Stress Peening of Minibloc-Springs, the most sophisticated Coil Spring

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Institute for material science

Steinbeis-Transfercenter for spring technology, component behavior and process in Iserlohn

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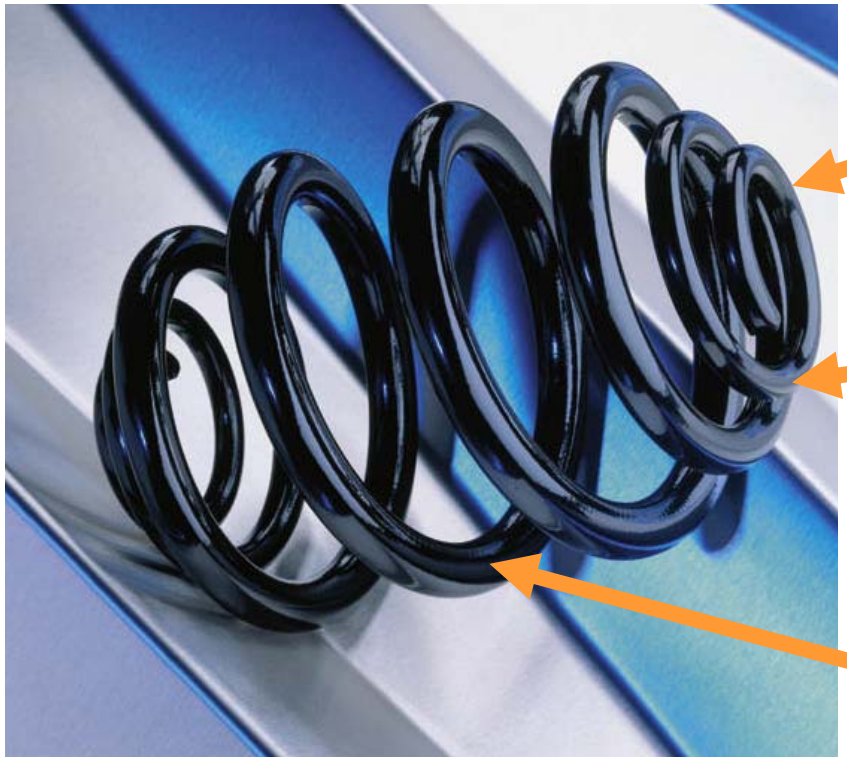
Minibloc Spring



Inconstant wire

coils with raising diameter

Some coils with constant diameter

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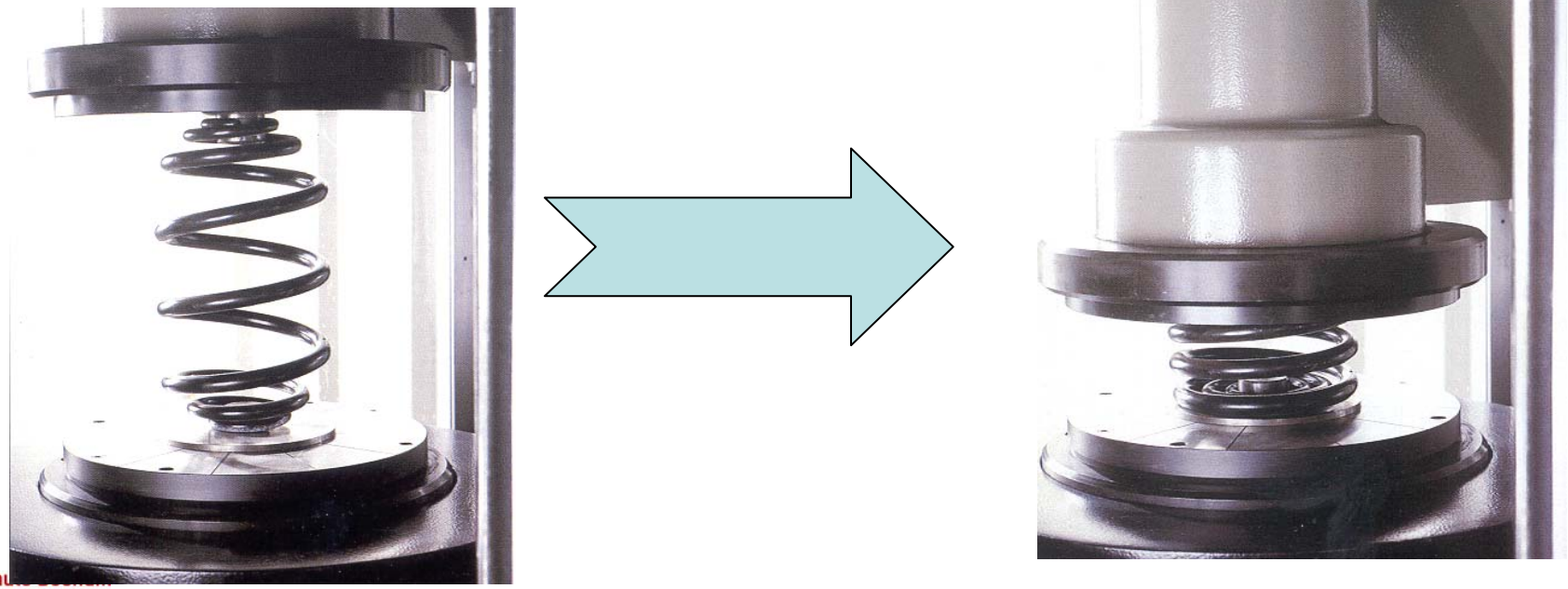
Minibloc Spring



lowest solid length

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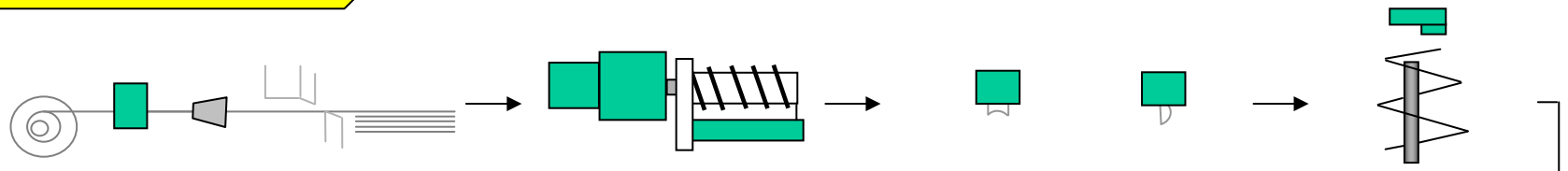
Improving Potentials

