Compact Core Yarns
Compact Yarns from Man-Made Fibres
5star® Apron – New Product
ProFiL® Cartridge – New Product

Mill Report
Super Spinning Mills, India
EliTe® – A User’s View

Mill Report
Ramco Group, India
EliTwist® for Weaving

- Zweigle – Hairiness Standard
- SOLIDRINGS – B 174 vs. B 20
- Premium Parts – Low Shoulder Drive Tire

EliTwist®
Experience the Revolution in Compact Ring Spinning

... be a step ahead ...
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Front Cover:
EliTwist® – Experience the Revolution
in Compact Ring Spinning
Dear Customers,
We are happy to report that Rieter have exercised their option and have taken over 100% of SUESSEN’s shares. One strategic goal behind Rieter’s initial investment in SUESSEN was to have an independent, technologically leading company selling technological key components to OEMs and to end users, also in competition to Rieter. Obviously, this strategy has paid off, and no change will take place! SUESSEN will continue to develop leading edge technologies and offer them to you, our customer.

In our previous issue, we reported that we had sold a few selected installations of EliTwist®. In the meantime, over 50,000 spindles have been sold to our esteemed customers. In this issue, you will find two reports by users of EliTwist®, telling us about what they have found out about this exiting new technology. We want to take this opportunity to thank both of them for their willingness to share their experience with us. Without this kind of interaction, progress would be much slower!

As we expected, EliCoreTwist® produces the most perfect core yarn to date. We will report about the amazing features in this issue. Man-made (synthetic) fibres, often blended with cotton, continue to gain ground for various reasons. While compact spinning – first and foremost EliTe® – is firmly entrenched in cotton applications, with man-made fibres and their blends, the market penetration as of today is less. It seems that EliTe®, and particularly also EliTwist®, can offer very substantial advantages for the spinners of man-made fibres, too. Some of these issues are explored in the present issue of our SPINNOVATION.

After ring spinning, Open-End is no doubt the second most important spinning technology today. SUESSEN has been, and continues to be, very active in this demanding field. In one of our last issues, we introduced our ProFil® Rotors, which were accepted favourably by our customers. Consequently, we have developed further products along this line, and we will present our ProFil® Cartridge, the new maintenance-free EverClean Axial Rotor Bearing in this issue.

Our markets are on the move, and we must adjust to this movement. We will cooperate with Jingwei in the field of EliTe® Compact Spinning, and we have concluded the relevant agreement. Jingwei is by far the largest manufacturer of textile machinery in China, and possibly in the world, and we are happy to be associated with this important company!

We hope, you will enjoy this issue of SPINNOVATION, and we invite your comments and suggestions.

Sincerely yours,

Erich Casanova, Managing Director
Peter Stahlecker, Managing Director
1. Introduction

The production of core yarns has continuously grown since about the middle of the sixties. Meanwhile, approx. 10 million ring spindles worldwide produce core yarns.

The spinning of core yarn is costly and complicated. Irrespective of these handicaps, the demand for such yarns is continuously growing. Growth rates of 200,000 to 300,000 spindles per year are expected in future, too.

Core yarns consist of a filament core covered by staple fibres. This design permits to ideally combine the advantages of filaments (elastomers) like high strength or high elongation, with those of the staple fibres like textile appearance and touch, moisture absorption or expansion (cotton) or light resistance etc. The essential quality characteristic of core yarns is the best possible coverage of the filament core with the least possible slippage of the covering fibres. SUESSEN has supplied for many years most different devices to produce core yarns and goes on with this tradition offering new, until now unrivalled products like EliCore and EliCoreTwist for the manufacture of compact core yarns.

2. Definition

We distinguish between rigid and elastic core yarns. The most important features are summarized in the table below.

<table>
<thead>
<tr>
<th>Features</th>
<th>Rigid Core Yarn</th>
<th>Elastic Core Yarn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress-strain characteristic</td>
<td>Low elastic elongation, high strength</td>
<td>High elastic elongation, standard strength</td>
</tr>
<tr>
<td>Core</td>
<td>Filament, usually PES</td>
<td>Elastomer (Lycra, Dorlastan, Spandex), receiving its</td>
</tr>
<tr>
<td></td>
<td></td>
<td>elastic elongation only by prestress</td>
</tr>
<tr>
<td>Application</td>
<td>Sewing thread, technical fields of application</td>
<td>Short-staple spinning: underwear, sportswear</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Long staple spinning: Outerwear</td>
</tr>
<tr>
<td>Percentage of sheath fibres</td>
<td>Combed cotton, polyester 30–55%</td>
<td>Combed cotton 80–95%</td>
</tr>
<tr>
<td>Core feed</td>
<td>With uniform tension draft to 20 cN (conventional)</td>
<td>Positively driven feeding device (unwind device) to</td>
</tr>
<tr>
<td></td>
<td>With uniform tension draft to 50 cN (compact)</td>
<td>produce a tension draft (prestress) of 2.5 to 4fold</td>
</tr>
<tr>
<td></td>
<td>Example of creel in Fig.2</td>
<td>Example of creel in Fig.1</td>
</tr>
<tr>
<td>Ring traveller shape</td>
<td>– High-bowed traveller</td>
<td>– Traveller shape as for cotton</td>
</tr>
<tr>
<td>and cross-section</td>
<td>– Flat or half round</td>
<td>– Half round or udr profile</td>
</tr>
<tr>
<td></td>
<td>(for coarse yarns) profile</td>
<td>– Lighter travellers than</td>
</tr>
<tr>
<td></td>
<td>– Higher traveller weight than</td>
<td>for conventional yarns</td>
</tr>
<tr>
<td></td>
<td>for conventional yarns</td>
<td></td>
</tr>
<tr>
<td>Traveller speed</td>
<td>max. 25 m/s (22 m/s with PES fibres)</td>
<td>max. 30 m/s</td>
</tr>
<tr>
<td>Separators</td>
<td>Without ring separators,</td>
<td>Without ring separators, high plate separators</td>
</tr>
</tbody>
</table>
3. Creel

Figures 1 and 2 show the principle of producing rigid and elastic core yarns on a ring spinning frame.

The quality of rigid core yarns depends on the tension draft of the filament. Fig. 3 shows the quality difference between core yarns produced with different tension draft of 6 cN and 20 cN. For this purpose, a white filament (150 dtex) was spun with black fibres (total yarn count Ne 19). Studies have shown that the tension draft of the filament must be higher in compact spinning (see table above). It is therefore extremely important to provide the creel with suitable brakes (yarn guide elements) for the filament. Filament packages can be located in principle in three different areas of the creel, which are shown schematically in Fig. 2.

4. Filament Feed at the Front Roller Pair of the Drafting System

To achieve a coverage of the filament or elastomer as perfect as possible, the filament must be fed reliably in the centre of the completely drafted fibre strand immediately before the impartation of twist, and this is usually at the front roller pair of the drafting system. A proven method of setting is to first let the fibre material run into the suction tube. A torch helps to check if the filament is actually covered by the staple fibres on all sides. Fig. 4 shows examples of unsuitable setting. Fig. 5 – on the contrary – shows a perfect setting scenario.

To demonstrate the effects of inappropriate elastomer feed, elastic core yarns were spun with black elastomer...
and the resulting yarns were knitted. The yarns were consistently spun with Z twist. Fig. 6 clearly shows how feeding of elastomer both on the right and on the left side of the fibre strand results in the dreaded imperfections. The filament becomes visible at the yarn surface and is no more protected. Complaints about elastomers thermally damaged by the ring traveller or in the downstream process can be the adverse knock-on effect.

For feeding the filament for rigid core yarns, or the elastomer for elastic core yarns, special smooth-running guide rollers have become widely accepted. Feeding rollers guarantee perfect positioning and a gentle and almost abrasion-free transport. Positively driven rollers are therefore preferred, as they are used in the SUESSEN Core-Yarn Device (Fig. 7).

In the case of rigid core yarn, numerous more primitive solutions of feed like ceramic eyelets or positioning plates between front edge of the cradle and front top rollers can be found.

