

# RECENT ACHIEVEMENTS IN MACHINERY FOR PROCESSING SHORT STAPLE FIBERS: AN OVERVIEW OF ITMA 2015

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**REZUMAT.** *Lucrarea trece in revistă câteva dintre cele mai recente și interesante realizări din domeniul prelucrării fibrelor, expuse la ITMA 2015 - International Textile Machinery Achievements. Sunt prezentate pe scurt cele mai reprezentative realizări ale producătorilor de mașini textile pentru filatura de bumbac și sunt evidențiate soluțiile pe care aceștia le oferă ca răspuns la cererea de utilaje flexibile, productive, eficiente și ușor de operat.*

**Cuvinte cheie:** prelucrarea fibrelor, bataj, cardare, laminare, pieptănare, filare, bobinare.

**ABSTRACT.** *The paper presents some of the latest and interesting achievements in the field of fibres processing, recently showcased within the International Textile Machinery Achievements - ITMA 2015. The most representative achievements of the textile machinery producers for manufacturing yarns from short staple fibres are reviewed and are highlighted the solutions they have brought as response to the customer demands for more flexible, highly productive, efficient and easy to operate machines.*

**Keywords:** fibre processing, opening, carding, drawing, combing, spinning, winding.

## 1. INTRODUCTION

The 17th edition of the largest International Textile Machinery Achievements - ITMA 2015 took place in Milan from 12 to 19 November and has gathered in the capital of Lombardy a significant number of exhibitors and visitors from all around the world. There were present 1691 exhibitors from 46 countries, 25% more than in ITMA 2011 and over 120.000 visitors from 147 countries, 20% more than in ITMA 2011.

The textile equipment manufacturers present at ITMA 2015 have covered the whole fibre processing industry, from primary steps of fibres processing up to the late stages of palletizing and packaging, including accessories and spare parts. They presented the latest innovations in their field, but also a large range of known products that already have a well-established market.

Among the suppliers of textile machinery for short staple spinning industry who showcased their latest achievements, one can mention the well-known companies with a tradition of over 100 years in the construction of textile equipment as Rieter AG., Trützschler Group, Marzoli Spa., Saurer Group (including Schlafhorst and Zinser) or Savio, but also new companies, most of them from Asia (Lakshmi, Murata Machinery, Jingwei, BALKAN).

## 2. PRESENTATION

Considering the limited space for this paper, only the updates provided by some of the most representative manufacturers of textile machinery for processing short staple fibres are further highlighted.

### 2.1. Rieter AG

**Rieter AG.**, the Swiss supplier of textile machinery showed the new machine generations and appropriate spare parts, as well as After Sales services and solutions for optimal utilisation of the spinning mill. [1]

Efficiency and low energy consumption, quality and flexibility are the main features for the Rieter machinery. The improvements and the innovative solutions oriented towards obtaining a high production performance and a consistent quality for slivers and yarns, allow customers to valorise the expensive raw material at high level. Use of the Internet for optimisation of the entire system was a further attraction at the Rieter booth.

The *Machines & Systems* business group displayed the new E36/E 86 combing set, which offers a significant increase in productivity, the enlarged

R 66 rotor spinning machine with improved S 66 spin box and the optimized air-jet spinning machine with the polyester option P 26. The extended SPIDERweb Mill Control System was another highlight.

The **E 36/E 86 combing set** consists of a new combing preparation machine - E 36 OMEGAlap - able to feed six E 86 combers (Fig. 1). With a production of over 540 kg/h and therefore able to supply almost 25 000 ring spindles, this combing set is claimed to reach the highest production volume on the market.



Fig. 1. Rieter E 36/E 86 combing set: one E 36 OMEGAlap and six E 86 combers

**E 36 OMEGAlap** (Fig. 2) uses the new belt winding technology in which the belt especially developed for this purpose wraps around the infeed batt and thus the lap. During lap build-up the wrapping angle is variable. At the start of the process, the contact circumference amounts to 180° whereas at the end of the process it reaches 270°. This results in an optimal distribution of contact pressure over the circumference of the lap, that enables production of a uniformly wound lap of optimal quality, in conditions of maximum productivity and speed which is up to 50 % higher in comparison with conventional systems.



Fig. 2. Rieter E 36 OMEGAlap.