AHLEFEDERN

Raw material



1. Ziehdrehen
peeling

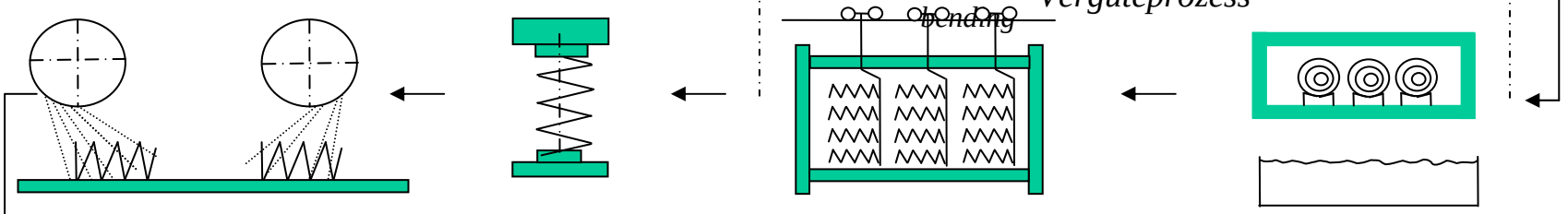
2. Wickeln
coiling

3. Anbiegen

Abschneiden
cutting

4. Plandrücken
plane pressing

Vergüteprozess



8. Strahlen
shot peening

7. Warmsetzen
warm setting

6. Anlassen

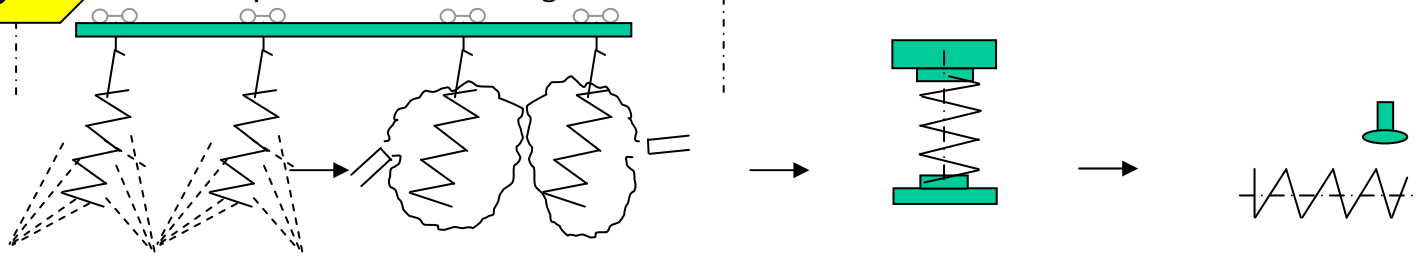
tempering

5. Härten

hardening

Peening

Oberflächenbeschichtung



9. Vorbehandlung + Phosphatieren
pretreatment + phosphating

10. Pulverlackieren
powder coating

11. Setzen + Prüfen
setting + testing

12. Signieren + Verpacken
signing + packing

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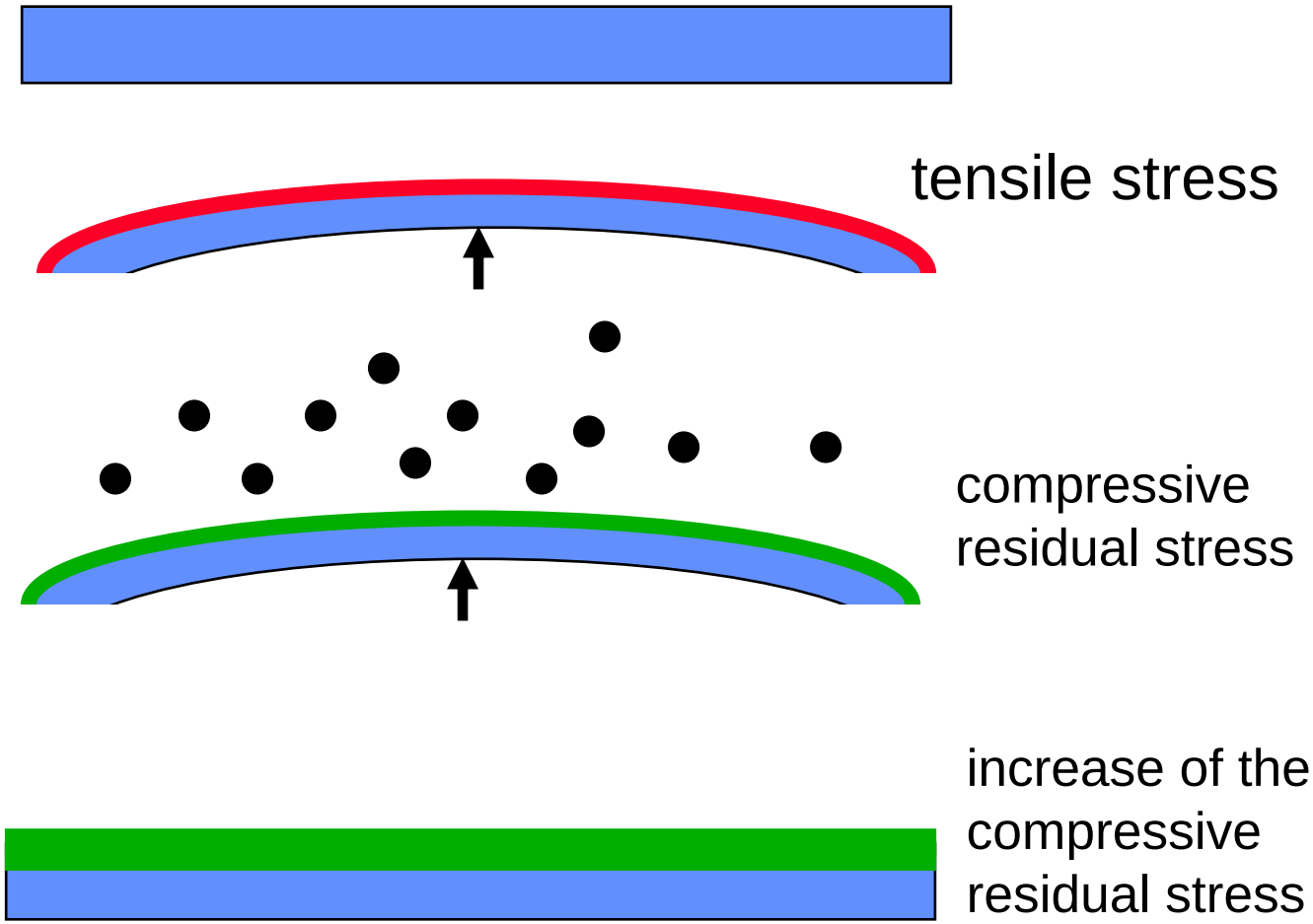
Stress Peening

