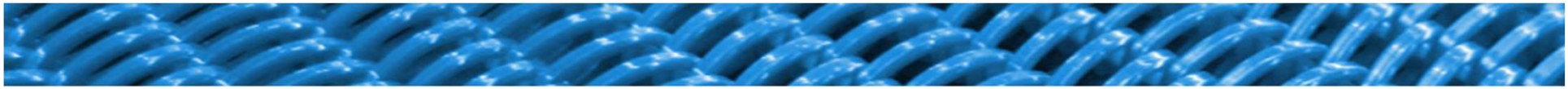
solution in spirals
Württembergische
Spiralsiebfabrik GmbH

STFI

Sächsisches Textilforschungsinstitut

(Saxonian Textile Research Institute)

Spiral fabrics in Spunlace operation



Targets

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Day 1 : **Test runs with viscose fibres**

Standard nonwovens in two common grammages of approx. 50 und 80 g/m² were produced.

The first run - as reference - with conventionally woven fabrics.

Following this, compaction wire and web stabilisation wire were one after the other replaced by **spiral fabrics**.

Day 2 : **Test runs with crimped PET fibres**

Procedure as outlined above.

Spunlace machine

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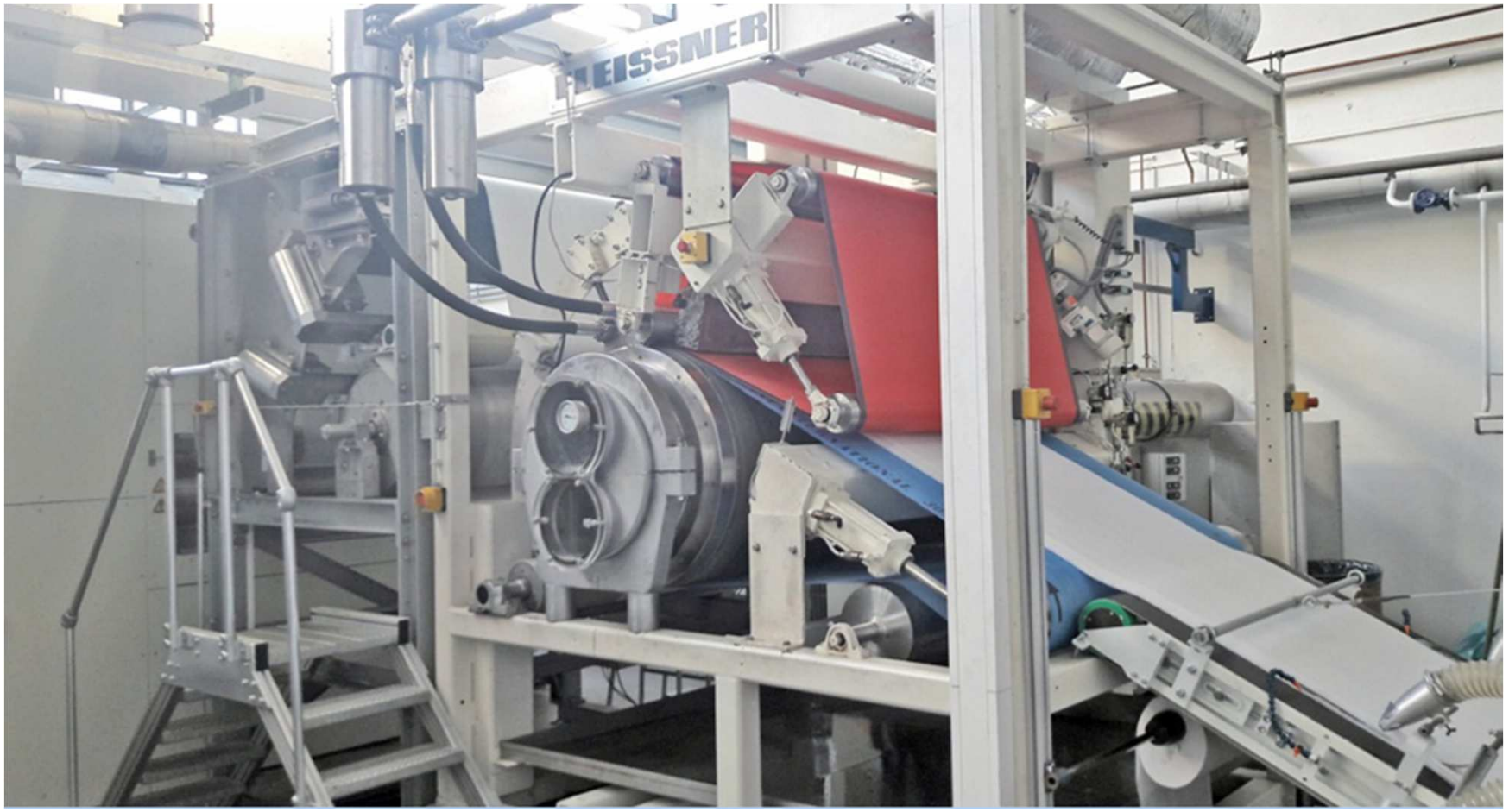

