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Spinning at ITMA 2023 – An Economic View

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Introduction

"Cautiously moving forward" appears to be the overarching motto of the spinning area at Milan's ITMA 2023. Of course, there are technical advances, but economically speaking, nothing that completely shakes up existing business models. Some of the incremental investments (1) of the 1980s are coming back to mind. Incremental investments allow textile manufacturers to utilize new or improved technologies without having to completely replace existing equipment. This conserves financial resources, which is relevant in uncertain economic times, as well as during times when technological directions are not yet clear. The theme of economic uncertainty was definitely visible and frequently mentioned in many conversations during ITMA.

Many machine manufacturers as well as their clients still mentioned "surviving COVID" as well as the post-COVID times. Economic activity is still reduced, and survival is simply more important than innovation, or at least more imminent. For equipment producers, just like for their clients, raw material prices have been very volatile and considerably higher than five years ago (2). These kinds of cost increases impact machine prices, thus changing the cost/benefit analysis for new equipment and new technologies. Similar price increases and volatilities have taken place in the raw materials for yarn producers, i.e., cotton, polyester, (2), making long-term decisions like the purchase of new spinning equipment extremely difficult.

Additionally, like for most other industries, a lot of technological innovation is happening in the integration, control, and coordination of processes. This requires computing equipment, semiconductors; all items that are still in supply chain recovery mode since 2018. Shortages in some cases lead to "allocation" of equipment to existing or strategic customers only, most definitely not a desirable situation for the industry.

Some themes do show up in the technology directions despite this economic backdrop.

Process Integration

Most of the equipment manufacturers showed very sophisticated programs that monitor, control, optimize, and integrate processes within and between plants. Cloud computing, remote access and control, and a plethora of data analyses was shown by most of the companies at ITMA. Software programs are a key to efficient plant management, and exhibitors integrate their maintenance and spare part business into their plant management toolboxes. While

spare parts etc. have always been an important business component, today these services are strongly promoted, showing how much more important they have become to the suppliers.

MyTrützschler, available from Trützschler Group SE, for example, allows you access to detailed plant information, with live feeds from practically anywhere. The MyWires functions help optimize card clothing management, whether the spinning mill conducts its own wire maintenance or utilizes the service provided by Trützschler. Technologically, this kind of real time data allows for optimized plant management, optimized equipment maintenance, and faster and better decision making. Economically, it also shows how much more integrated the supply chain on the textile equipment side is . Not only are the textile equipment manufacturers much more integrated in bale handling through spinning, but also any of the auxiliary suppliers such as monitoring, maintenance, etc., are tied into the supply chain through acquisitions and strategic alliances.

In similar fashion, Marzoli Machines Textile S.r.l. provides digital solutions to optimize the spinning process and monitor KPIs (Key Performance Indicators) in real time. Implementing its predictive maintenance program analyzes a large volume of company data against benchmark values, resulting in maintenance cost savings of up to 30%. Through the cloud-based MRM (Marzoli Remote Maintenance) software, problems can be analyzed remotely, and energy consumption and efficiency can be optimized.

On the equipment side, Trützschler showed the TC 19i card, with the gap optimizer (T-GO) that automatically "finetunes" the carding gap to compensate for changing temperatures and conditions during operation, leading to higher production and better quality. The optical sensor of WASTECONTROL continuously monitors the waste quality at the licker-in and automatically optimizes the mote knife setting via the servo motor. With rising raw material costs any raw material savings are an important cost factor, no matter what textile market is served. NEPCONTROL data is monitored and uploaded to the MyMill system, where any deviation in nep count can be analyzed and addressed at the machine level from anywhere in the world. The TC 30i card has been updated sinceITMA 2019 in Barcelona and showed an increased carding area (about 1/3 more active flats plus a pre-carding and post-carding zone). While an increased carding surface is not a new idea or technology, the existing carding technology has certainly been improved, leading to higher production levels, better quality, and more efficient waste management (minimizing fiber waste, and separating waste fibers to optimize the recovered value). Similar improvements can be seen in drafting (like the self-optimization in the TD 10), leading to higher efficiencies, improved quality monitoring, and better integration of mill management.