Basics:



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Behavior of the Residual Stresses

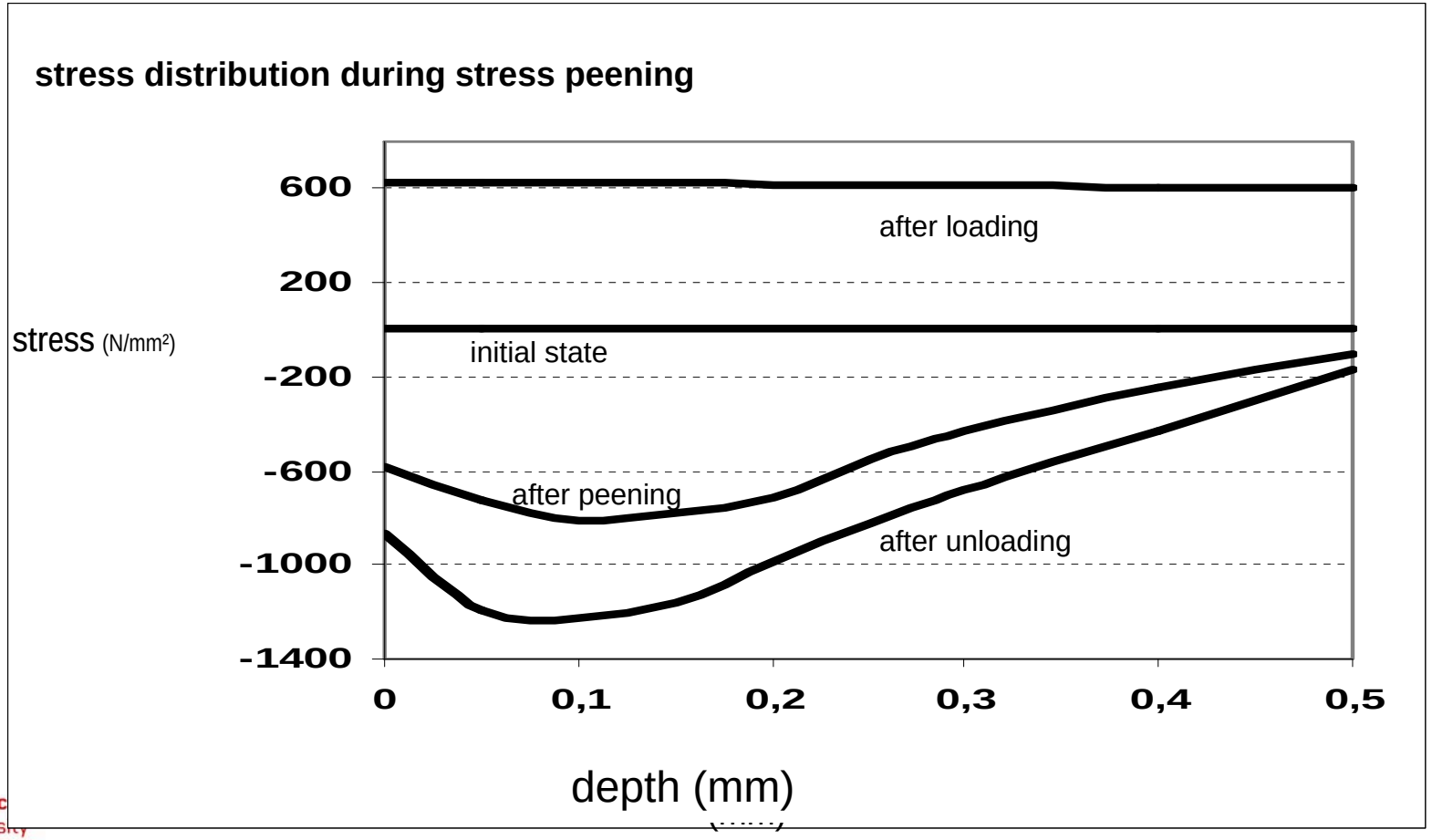


Fig. 1. The residual stress distribution (schematically) after the different steps

