Monforts Soft-Coating®: Maximum fabric effects with minimum machine application

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1. What does soft-coating mean?

"Coating" is a widespread application in the finishing of technical and functional textiles.But not "everything" always has to be coated. Many finishing processes with products in aqueous liquors can be applied more easily and better using other methods. One example of this in the soft-coating process. Soft-coating is a "revival" of an "old" technique. Soft-coating is the application of selective quantities of liquor and can be performed:

(a) On one side with 1 formulation.
(b) On two sides with 1 formulation.
(c) On two sides with 2 different formulations.

The "minimum liquor application" is understood here as the quantity that permits energy-efficient drying with maximum fabric effects. (see fig. 1)

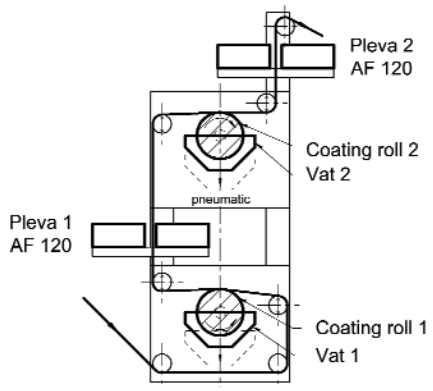

Fig. 1: Shows the principle of the soft-coating range.

Two liquor vats with two coating rolls controlled independently of one another by two **Pleva AF 120** microwave measuring units form the heart of the range. It allows dry-in-wet and wet-in-wet processes to be carried out exactly to order. Adjustable guide rolls help to influence wetting, application time and penetration depth. Soft-coating enables drying costs to be cut, production speeds to be increased, processes to be changed, functionalities to be created and two-sided effects to be achieved. (see fig. 2)

2. For which processes is soft-coating particularly suitable?

The application of the soft-coating range is explained here by reference to 4 examples from practice.

Fig. 2: Shows the original range.

Table 1 shows the different production possibilities.

Example 1: Hydrophobing to reduce the penetration depth Material: 100% glass fibre, 550 g/m², width = 1.80 m Dryer: Montex 7F stenter, nominal width = 220 cm

Case I	Initial moisture Residual moisture Temperature Fan speed x	50% (padder) 1% 130/150°C 1450 rpm 14% v/v	Heat energy with HR Electrical energy	835 kW 115 kW	32 m/min
Case II	Initial moisture Residual moisture Temperature Fan speed x	15% (single side) 1% 130/150° C 1450 rpm 14% v/v	Heat energy with HR Electrical energy	967 kW 120 kW	107 m/min (possible)
Case III	Initial moisture Residual moisture Temperature Fan speed x	15% (single side) 1% 110/100° C 600 rpm 30% v/v	Heat energy with HR Electrical energy	295 kW 17 kW	32 m/min

Summary: At constant production speed 65% less heat energy and 85% less electrical energy.

Example 1: Hydrophobing of a glass fibre fabric before coating.

The purpose of hydrophobing is to reduce the penetration depth of the coating compound. Originally the glass fibre fabric was padded with 50% liquor absorption and then dried. The padding process has been replaced by soft-coating with single-sided application of 15% liquor (fluorocarbon). (see table 1)

❖ **Case I** is the padding process with 50% liquor absorption.

Table 2 shows the different production possibilities.

Example 2: Hydrophobing and UV protection Material: 100% PES, 185 g/m², width = 1.60 m 1. Drying: Montex 7F stenter, nominal width = 220 cm 2. Condensing: Thermex hotflue

Case I	Initial moisture Residual moisture Temperature Fan speed	70% (padder) 2% 130/150° C 1450 rpm	Heat energy with HR Electrical energy	843 kW 122 kW	80 m/min
Case II	Initial moisture Residual moisture Temperature Fan speed	25% (soft-coating, single side) 2% 130/150° C 1450 rpm	Heat energy with HR Electrical energy	943 kW 132 kW	224 m/min (theoretically possible)
Case III	Initial moisture Residual moisture Temperature Fan speed	25% (soft-coating, single side) 2% 110/100° C 600 rpm	Heat energy with HR Electrical energy	428 kW 22 kW	97 m/min

Summary: With reduced range setting higher production speed of 97 m/min and thereby 49% less heat energy and 82% less electrical energy.

- **Case II** is the soft-coating process with 15% liquor absorption, but drying conditions same as for Case I. The result is an increase in production speed from 32 m/min to 107 m/min. In many cases this is not feasible, therefore,
- **Case III** Reduced temperatures, reduced fan speeds and increased chamber climate, i.e. reduction in the exhaust air.

Case III shows that with the same production speed and desired fabric effect (hydrophobing of one fabric side), a saving of 65% in heat energy and a saving of 85% in electrical energy can be achieved for this drying process. The condensing of the products occurred during the coating step.

