PRACTICAL CASE

Cost and quality optimization with USTER® *AFIS PRO 2* – a case with a blended yarn for knitting

Why should ongoing processes be cross-checked time and again? How do they contribute to cost, and quality optimization?

It was a couple of years since the spinner had last checked the comber noil settings. The mill always had consistent cotton quality as input to the spinning process. However, the management wished to confirm if the mill processes were still up to standard, to continue their efforts to manage the mill with quality in mind.
For the assessment, the mill chose a Ne 45 blended knitting yarn of 60 % combed cotton and 40 % PES. All the quality parameters were considered good – concerning both spinning preparation processes and the final yarn and its further use.
The level of fabric appearance and the number of small neps in the fabric – the two major indexes the knitting mill had sought – were satisfactory when compared to the mill specifications.

USTER solution
During the assessment of its quality management system, the spinning mill decided to check if the processes were optimized. The mill decided to focus on the most prominent waste element – comber noil – in order to seek optimization and cost saving.
In the design of the trial, the mill decided to check the comber noil at the level of 17 %, compared to the actual level of 18 %. The aim of the trial was to find out the influence on quality, and whether this could be tolerated. All the samples for both noil settings were processed on the same machines, with the same material and at the same time.

Results
The spinning mill kept a close eye on the quality of each process.

Quality data from the comber, the drawframe and the roving machine
Both comber sliver and comber noil were checked using USTER® *AFIS PRO 2*. The results, as listed below, did not show any difference between the two comber noil settings, allowing for normal material variations. (Table1)

	Comber sliver		**Comber noil**	
	Original setting 18.3 %	Test setting 17.2 %	Original setting 18.3 %	Test setting 17.2 %
Neps/g	5	6	216	244
SFC (n)	13.2	13.3	85.9	87.1
Trash/g	14	12	61	73
UQL	32.4	32.3	16.8	16.5
L(n)	25.1	24.9	10.1	9.9

Table 1: Comparing the quality of comber sliver and comber noil using USTER® *AFIS PRO2*

After combing, the cotton slivers were blended with the polyester slivers in three drawframe passes, before reaching the roving machine. (Table 2)

		1st passage drawframe	2nd passage drawframe	3rd passage drawframe	Roving machine
Neps/g	Original setting	4	3	6	4
	Test setting	6	6	3	5
SFC(n)	Original setting	8.6	8.7	8.9	8.8
	Test setting	9.7	9.6	9.3	9.3
Trash(g)	Original setting	15	9	8	3
	Test setting	25	12	9	3
UQL	Original setting	37.7	38.0	38.2	38.4
	Test setting	37.4	37.8	38.2	38.4
L(n)	Original setting	31.3	31.5	31.8	31.7
	Test setting	32.3	32.3	32.4	32.3

Table 2: Comparison of the quality data from the processes after combing. Test results from USTER® *AFIS PRO2*

An increase in the short fibers for the test setting of the comber noil was noticed, and needs to be evaluated later to assess its significance. However, the spinner also acknowledged that the roller spacing was not optimized to avoid fiber breakage. So, the spinner decided to leave the settings unchanged for the trial only. The level of neps for both comber noil settings did not show any difference.

Quality data from the yarn

The spinning bobbins with yarn from both comber noil settings were collected and tested in the USTER® *TESTER 6*. (Table 3)

	CVm%	H	Thin places	Thick places	Thick places	Neps	Neps
			-40 %/km	+35 %/km	+50 %/km	+140 %/km	+200 %/km
Original setting	13.34	3.44	145	406	37	100	28
Test setting	13.15	3.46	125	364	28	95	24

Table 3: Spinning bobbin quality results from USTER® *TESTER 6*

Testing of the spinning bobbins in USTER® *CLASSIMAT 5* did not reveal any significant differences in the quality of the yarn between the two settings. (Table 4)