Residual Stress Measurements

points of measurements

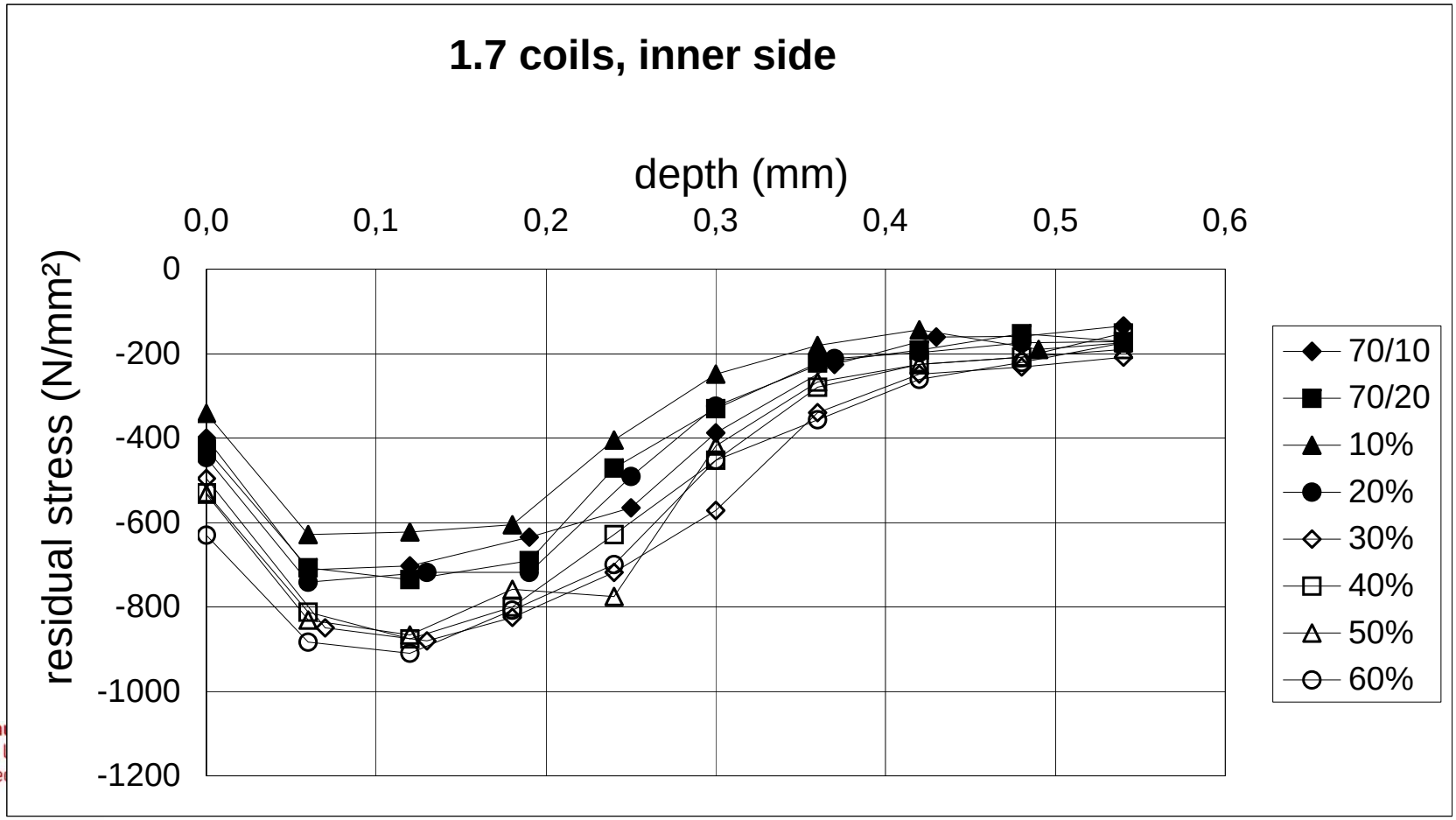
inner and outer side of the wire

preload:
0 % to 60 % of the maximum possible load

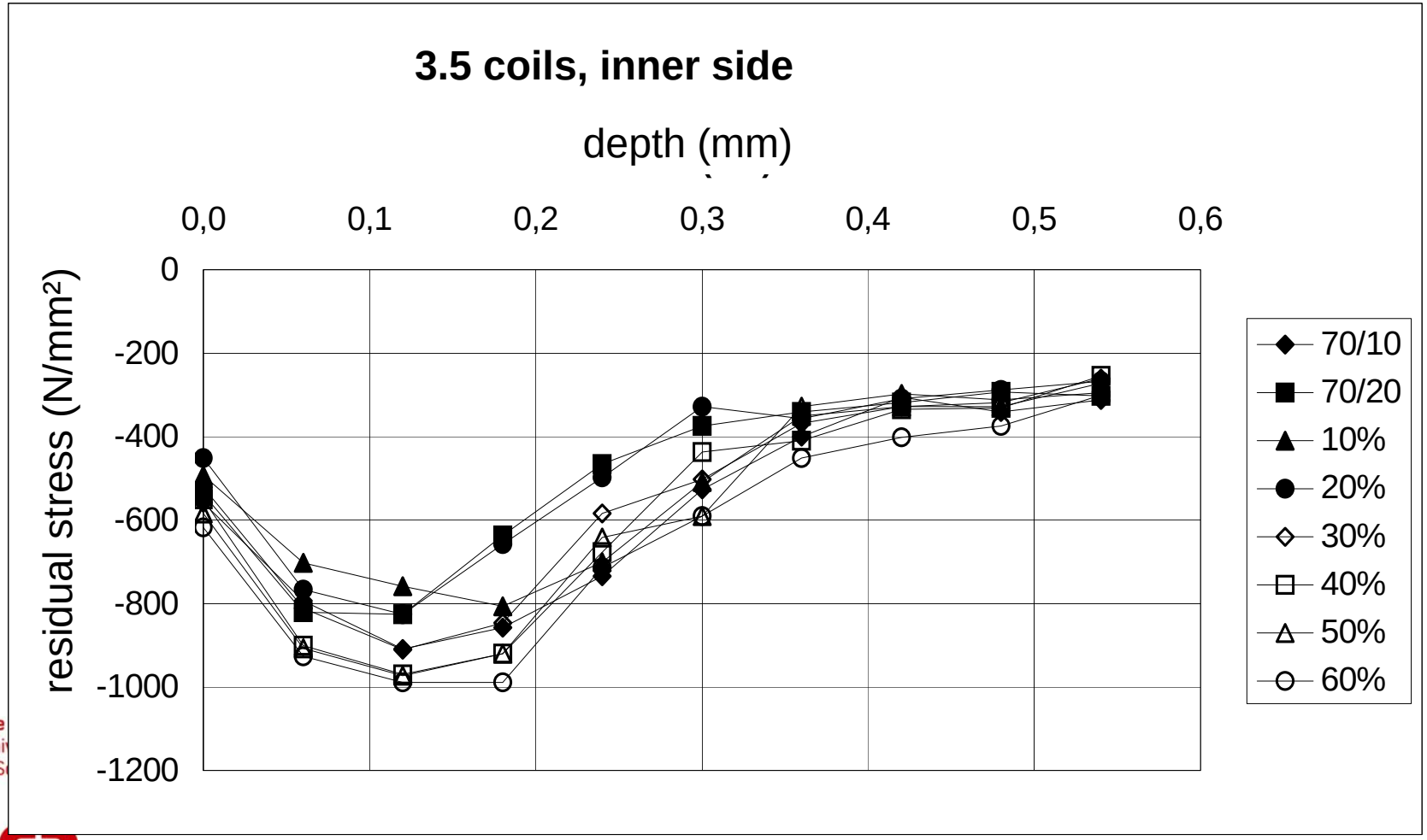
R_m = 1800 N/mm²

ICSP10 2008

Results


1.7 coils, inner side
depth (mm)
0,0
0,1
0,2
0,3
0,4
0,5
0,6
residual stress (N/mm²)
0
-200
-400
-600
-800
-1000
-1200
70/10
70/20
10%
20%
30%
40%
50%
60%

