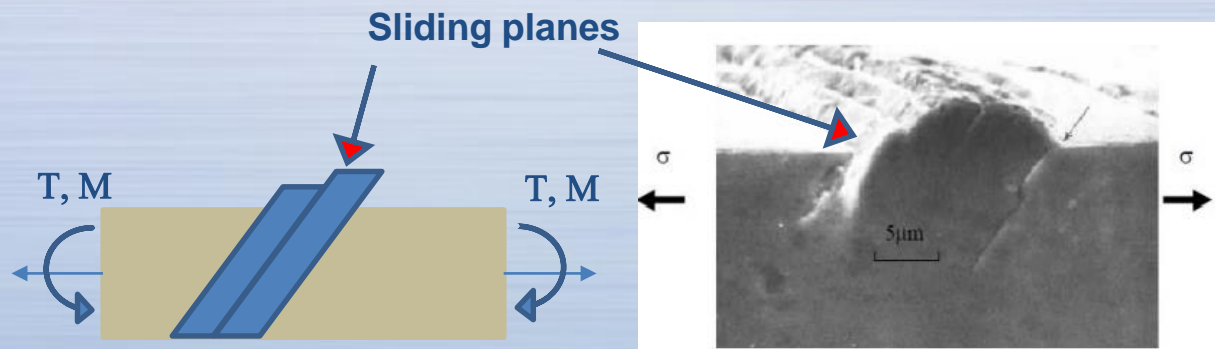
Basic concepts on wire fatigue



What's the process behind the wire break for fatigue?

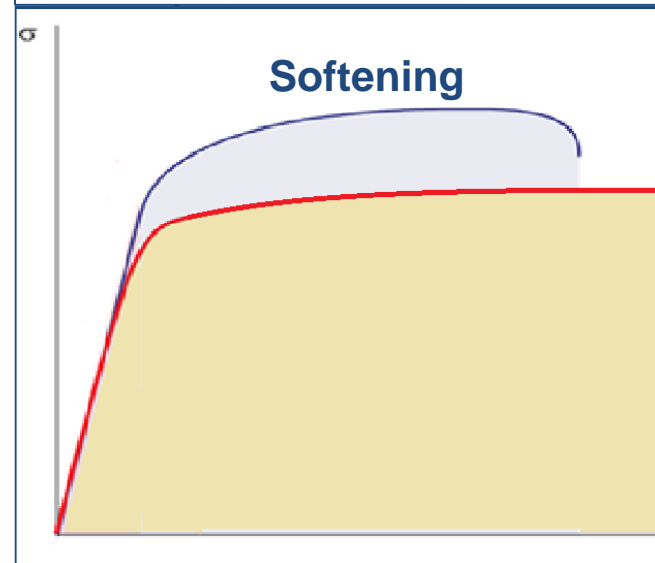
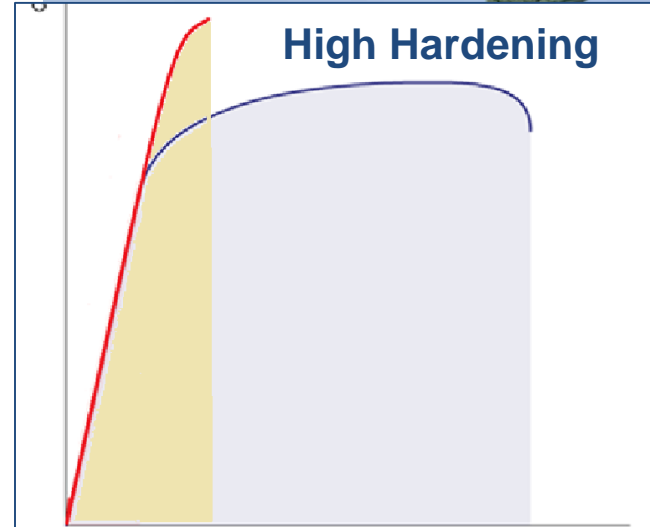
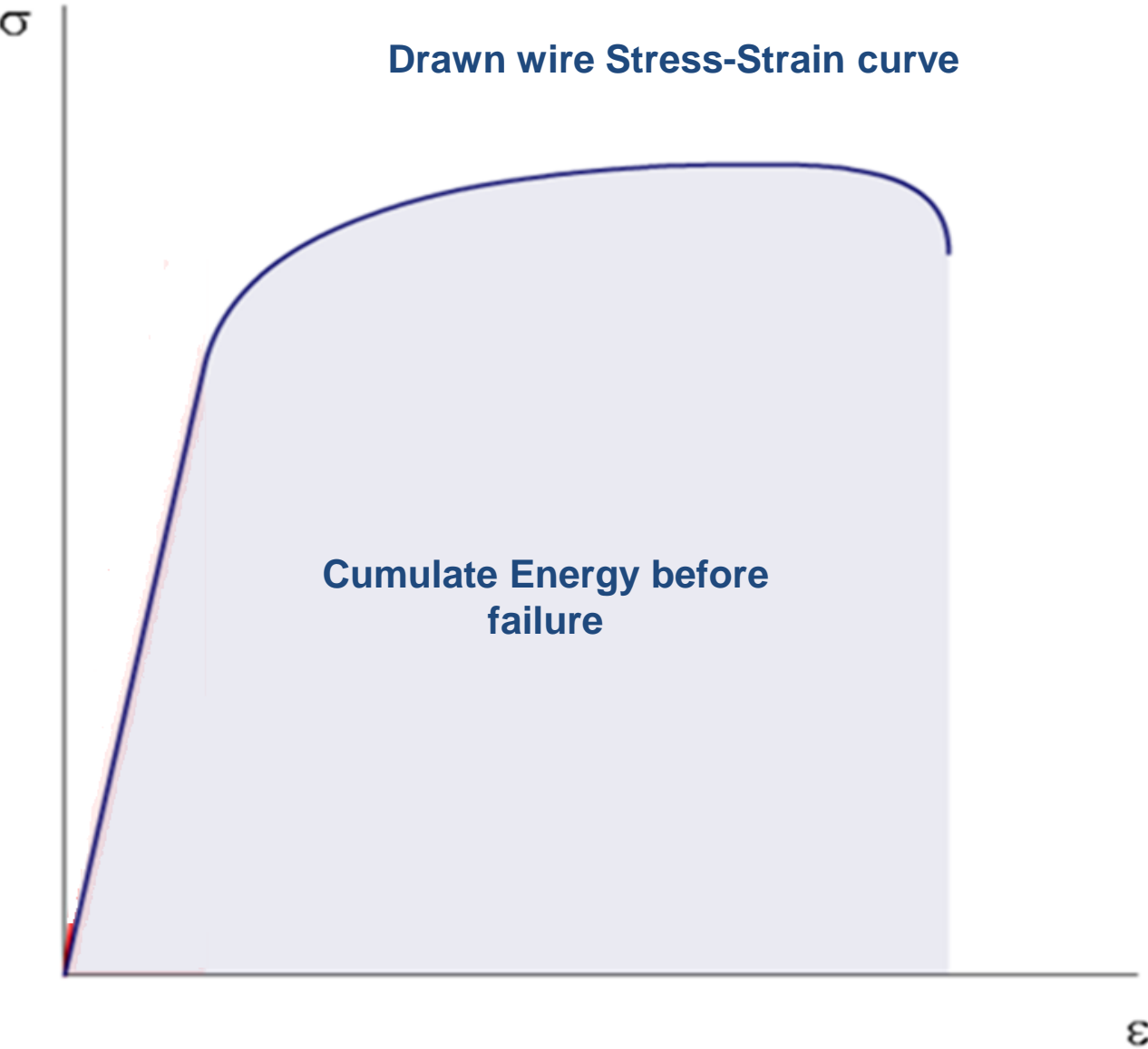
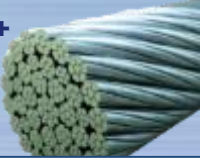