5. Compact Core Yarns

5.1 EliCore® – Compact Single Yarn

Customers are very much interested in core yarns with reduced long-hairiness. In principle, the well-known excellent properties of compact yarn can be transferred to core yarns. Textile articles produced with compact

Fig. 4 Wrong setting

Fig. 5 Correct setting

Fig. 6 Correct filament feeding (A) Wrong filament feeding (B + C)

Fig. 7 SUESSEN Core-Yarn Roller
Table 2: EliCore® – rigid

<table>
<thead>
<tr>
<th>Method</th>
<th>Nm (Ne)</th>
<th>Filament</th>
<th>Tenacity (cN/tex)</th>
<th>Elongation at break (%)</th>
<th>Uster CV (%)</th>
<th>IPI (-50/+50/+200)</th>
<th>Hairiness Uster H</th>
<th>Hairiness Zweigle S 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>76 (45) PES</td>
<td>78 dtex PES</td>
<td>45.4</td>
<td>13.0</td>
<td>8.1</td>
<td>0/12/8</td>
<td>3.39</td>
<td>266</td>
</tr>
<tr>
<td>EliCore®</td>
<td>76 (45) PES</td>
<td>78 dtex PES</td>
<td>52.0</td>
<td>13.2</td>
<td>6.9</td>
<td>0/3/7</td>
<td>2.97</td>
<td>193</td>
</tr>
<tr>
<td>Conventional</td>
<td>81 (48) Cotton</td>
<td>74 dtex PES</td>
<td>42.7</td>
<td>12.6</td>
<td>11.2</td>
<td>0/59/172</td>
<td>3.6</td>
<td>1019</td>
</tr>
<tr>
<td>EliCore®</td>
<td>81 (48) Cotton</td>
<td>74 dtex PES</td>
<td>43.8</td>
<td>12.8</td>
<td>9.3</td>
<td>0/21/10</td>
<td>52.6</td>
<td>77</td>
</tr>
</tbody>
</table>

EliCore® – elastic

<table>
<thead>
<tr>
<th>Method</th>
<th>Nm (Ne)</th>
<th>Elastomer</th>
<th>Tenacity (cN/tex)</th>
<th>Elongation at break (%)</th>
<th>Uster CV (%)</th>
<th>IPI (-50/+50/+200)</th>
<th>Hairiness Uster H</th>
<th>Hairiness Zweigle S 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>50 (30) Cotton</td>
<td>12.4 dtex Lycra</td>
<td>13.6</td>
<td>6.4</td>
<td>12.2</td>
<td>2/25/27</td>
<td>5.9</td>
<td>1344</td>
</tr>
<tr>
<td>EliCore®</td>
<td>50 (30) Cotton</td>
<td>12.4 dtex Lycra</td>
<td>16.2</td>
<td>7.6</td>
<td>12.0</td>
<td>0/27/31</td>
<td>4.7</td>
<td>294</td>
</tr>
<tr>
<td>Conventional</td>
<td>40 (24) Cotton</td>
<td>12.4 dtex Lycra</td>
<td>13.8</td>
<td>5.8</td>
<td>10.2</td>
<td>0/0/2</td>
<td>6.2</td>
<td>1274</td>
</tr>
<tr>
<td>EliCore®</td>
<td>40 (24) Cotton</td>
<td>12.4 dtex Lycra</td>
<td>16.4</td>
<td>5.9</td>
<td>10.2</td>
<td>0/0/2</td>
<td>4.6</td>
<td>246</td>
</tr>
</tbody>
</table>

core yarns contain significantly less long hairs. The slippage resistance of the covering fibres on the filament is drastically improved. Knitwear has a clear stitch definition. However, it is often required to reduce yarn count and yarn twist to achieve a soft textile touch.

Table 2 shows a comparison of conventional core yarns with some elastic and rigid EliCore® yarns spun with the EliTe® CompactSet and SUESSEN Core-Yarn Device.

It is often disregarded, however, that the setting procedure, which is already delicate for standard ring spinning frames, is even more complicated on compact spinning systems. Most important is to set the filament or elastomer path right in the centre of a fibre strand of about 0.4 mm width or even less. Practical experience has proved that the required uniformity over all spinning positions of a compact spinning machine can only be achieved without traverse movement and with excellently trained personnel.

Coverage can be slightly improved, if the filament is fed already at the front top roller of the drafting system and passes the compacting zone together with the fibres.

Vast series of trials have shown that even under laboratory conditions it is often impossible to completely prevent the black elastomer from shining through the fibre sheath. Fig. 8 shows conventionally produced elastic core yarn on the one hand and compact core yarn on the other hand. For this
but also the substantially reduced hairiness and the very clear stitch definition in the knitwear. Consequently, a compact core yarn is far superior to conventional core yarn as regards its most important properties, but at the same time it is more prone to complaints.

5.2 EliCoreTwist

The new EliCoreTwist technology, by which two condensed fibre strands in V-shaped arrangement are combined on the ring spinning machine to form a two-ply yarn, permits to produce compact core yarns, whose quality and coverage of the filament or elastomer core are perfect.

The filament or elastomer is fed in the centre of the twisting triangle (Fig. 9). The setting precision required is significantly reduced and comparable with conventional core yarns. Even if the path of the core is not 100% in the centre, the total coverage with fibres is assured. So the setting is much less demanding than with single core yarn.

Fig. 10 compares a conventional elastic core yarn with EliCoreTwist of the same final count. Low hairiness and the very clear stitch definition apart from the perfect elastomer coverage definitely speak in favour of EliCoreTwist.

EliCoreTwist with rigid core has a better covering effect than conventional core yarn (Fig. 11a, 11b).

The increased slippage resistance of the fibres reflects the actual advantages of the new yarn design. Tests on the Webtester of ITV Denkendorf prove this impressively (Fig. 12a, 12b).

Since core yarns are mostly twisted for subsequent processes, EliCoreTwist offers some additional economical advantages. Twisting is not required, and the percentage of filament or elastomer in the final yarn count can be reduced.
6. Splicing of Core Yarns

Today’s standard is that core yarns are spliced. All manufacturers of yarn splicing equipment offer corresponding technical solutions. A suitable modification, for instance longer positioning slots, special surface design of prisms and adjusted air pressure, prevents yarn ends, particularly of elastic core yarns, from withdrawing, the result of which would be defective splices. Splicing of EliCore® and EliCoreTwist® yarns is also possible without any restriction with usual splicing equipment of renowned manufacturers.

7. Summary

The improved properties, known from compact yarns, are also valid for elastic and rigid core yarns. Spinning single compact core yarns requires utmost precision in setting the filament or elastomer feed and carefully trained personnel.

The new product EliCoreTwist® permits to economically produce compact core yarns of superior quality at a clearly simplified setting of the filament and elastomer feed.
**ProFiL® Cartridge –**

The New Maintenance-Free EverClean Axial Rotor Bearing

Michael Basting, Product Manager Premium Parts, SUESSEN

Along with the SUESSEN SC-M and SQ SpinBox Modernization Packages, the EC bearing (EC = EverClean) was first presented to Open-End customers.

Until now, more than 200,000 rotor spinning positions have been modernized or retrofitted with the SUESSEN EC grease cartridge, and the demand is still continuously growing.

These customers know and confirm the advantages of the SUESSEN EC grease-lubricated bearing over conventional oil-lubricated bearings:

- avoiding of oil leakages and emission of oil mist within the SpinBox
- substantial increase of maintenance intervals, which can almost be doubled
- definitely reduced maintenance and cleaning costs
- no blockage of rotors due to oil-contaminated fly with consequential damages
- no oil changes at the EC Thrust Bearing
- clean feed roller drives providing constant driving torques

Fig. 1 – Photo taken under industrial conditions after six weeks of use in the same machine, spinning 100% cotton into Ne 26: the bearing unit on the right is equipped with the EC cartridge.

**Advancement –**

the red **ProFiL® Cartridge**

As any other product, the EC cartridge revealed its potential of improvement in practical application.

The logical consequence was the development of the **ProFiL® Cartridge**. Maintaining the above-mentioned benefits, one particular characteristic of the former EC cartridge was decisively improved: the maintenance of the cartridge itself.