Results



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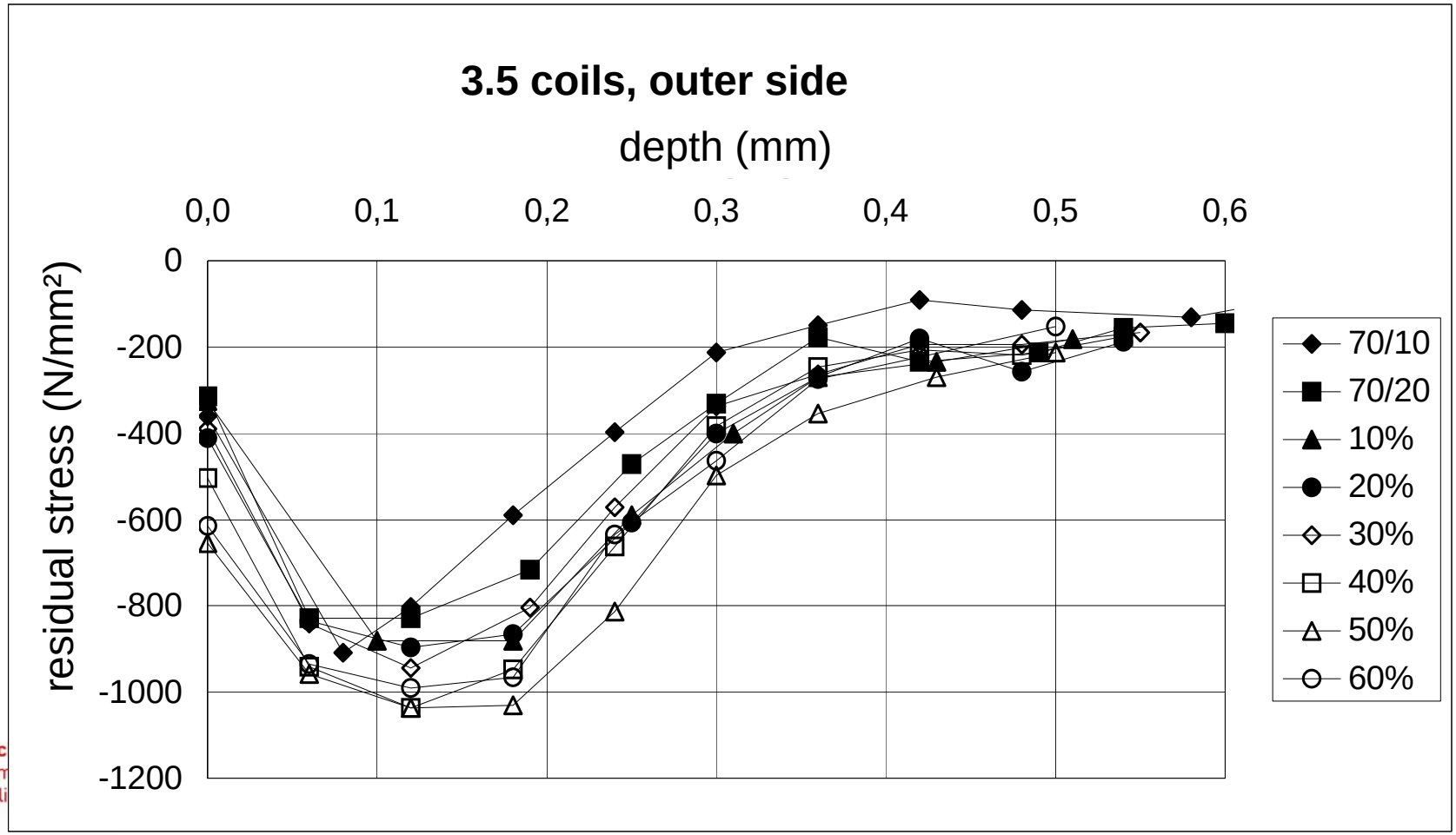
Results