**E 86 Comber** (Fig. 3) is characterized by the following features:

- a maximum production of combed sliver up to 90 kg/h;
- the Ri-Q-Comb Flex height-adjustable circular comb, with the largest active combing surface, allows more flexibility in the noil extraction height and improves the fibres parallelism;

- gentle, controlled fibres treatment achieved by optimally coordinated combing movements and the technology elements developed by rieter;

- choice of Flexible Transport Systems: semi-automated SERVOTrolley or fully-automated SERVOLap;

- use of 1 000 mm diameter cans which reduce the number of can changes by 50 % and therefore the operating expenses by 10 %;

- fully automated lap change and batt piecing system ROBOLap (Fig. 4) which allows reduction of human resources, eliminates waiting times, increases efficiency and improves the combed sliver quality.



Fig. 3. Rieter E 86 Comber.



Fig. 4. Automatic lap changing and piecing system ROBOLap.

For older generations of combers, Rieter offers conversion kits that improve the productivity and yarn quality, making possible a reduction of the noil rate. At ITMA 2015 Rieter has demonstrated how quickly such a conversion can be realized and what economic advantages get the customer.

The **R 66 automated rotor spinning machine** (Fig. 5) with the new spinning box S66 is claimed that ensures high spinning stability and improves the yarns strength. With up to 700 spinning positions and higher rotor speeds (up to 175 000 rpm) the machine combine the need for high productivity and flexibility with requirements for low energy consumption. The increased length of machine allows reducing the costs for the entire rotor spinning system. Up to 6 efficient robots ensure high efficiency (cycle time 20 s) even with many piecing and bobbin changes. The suction system with automatic filter cleaning ECOrized allow up to 10% energy savings.

The additional flexibility of R 66 rotor spinning machine is given by the two independently adjustable machine sides, which allow spinning different lots of yarns on each machine side (fig.6). Two

separate tube loaders and conveyors belts provide maximum protection against mix-up of the lots.

The new replaceable CHANNELpass simplifies the optimization for different raw material while the new electro-mechanical yarn traverse simplifies the setting of the winding angle for a wide range of applications, in order to obtain reliable package flanks and good unwinding behaviour.

Optional, the R 66 can be equipped with VARIOspin device from Amsler, for production of fancy yarns.



Fig. 5. Rieter R 66 rotor spinning machine.

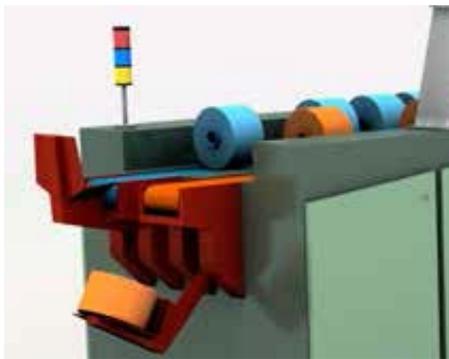


Fig. 6. R 66 Independently adjustable sides.

The *J 26 air-jet spinning machine* (fig.7) completes the range of spinning machines offered by Rieter. With 200 spinning units, maximum delivery speed up to 500 m/min and spinning unit automation with short piecing time, the J 26 air-jet spinning machine ensures the most economical production process. The double side machine layout with cans situated under the machine saves up to 60% space and reduces mill operating costs. [5]

Two independent machine sides, with different settings for all parameters, allow simultaneous production of two different yarn qualities on one machine. On each machine side, there are separate filter chambers to process waste from the spinning positions and robots enabling collection of unconta-

minated wastes that can be further used, from separate streams.



Fig. 7. Rieter J 26 Air-jet spinning machine.

Fig. 8. Rieter J 26 Air-jet spinning unit.

The company reports the machine's new spinning unit (fig. 8) produces yarn with improved strength and reduced incidence of imperfections.

When processing polyester fibres, the challenge lies in the deposits of spinning finish and co-polymers. For this reason, Rieter now offers the option P 26, which claims to significantly extend the time between the necessary cleaning operations.

The Q 10 A yarn clearer used successfully in rotor spinning has been further developed for air-jet spinning. Based on an accurate monitoring of yarn structure, hairiness and yarn diameter, it interprets "not only the standard functions but also the yarn tenacity."

The range of raw material processed covers 100% polyester, combed cotton, cellulosic fibres, micro-fibres and different blends including man-made fibres, in the yarn count range from Ne 20 to 70 (Nm 34 to 120).