The **ProFiL® Cartridge** is absolutely maintenance-free during its entire service life, this means that the formerly required twirling of the grease twice a year by means of the mixing blades integrated in the EC cartridge is no more necessary.
The required lubrication is ensured by an optimized internal design of the ProFil® Cartridge and a new type of grease adapted to operating conditions and materials. Consequently, the mixing blades became superfluous.

The ProFil® Cartridge has the same expected service life as the SUESSEN TwinDisc with two cooling grooves and is therefore replaced together with the TwinDisc. Other maintenance work concerning the axial rotor bearing, like oil change and replacement of seals, is omitted.

The only prerequisite for a reliable function of the ProFil® Cartridge is the use of rotors with ceramic pin.

**Application**

- As a spare part the ProFil® Cartridge is interchangeable with the former designs, i.e. EC bearings of aluminium for SE 7/SE 8/SQ 7/SQ 8, and EC bearings of white synthetic material for SE 9/SE 10/SQ 9/SC-M. (Fig. 3, 4)
- In addition, the ProFil® Cartridge is naturally part of the well-known SC-M and SQ Modernization Packages for SUESSEN Spin-Boxes, as well as
- of the partial modernization packages for the axial rotor bearing in SE 7/SE 8/SE 9 and SE 10 machines with new or reworked bearing units.

**Summary**

The SUESSEN EC axial rotor bearing offers substantial advantages over conventional oil-lubricated bearings concerning soiling and maintenance. The consequent development of the EC bearing into the ProFil® Cartridge will now relieve our customers of the last manual maintenance work, i.e. twirling of the mixing blades. It is not necessary to replace the cartridge before the SUESSEN TwinDiscs with two cooling grooves.

The ProFil® Cartridge can easily replace the former designs of aluminium or white plastic and will be standard from now on in every SUESSEN modernization of rotor spinning machines.
Since the first industrial installation of the EliTe®Compact Spinning System in the year 1998, compact spinning as a whole has gained in importance and has developed most dynamically.

Continuous R&D and direct investigation in customer mills enabled us to advance the development of technical and technological components of the EliTe®CompactSet uncompromisingly and resolutely. Special attention has been focused on their universal applicability, reduced maintenance and simultaneously improved yarn quality, increased service life and proven reliability in industrial application. Evidence of this development is given by the encapsulated EliTop, EliTube with insert and variant applications EliCore® and EliTwist®.

Our latest product within the framework of this development is the new lattice apron named 5star®Apron.

The new 5star®Apron is an endless woven lattice apron with a special matrix enclosed. For the entire service life of the apron, this matrix offers a clearly better friction behaviour and reliably prevents dust, dirt and fibre fragments from clinging to the apron. The development of the new 5star® Apron is yet another significant contribution to the considerably improved running stability and quality assurance of the EliTe®CompactSet going along with an important reduction of the operation cost in the spinning mill.

The new apron was developed and made marketable in cooperation with the manufacturer, our R&D department and naturally with our customers. By numerous trials and inspections a number of different structures were thoroughly tested, to guarantee sustainable quality improvement and industrial versatility. From the results of these tests could be extracted five...
obvious advantages, which inspired us to call the new product 5star®:

* **star 1: low friction**
Owing to the optimized surface, the apron produces less friction. This results in reduced wear on the 5star® Apron itself, but also on other EliTe® Components like EliTube and insert.

* **star 2: low maintenance**
On the new surface structure the adhesion of fibres, particles and dust is made more difficult – manpower cost for cleaning the aprons is reduced to approx. 25% of the amount required for conventional aprons. Cleaning intervals of the drafting system are extended by the factor 3 to 5.

* **star 3: extended service life**
The service life of the 5star® Apron is longer compared with the conventional EliTe® Apron, and the service life of other components like EliTube and insert is extended correspondingly.

* **star 4: low variations in yarn parameters**
The superior running properties of the 5star® Apron improve yarn quality and help to minimize natural quality variations between individual spinning positions.

* **star 5: reduced operating costs**
Longer service life, less maintenance, constant yarn quality and sustainability of these characteristics stand for better performance in the spinning mill.

The 5star® Apron has been offered since early this year. Changing from conventional EliTe® Lattice Aprons to the 5star® Apron is easily possible at any time.
Low Shoulder Drive Tire – for Conversion from SRK to SRZ

Michael Basting, Product Manager Premium Parts, SUESSEN

When existing Autocoro rotor spinning machines are converted from conical (SRK) to cylindrical (SRZ) package building, problems with the winding tension are inevitable.

The majority of the machines concerned are still operated with the original SRK winding drums, as a replacement by SRZ drums is often too costly. But using SRK winding drums with cylindrical packages now reveals a decisive disadvantage – the winding tension is not constant during the package building process.

We can observe that the winding tension on the starter package is much higher than on the full package. The reason is that the bead of the drive tire cannot press itself into the few layers of yarn wound on the starter package. The bead practically runs against the hard cone and consequently drives the package with its largest diameter.

As soon as a number of yarn layers have been wound, this bead can press into them, the package virtually lies on the entire winding drum and is driven by a smaller diameter. As a consequence, the winding tension is reduced to a standard value (see Fig.1).

This means in practice:

- Variation in winding tension often results in unwinding problems in subsequent processing steps like warping, knitting or weaving. Whole layers of yarn can slough off from the packages, get stuck and cause a stop.

- Another consequence is different elongation in the yarn. Yarn wound with a higher winding tension is more slender and therefore has another optical appearance. Stripes become visible in the fabric, which can cause complaints. In dyed fabrics, the stripes are even more evident.

- Particularly in machines with mechanical yarn detector the winding tension can only be set on large package diameters, to avoid uncontrolled stop of a spinning position due to a lack of yarn tension.

![Conversion from SRK to SRZ](image)

![Winding Tension in Relation to Package Running Time](image)

Conventional SRK Drive Tire with Cylindrical Package

Fig. 1
The optimal winding tension consequently results from a harmonization of drive tire and package format and remains uniform during the entire package building process. Fig. 2 shows a tension diagram with conical drive tire and conical package.

On the basis of these data, SUESSEN has developed a drive tire eliminating the aforesaid problems on converted machines (SRK to SRZ).

**Innovation: Low Shoulder Drive Tire**

The Low Shoulder Drive Tire serves to maintain the required uniform winding tension during the package building process on machines converted from conical to cylindrical packages (see Fig. 3).

**Summary:**

The Low Shoulder Drive Tire is crucial for a successful conversion of Auto-coro rotor-spinning machines from conical to cylindrical package building. It has an essential effect on yarn winding tension and consequently yarn quality, fabric quality and the performance in subsequent processing steps.
Super Spinning Mills Limited (SSML) was incorporated in 1962 in South India. SSML is part of the Sara Elgi Group.

SSML has four divisions: Agriculture, Spinning, Weaving and Garments.

The Spinning Division comprises three units with a capacity of more than 130,000 ring spindles, including about 32,000 EliTe®/EliTwist® Spindles, manufacturing yarns from Ne 6 to 140 (100% cotton, carded and combed, compact single, EliTwist®, core spun, fancy etc.).

Quality Assurance activities include usage of all the latest testing equipments from the leading suppliers. Controls are well planned right from ginning to ensure yarn production with very less contamination.

Super Spinning Mill’s turnover is $ 81 Million of which about $50 Million is exclusively catering to export purpose. The exports are catering to countries like Italy, Germany, Spain, UK, France, Gulf, Hong Kong, Taiwan, USA, Japan, Korea etc.

Super Spinning Mills have been accredited for ISO 9001–2000 by BVQI and for ISO 14001:1996 environmental standards. SSML got the award for excellence in Quality Management during 1997-98 by ICMF Birla Economic and Textile Research Foundation India.

SSML has been authorized by Skal International Netherland to process organic cotton and natural fibres. SSML is a Licensee for producing Supima Products Viz., Yarns, Fabrics, Garments and Made Ups. SSML has been given the right to use Cotton Council International Trade Mark Cotton USA labels for the products.

Knitting Unit
Super Spinning Mills has a knitting unit with state-of-art machines having provision for autostripping, jacquard, rib etc., with a production capacity about 2,000 kgs per day.