Switzerland-based Rieter showed very similar directions in its developments, with the carding machines C77 and C81 showcasing an increased carding surface (the C81 sporting the "largest active carding area" in the market), automatic Carding Gap Control, and optimized fiber yield through their Trash Level Monitor. Improvements in spinning continue, for example in ring-spinning (G38 and G37), rotor-spinning (like the fully automatic R70), or compact spinning (like the K48). Air jet spinning (J70) was specifically highlighted at ITMA. With roughly 25% higher production speed over ring spinning and unusually high flexibility through the VARIOlot option (up to two different lots per machine side), the J70 matches the ever-changing market demands for smaller lot sizes. Cost and flexibility remain relevant.

Marzoli showed the FTM320 roving frame with the central headstock in the middle of the machine. This layout not only simplifies managing the machine itself and optimizes

automated transport of bobbins to the spinning machines, but it significantly reduces exchange and cleaning times (almost 30%), thus increasing efficiency and reducing cost, specifically energy cost, which is of course an ongoing concern in the industry. The layout itself also reduces space requirements, and while looking at productive areas vs. non-productive areas is not always one of the most urgent decision criteria, in some cases space becomes an absolute dealbreaker or deal maker. Marzoli's MDS2 spinning frame also showed improved efficiency and reduced energy consumption, in line with the concerns of industry. Energy consumption, and specifically air consumption, are also the key improvements seen in the comber CMX, with increased productivity and up to ten combing heads.

In addition to the high degree of automation within each of the machines, from self-correcting adjustments to automated and integrated maintenance, Marzoli also showed the integration between machines. Automated transport and coordination between combing, roving, and spinning are key elements in addressing concerns about labor availability and reliability.

The overarching theme, however, was automation and integration, and the ROBOspin fully automated piecing robot is now also available for compact spinning. Improved control systems allow quality control going into and out of the machines, and Rieter helps mills through their Rieter Digital Spinning Suite to monitor, manage, and optimize spinning mills remotely. Service, maintenance, and spare parts as well as carding wire management are an essential part of the Rieter business model.

Saurer also showed automation and process integration as a major theme. Like most equipment producers, Saurer addresses automation as a managerial response to rising labor costs worldwide, and independent of cost automation, addressing reduced availability of skilled labor in the industry. All equipment manufacturers mention training programs (in person, online, or at the machines) as well as automation in order to address various labor issues that are an industry concern worldwide. Saurer does this through Saurer Academy. Additionally, automation and process integration can improve quality and efficiency by reducing human error. Saurer specifically showed the Autocard SC7 carding machine (automatic gap adjustment for recycling, increased carding surface area for improved quality and production rates), and automation in linking (automatically transporting) from one process to the next. The ZI 72XL compact spinner, the Autoairo air spinning machine, rotor spinning (Autocoro 11 and BD8 with Twinsuction on both ends) as well as ZI 451 worsted compact-spinning machine were shown, and twisters, cablers, and winders. Energy efficiency and reduction of energy consumption are an important topic in spinning, where energy cost often exceeds the cost of direct labor. Saurer addresses this through their Textparts product line, showing a smaller diameter spindle Eshape to reduce energy costs, among other parameters.

Automation in process and product monitoring and inspection is of course a key component in any textile manufacturing setting, and Uster Technologies AG showed its 360Q solution suite as a fully integrated system helping with data generation, analysis, and solutions for quality as well as cost management. The leader in textile testing has integrated in-line monitoring at all levels with analysis and decision-making tools. Human error is essentially removed from the equation, and the RSO3D, Uster Quantum, and Uster Sentinel are key elements in mill management that existing and new spinning mills need to remain competitive. Loepfe's Yarn Master PRISMA allows superior clearing with the dual measurement system (infrared and mass sensors), thus improving quality while saving cost, the two key business drivers in yarn production. Through the innovative Autostart feature set-up times are drastically reduced, allowing for faster and less costly product

changes, which is a key aspect of agile manufacturing. Integrating software enables a complete management system, and as additions to existing equipment Uster and Loepfe have always been part of new and incremental investment strategies in the industry.