- The axial load generates sliding planes on 45°
- The bending moment generates high surface tensions inducing crystal plane protrusion

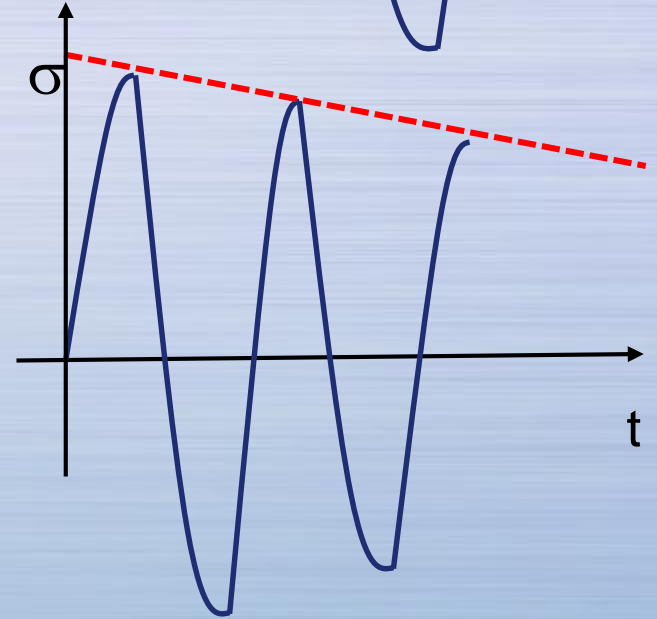
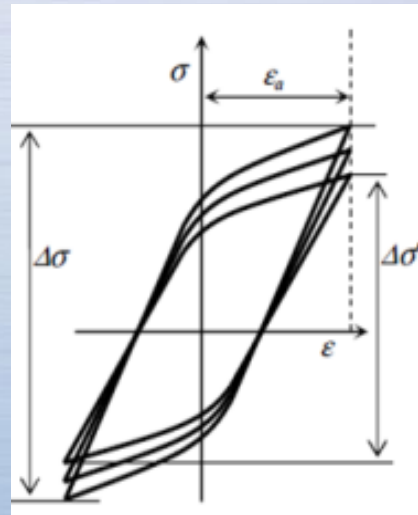
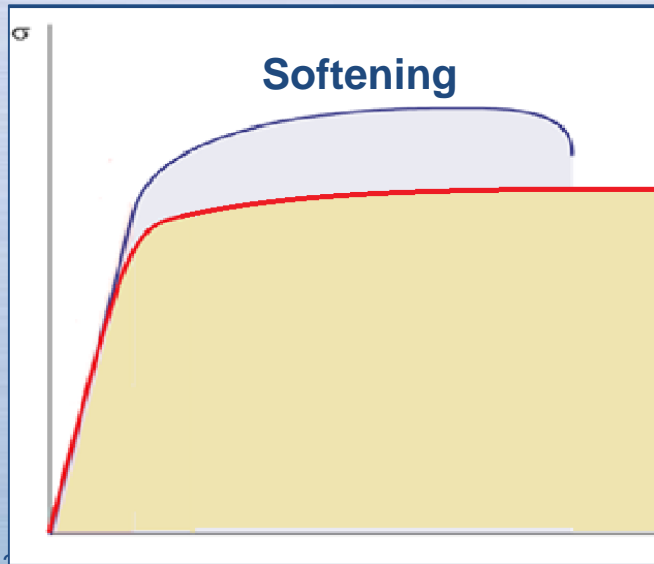
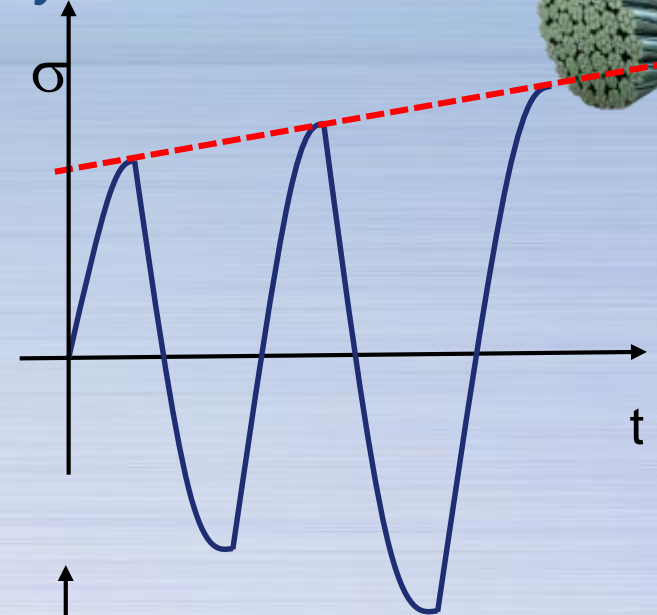