Weaving
Super Spinning Mills uses carded and combed yarns in its weaving division to manufacture grey fabrics with different structures meant for various applications.

Garment Unit
The yarns produced in house are used for fashioning garments of about 13,000 pieces/day in various styles like polo T-shirts, ladies’ & children garments. They are specialized in making single/double mercerized 100% cotton knitted garments from best cotton like Giza, Pima etc. SSML is known for excellent and consistent product quality. The company continuously strives towards upgrading their machinery to state-of-the-art machines to ensure customer satisfaction.
1. Introduction

The endeavour to engineer the need-based yarn quality in the spinning process has undergone significant improvement over the years.

The compact spinning is one other pioneer step towards the same. The fibre flow is laterally compacted by metered aerodynamic forces resulting in the very narrow spinning triangle.

The fibres in the triangle are gripped and fully integrated into the yarn axis producing nearly perfect yarn with minimum hairs.

In addition to produce the single compact yarn, this technology has extended its application for the double yarn spinning also in the ring frame itself with manifold advantage over the conventional double yarn production.

Owing to the additional functional aspects of compact yarn, mills will prefer to go in a big way for compact yarn manufacturing in the years to come.

2. Concept of Compacting

2.1 Single Yarn

In the single yarn compacting, the drafted assembly of the fibres is condensed before twist is imparted. The geometrical conditions and technical design of the compacting tube forming the compacting zone helps to compact the protruding fibres by metered airflow. This suction binds the protruding mass of the fibres parallel to the yarn axis rigidly.

2.2 Double Yarn, EliTwist® Yarn

Two fibre strands (rovings) are drafted parallel in the ring frame itself and combined with the help of well-designed EliTwist® Suction Slots. The two drafted fibre strands leaving the drafting zone do not form a spinning triangle resulting in no fibres are sticking out, spreading up to the other yarn component. The twist running into the 2 legs from the twisting point flows uniformly without any resistance.

The speciality of such yarn is that the direction of twist in both legs is the same as in the resulting two-ply yarn.

3. Spinability of Compact Yarn

3.1 EliTe® Yarns

The EliTe® Compact Spinning System offers spinners to enjoy EliTe® Yarns (single) from Ne 6s to Ne 140s with the significant advantages in hairiness, elongation, yarn strength and appearance over conventional yarn. The incorporation of the EliTe® Compact Spinning System also does not pose any significant structural modification in conventional ring frame, thereby eliminating unwanted additional investment.
Two strands of roving are fed per spinning position and condensed by means of EliTwist® Spinning System to produce the compacted double yarn called EliTwist® Yarn. For example to spin Ne 2/80s in ring frame using EliTwist® Spinning System, 2 roving strands for Ne 80s are fed. Drafting and twist is suitably adjusted to get 40s Ne i.e., Ne 80/2 EliTwist® Yarn in Ring Frame itself.

The EliTwist® Spinning System offers possibility for the spinner to produce from Ne 20/2 to Ne 140/2 without any practical obstructions.

### 4. Field Experiences

The table shows that there is a reduction in Uster Hairiness to about 20-30% and 70 to 80% reduction in S3 value (as per Zweigle) depending upon the blend used.

<table>
<thead>
<tr>
<th></th>
<th>40/1 CW</th>
<th>80/1 CW</th>
<th>60/1 CW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conventional Yarn</td>
<td>Compact Yarn</td>
<td>Conventional Yarn</td>
</tr>
<tr>
<td>U%</td>
<td>9.92</td>
<td>9.76</td>
<td>11.9</td>
</tr>
<tr>
<td>Thin</td>
<td>1</td>
<td>0</td>
<td>31</td>
</tr>
<tr>
<td>Thick</td>
<td>18</td>
<td>15</td>
<td>93</td>
</tr>
<tr>
<td>Neps</td>
<td>51</td>
<td>37</td>
<td>200</td>
</tr>
<tr>
<td>Total</td>
<td>70</td>
<td>52</td>
<td>324</td>
</tr>
<tr>
<td>RKM</td>
<td>18.2</td>
<td>20.7</td>
<td>21.6</td>
</tr>
<tr>
<td>H</td>
<td>5.3</td>
<td>3.5</td>
<td>4.1</td>
</tr>
<tr>
<td>E%</td>
<td>5.2</td>
<td>5.8</td>
<td>3.6</td>
</tr>
</tbody>
</table>

- As per our customer, yarn structure resembles to filament yarn surface and is smooth.
- Many of our customers substituted the 30/1 CW Ne compact yarn for Ne 60/2 CW normal yarn
- Customers expressed their satisfaction in this regard
- Conventional Ne 60/2 yarns were used in yarn-dyed warp with weft as filament 80 Denier. After introduction of 30/1 CW compact, 2/60s warp conventional doubled yarn is replaced by 30/1 CW compact without sizing, in yarn-dyed fabric-manufacturing sector.
- Similar way, 80/2 Ne CW is replaced by 40/1 CW compact.
- Appearance of the fabric surface is improved with EliTe® Yarn.
- It is also seen that the RKM increases by about 10 – 15% depending upon the blend.
Table 2: Compact EliTwist® Yarn

<table>
<thead>
<tr>
<th></th>
<th>60/2 Ne CW</th>
<th>80/2 Ne CW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conventional Two-Ply Yarn</td>
<td>EliTwist® Yarn</td>
</tr>
<tr>
<td>U%</td>
<td>8.5</td>
<td>7.8</td>
</tr>
<tr>
<td>Thin</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Thick</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Neps</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>RKM</td>
<td>22.8</td>
<td>24.6</td>
</tr>
<tr>
<td>H</td>
<td>4.9</td>
<td>2.8</td>
</tr>
<tr>
<td>E%</td>
<td>5.2</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Fig. 3: EliTe® CompactSet Suction Slot with delta for finer yarn counts

Fig. 4: EliTwist® Suction Slots

- Loom efficiency improves by 3 to 6%
- Sizing cost reduces by 30% while using compact yarn
- Fabric woven from compact yarn possess better lustre
- Due to improved fabric appearance, pilling tendency is also minimum in compact woven fabric.
- In addition tearing & bursting strength of woven fabric increases by 10% for the EliTwist® Fabric.
AT MILLS:
- Productivity at ring frames can be maintained on the same level as that of normal yarn against the apprehension of lower productivity with compact system.
- The atmosphere at spinning shed is clean due to less fly liberation.
- Breakage at spinning stage is less by about 25% with EliTe® Compact.
- Due to limitation of cotton availability, when we are not able to meet the yarn specification, we are able to meet them with compact technology.

6. CONCLUSION

I would like to comfortably say that Compact Yarns improve the weaving performance significantly and the appearance of the fabric made from compact yarn is superior to the fabric woven from any conventional yarn. This results in better value addition to the compact fabric, yielding commercial advantage to the present textile industrial scenario.

Compact single yarn gives undoubtedly value addition to the single yarn whereas the EliTwist® Yarn gives significant quality improvement in addition to lucrative economic advantage in double yarn manufacture.
The hairiness of a yarn, apart from strength, elongation, irregularity and other parameters, has an essential influence on its character and properties. Yarn hairiness is generally defined as fibre ends not embedded in the yarn body and protruding from it in different lengths. This hairiness depends on many factors and is influenced, among others, by raw material, twist, spinning accessories and so on.

Yarn hairiness can be roughly classified in two groups. On the one hand the very short hairs with only 1 or 2mm in length. These hairs are also responsible for the touch of a fabric or knittedwear and consequently make yarn different from a wire.

Longer hairs, as a rule 3 mm and more, usually are not welcome. This applies particularly to those machines in subsequent processing, where these hairs may disturb production. In warping, the single threads cling; in knitting, machines stop despite of the waxing of yarn, and in weaving all these long hairs, which are not firmly embedded in the yarn, turn up as fly on machines or in the room.

In the finished product, for example a T-shirt or pullover, these hairs are responsible for pilling.

All these reasons make it necessary to measure yarn hairiness in a sophisticated manner.