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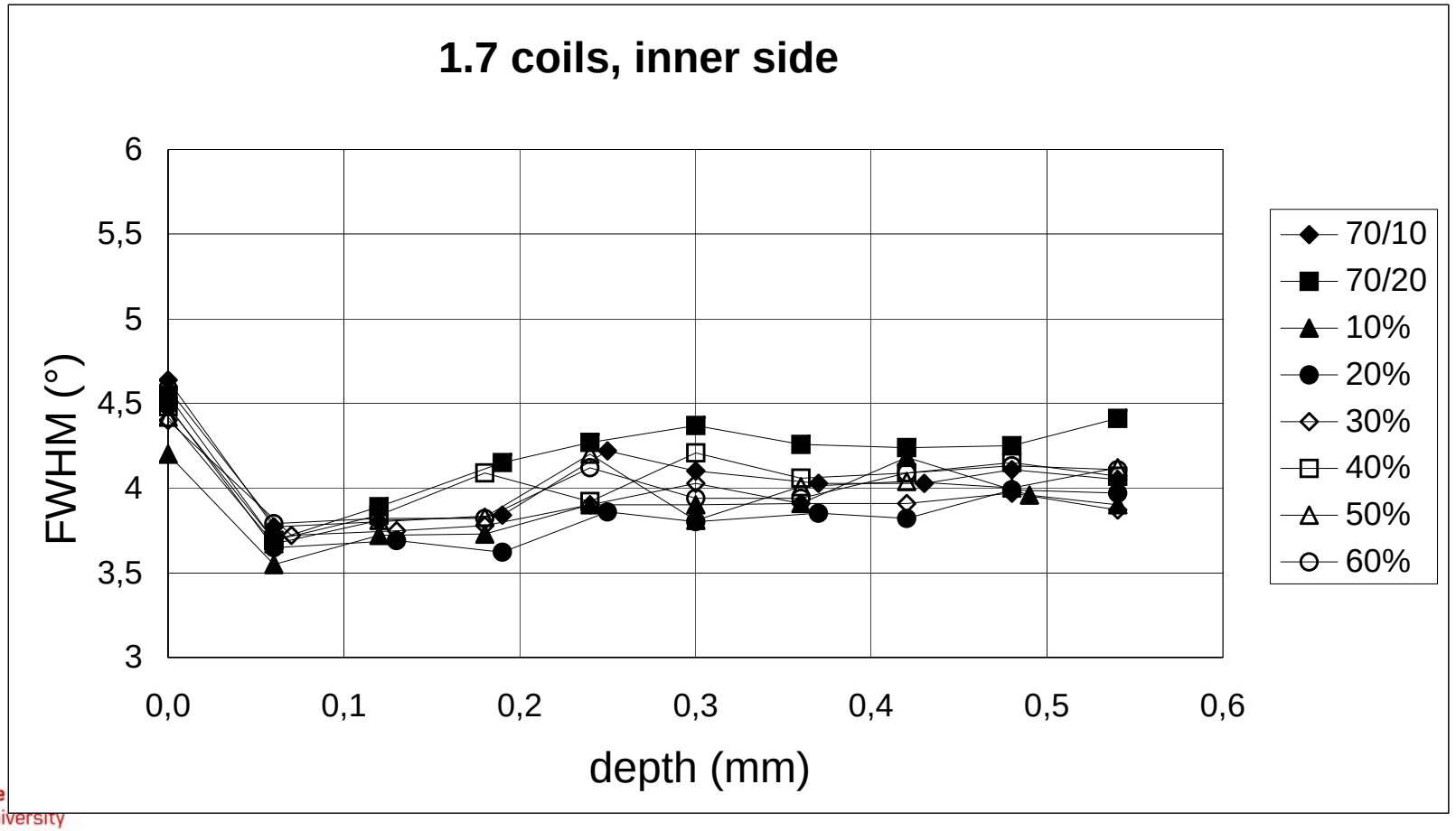
Microstresses



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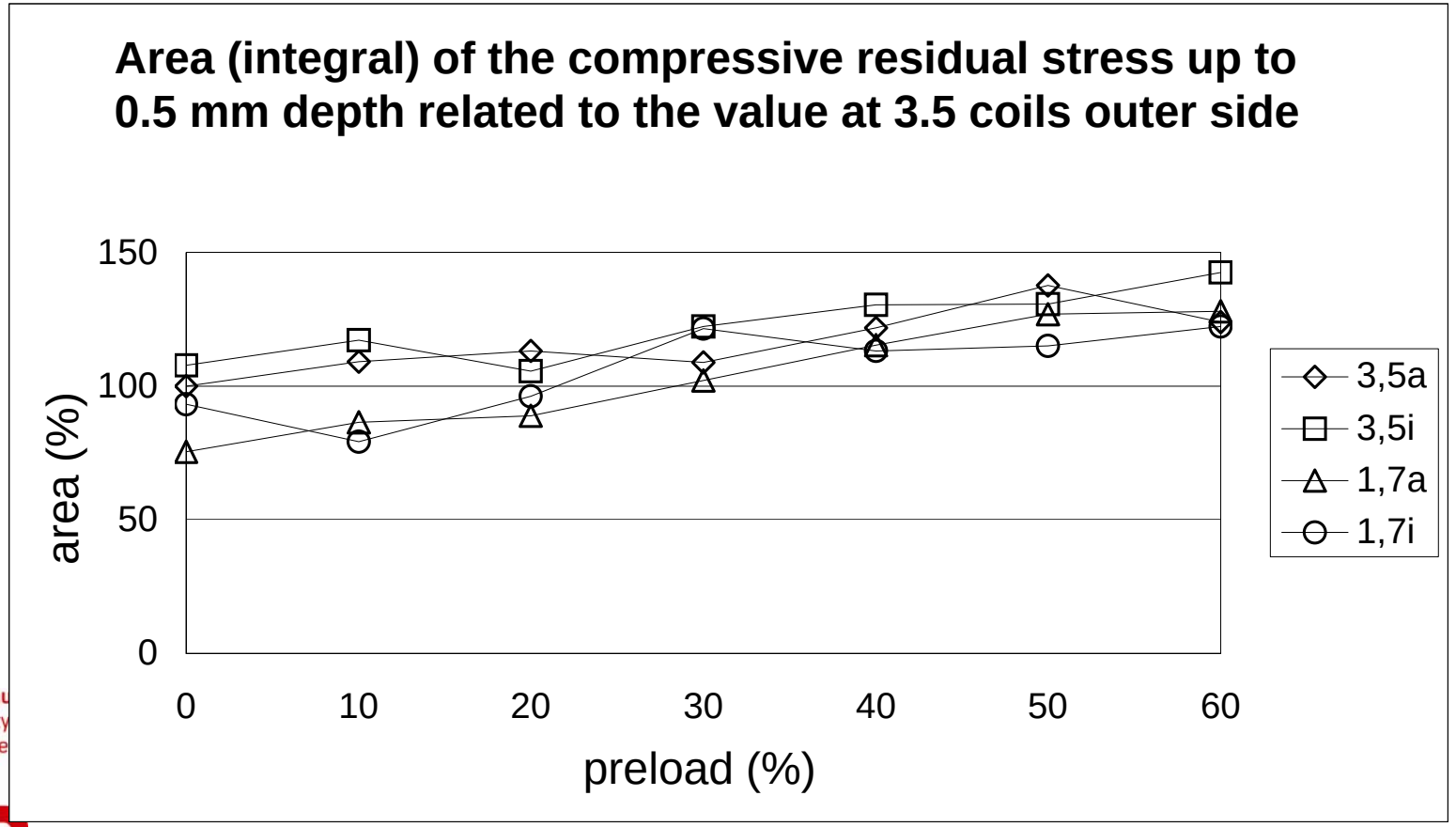
Summary Residual Stress