Sketch Spunlace machine

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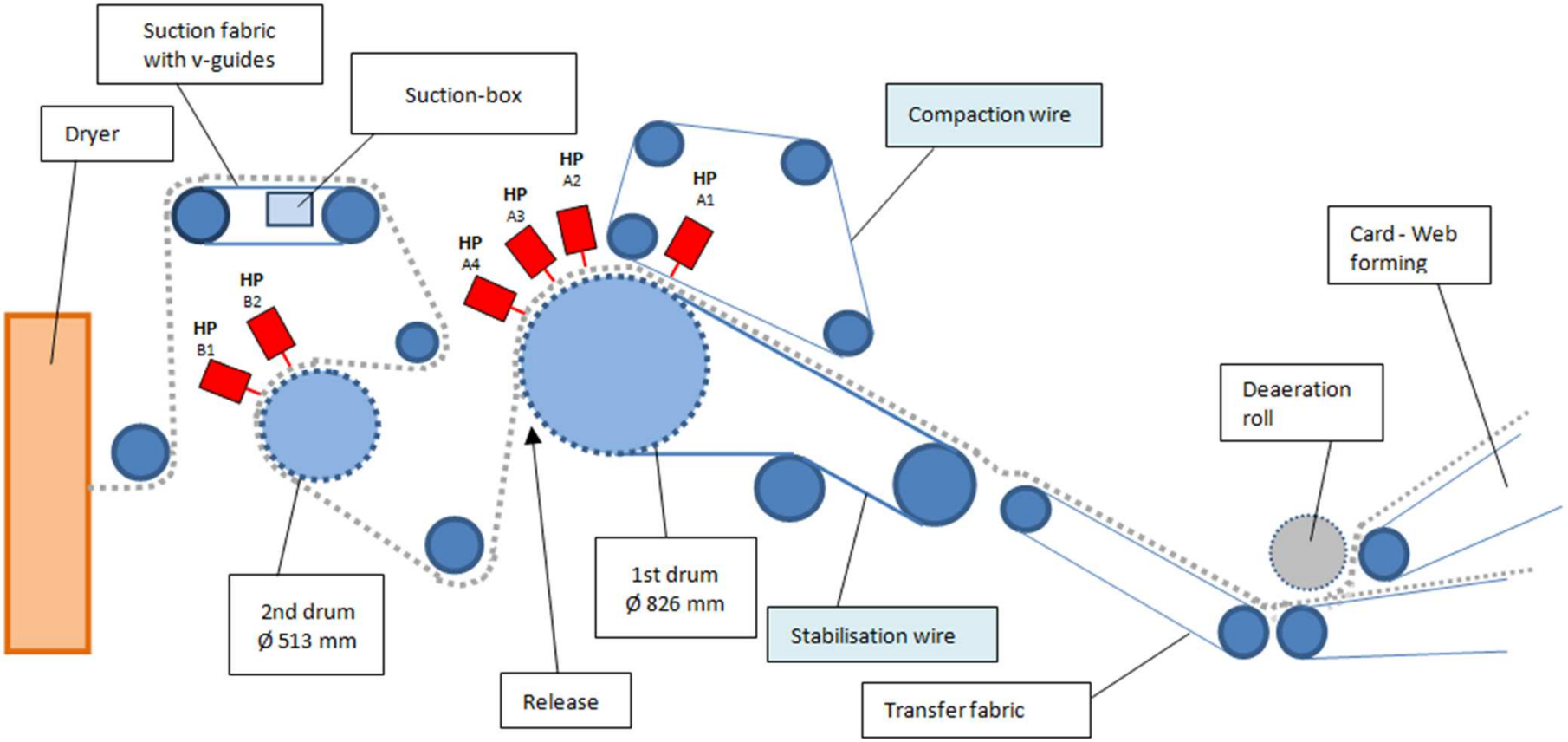