The Zweigle hairiness tester lists these figures in detail. The number of hairs of each length is determined in respect of a certain yarn length tested, and displayed numerically and graphically. In addition, all hairs with a length of 3 mm or more are added and represented as the so-called S3 value. This value is best suitable to evaluate compact yarns, in which these long hairs should exist only to a very low extent.

The hairiness tester is rather widespread meanwhile, just as a result of the spreading of compact yarns. This simultaneously means that the S3 value is increasingly used to classify a (compact) yarn, not only in the own spinning mill, but the interest also aims at classifying yarns with respect to the total production.

This is the reason why some time ago M/s. Zweigle in close co-operation with SUESSEN started to collect EliTe® yarns worldwide from most different customers and of most different yarn counts, and to present the results in an overall statistic. This undertaking started with 100% combed cotton, because compact yarns today are mainly spun from this quality. The statistic only includes yarn parameters determined in our laboratory on identical measuring devices and under standard conditions. This means that information on yarn quality parameters from external sources is disregarded.

The yarns were tested from the cop to ensure better comparability. The winding process has a great influence on the yarn and particularly on yarn hairiness and was not taken
into account due to the multitude of machines and methods available.

On the basis of these data, the three diagrams have been established for the length classes of 1 mm, 2 mm and the above-mentioned S3 value, which combines all hairs with a minimum length of 3 mm.

The grey area refers to all data collected; the black line shows the average values determined for each yarn count. The green line corresponds to the lowest values of all tested yarns, and the red line consequently to the highest values. Although it is a general goal to reduce the number of long, disturbing hairs of compact yarns in particular to a minimum, the data included in the diagrams cannot represent the final evaluation of a yarn. Yarns are different and require different properties to suit their special application, which every spinning mill determines on its own. Nevertheless, the standards can give a certain support or a hint, how "my" yarn is classified in comparison with others.

The Zweigle Hairiness Standards will be continued, updated and completed. The quality evaluated in the diagrams, i.e. 100% combed cotton, is certainly the most frequent application in ElTe® Spinning and therefore was the first to be tested. But since the ElTe® Spinning Process is versatile with regard to raw material, the standard, which is going to be set up continuously, will reach from carded cotton to man-made fibres.
Accotex® – The Leaders Choice In Compact Spinning

Accotex cots & aprons for improved yarn quality in all spinning applications.

For an Accotex contact in your country, please visit our web site www.Accotex.com
Sri P.R. Ramasubrahmaneya Rajha, the Chairman of the Ramco Group, has built a formidable enterprise on the foundation laid by his illustrious father. Under his dynamic leadership, the Ramco Group has been progressing to great heights in Textiles and also many other fields like cement, software and healthcare products.

The origin of the Ramco Group was a small spinning mill, founded by Sri P.A.C. Ramasamy Raja in 1937. Within the next few decades, he made a major breakthrough in the industrial fortunes of the Ramco Group Textile Division.

From its humble beginning in 1938, the Ramco Group Textile Division has emerged as one of the most successful industries to symbolize an entity with strong commitment to quality, innovation, and customer satisfaction. It has been a pioneer in adopting state-of-the-art technology. In line with this, considering the great market potentiality, Ramco Group has made investments to increase Compact Yarn capacity. Today, Ramco Group Textile Division has a spindle capacity of 200,000 including more than 30,000 compact spindles, whereof 13,000 already represent SUESSEN EliTwist® Spindles.

80% of its annual turnover of USD 65 million derives from exports. Ramco has been successful in entering markets of high quality-consciousness like Japan. Its long-term relationship with trading house giants like Mitsubishi Corporation (Osaka, Japan) and consumers like Unitika Ltd, Dokobo (Japan) is a standing testimonial to the high-quality yarns produced by Ramco. It is also exporting to countries like China, Korea, Hong Kong, Malaysia, Indonesia, Thailand, Pakistan, Honduras, Italy, Spain, Vietnam, and to various other countries in the Gulf region and Europe.

Ramco Group Textile Division has always been at the forefront in adopting new technologies:

- Pioneer in introducing the concept of Open-End Spinning in India, especially for production of coarser counts, which have replaced their counter parts from ring spinning process with very high productivity and acceptable quality
- First to install automatic cone winding in this region in the form of Schweitzer Circular machines
- First to establish marketing arrangements with Mitsubishi Corporation, Japan
- First to buy SUESSEN EliTe® Compact Spinning frames and EliTe® CompactSet conversion of LR G5/1 to compact spinning
- Has undertaken large-scale adoption of eco-friendly non-conventional energy sources by installing numerous windmills in one of the world’s best sites of Wind Energy Muppandal, Kanyakumari District, South India. Today, about 85% of the total power requirements are met by this eco-friendly energy source

Ramco Group Textile Division believes that Quality is not merely a policy but a way of life and an integral part of the company’s strategy for customer satisfaction. A team of dedicated workers and committed technical people work in perfect unison, adopting the most stringent quality control standards to ensure high quality yarn consistently from all the mills of Ramco. The quality consciousness begins from cotton procurement itself. Both online and off-line monitoring on outgoing products is constantly exercised. Investments in sophisticated instruments from world-renowned manufacturers only are an integral part of the group to implement Total Quality Assurance.

Ramco Group Textile Division also follows worldwide proven quality systems like 5S, 7S, Kaizen, ISO 9000 series and Quality Circles to further enhance the quality standards.
Preamble

The weaving performance of warp yarn in a loom depends on the state of surface fibres. Fibres that are not firmly attached to the yarn can be abraded off the yarn easily. So, untreated single yarns are not suitable for direct use in weaving. To produce satisfactory warp yarn, it is necessary to improve the binding between the surface fibres and the body of the yarn. Hence, sizing is used in short staples and two folding in long staple fibres, but the yarn cost increases.

So, it has been the dream of the spinners to produce such weavable yarns at spinning itself. SIRO spinning was one such method tried earlier to produce such type of yarn in spinning. But, it has speed limitations especially for short staple spinning and again the production cost increases. With the invention of EliTwist®, the limitations in the SIRO spinning are eliminated.

Our Experience

For the past six months, we have started producing EliTwist® Yarns, which are sold under the brand name of Ultima-Duo. It is a sort of co-work between our customers and us for the promotion of such yarns. With the aim to replace existing doubled-yarns and to find different types of applications, we have been producing EliTwist® Yarns with different twist factors using different varieties of cotton.

Quality of EliTwist® Yarn and conventional TFO (two-for-one) yarn

From the results in Table 1, we can clearly understand the improvement in most of the yarn properties for the EliTwist® Yarns. In hairiness, there is a reduction of about 1.7 in absolute value; yarn strength (RKM) has increased by about 20% and elongation by 10%. Because of the reduction in hairiness and improvement in roundness, appreciable improvement has been noticed in the fabric appearance. However, because of the uni-directional twist (i.e. S on S or Z on Z) on both the components of EliTwist® Yarns, the fabric feel is little bit harsher when compared to conventional two-ply yarns.

This can be avoided by reducing the twist factors. The trial results of the impact of different twist factors on the quality of yarn are presented in Table 2. This trial was conducted on EliTwist® Yarns using ELS Cotton.