Savio Machine Tessili S.p.A. also showed trends towards more automation (e.g., the automatic winder Proxima Smartconer) and more flexibility in air jet spinning, where the Lybra Smartspinner allows changing fiber blend ratios in the yarn from two slivers via computer.

There was much expectation about Toyota's vortex spinning machine "Helix", but unfortunately the machine was not shown, and videos were only available to customers. According to company associates, production speeds are in the 50,000 RPM range with very fast start-up speeds. Something to look forward to at ITMA 2027!

Murata Machinery Ltd. (Muratec) showcasing its Vortex spinning system had only a very small booth with videos rather than machines. NSC-Schlumberger showed similar directions of improvement (automation, energy savings, process integration) for long staple as described above for short staple. Marzoli focuses on automation, digitalization, and engineering services, offering consultancy to improving spinning plant operations. In similar manner, Spinhole Consulting offers consultancy services helping spinning mills to change the configuration of the drafting zone and yarn guides to create a double ("multi) balloon, allowing increased production speeds, reduced energy consumption, and thus reduced costs, a true incremental investment as defined above. Greenspin offers similar retrofitting of drafting systems for worsted and woolen ring spinning machines.

Also, in winding (e.g., Dietze+Schell or Sahm) the trend toward more automation, higher production, increased flexibility (like the Flexible Traverse option), and remote support and service has been shown.

It should be noted that in addition to the traditional producers, there are equipment producers from India (for example LMW) or China (Jingwei textile machinery) showing the full range of equipment for spinning mills.

Going Green

All major manufacturers of equipment showed not only how they reduce energy consumption, but also how they contribute to a circular economy. Recycling has been moved from a merely mentioned ability to now being treated as a separate business concept that warrants complete business segments within the companies with dedicated equipment from opening through spinning. The manufacturers market dedicated product lines specifically for recycled materials (e.g., TRUECYCLED by Trützschler or the COM4 Recycling process by Rieter), and with raw materials being the biggest cost factor in textile processing, recycling makes sense economically as well as environmentally. Being able to process obsolete products into raw materials is as essential in the circular economy as any other step within this circle.

All the equipment manufacturers also describe reduced energy consumption in their products; this is of course an ongoing trend, and economically highly relevant as energy costs in spinning tend to be more relevant than labor costs. Managerially speaking, cost savings are always easy to justify, especially when these costs are getting more volatile. Additionally, reduced energy consumption results in a smaller CO_2 footprint, which is good for the environment and a company's CSR (corporate social responsibility) report. While these are all easy concepts to sell, they are not necessarily easy concepts to implement into the equipment, and they tend to make equipment more complex and more difficult to maintain. This is where remote training programs, the service and maintenance programs offered by the

manufacturers become an integral part of the business models.

Conclusion

The world economy is still recovering, and supply chain issues, specifically in the electronics areas, impact spinning equipment like any other. In terms of innovation, there is not a completely new mousetrap, but the existing mousetraps are continuously improving: higher efficiencies, more automation and process integration, better controls, and remote access. Most equipment features self-correcting systems that ensure higher speeds, more flexibility, and better quality. Simultaneously, manufacturers are aligning with cultural trends toward sustainability by embracing energy efficiency and product lines for the circular economy.

Endnotes:

(1) H. Hergeth, „Investitionsstrategien für Stagnierende Branchen“, in der Reihe Empirische Wirtschaftsforschung Bd. 1, Münster, 1986. Also, H. Hergeth, Incremental Investments and their Results in the Textile and Apparel Industries, Ars Textrina 26, 1996, pp. 65 - 79.

(2) Federal Reserve Bank of St. Louis, Commodity Prices for various products, Federal Reserve Economic Data | FRED | St. Louis Fed (stlouisfed.org)