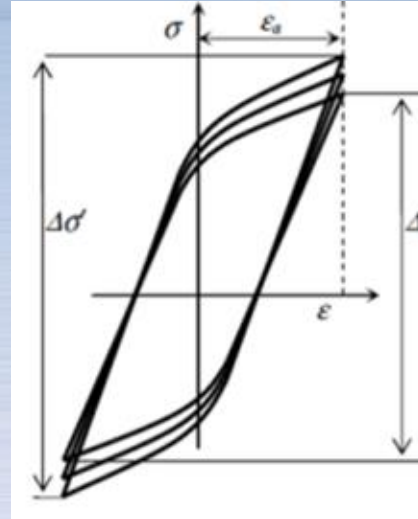
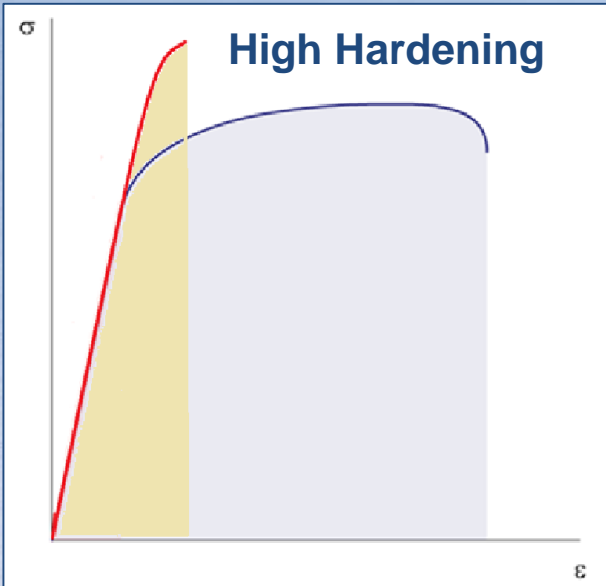
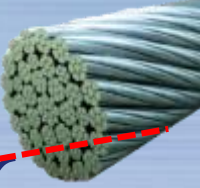


Hardening effect on Ductil – Brittle transition after cyclic alternate loads

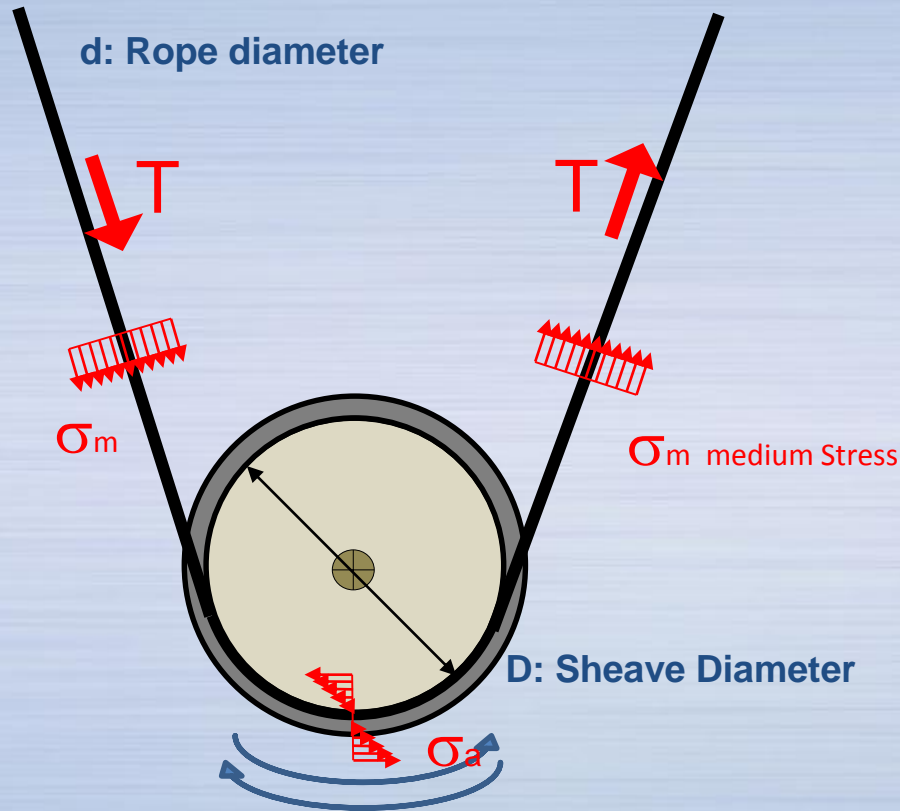
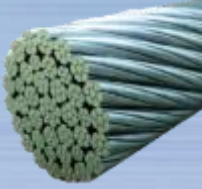
TENSILE +
BENDING
STRESS



