

Machinery Compendium III

# INDUSTRY 4.0





# From the Editor's Desk



## *4-ging Ahead*

*The compendiums that we at Fibre2Fashion publish from time to time do two things simultaneously—take stock of the situation, and look ahead. This particular compendium, on Industry 4.0, too does both, but more of the latter.*

*The canvas is huge, and like the universe itself, it is forever expanding. The term Industry 4.0 means different things to different people and so the predictions from industry experts as well as academics and researchers differ as well. But what all agree on is that the convergence of information technology (IT) and operational technology (OT) will drive manufacturing. The next phase of industrialisation, being referred to popularly as the Fourth Industrial Revolution, will be different from the earlier ones in that it will also be about life-cycles. In short, it goes beyond manufacturing.*

*The concept itself is still new and evolving at a frenetic pace. This also makes it difficult for those in industry to go the Industry 4.0 way. Formulating strategies and implementing them needs to start with knowledge. That's where this compendium comes in.*

*This hard-bound volume includes among other things vision statements from industry leaders, some best practices and case studies, and the F2F Ready Reckoner.*

*I hope this Industry 4.0 edition of our Machinery Compendium will go a long way in helping you arrive at some thoughts on how to keep pace with the ongoing Fourth Industrial Revolution.*

A handwritten signature in blue ink, appearing to read 'Richa Bansal', is positioned above the printed name.

**Richa Bansal**

# IS INDIA READY?

The textiles industry is growing in terms of technological innovations and upgradation. A wide-range of possibilities have opened up in Textiles 4.0 through use of these technologies, says **B PRAKASH**, Associate Director, Wazir Advisors.

**H**istory chronicled the first industrial revolution in the 18th century with the invention of water power, steam power, steam engine, machine tools and factory system. New manufacturing processes transformed the entire manufacturing sector. Among them, the textiles industry was the most dominant in terms of modern production methods as well as final output. Mass production of yarn and cloth became a mainstream industry.

Then came the second and third revolutions which further brought about technological advancements in manufacturing. The second industrial revolution starting from the late 19th century became widely known as the technological revolution with mass production lines and invention of electrical energy as its main features. The second revolution was a rough draft of today's industry. By the time, the third revolution came into focus, globalisation was already on its way catalysed by the invention of the first computer and subsequent discovery of the World Wide Web. Other major shifts were rapid digitalisation and automation in the manufacturing industry with the convergence of new technologies such as intelligent software, novel materials, and a wide range of web-based services.

## Organisations Exploring Industry 4.0 Technologies

All over the world textile research is primarily focused on technological innovations, fibre production and application, and sustainability. Here are some examples of research and adoption in this area.

## ANALYTICS DASHBOARD



### Sales per countries



Last Updated:  
3 min ago

92%

Data Availability






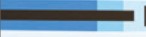

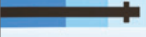
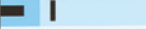
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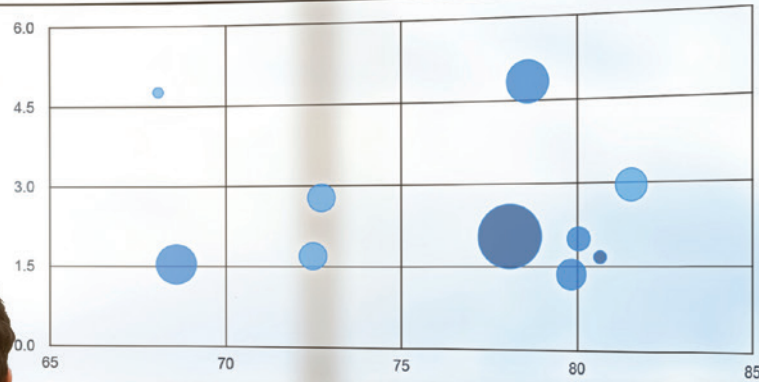
Actual vs Target



More info >

Target	Actual	Target
	\$3.4M	82.0%
	\$1.2M	108.7%
	\$850.3	71.0%
	96.0%	96.0%
	15432	145.0%
	98.3%	105%
	46.9%	8%

### Products positioning



### Top 10 products



### Advanced Functional Fabrics of America (AFFOA)

It is a non-profit organisation working towards a progressive textiles industry. With a vision to enable a manufacturing-based revolution by transforming traditional fibres, yarns and textiles into highly sophisticated integrated and networked devices and systems, it aims to facilitate economic growth through fibre and fabric manufacturing. It has launched two product prototypes till now:

- ♦ **A programmable and scannable backpack:** A coding system is woven into the plaid stripes on the backpacks and when scanned by a smartphone, the owner's information is displayed by an app called "Looks". The wearer can "program" their pack to include information like favourite song, cause, etc, which anyone can scan and get to know.
- ♦ **Fabric Lift:** The world's first fabric-based communication system that converts LED light into sound. AFFOA developed a cap with earphones which if it gets under a designated area, starts receiving audio signals.