A new version of *SPIDERweb Mill Control System*, the data monitoring system that records all production and quality data for the all range of Rieter system installations was also presented. For the first time, Rieter sowing a mobile solution that not only provides an overview of the data of the

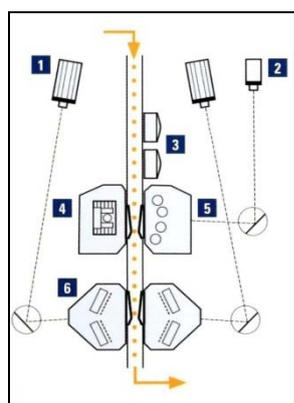


spinning mill, but also offers a configurable alarm function. SPIDERweb opens the door to an Internet-based, intelligent control of spinning mill. The system offers advantages like permanently monitored sliver and yarn quality, incorporated expertise, optimal allocation of operating personnel, support for systematic preventive maintenance, fact-based and quick reaction to deviations, and increase in spinning mill availability and productivity.

## 2.2 Trützschler Group

**Trützschler Group.** All four divisions of German textile machinery manufacturer Trützschler (Spinning, Nonwovens, Card Clothing and Man-Made Fiber) showed their new products at ITMA 2015 under a central theme, *'Processes and machines to improve economic efficiency at our customers are in the spotlight'*. [2]

- |                |                                |
|----------------|--------------------------------|
| • F-Module     | coloured/dark foreign parts    |
| • P-Module     | transparent foreign parts      |
| • UV-Module    | fluorescent foreign parts      |
| • G-Module     | shiny foreign parts (NEW)      |
| • LED-lighting | small/thin foreign parts (NEW) |



- 1 - T-SCAN cameras with very high resolution and scanning frequency
- 2 - Camera with polarization filter
- 3 - Speed sensors
- 4 - Lighting unit with polarization filter
- 5 - UV lighting unit
- 6 - LED lighting modules with 536 LEDs and special lenses



Fig. 9. Trützschler Foreign part separators TSCAN TS-T5.

The automatic *Can Filling Station T-MOVE* (Fig. 11) allows quick can change, for large cans, with minimal space requirements. With this system, the sliver feeding is moved while the cans remain stationary. Some benefits of T-MOVE are: quick change of the filling position, increased delivery speed during can change, use of larger cans (up to 1200 mm diameter) and increased card efficiency. [6]

*Twin draw frame TD 9T* is a new concept for breaker draw frames developed by Trützschler, with focus on reduced space requirement and efficient production. If required it is also available as single version. Thus each number (odd or even) of drafting heads can be implemented. The TWIN-concept is

In blowroom section, Trützschler presented the new generation of foreign part separators *TSCAN TS-T5* featuring five modules, two more than older system (Fig. 9).]

*Trützschler Card TC 15* (Fig. 10) presented in ITMA 2015 is an improved variant of the new card generation introduced in 2011 that allows an increase in productivity by 15% compared to TC 11, thus achieving lowest carding costs. The particular features of the new TC 15 are:

- expansion of performance limits through T-MOVE and Optimiser T-CON systems;
- increased delivery speeds during can change (can diameter 1000 mm, 1200 mm);
- new webb doffing and sliver formation for speeds up to 500 m/min;
- smallest floor space in comparison to production ;
- lowest waste quantities;
- reduced air consumption.

based on independent draw frame modules, with only few common elements, those without a negative influence on efficiency, such as control cabinet, control, screen, operator platform and filters. With the new TWIN-concept, if one side of the draw frame stops the production, the other side continues to work without any loss of production.

The Trützschler breaker draw frames TD 9 and TD 9T (fig. 12) share a variety of technologically important elements with the reliable Trützschler autoleveller draw frame TD 8, such as: 4-over-3 drafting system with pressure bar, pneumatic load, separately controllable for each top roll, self-adjusting lap monitoring, all creel versions, coiler plate with hydro polished tube.



Fig. 10. Trützschler Card TC 15.

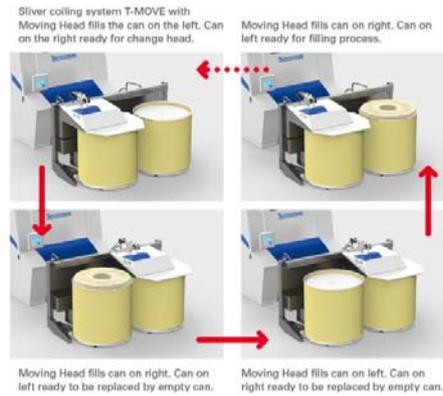


Fig. 11. Can Filling Station T-MOVE.



Fig. 12. Trützschler twin draw frame TD 9T.

In combing section, two new machines were presented. They are the result of a fruitful co-operation between Trützschler and Toyota.

The new developed *Trützschler - Toyota Superlap TSL 12* (Fig. 13) with multi-drive system is able to produce premium-quality laps. Thanks to individual drives, draft and tension can be precisely adapted to cotton quality and batt weight. Each sub-



Fig. 13. Trützschler - Toyota Superlap TSL 12.