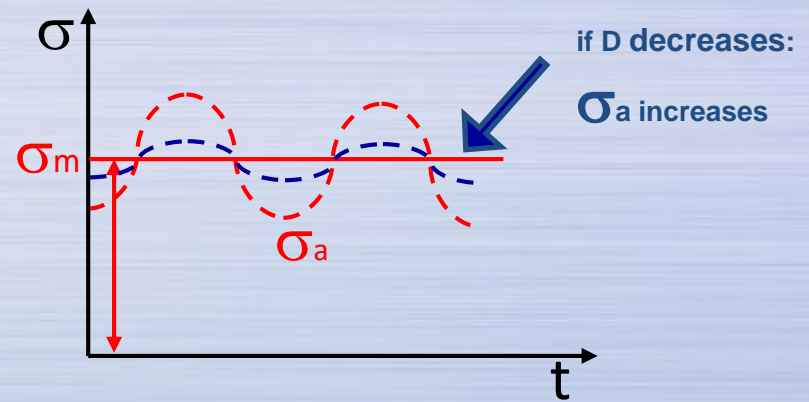
Hardening effect on Ductil – Brittle transition after cyclic alternate loads



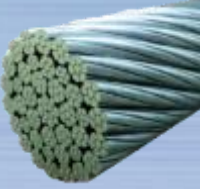
What about the rope?



$$\sigma_a = \frac{d \text{ rope}}{D \text{ sheave}} \times E$$



External actions



TENSILE + BENDING STRESS

(load, D/d ratio, cycles)

INCREASE OF TEMPERATURE

(load, friction, AHC, cycles)

How many of you think the temperature monitoring is important?

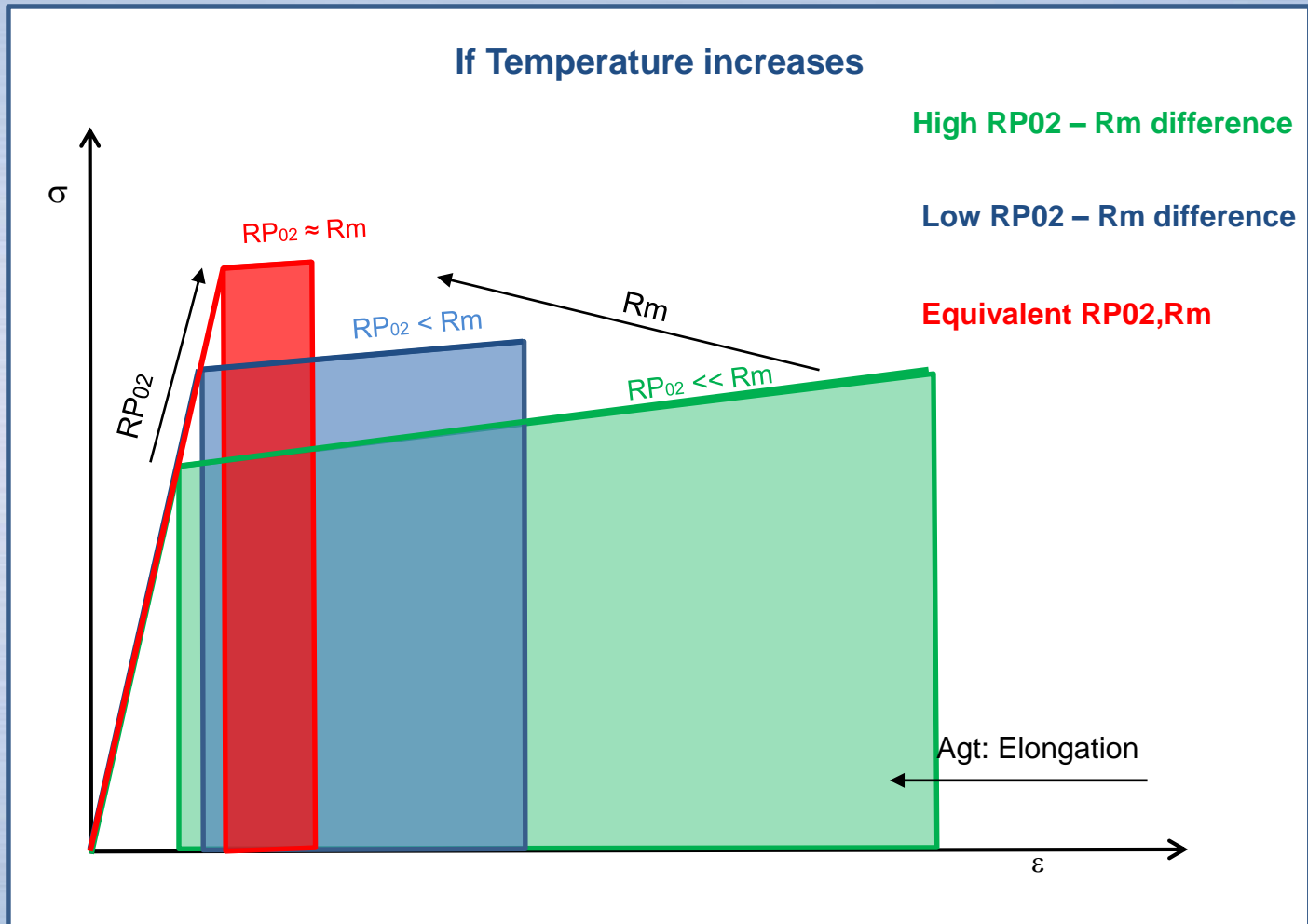
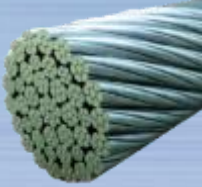
And why?