<table>
<thead>
<tr>
<th>Count: 80/2</th>
<th>Conventional Yarns (C.W. A.W. TFO Rewinding)</th>
<th>EliTwist® Yarns</th>
</tr>
</thead>
<tbody>
<tr>
<td>U%</td>
<td>8.88</td>
<td>8.53</td>
</tr>
<tr>
<td>Total imperfections</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>Hairiness Index</td>
<td>5.70</td>
<td>4.02</td>
</tr>
<tr>
<td>RKM</td>
<td>19.5</td>
<td>23.34</td>
</tr>
<tr>
<td>Elongation</td>
<td>4.04</td>
<td>4.44</td>
</tr>
<tr>
<td>Yarn diameter</td>
<td>0.220</td>
<td>0.191</td>
</tr>
<tr>
<td>Yarn density (Compactness)</td>
<td>0.39</td>
<td>0.51</td>
</tr>
<tr>
<td>Yarn roundness</td>
<td>0.73</td>
<td>0.81</td>
</tr>
<tr>
<td>Yarn Evenness</td>
<td>IPI Imperfections</td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>EliTwist®Yarn</td>
<td>conventional tfo-yarn</td>
<td></td>
</tr>
<tr>
<td>8.4</td>
<td>8.5</td>
<td></td>
</tr>
<tr>
<td>8.5</td>
<td>8.9</td>
<td></td>
</tr>
<tr>
<td>8.6</td>
<td>8.7</td>
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<td>8.7</td>
<td>8.8</td>
<td></td>
</tr>
<tr>
<td>8.8</td>
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<td>8.9</td>
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<td>19</td>
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<tr>
<td>15</td>
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<td>11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fuzziness</th>
<th>Tensile Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>EliTwist®Yarn</td>
<td>conventional tfo-yarn</td>
</tr>
<tr>
<td>3.0</td>
<td>23.3</td>
</tr>
<tr>
<td>3.5</td>
<td>19.5</td>
</tr>
<tr>
<td>4.0</td>
<td>18.0</td>
</tr>
<tr>
<td>4.5</td>
<td>17.0</td>
</tr>
<tr>
<td>5.0</td>
<td>16.0</td>
</tr>
<tr>
<td>5.5</td>
<td>15.0</td>
</tr>
<tr>
<td>6.0</td>
<td>14.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Yarn Elongation E%</th>
<th>Yarn Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>EliTwist®Yarn</td>
<td>conventional tfo-yarn</td>
</tr>
<tr>
<td>4.0</td>
<td>0.22</td>
</tr>
<tr>
<td>4.1</td>
<td>0.20</td>
</tr>
<tr>
<td>4.2</td>
<td>0.19</td>
</tr>
<tr>
<td>4.3</td>
<td>0.18</td>
</tr>
<tr>
<td>4.4</td>
<td>0.17</td>
</tr>
<tr>
<td>4.5</td>
<td>0.220</td>
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<tr>
<td>4.6</td>
<td>0.216</td>
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<tr>
<td>4.7</td>
<td>0.212</td>
</tr>
<tr>
<td>4.8</td>
<td>0.208</td>
</tr>
<tr>
<td>4.9</td>
<td>0.204</td>
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</table>

<table>
<thead>
<tr>
<th>Compactness</th>
<th>Yarn Roundness</th>
</tr>
</thead>
<tbody>
<tr>
<td>EliTwist®Yarn</td>
<td>conventional tfo-yarn</td>
</tr>
<tr>
<td>0.39</td>
<td>0.73</td>
</tr>
<tr>
<td>0.39</td>
<td>0.72</td>
</tr>
<tr>
<td>0.40</td>
<td>0.74</td>
</tr>
<tr>
<td>0.41</td>
<td>0.76</td>
</tr>
<tr>
<td>0.42</td>
<td>0.78</td>
</tr>
<tr>
<td>0.43</td>
<td>0.80</td>
</tr>
<tr>
<td>0.44</td>
<td>0.82</td>
</tr>
</tbody>
</table>

SPINNOVATION No. 21
In U% and imperfections, there is no change due to increase in TPI, whereas hairiness gets reduced from 4.28 to 3.33, as the TPI increases from 15.10 to 20.55. Elongation is showing an increasing trend from 4.85 to 5.36. It can be noted from the results that when we increase the TM factor from 2.4 to 2.61, there are steep increases in yarn strength (i.e. 10%). Further increase in twist factors only marginally increases the strength. So, it can be concluded that 2.6 twist factor is the optimum one for this type of cotton. With this reduced TPI, we have significantly improved the fabric feel.

**Productivity**

Normally, with Indian long staple cottons, we’ll obtain 45 grams/spindle/shift of 8 hours for 80/1 counts. For these 80/2 Ultima-Duo yarns, we could achieve 94 grams/spindle/shift even at 11500 rpm of spindle. This obviously explains that the production is more than two-fold, even with lesser spindle speed. The higher productivity is mainly because of lower twist factors.

In other words, for the same output of doubled counts, we require half the capacity of ring frame spindles besides the complete elimination of TFO or doubling machines. This is a huge cost saving for the spinners as well as for the weavers and knitters.
Fibre consumption worldwide is currently made up of about 58% man-made fibres and about 42% natural fibres. Although the percentage of cotton has slightly and continuously grown in the last years, its share of the total consumption of fibres is about 40% only. Further growth cannot be expected, because the already extensive cultivation permits no further growth and an expansion of the area of cultivable land is not possible.

It is therefore unavoidable to compensate the expanding demand for fibres by the growing world population and the additionally rising per capita consumption in many newly industrializing countries by an increasing application of man-made fibres.

1. Conventional ring yarns from cotton and man-made fibres

Yarns from man-made fibres offer a number of well-known advantages over cotton yarns. Owing to their higher fibre strength, they have a better breaking strength. Due to the rectangular staple fewer fibre ends stick out from the yarn body, so that such yarns have a smoother appearance. The uniform staple length and absence of impurities, neps or unripe fibres help to minimize interruptions in the course of the yarn-building process. As a result, yarns from man-made fibres usually contain fewer imperfections than cotton yarns of the same count.

This is exemplified by the subsequent comparison of conventional ring yarn of the medium count Ne 40 spun from cotton, polyester and viscose, based on the 50% lines of Uster Statistics (see table 1). Compact spinning meanwhile permits to spin cotton yarns, whose hairiness is substantially lower than that of synthetic yarns. Due to the better utilization of fibre substance it has even been possible to raise the breaking strength of cotton yarns to the level of viscose yarns. In consequence of this irreversible development, cotton spinning mills without compact yarns in their range of production already sustain severe competitive disadvantages.

2. Main problems of conventional ring yarn spun from man-made fibres

So the question arises why mills spinning synthetic fibres are yet more and more disposed to turn towards compact spinning.

There are three complexes of problems, with which producers and users of synthetic yarns are permanently confronted:

Air-jet weaving

Long-hairiness and the notorious clinging tendency in weaving are directly connected. Unlike cotton, the high-tenacity ends of man-made fibres, sticking out from the yarn body, do not break in clinging, but are a handicap in weft insertion. This is the reason why the very high potential of performance of air-jet weaving machines often cannot be fully exploited.

Pilling

There is a linear connection between long-hairiness and pilling in the textile article (Fig. 1). The high-tenacity fibre ends do not break, but accumulate to ball-like entanglements of fibres on the fabric surface, which affect the appearance and often are opposed to an increased application of man-made fibres for clothing.
Slippage of fibres during yarn processing

The higher slippage tendency of man-made fibres is also a large problem and reflected by the abrasion properties. In knitwear for example, high slippage tendency can result in increased abrasion and cause the dreaded "ladders".

3. Effects of the compacting process on the spinning of man-made fibres

So it is above all the reduced hairiness and better embedding of peripheral fibres, which makes compact spinning so interesting for man-made fibres. Naturally, other positive influences on the textile article like better brilliance or modified touch can give additional motivation to turn to compact spinning.

Spinning synthetic fibres into compact yarns makes higher technological demands on a compact spinning system than cotton, just because of the multitude of fibre types. Only a compact spinning method with maximum versatility is capable to cope with such a variety of parameters like fibre fineness, staple length, fibre stiffness, crimp levels, slenderness ratio and flexibility.

Prerequisite for compacting man-made fibres is a system enabling different tension draft between the front roller pair of the drafting system and the condensing zone. The EliTe® Compact Spinning System ideally fulfils this requirement. Experience shows however that – quite contrary to the spinning of cotton – no general advice can be given for the tension draft of man-made fibres. It must be adjusted precisely to each fibre type and blend.

For better adaptation to the relevant fibre material, various designs of lattice aprons and the possibility of modifying the negative pressure in the compacting zone are available.

The main drafting zone can be optimized and adjusted to the relevant fibre length by means of 3 different cradle lengths for the SUESSEN HP-A 320 Top Weighting Arm:

- HP-C K22 cradle – for short staple
- HP-C M22 cradle – for medium staple
- HP-C L22 cradle – for long staple

Fig. 2 shows the fields of application of the three cradle types. Overlaps exist in threshold areas depending on the influence of other fibre characteristics like fineness, slenderness ratio or crimp. We therefore advise our customers to have optimum cradle equipment determined by trials in our R+D department prior to the delivery of the EliTe® CompactSet.