Details Spunlace machine

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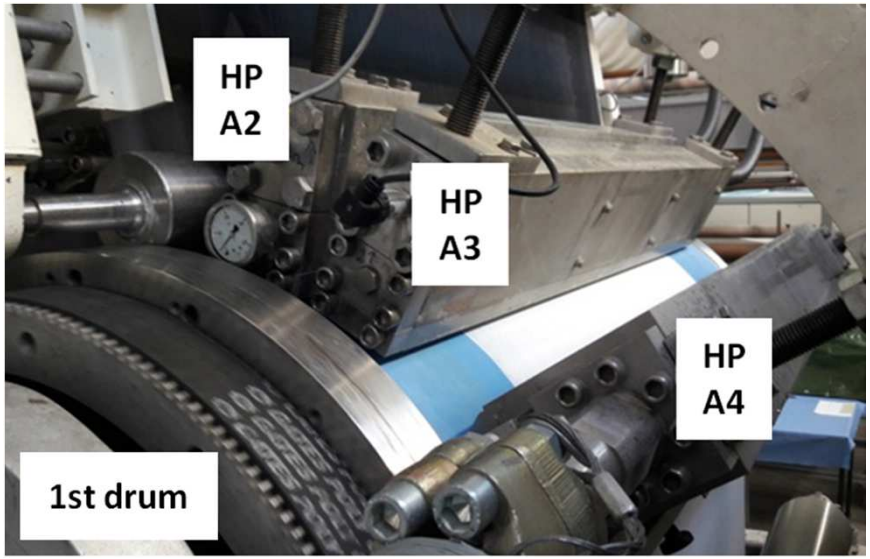
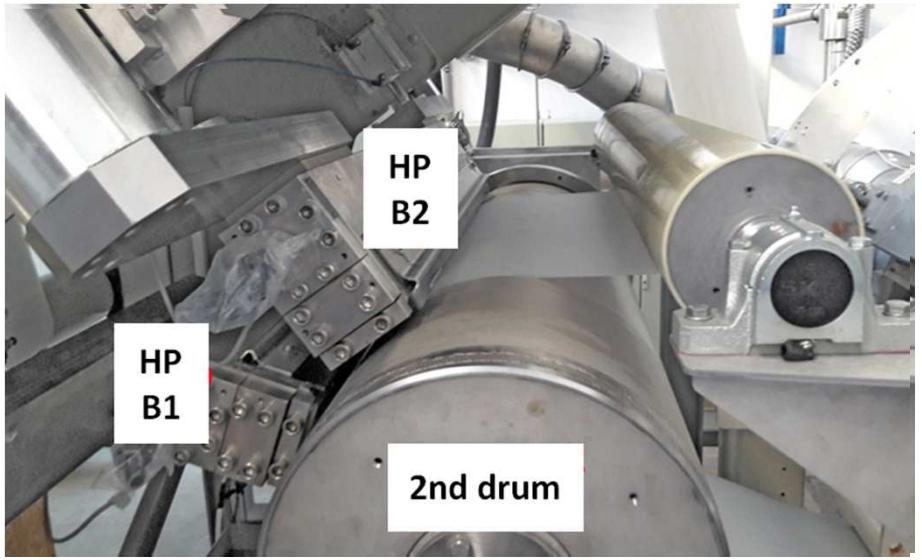
1st drum (from drive side)



2nd drum (from front side)



Fabrics / materials

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Compaction position :

(L3,07 x W1,30m)	Standard	Woven, conductive, 500-600 cfm
	Trial	**Spiralsolution 38000 FS, non-conductive, 900 cfm**

Stabilisation position :