Maybe because of the lubricant preservation?

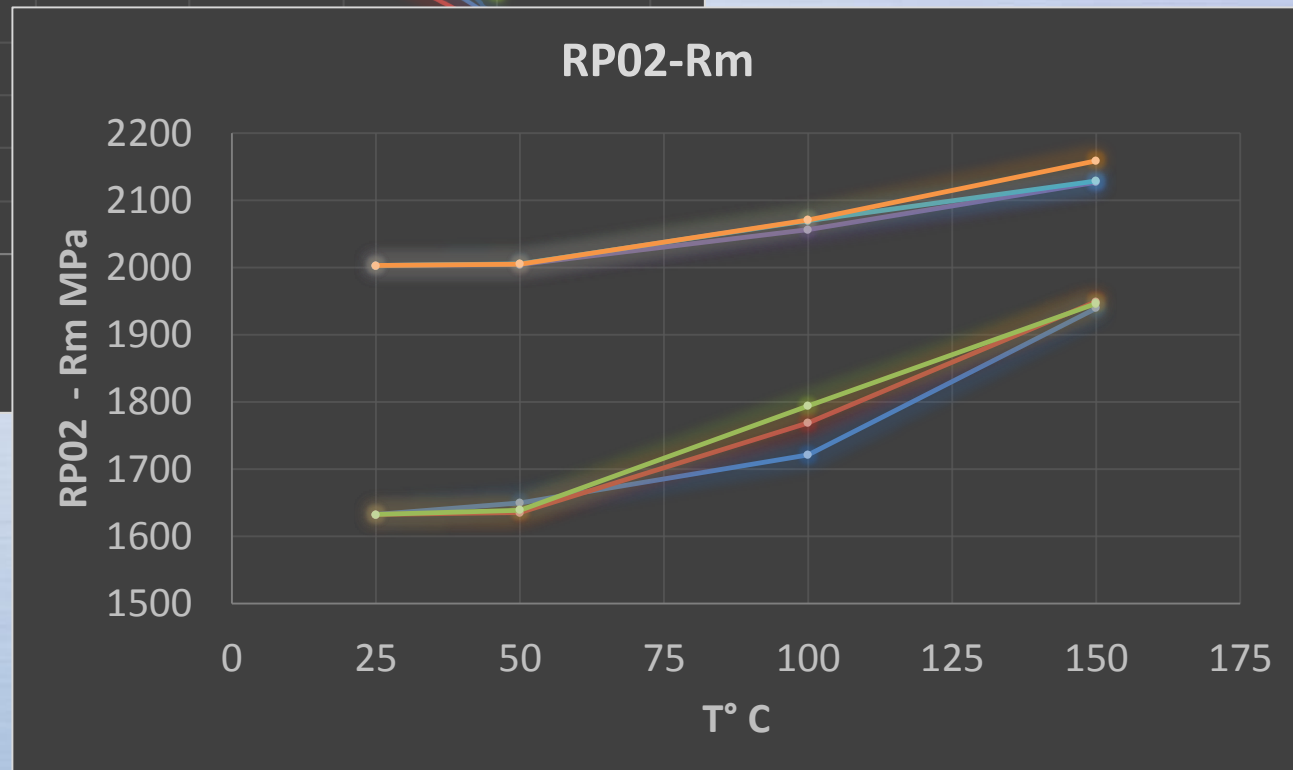
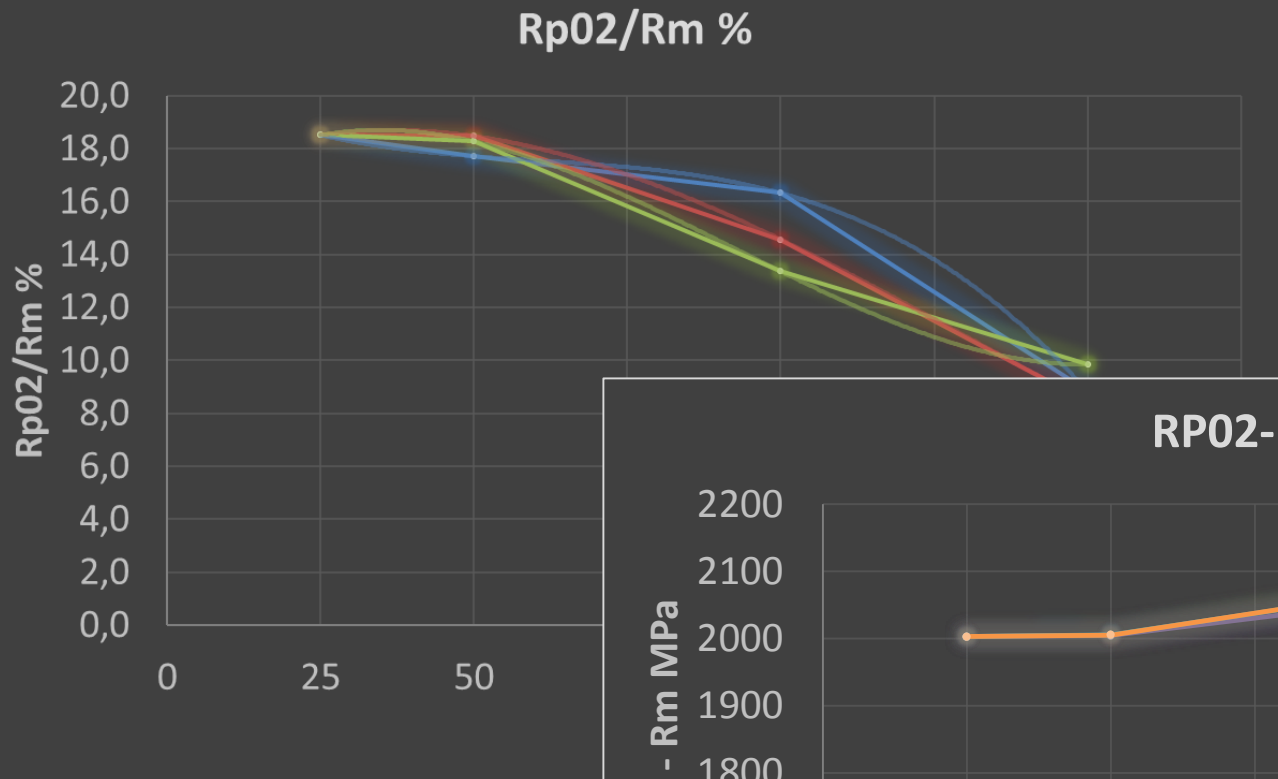
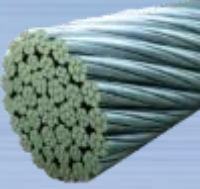
Not exactly