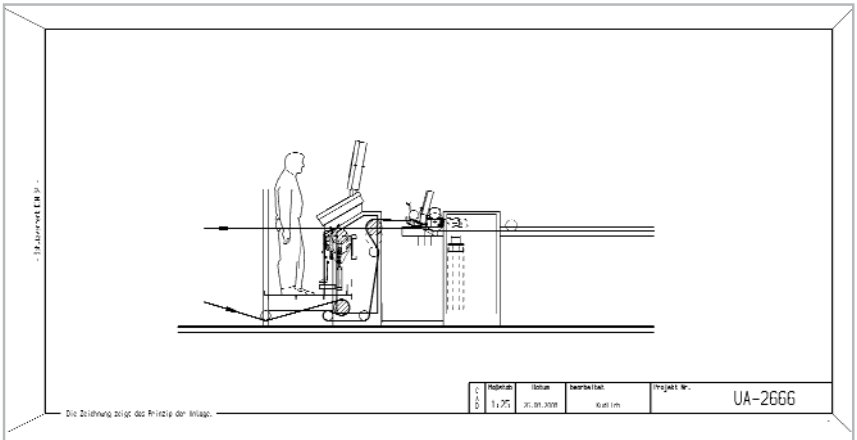

Fig. 3 shows that an application head can be integrated into the stenter infeed section.

Example 2: Fluorocarbon finishing (hydrophobing) with UV protection for 100% PES fabric (single-sided finishing).

Originally the PES fabric was padded with 70% liquor absorption. This process has been replaced by soft-coating with 25% liquor absorption.(See table 2).

Here we can see that by reducing the liquor absorption from 70% to 25% (Case II), an increase in the production speed to approx. 224 m/min. would be theoretically possible. It is better, however, to accept only a slight increase in production speed accompanied by 49% less heat energy and 82% less electrical energy, as shown in Case III.

For single-sided liquor application, Monforts offers a further alternative. On many of the Monforts Montex stenters, an application head can be integrated into the stenter infeed section, as illustrated in Fig. 3 as above.

Here it is possible to apply a liquor using the soft-coating method, it is possible to coat and both can also be carried out at the same time.

Example 3: Two-sided application with one liquor.

The capillaries of cotton are saturated with approx. 40% liquor absorption. After a liquor application on the padder, the squeeze effects are approx. 70%, that means 30% liquor is still contained in the yarn and between the stitches and has to be "unnecessarily" dried out.

Here the soft-coating process allows the liquor quantities to be applied selectively to both sides, e.g. 2 x 20%, i.e. with 40% liquor absorption (with stronger formulation) 30% less has to be dried compared with the 70% liquor absorption. Less initial moisture means less heat energy and less electrical energy with the same production speed, as already shown in the examples 1 and 2.

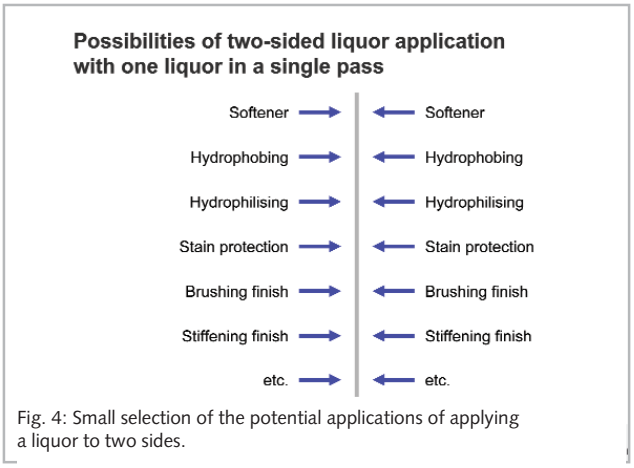

Fig. 4: Small selection of the potential applications of applying a liquor to two sides.

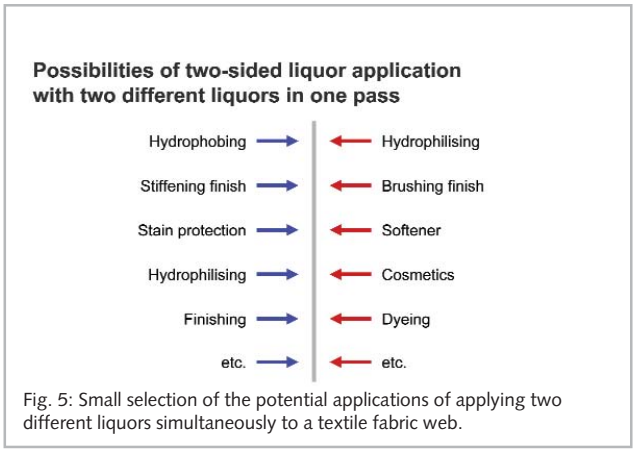

Fig. 5: Small selection of the potential applications of applying two different liquors simultaneously to a textile fabric web.

[Fig. 4] shows a small selection of the potential applications of applying a liquor to two sides while avoiding unnecessary liquor quantities and achieving maximum fabric effects.

Example 4: Two-sided application with two different liquors.

The aims of the soft-coating process are not only to achieve savings in electrical and heat energy, but also to obtain two-sided effects and new finishing possibilities in a single pass.

Coating each side of the fabric differently meant until now 2 passes of the fabric, 2x drying and 2x treatment process.

With soft-coating it is possible to apply two different liquors at the same time and to dry the fabric with minimum energy utilization. There are practically no limits to the user's fantasy here.

[Fig. 5] shows a small selection of the potential applications of applying two different liquors simultaneously to a textile fabric web.

3. Final considerations

Soft-coating has "revived" an "old" technique. Modern measuring and control systems and intelligent links result in a precise liquor application, irrespective of the production speed.

This system can make a major contribution to relieving the environment, and is a huge step forward towards combating the dwindling of resources. That can be achieved by minimizing machine application. Energy conservation has to be our foremost goal!◆