(L4,60 x W1,41m)	Standard	Woven, 60 mesh, 230 cfm
	Trial	**Spiralsolution 38250 FS, 250 cfm**

Trial materials:

Viscose fibres	smooth / 1,7 dtex / 40 mm
PET fibres	crimped / 1,7 dtex / 38 mm

Pictures Day 1

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Release-behaviour of viscose fibres

with standard fabric

(clean release)

with WSF spiral fabric

(some fibre adhesion visible)

Comments Day 1

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Viscose fibres

Nonwovens release-behaviour a little poorer when using spiral fabric as stabilisation wire on 1st drum, some fibre adhesion visible under spotlight.

However, all settings could be run in all trials, producing nonwovens with the targeted grammages.

Data Day 1, Viscose
Max. tensile strength

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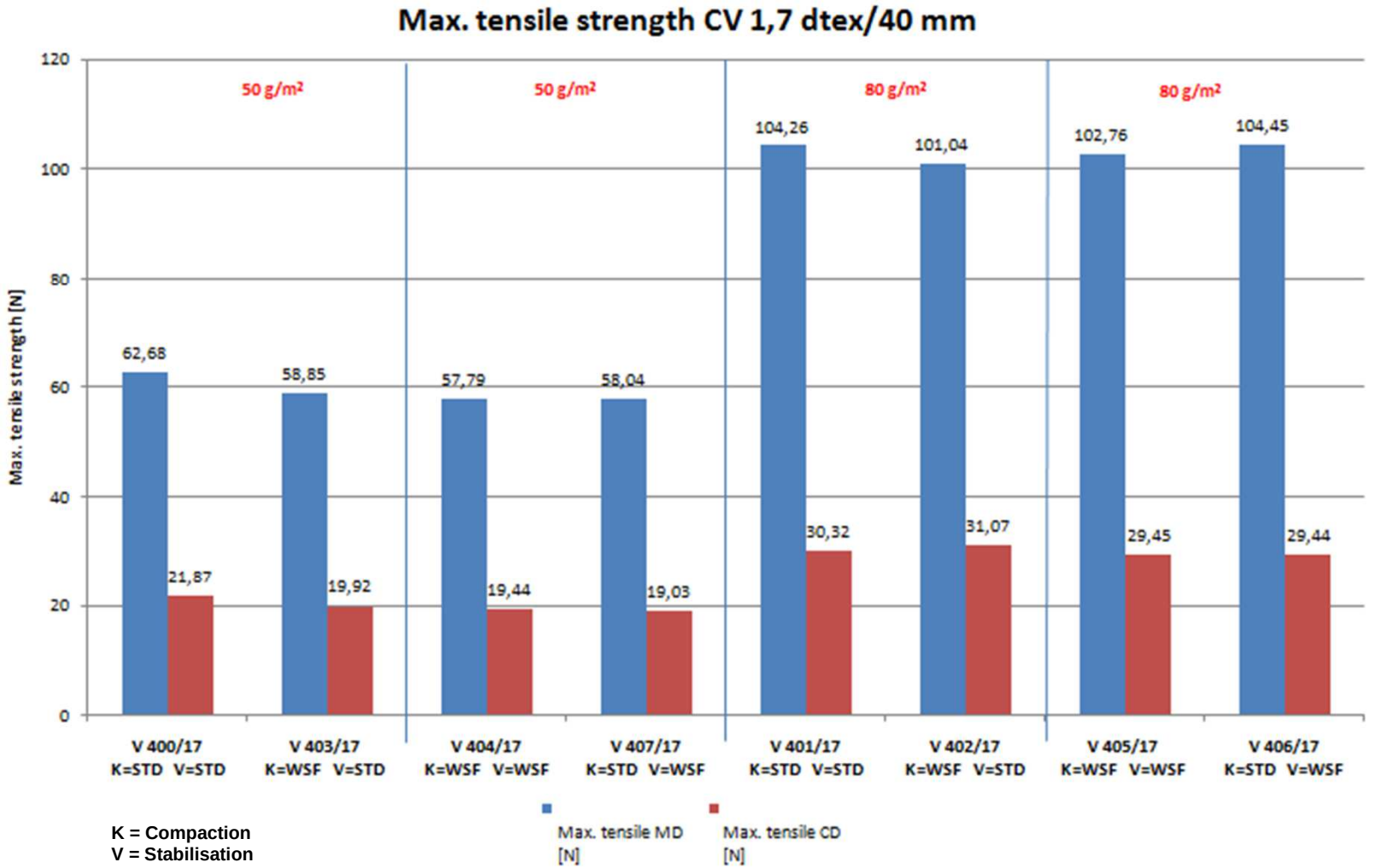