What about the steel properties?

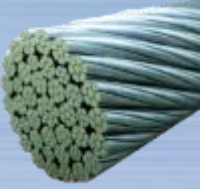
What if heating acts on wire?



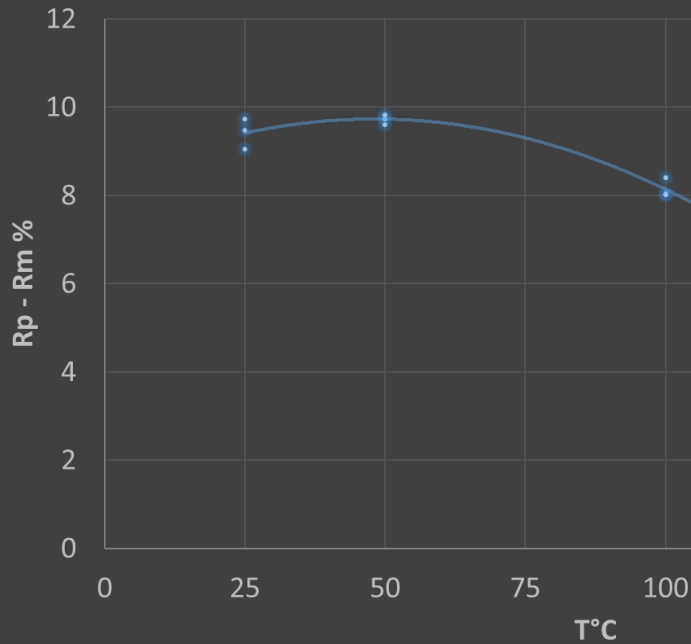
What if heating acts on wires?



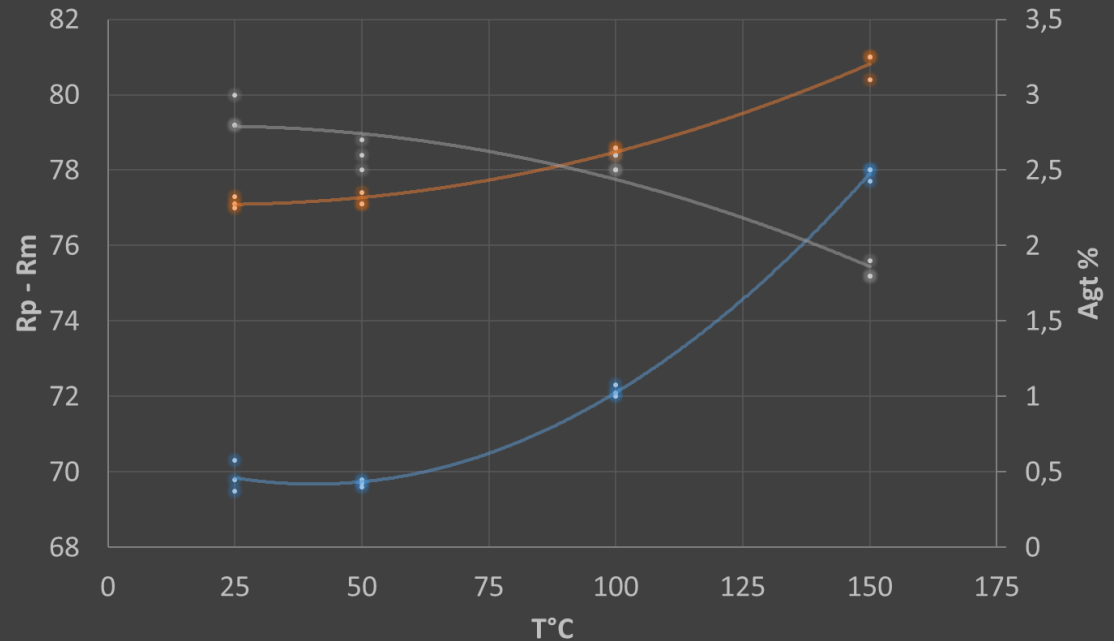
What if heating acts on Strands?