Fig. 15. Toyota-Trützschler Comber TCO 12.

The new concept of the TCO 12 is based on 2x2 highly dynamic synchronous servo motors. Two motors on each side drive the two detaching rollers. This results in synchronous running and absolutely

process has its own drive: drawing system, pressure calendar, lap forming roller.

The 3-over-3 drawing system is easily accessible; the top rollers feature separately controllable pneumatic load, with quick relief at machine stops (Fig. 14). The empty tubes are fed from the side through an opening in the panel. This development reduces the time required to change laps. Lap transport can be done manually with trolley or with an automatic transport system.

*Toyota-Trützschler Comber TCO 12* (Fig. 15) represent the perfect symbiosis between Toyota combing know-how and Trützschler draw frame technology. It offers consistent, reproducible qualities even at highest performance, and easier operation than conventional combers.



Fig. 14. The 3 over 3 drafting system.

comparable motion sequences on all combing heads. The new comber can run at higher nip rates because the mechanically limiting factors no longer apply. The mechanical elements are replaced by specially designed servo motors. The double sided drive minimise torsion forces and angle.

The robust Trützschler 4 over 3 drawing system with pressure bar was designed for the high drafts on the comber (Fig. 16). The 4th top roller ensures an even gentle sliver deflection at the delivery side of the drawing system, while the adjustable pressure bar in the main draft area provides controlled guidance. All four top rollers can be lifted up together with on single action.



Fig. 16. The 4 over 3 with pressure bar drafting system.



Fig. 17. Marzoli FT60/FT70 roving frame.



Fig. 18. FT60/FT70 drafting system.

### 2.3. Marzoli Spa

The Italian group Marzoli SpA. showcases at ITMA 2015 some of the latest achievements:

**Marzoli FT60 and FT70 roving frames** (Fig. 17) are based on advanced and reliable electronics components in order to perfectly synchronize all the independent motors driving the working organs, spindles, flyers, bobbins rail and drafting units. Therefore mechanical transmission is reduced and this grants following benefits:

- high speed and high quality roving thanks elimination of uncontrolled vibrations;
- low energy consumption due to the reduction of the mechanical frictions;
- high reliability because of the fewer components and the reduced mechanical wear;
- high flexibility because the machine can be easily set electronically through the touch screen interface without any mechanical modification.

The spindles and the flyers drives of the new roving frames include high efficiency servomotors with servo drive for the flyers (one every 64/48) and IE3 motors to drive the spindles (one every 32/24). The completely electronic drafting system (Fig. 18) ensures the highest degree of flexibility: the draft can be changed by simply inserting the new draft parameter on the touch screen interface, no mechanical modification is required. Using the production management platform YARNET, the draft can also be inserted remotely (e.g. from the production manager's computer). [3]

FT60 and FT70 roving frames are fully integrated with Marzoli Bobbin Transport systems and ring frames through specific mechanic solutions (e.g. dedi-

cated creel system for transport trains) and software production control platform. This allow realizing a superior and fully integrated Spinning Section, maximizing overall coordination and effectiveness of roving and spinning operations through a constant and regular supply for the spinning frames, allowing for full and enhanced productivity of the spindles.

The two recently developed innovative platforms, YarNet and Marzoli Remote Maintenance, enables easily control and manage the entire spinning mill.

*YarNet platform* allows to continuously monitoring real-time production data, operating conditions and statuses of each machine. Everything, from the production per hour to the energy level, from the number of roving breakages to the waits and stop causes, can be accurately monitored in real time by the client on his computer. YarNet allows downloading, modifying, creating from scratch and sending new production recipes to every machine.

The "Layout" window allows monitoring every machine in the spinning mill. This window lists all the machines and, for each of them, it showcases real-time production data (e.g. count, twist, speed, production volumes etc.) and machine statuses (using colored progress bars). This gives a clear overview of the whole plant and enables immediately identify machine alarms and stops. The "Production" and "Charts" windows allow investigating production and efficiency levels of the mill. The data can be filtered and managed in several ways such that it helps the manager to find ways to boost productivity and efficiency of the plant. The "Waits&Stops" window offers the possibility to analyze the causes of the stops and waits of the machines, giving valuable guidance for maintenance operations.