Data Day 1, Viscose
MD/CD tensile ratio

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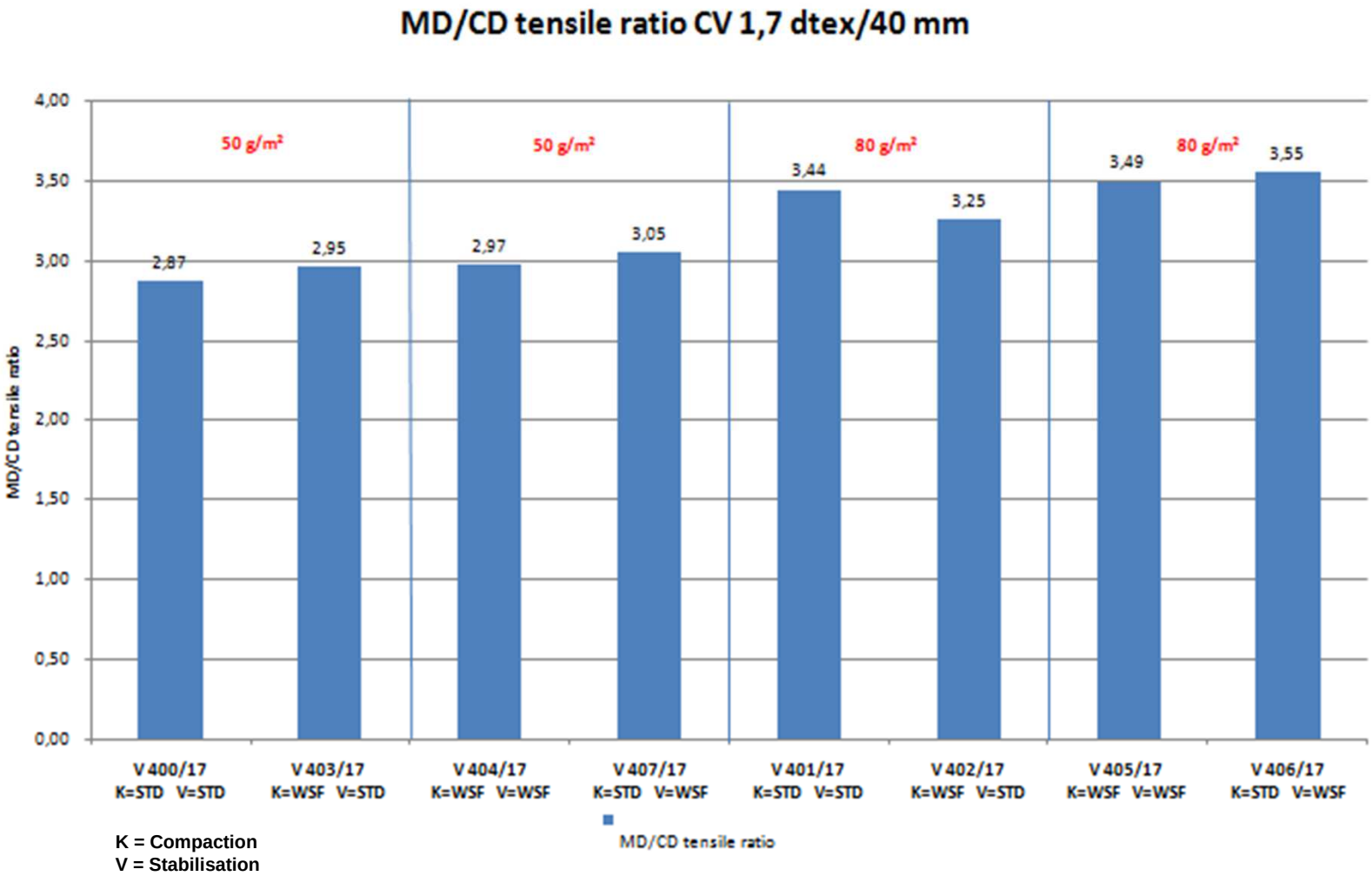

Conclusion:
Day 1, Viscose trials

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Only very small differences were observed in the mechanical / physical properties of the viscose fibre webs produced first with conventional fabrics and then with spiral fabrics in the compaction and stabilisation positions.