	9 classes sum	A3	C3+C4	D3+D4	E	F	G
Original setting	15.4	2.5	1.5	1	3.6	5.3	0.5
Test setting	17.4	3	3.4	0.9	3.6	7	1.8

	H1	I1	A0	A1	B0	B1	C0	D0
Original setting	87	0.6	676.6	162.5	125.7	60	10.2	0
Test setting	83.6	1.4	582.9	129.4	94.8	48.85	16.05	1

Table 4: Results from the USTER® *CLASSIMAT 5*

The yarn was cleared on the winding machine and the clearer data, using the same clearing curve and conditions, were comparable. (Fig. 1)

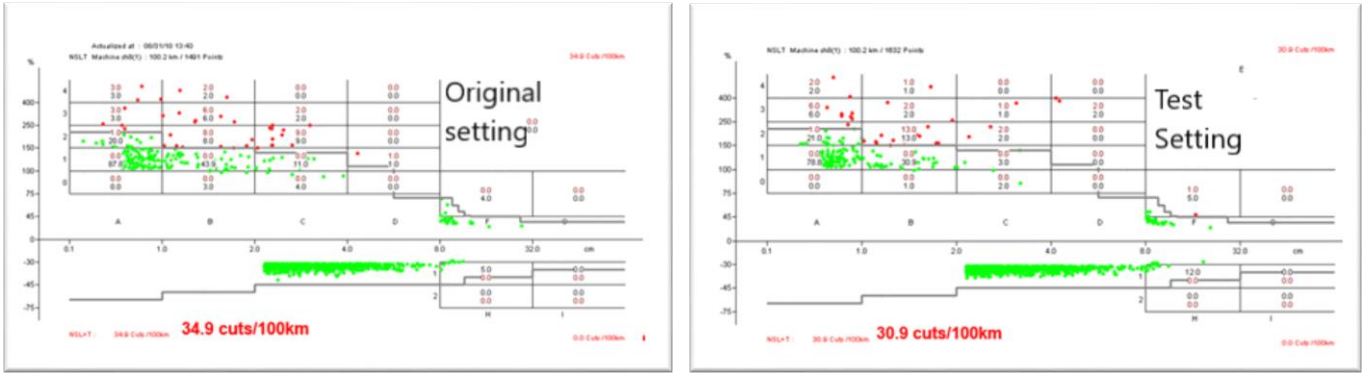

Fig. 1: Yarn faults scatter plots from USTER® *QUANTUM EXPERT*

Quality data from the fabric

Finally, the yarns from both settings were knitted into single jersey fabrics and checked by the mill's experienced fabric inspectors, who were adept at such controls.

The remaining yarn defects were classified into categories, as the mill normally does. The amount of knitted fabric inspected was 10 kg per setting. (Table 5)

	Original setting	**Test setting**
Fly	9	4
Splices	1	2
Dirt	4	4
Thick places	8	8
Foreign fiber	2	3
Neps	0	1

Table 5: Comparison of the yarn defects in the knitted fabric, visually inspected

Conclusion and Summary

- The spinning mill decided to change the comber noil setting in a group of machines and repeated the trial on a larger scale. The results obtained were similar to the results of the initial trial.
- The decision, finally, was to change the comber noil to the new setting. This change, apart from ensuring there was no deterioration in yarn and fabric quality, had a positive impact on the mill's profits. According to the spinner's calculation, the mill was able to increase the profit from this specific yarn to approximately USD 40 000 per year. Note: in the calculation below, the blend percentage of the cotton is considered as 60 %. (Fig. 2)
- Finally, the spinner decided to test the comber noil setting every three months and at every major change of the cotton supply. This way, the spinner could ensure that there was no unnecessary increase in waste.
- Based on other experiences, it is good practice to check the comber noil frequently. Higher comber noil does not always result in better yarn and fabric quality. Finding the optimum level is a routine for many spinning mills.