Certainly the increase in strength of synthetic yarns is not in the fore-
### Table 2: Yarns from 100% viscose

<table>
<thead>
<tr>
<th>Method</th>
<th>Yarn count Nm (Ne)</th>
<th>Fibre length mm</th>
<th>Fibre fineness dtex</th>
<th>Strength (cN/tex)</th>
<th>Uster CV (%)</th>
<th>IPI (-50/+50/+200)</th>
<th>Hairiness Uster H</th>
<th>Hairiness Zweigle S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>76 (45)</td>
<td>38</td>
<td>1.1</td>
<td>22.4</td>
<td>10.7</td>
<td>0 / 6 / 22</td>
<td>3.6</td>
<td>1648</td>
</tr>
<tr>
<td>EliTe®</td>
<td>76 (45)</td>
<td>38</td>
<td>1.1</td>
<td>23.0</td>
<td>10.3</td>
<td>0 / 4 / 17</td>
<td>3.2</td>
<td>282</td>
</tr>
<tr>
<td>Conventional</td>
<td>50 (30)</td>
<td>44</td>
<td>1.3</td>
<td>17.0</td>
<td>11.9</td>
<td>0 / 8 / 20</td>
<td>4.4</td>
<td>568</td>
</tr>
<tr>
<td>EliTe®</td>
<td>50 (30)</td>
<td>44</td>
<td>1.3</td>
<td>17.3</td>
<td>10.8</td>
<td>0 / 3 / 12</td>
<td>3.8</td>
<td>128</td>
</tr>
<tr>
<td>Conventional</td>
<td>98 (58)</td>
<td>38</td>
<td>1.7</td>
<td>22.5</td>
<td>13.9</td>
<td>14 / 24 / 37</td>
<td>3.5</td>
<td>243</td>
</tr>
<tr>
<td>EliTe®</td>
<td>98 (58)</td>
<td>38</td>
<td>1.7</td>
<td>24.2</td>
<td>13.8</td>
<td>17 / 10 / 26</td>
<td>3.2</td>
<td>98</td>
</tr>
</tbody>
</table>

### Table 3: Yarns from 100% polyester

<table>
<thead>
<tr>
<th>Method</th>
<th>Yarn count Nm (Ne)</th>
<th>Fibre length mm</th>
<th>Fibre fineness dtex</th>
<th>Strength (cN/tex)</th>
<th>Uster CV (%)</th>
<th>IPI (-50/+50/+200)</th>
<th>Hairiness Uster H</th>
<th>Hairiness Zweigle S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>50 (30)</td>
<td>44</td>
<td>1.5</td>
<td>33.1</td>
<td>12.2</td>
<td>0 / 5 / 19</td>
<td>6.0</td>
<td>3122</td>
</tr>
<tr>
<td>EliTe®</td>
<td>50 (30)</td>
<td>44</td>
<td>1.5</td>
<td>35.4</td>
<td>11.5</td>
<td>0 / 7 / 10</td>
<td>4.0</td>
<td>361</td>
</tr>
<tr>
<td>Conventional</td>
<td>50 (30)</td>
<td>38</td>
<td>1.7</td>
<td>30.3</td>
<td>12.8</td>
<td>3 / 2 / 2</td>
<td>5.6</td>
<td>595</td>
</tr>
<tr>
<td>EliTe®</td>
<td>50 (30)</td>
<td>38</td>
<td>1.7</td>
<td>31.7</td>
<td>12.8</td>
<td>1 / 2 / 2</td>
<td>4.1</td>
<td>204</td>
</tr>
<tr>
<td>Conventional</td>
<td>34 (20)</td>
<td>60</td>
<td>3.3</td>
<td>25.7</td>
<td>13.8</td>
<td>9 / 5 / 6</td>
<td>7.3</td>
<td>1926</td>
</tr>
<tr>
<td>EliTe®</td>
<td>34 (20)</td>
<td>60</td>
<td>3.3</td>
<td>28.3</td>
<td>13.2</td>
<td>4 / 3 / 3</td>
<td>5.3</td>
<td>1216</td>
</tr>
<tr>
<td>Conventional</td>
<td>50 (30)</td>
<td>38</td>
<td>1.6</td>
<td>17.0</td>
<td>12.2</td>
<td>1 / 0 / 2</td>
<td>4.63</td>
<td>1256</td>
</tr>
<tr>
<td>EliTe®</td>
<td>50 (30)</td>
<td>38</td>
<td>1.6</td>
<td>18.2</td>
<td>11.0</td>
<td>0 / 0 / 0</td>
<td>3.4</td>
<td>696</td>
</tr>
</tbody>
</table>

### Table 4: Yarns from polyester/viscose

<table>
<thead>
<tr>
<th>Method</th>
<th>Yarn count Nm (Ne)</th>
<th>Fibre length mm</th>
<th>Fibre fineness dtex</th>
<th>Strength (cN/tex)</th>
<th>Uster CV (%)</th>
<th>IPI (-50/+50/+200)</th>
<th>Hairiness Uster H</th>
<th>Hairiness Zweigle S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>24 (14)</td>
<td>51</td>
<td>1.6</td>
<td>26.9</td>
<td>10.9</td>
<td>0 / 9 / 14</td>
<td>5.8</td>
<td>633</td>
</tr>
<tr>
<td>EliTe®</td>
<td>24 (14)</td>
<td>51</td>
<td>1.6</td>
<td>29.5</td>
<td>9.2</td>
<td>0 / 4 / 5</td>
<td>5.5</td>
<td>210</td>
</tr>
<tr>
<td>Conventional</td>
<td>135 (80)</td>
<td>38</td>
<td>1.5</td>
<td>19.6</td>
<td>16.5</td>
<td>118/72/59</td>
<td>3.9</td>
<td>299</td>
</tr>
<tr>
<td>EliTe®</td>
<td>135 (80)</td>
<td>38</td>
<td>1.5</td>
<td>22.3</td>
<td>16.1</td>
<td>75/58/74</td>
<td>2.5</td>
<td>78</td>
</tr>
</tbody>
</table>
Table 5: Yarns from 100% acrylic

<table>
<thead>
<tr>
<th>Method</th>
<th>Yarn count Nm (Ne)</th>
<th>Fibre length mm</th>
<th>Fibre fineness dtex</th>
<th>Strength (cN/tex)</th>
<th>Uster CV (%)</th>
<th>IPI (-50/+50/+200)</th>
<th>Hairiness Uster H</th>
<th>Hairiness Zweigle S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>34 (20)</td>
<td>48</td>
<td>2.2</td>
<td>19.7</td>
<td>11.7</td>
<td>0 / 2 / 1</td>
<td>0.0</td>
<td>6.9</td>
</tr>
<tr>
<td>EliTe®</td>
<td>34 (20)</td>
<td>48</td>
<td>2.2</td>
<td>19.1</td>
<td>14.7</td>
<td>25/29/7</td>
<td>6.9</td>
<td>5305</td>
</tr>
</tbody>
</table>

Table 6: Yarns from polyester/cotton

<table>
<thead>
<tr>
<th>Method</th>
<th>Yarn count Nm (Ne)</th>
<th>Fibre length mm</th>
<th>Fibre fineness dtex</th>
<th>Strength (cN/tex)</th>
<th>Uster CV (%)</th>
<th>IPI (-50/+50/+200)</th>
<th>Hairiness Uster H</th>
<th>Hairiness Zweigle S3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional</td>
<td>50 (30)</td>
<td>38 (PES)</td>
<td>1.3</td>
<td>18.8</td>
<td>13.5</td>
<td>0 / 87 / 261</td>
<td>5.6</td>
<td>543</td>
</tr>
<tr>
<td>EliTe®</td>
<td>50 (30)</td>
<td>38 (PES)</td>
<td>1.3</td>
<td>21.0</td>
<td>12.9</td>
<td>0 / 87 / 298</td>
<td>3.8</td>
<td>70</td>
</tr>
<tr>
<td>Conventional</td>
<td>76 (45)</td>
<td>38 (PES)</td>
<td>1.3</td>
<td>17.8</td>
<td>13.7</td>
<td>6 / 67 / 98</td>
<td>3.8</td>
<td>1588</td>
</tr>
<tr>
<td>EliTe®</td>
<td>76 (45)</td>
<td>38 (PES)</td>
<td>1.3</td>
<td>18.7</td>
<td>13.1</td>
<td>6 / 41 / 118</td>
<td>3.4</td>
<td>550</td>
</tr>
</tbody>
</table>

ground of compact spinning. But interesting aspects of production increase on the ring spinning frame derive from it. The better bundling of fibres permits in most cases to reduce yarn twist and to achieve improvements in subsequent processes, which upgrade the quality of the textile end product. A production increase of up to 20% on the ring spinning frame is not rare.