The MD/CD ratio is increased when using spiral fabrics, meaning the isotropic properties of the web are slightly reduced.

The reason for this increase in MD tensile strength (with simultaneous decrease in CD strength) probably lies in the higher MD fibre orientation, which in turn is the result of the impacted release-behaviour and therefore higher draw necessary when running spiral fabrics.

Regarding measurement accuracy, it needs to be noted for this conclusion, that the absolute differences in MD and CD tensile strength values are so low that measurement accuracy and tolerances may play a major role, logical consequences need to be verified by further test runs.

Pictures Day 2

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Release-behaviour of PET fibres

with standard fabric

(earlier release, no fibre residue)

with WSF spiral fabric

(poorer release-behaviour, improved by change of machine settings)

Comments Day 2

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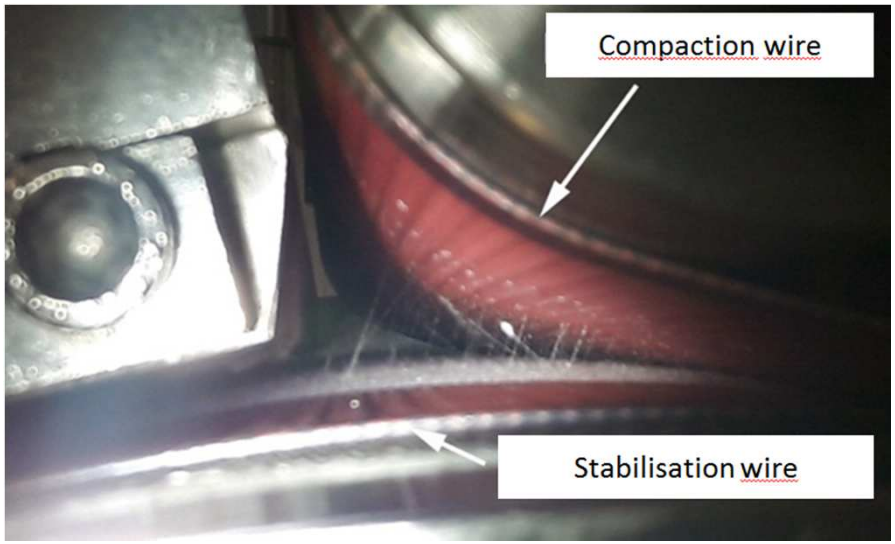
PET fibres



Some fibre residue on the **compaction wire** (top spiral fabric, pictured left), not worsening throughout the trial - result of cleaning action by the inside HP needling beam A1?

Stabilisation wire (picture previous slide)

Poorer release-behaviour of the PET nonwoven from the spiral fabric corrected by change of machine settings, i.e. increased draw from the stabilisation wire.

Results Day 2
Further actions

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1. Spiral fabrics can be used in the stabilisation of nonwovens on Spunlace machines.

2. STFI offers product analyses of the nonwoven webs produced, meaning exact determination of grammages and MD/CD tensile strengths under laboratory conditions. Any technical differences in the nonwovens produced can be identified by these means.