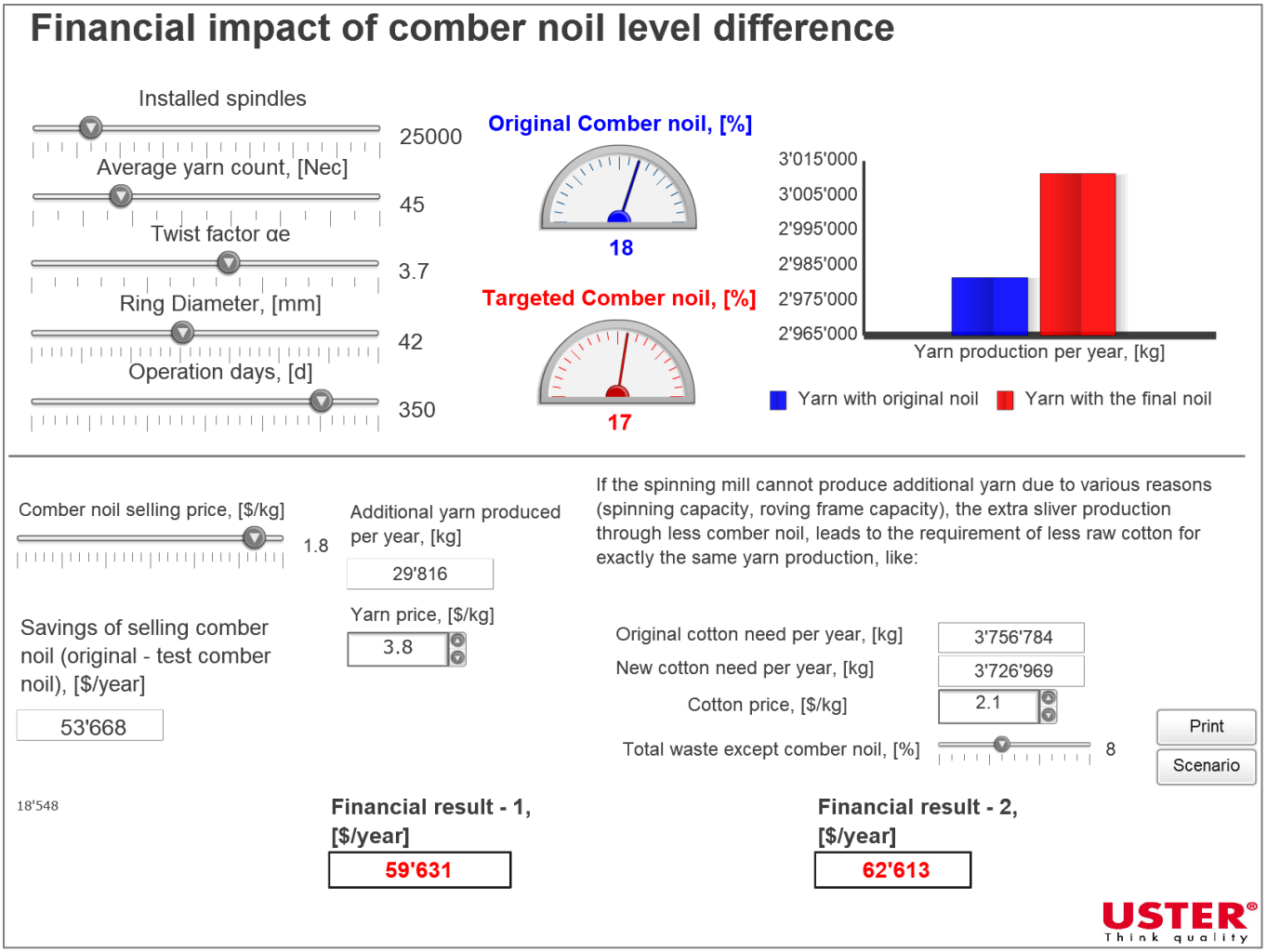

Fig. 2: Calculation of the cost/profit difference between the two comber noil settings

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