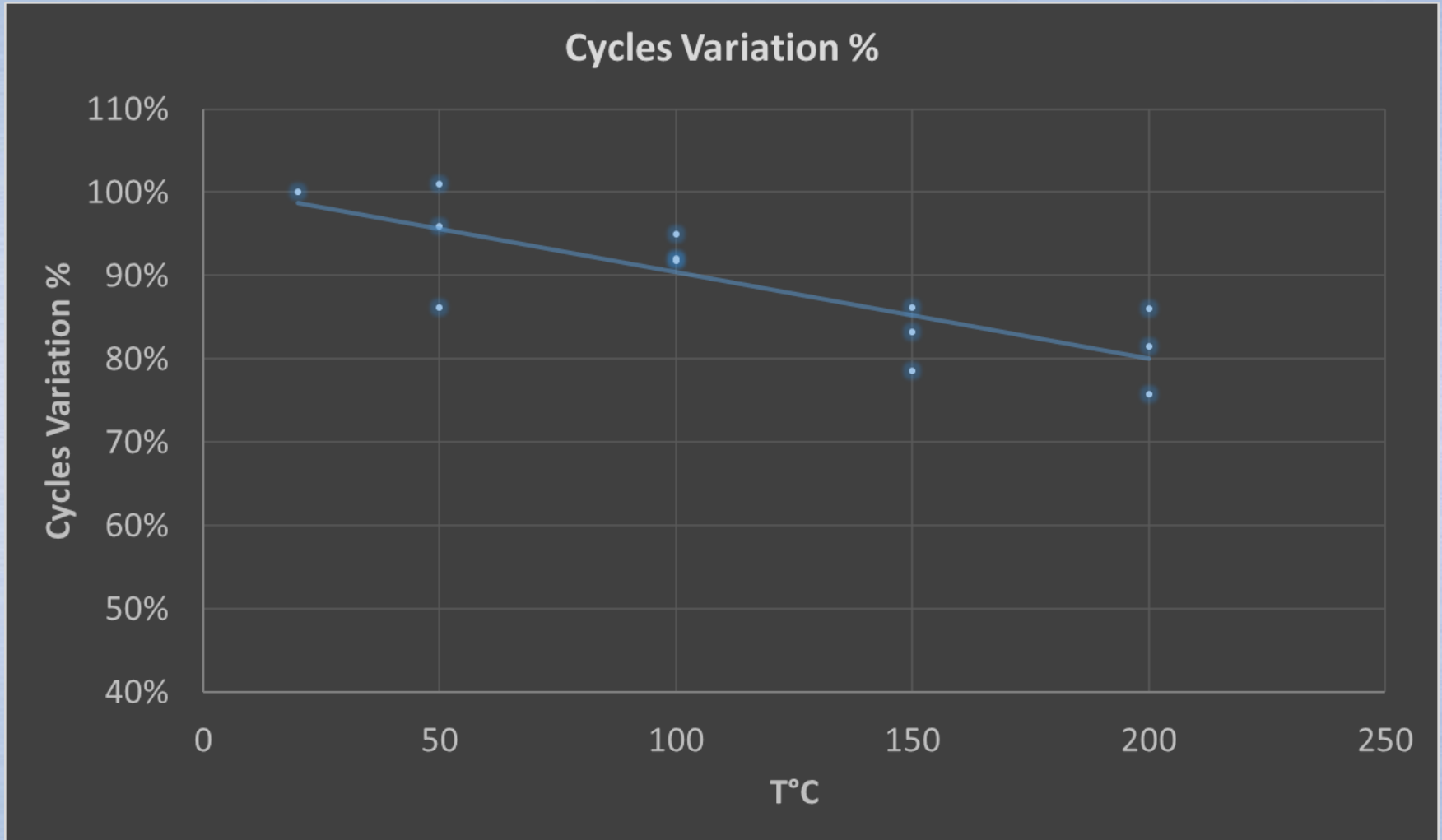
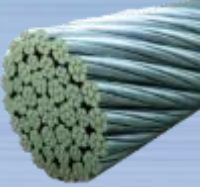
Rp02/Rm %

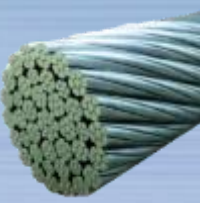


Rp02 - Rm



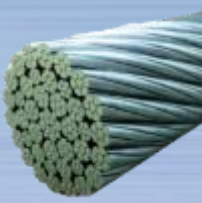
What if heating acts on Strands?





**Still convinced we can extend the life time
of the ropes just developing high
temperature resistance lubricant?**

What's important in all of this?