3. Further trials for spiral fabric optimization are planned.

4. Spiral fabric designs, envisaged for further test runs:

Compaction wire	45000 S
Stabilisation wire	45xxx S-V (minimum possible permeability)

Data Day 2, Polyester
Max. tensile strength

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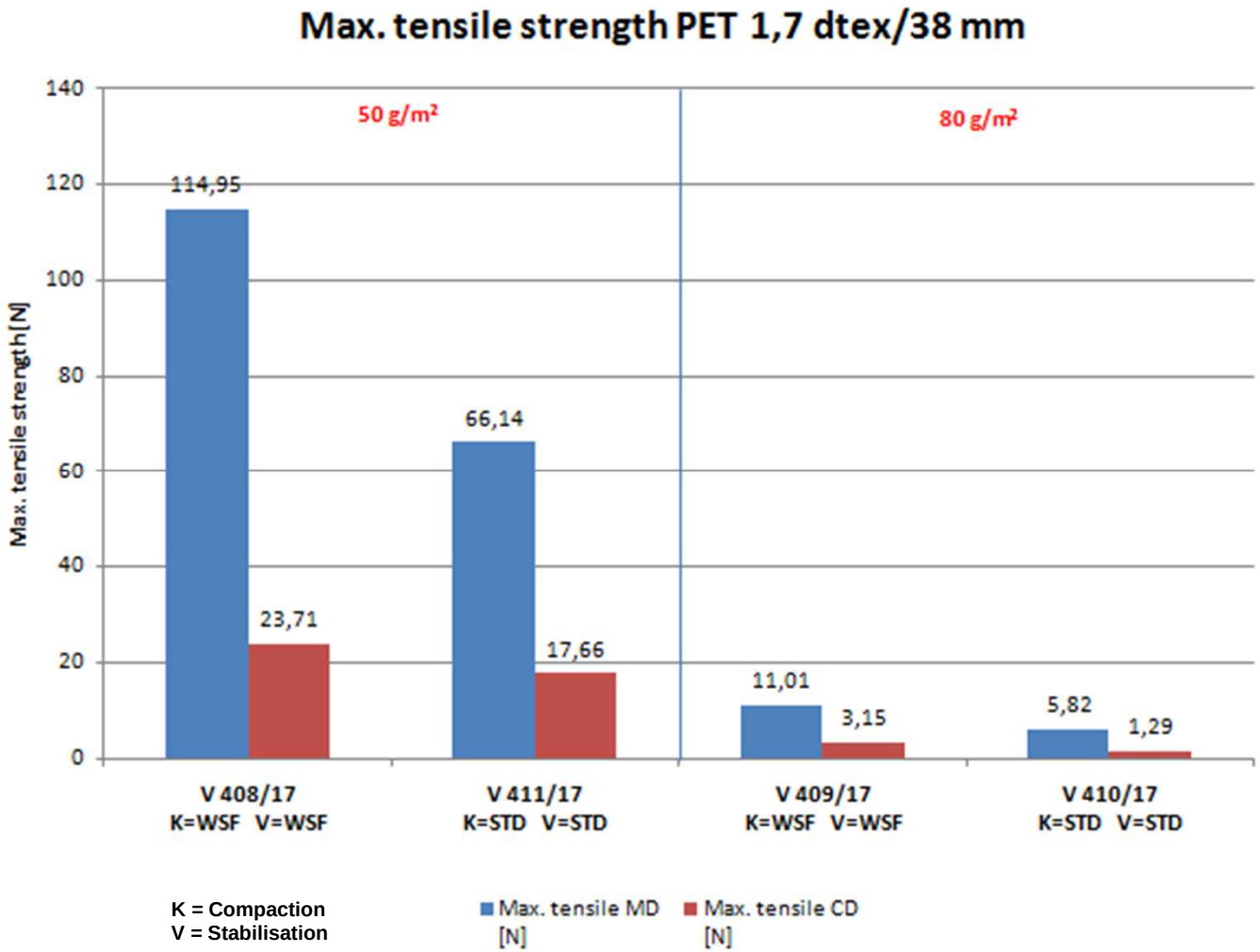