**Marzoli Remote Maintenance (MRM)** is an innovative service that draws on diagnostic technology installed inside the machines in order to monitor the state of health of critical parts (Fig. 19). If there are any parameters (temperatures, vibrations etc.) that are outside the nominal operating ranges, the client is alerted (exploiting all channels possible, from an alert via PC to an SMS on the cell phone) so that the maintenance operations can be undertaken before the situation worsens. [7]

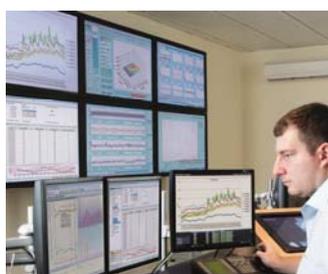


Fig. 19. Marzoli Remote Maintenance (MRM).

MRM support customers to constantly operate their machines in standard-target operating conditions, thus maximizing overall effectiveness of plant operations and enabling key economic benefits:

- maximized up-time and productivity,
- maximized machines efficiency and energy savings through constant and preventive control of machines critical components,
- maximum effectiveness of problem solving and resolution times for maintenance and technical operations, maximized life-time of the investment.

## 2.4. Saurer Group

**Saurer Group**, which includes the spinning brands **Schlafhorst** and **Zinser**, revealed the new E<sup>3</sup> labeled machinery with the triple added value for the customers. They claim to “*showcase new standards in energy savings, production flexibility, highest productivity and the most complete automation processes.*”

Schlafhorst presented the new generation of rotor spinning machines, **Autocoro 9** (Fig. 20) which has been awarded the E<sup>3</sup> label. It is said to offer spinning mills a triple added value in the areas of *energy, economics* and *ergonomics*.

Compared to the previous model, the new Autocoro 9 uses less energy by up to 25% due to use of more energy-efficient components and the Energy Monitoring system that keeps track on the energy online, per lot or per kilogram of yarn. Longer machines, higher rotor speeds, intelligent automated processes and minimized maintenance costs increase efficiency, productivity and profitability. Productivity increased by 30% due to high rotor speed (up to 180 000 rpm) and high efficiency rating. The main-

tenance costs may be reduced up to 60% due to the possibility of individual intervention on each spinning position during on-going operation. There is no longer need for complete machine shutdowns for maintenance and cleaning. The intelligent spinning position is able to communicate individually with the operating personnel via a smart symbol display. In the event of malfunctions, the display signals the relevant error and the staff can intervene immediately. [8]



Fig. 20. Schlafhorst rotor spinning machine Autocoro 9.

The new Autocoro 9 is also a flexible machine. Each spinning position is an independent production unit with individually controlled spinning and winding processes. With MultiLot technology, Autocoro 9 is able to spin up to five lots simultaneously. The number and assignment of spinning positions for the individual lot can be specified and this enables production of smaller “just in time” lots in parallel with the delivery of large customer orders. Using PilotSpin, individual spinning units can be used also for the production of test packages while the other spinning positions continue to work.

Another cost-effective option available on Autocoro 9 is Fancynation (Fig. 21). This allow to spin up to 5 different fancy yarns simultaneously, or fancy yarns and smooth yarns in parallel, on the same machine. [4]

*ZinserRing 71* and *ZinserRing 72*, the latest ring spinning machines from Zinser have also the E<sup>3</sup> label (fig.22). Classic ring yarns for any requirement may be obtained with *Zinser Ring 72/72*, while *Zinser Impact 72/71* is able to spin compact yarns using the self-cleaning Impact FX technology.

Innovative Twin Suction system, tangential belt drive, high performance motors for drafting system and high precision spindles allow important savings in energy. [9]

A highlight of the *Zinser 72* is its length. It is claim that with 2016 spindles, *ZinserRing 72* requires up to 21 % less space and allows decrease of the production costs by up to 11 % compared with a ring spinning installation with 1,200 spindles.

Automatic doffer CoWeMat, self-sorting tube feed CoWeFeed, self-cleaning Impact FX compacting technology, enable reducing the operator’s workload.



Fig. 21. Fancy yarns and fabrics.



Fig.22 - ZinserRing spinning machine.

A fully-automatic linked system solution, from the roving frame to the winding machine is available. It is said to be the “interplay of a highly integrated automation solution for the greatest possible energy savings, maximum economic efficiency and optimum user-friendliness.”

### 3. CONCLUSIONS

The paper underlined the achievements of the most representative manufacturers of textile machinery

for processing cotton fibers: Rieter AG., Marzoli Spa., Trützschler GmbH, Schlafhorst and Zinser (part of Saurer Group).

As a general conclusion can be noted the particular concerns of all textile machinery manufacturers to find new and innovative technical solutions to reduce consumptions (energy, raw materials and spare parts), diminishing time and maintenance costs, increasing productivity and rise the product quality while reducing the investment and the production costs.

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