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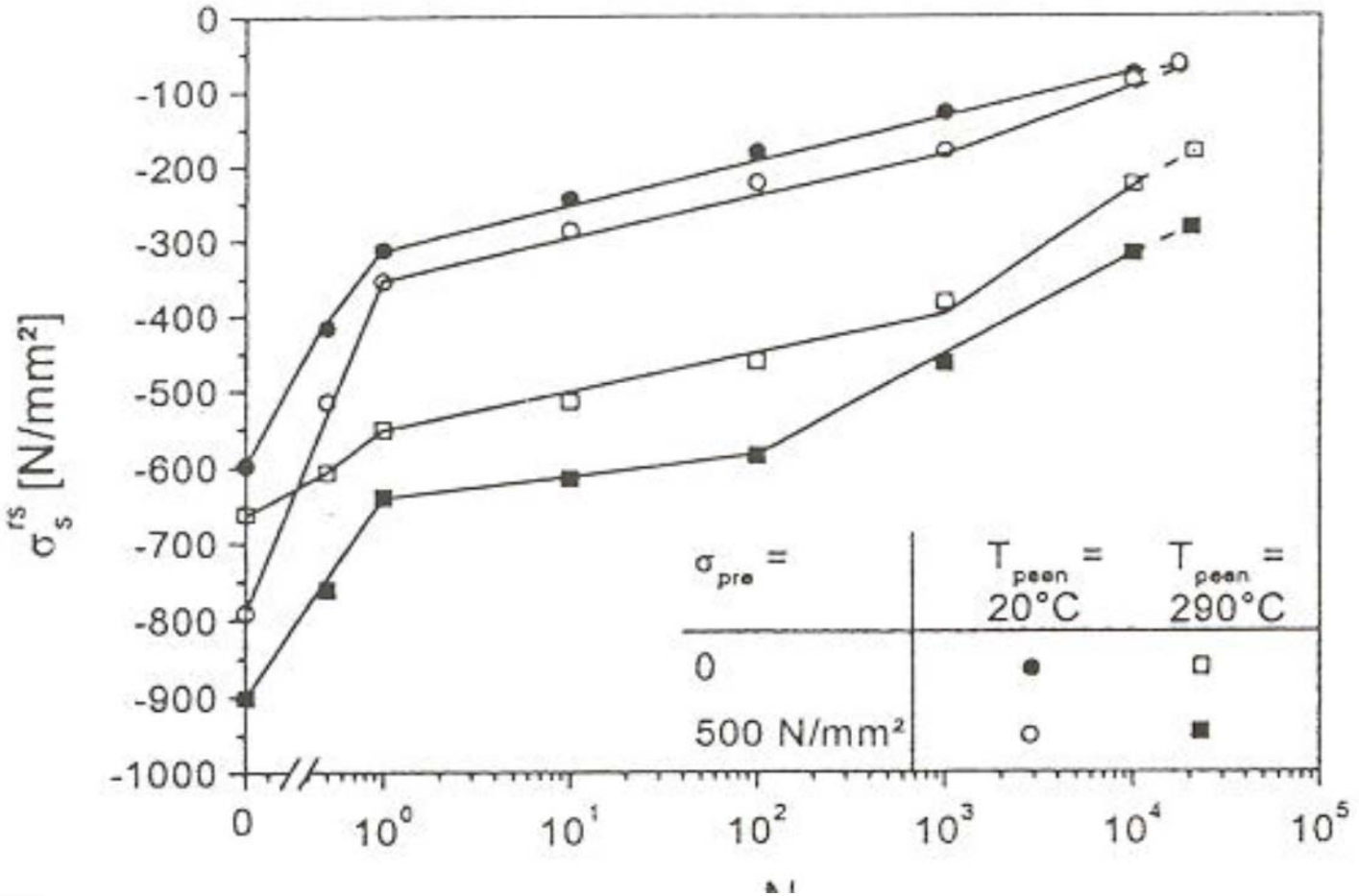
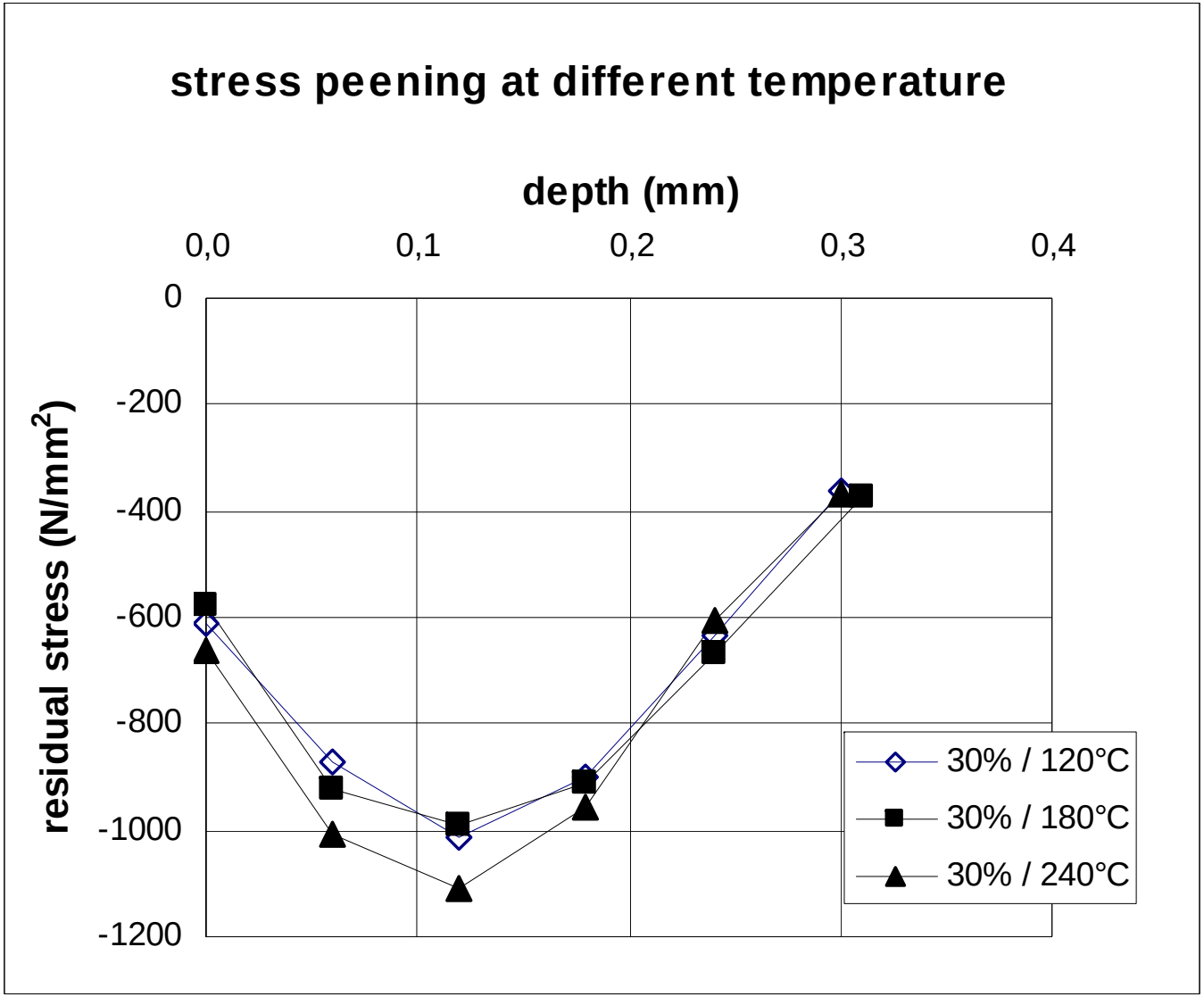
Advantage of Warm Peening