Data Day 2, Polyester
MD/CD relationship

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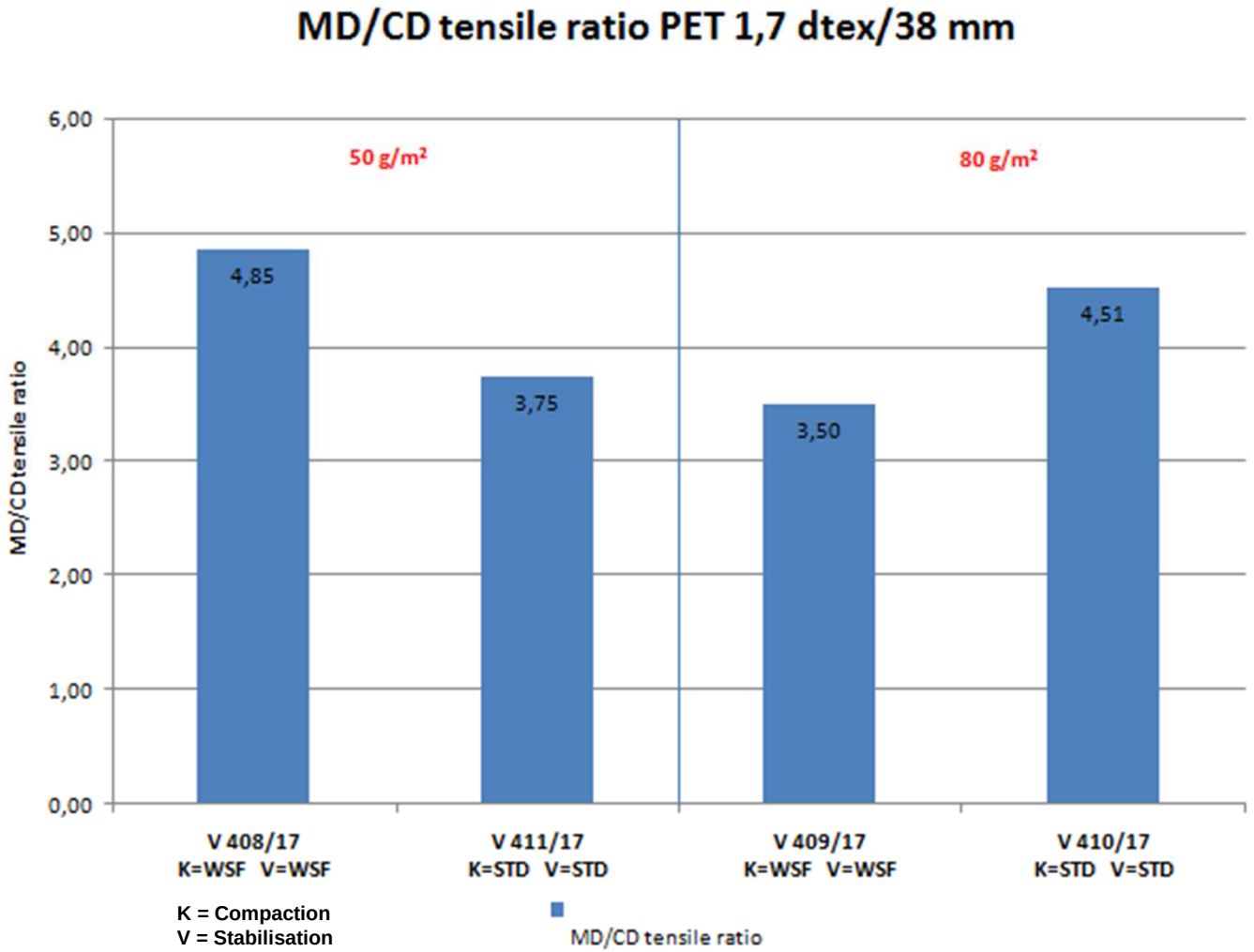

Conclusion:
Day 2, Polyester trials

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Upon viewing the measurement results, it has become evident that
only the 50 g/m² PET nonwovens figures should be considered more closely.

Tensile strengths of the 80 g/m² PET nonwovens have proven to be extremely low, possibly due to the energy input required for release purposes from the spiral fabric stabilisation wire.

The measurement results for the 50 g/m² PET nonwovens are remarkable in that they show approx. 74% MD tensile strength increase for use of spiral fabrics in the compaction and stabilisation positions of the Aquajet unit, at the same energy input.

Equally, but not to the same extent, the CD tensile has risen (approx. 35%), altogether increasing the MD/CD tensile ratio and decreasing the isotropic properties of the nonwoven.

The enormous increase in tensile strength is rated positively, allowing nonwovens - at a given minimum tensile strength required - to be produced at reduced needling water pressures, thus saving energy.

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Thank you for your interest!

Oliver Maier

October 2017