INFORMATION

German Quality Since 1856.

Moisture Boosting with the TurboCooler

Increasing moisture absorption and achieving constant moisture levels even over the seasons in order to maintain constant quality are two challenges in the textile industry. In order to be able to act more independently of the seasons and to gain more moisture, the TurboCooler (TC) offers the appropriate solution.

Pre-Cooling as Revenue Booster

In conditioning machines the moisture is transported via saturated steam. The steam transfers the thermal energy to the textile good via condensation. The greater the temperature difference (delta t) between the goods to be conditioned and the steam temperature, the more steam can condense and thus moisten the textile. Therefore, a colder good will get more moisture, whereas a warmer moisture gets less.

Steam temperature is usually limited by climate conditions and for knitting yarns by the application (wax melting point), mostly not higher than 60°C. Such being the case, delta t can only be increased by lowering the temperature of the material to be conditioned.

The financial gain in moisture compensates by far the cost of energy, so that pre- cooling with the TurboCooler is a true and interesting alternative.

TurboCooler version as an automated cooling tunnel.

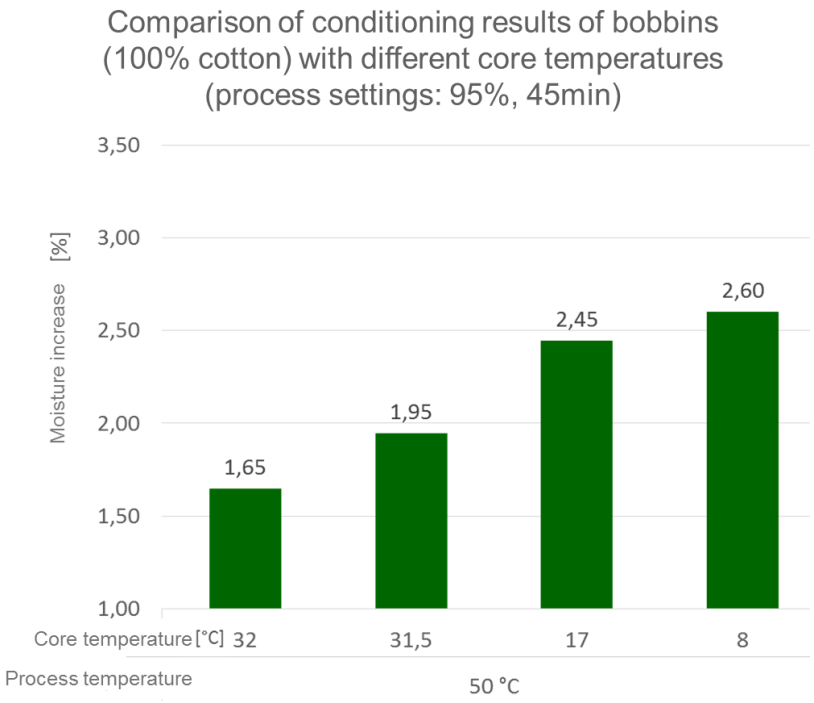

Figure 1: Comparison of the increase in moisture with different starting temperatures

Moisture boosting

The TurboCooler offers the possibility of pre- cooling the goods to be conditioned within a very short time and thus increasing the delta t for the conditioning process. Due to the increased delta t, more moisture can be absorbed during the conditioning process and a consistently high quality can be achieved over the seasons.

"Figure 1" on the left shows the effects on moisture absorption within a conditioning process for bobbins with different core temperatures. The temperature was determined directly before the conditioning process.

The moisture absorption can be increased by + 50% compared to conventional conditioning processes.

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Cooling Times

Various cooling times for bobbins at different starting temperatures were determined within internal test series. The respective temperature development is shown in "Figure 2" below.

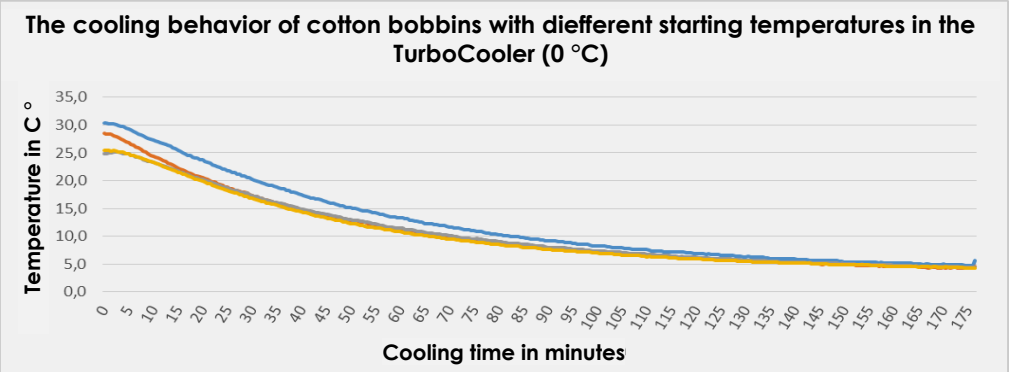

Figure 2: Cooling times of bobbins with different core temperatures

A temperature drop of over 10 °C is possible within less than an hour cooling time inside a TurboCooler.

From a bobbin temperature of 10- 15°C, which corresponds to a cooling time of 1 to 2 hours, a moisture increase of over +3% could be achieved by using the TurboCooler.

Economic benefit

The additional moisture absorption increases the yarn quality and ensures that this level can be maintained throughout the year.

In addition to the improvement in quality, an increase in weight also enables an economic benefit. Despite the additional energy requirement of the TurboCooler, the savings due to the increased moisture absorption are significant, as shown in Table 1 on the right.

The TurboCooler can be engineered as stand alone unit for existing plants for manual operation or as Tunnel Unit for automated factories.

		Conditioning standard	Conditioning & Moistur boosting
Item		Cost	Cost
Local currency		USD	USD
100% Cotton, 1h in TurboCooler			X
100% Cotton, Conditioning at 60°C for 45 minutes		X	X
Total hours per year		8.700	8.700
Planned production quantity Kg. per hour		1.000,0	1.000,0
Total production processed in Tons/ year		8.700,0	8.700,0
Calculated minimum weight increase in % acc. to above average example		1,5	2,5
Weight increase in Kg/ hour		15,000	25,000
Weight increase yearly in Kg		130.500,0	217.500,0
Energy cost per kWh USD		0,100	0,100
Energy consumption per 1000,0 Kg of production [kWh]		27,50	27,50
Energy consumption per 1000,0 Kg of conditioning [kWh]		25,00	25,00
Cool down of 1000 kg by 10°C (cooling time for ~1h) [kWh]			4,00
Total consumption per year in kWh		239.250,00	274.050,00
Total cost for electric energy/year		23.925,00	27.405,00
Total cost for water/year (1USD/cbm, 300l/h, 2610 cbm total consumption per year)		2.610,00	2.610,00
Selling price per Kg of yarn		3,00	3,00
Additional value obtained for the increased weight		391.500,00	652.500,00
Less cost for maintenance and consumables		3.500,00	3.500,00
Net operating profit per year		361.465,00	618.985,00
Price of the offered machine type	CONDIBOX	90.000,00	90.000,00
	TurboCooler		30.000,00
Additional expenses for installation, energy, water, pit etc.		5.000,00	5.000,00
Total investment		95.000,00	125.000,00
Operational return of invested capital in years		**0,26**	**0,20**
Net operating profit in 5 Years		**1.807.325,00**	**3.094.925,00**
Net operating profit in 10 Years		**3.614.650,00**	**6.189.850,00**

Table 1: Profitability of the TurboCooler

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