V. Schulze: *Modern Mechanical Surface Treatment*, (Wiley-VCH, ISBN: 3-527-31371-0, 2005)

Warm Peening



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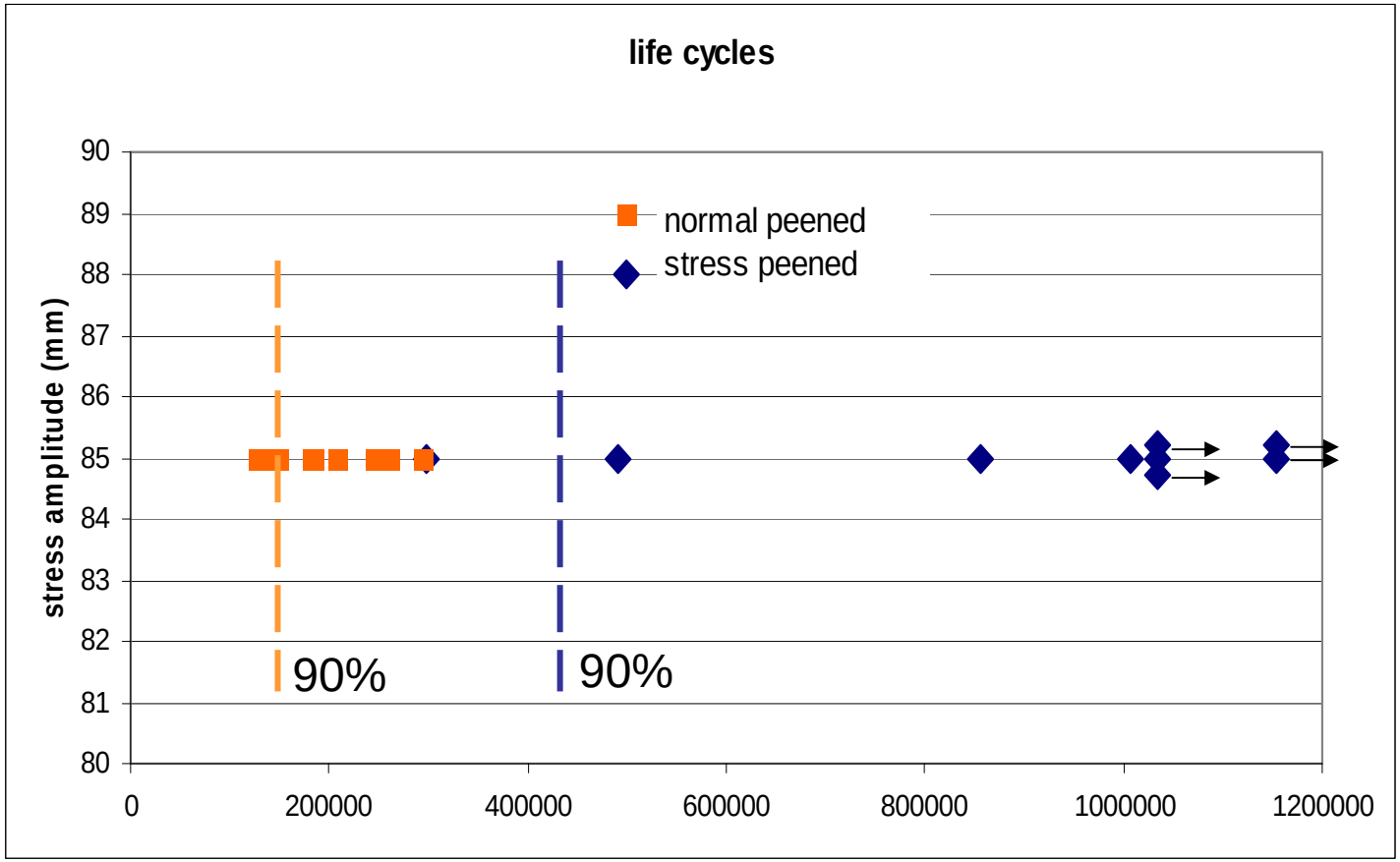
Durability



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Conclusions

- ☑ Stress peening of Minibloc springs is successful possible
- ☑ At 50 % preload a maximum of the compressive residual stress is reached
- ☑ It is no significant difference between outer and inner side of the wire

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