4. Spinning results with the EliTe® CompactSet

See above a selection of spinning results of our customers with most different fibre materials and blends to explain the potential of the EliTe® Compact Spinning System for the processing of man-made fibres. For clarity we only present such comparisons where yarn twist and spindle speed are identical for conventional ring spinning and EliTe® Spinning.

All in all, the results prove that EliTe® helps to significantly reduce the long-hairiness S3, which is so important for man-made fibres. Sometimes, this improvement is not so visible by means of Uster hairiness H. Due to the multitude of special characteristics of man-made fibres, high demands are made on the flexibility of compact spinning. Most important is the possibility of adjusting the tension draft in the compacting zone.

5. Summary

Compact spinning will continue its triumphant advance also in the case of staple-fibre yarns from man-made fibres, although with a difference of time to cotton yarns. The increase in man-made fibre consumption, the appearance of such textile articles, which is still often criticized, and interesting potentials to raise production speed in yarn production and subsequent processing are the main arguments in its favour. The EliTe® CompactSet complies with this demand in a perfect manner.
When it comes to the selection of spinning accessories for cotton yarns, customers frequently ask which SOLIDRING is the most suitable. According to current literature, two SOLIDRINGS, i.e. B 174 and B 20, are available for this application.

SOLIDRINGS have the following essential tasks:
- combing the fibre beard
- fibre singularization
- trash extraction
- transport of fibres to the fibre channel

and the properties to fulfil these tasks:
- tooth form to match the fibre to be processed
- absolutely identical form of all teeth on the same SOLIDRING
- suitable tooth structure and hardness
- excellent running properties as well as
- a long service life

The first step in developing a tooth form to fulfill the aforesaid tasks and properties especially for processing cotton yarns was the B 20. In permanent search of improving yarn quality and increasing durability, SUESSEN developed the crescent tooth shape of the B 174.

The principal and most important distinctive feature between the two tooth designs is the wear behaviour. Wear of B 174 is considerably lower than of B 20, when processing the same material during the same production period.

The reason of the different wear behaviour is that fibres slide better on the crescent-shaped flank of the B 174 tooth and therefore touch the tooth flank in several points, whereas in case of the B 20 fibres touch the tooth flank mainly in one point, due to the flat tooth form. Consequently, wear is much higher in this area of the tooth.

Differences in yarn quality

Some of our customers report that the quality of fine cotton yarns (Ne 20 and finer) achieved with B 20 is better.

This is only true to a certain extent. The slightly better yarn parameters of B 20 at production start are confronted with better yarn values with B 174 after a production period of about 3 to 5 months.

Consequently, the aforesaid positive influence of the B 174 permits to achieve a permanently good yarn quality over a longer period of production than the B 20. The better yarn quality is mainly reflected by the imperfection values.

For coarser yarn counts the initial quality difference cannot be confirmed, but long-term behaviour in such appli-
cations speaks in favour of the B 174 tooth form.

The diagram of Fig. 5 explains the influence of lifetime on yarn quality and the difference between the two tooth shapes. The curves represent a medium value from several long-term trials with different yarn counts.

**Trash extraction**

Another advantage of the crescent-shaped tooth form of the B 174 is the slightly more intensive trash extraction and singularization of fibres. A reduced trash deposit in the rotor groove and consequently fewer end-breaks and clearer cuts reflect this advantage.

Particularly in the case of delicate material like recycled fibres, customers can profit from the B 174 Solidring. The diagram of Fig. 6, based on a number of spinning trials carried out by our R+D department, illustrates the higher percentage of trash extraction achieved with a B 174 Solidring when processing 100% cotton into different yarn counts.

**Summary**

When comparing directly the quality of fine cotton yarns produced with new B 174 and B 20 Solidrings under identical conditions, the B 20 tooth form often offers slight advantages with regard to yarn imperfections. However, this initial advantage is reversed already after a few months of production due to the reduced wear of the B 174 tooth form.

When processing sliver with a normal or higher degree of impurities or recycled fibres, the B 174 tooth shape offers advantages in trash extraction and therefore a reduced soiling of the rotor groove. Thus better running properties and a lower ends-down rate are achieved.
Joint Action with Bräcker and Novibra in ITMA ASIA 2005

From October 17–21, 2005, ITMA ASIA will be held in Singapore for the second time. For the first time, Bräcker, Novibra and SUESSEN will present their products on a common stand, which will be located in Hall 2 Stand C18.

The three companies will boost your performance to the way of perfection.

- The original SUESSEN Top Weighting Arms HP-A 310/320 and HP-A 510 together with
- the Novibra Spindle HP-S 68, completed by
- the tubes, spinning rings and ring travellers from Bräcker

will demonstrate the combined passion of the undisputed technology leaders in ring spinning drafting systems, spindles and spinning rings for your benefit:

- One trade partner
- One order management
- One service network
- One team – one guarantee

Only the best-equipped machines are capable of meeting competitive and profitable requirements.

The common offering of SUESSEN, Novibra and Bräcker represents the decisive factor of performance and quality to the produced yarn:

- No compromise – boost your performance with the most outstanding products
- No headache – enjoy the most reliable service and quality available
- Live Your Visions!

Participation in Shanghaitex 2005

SUESSEN will participate in Shanghaitex 2005 from June 3–7. Our booth is located in Hall 6 Stand B55.

We invite you to see a running worsted ring spinning machine modernized with our EliTwist®CompactSet-L, the EliTwist®Modernization to spin Two-Ply Worsted Compact Yarn (EliTwist®Yarn) directly on a ring spinning machine. We will process 100 % wool to the yarn count of Nm 96/2. Additionally the machine will be equipped with our Core Yarn Device EliCore® to demonstrate the processing of compact worsted two-ply soft core yarn, called Worsted EliCoreTwist®Yarn.

Further you will see drafting system models of our EliTe®CompactSet-S for short-staple fibres as well as HP Components for drafting systems of ring spinning and roving frames.

In open-end rotor spinning we display our Premium Parts Modernization Packages, Spinning Components and Spare Parts for Autocoro Machines as well as a model of our Quality SpinBox SQ.

Vitale Barberis Canonico continues to invest in SUESSEN EliTe®CompactSet Technology

Vitale Barberis Canonico started immediately after ITMA 1999 in Paris to invest in compact spinning technology and purchased the first SUESSEN Fiomax E 2 worsted ring spinning machine available direct on the ITMA in Paris. It was the machine shown at the trade fair with 288 spindles.

Now the renowned Italian company Vitale Barberis Canonico with production plants in Pratrivero (Biella) and Pray (Vercelli) have ordered additional 16 EliTe®CompactSet-L to modernize their Fiomax 2000 worsted ring spinning machines.

Due to the excellent results of the first four EliTe®CompactSet-L Modernizations delivered, Dr. Alberto Barberis Canonico and his son, Dr. Alessandro Barberis Canonico, decided to convert the complete spinning mill in Prativero (Biella) into a compact spinning mill.

This investment underlines the current tendency in Italy that the compact technology will prevail on the market, and this also in the wool sector.
Top Weighting Arm HP-A 310/320
For Short-Staple Ring Spinning Machines

- Three roller double-apron drafting system
- For cotton, man-made fibres and blends up to 60 mm staple length
  - Excellent yarn results, constant quality values guaranteed
  - Total drafts up to 80-fold
  - Partial weight release
  - With HP-C Stability Cradles and HP-R Top Rollers
- Basic preparation for a later retrofit with EliTe® CompactSet

...again a step ahead...