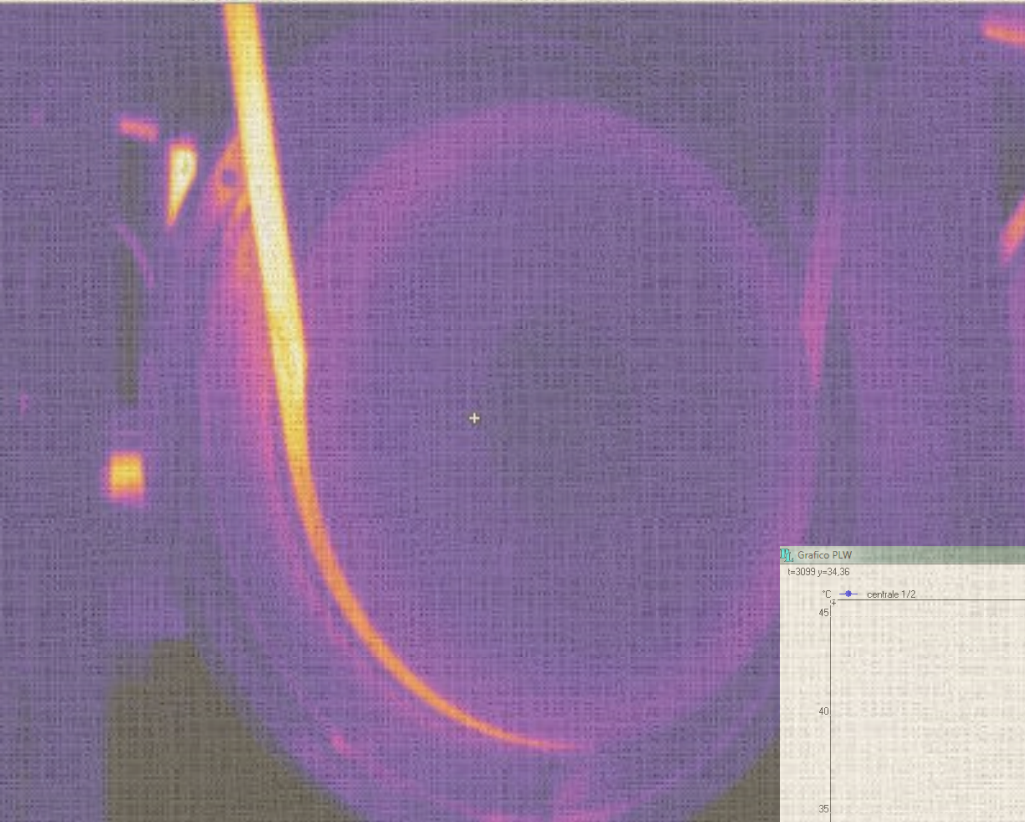
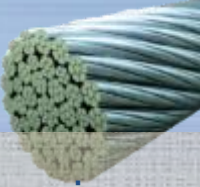
Few further considerations:

We can develop

- continuous monitoring systems (no matter is the Technology)
- Diagnostic systems (MRT, LMA)
- High temperature lubricant resistance

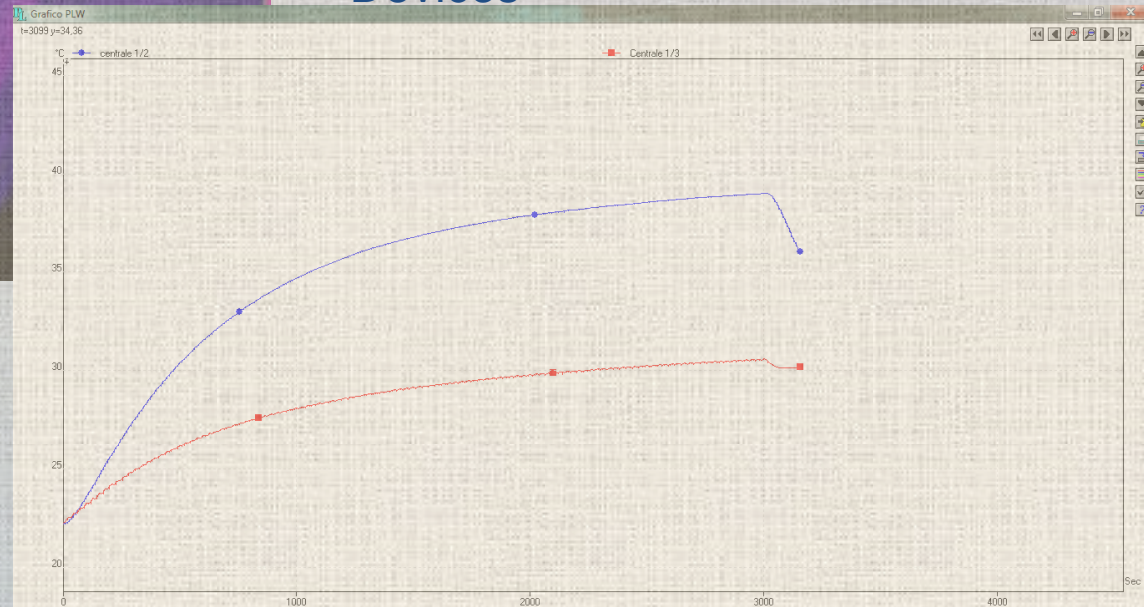
But

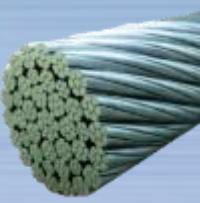
If we do not keep in mind what is the limit of utilization of the raw material we can just wait until some problem to occur before we can detect it



Thermal status of the rope under given conditions

- Thermal gradient acquisition inside/outside the rope
- Correlation between the 2 values in transient and steady state status
- Definition of Redaelli Mathematical model
- Devices





Grazie
Thank you

M.Meleddu



Redaelli