Fast forward to today, industry is going through another paradigm shift, popularly referred to as the "Fourth Industrial Revolution" or "Industry 4.0". The ultimate goal of the fourth revolution is to build a parallel virtual world that will control and run the physical world. Everything that can be digitalised will be digitalised throughout the course of Industry 4.0.

The future of manufacturing lies with big data analytics, robots, automation and the Internet of Things. Manual labour will be replaced with digital factories containing advanced materials and artificially intelligent machines that run entire factories on their own. Not only that, cognitive manufacturing will enable manufacturers to forecast demand, carry out predictive maintenance, estimate problems that might occur and trigger solutions to those problems without any human interference. The manufacturing industry is set to witness another global renaissance using principles of Industry 4.0.



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### Factors Driving Technological Shift

All the industrial revolutions started with the introduction of a disruptive technology which acted as a change agent across industries. Numerous factors also contributed to new needs generation within the manufacturing industry. Similar forces are acting to bring about the Industry 4.0 paradigm shift:

- ♦ **Ever-evolving technology:** Technology has been the major driver of any industrial revolution. Automation and efficiency in production as well as gaining scale in advanced material, robotics, nanotechnology, artificial intelligence and the Internet of Things.
- ♦ **Changing demand and supply dynamics:** Shorter product cycles, faster launches and shift from high volume, low mix to low volume, high mix.
- ♦ **Rising limitations in factors of production:** Scarcity of skilled labour and rising wage costs.
- ♦ **Strong emphasis on sustainability:** Growing population and changes in lifestyle require development of new technologies that will be able to reduce the resources used (water, material, energy).

### Key Industry 4.0 Levers

Industry 4.0 is characterised by digitisation of the manufacturing sector. It introduces a concept called “smart factories” in which technology monitors physical systems/processes, and makes decentralised decisions. The future

of the manufacturing industry lies with five technologies—the Internet of Things, artificial intelligence, advanced robotics, wearables and 3-D printing which will revolutionise global production systems and set new precedents for competition among producers and countries alike.

Following the footprints of the global manufacturing industry, the textiles sector is also growing leaps and bounds in terms of technological innovations and upgradation. A wide-range of possibilities have opened up in Textiles 4.0 through use of these technologies:

- ♦ **Big data analytics:** Collection and analysis of large sets of data is the layman’s explanation of big data analytics. It is forecast that any

### THEN Germany

THEN Germany is working towards artificial intelligence application in textiles and apparel. THEN is working on the following: recipe prediction for fluorescent dyes using artificial neural networks and artificially intelligent machines which can measure own performance and inform supervisors to carry out predictive maintenance.

company missing out on big data analytics will miss out on the new age of innovation, competition and productivity. Big data applications are wide and varied: discovery and analysis trends, patterns, associations and interactions among various entities, supply chain management and analytics, merchandising and market-based analytics, market and consumer segmentation, accurate and faster trade surveillance, real-time decision-making, multi-channel analytics, predictive analytics, customer churn prevention, price optimisation and many more.

- ♦ **Smart textiles/wearables:** Smart textiles are intelligent textiles that can sense and react to environmental conditions. Smart textiles find their application in health, military/defence, fashion and entertainment, sportswear, etc. Recently, the Google and Levi's connected jacket that lets you answer calls, use maps, topping or starting their music, getting directions, or reading incoming text messages just by swiping or tapping on the jacket's sleeve—is an example of this. This works because the gesture-sensing sensors ("Jacquard Threads") are woven into the jacket's cuff, and are then wirelessly connected to the wearer's mobile phone using tiny electronics embedded inside the sleeve in a flexible snap tag.

- ♦ **Advanced robotics:** Advanced robotics can help in automation in business operation. Companies are coming up with concepts wherein robots will handle the entire production system including material handling in cut and sew industry. Application of robotic automation in the textiles industry provides many benefits such as labour savings, reduced cycle and lead times, improved quality and safety, increased productivity and efficiency.
- ♦ **3-D printing/additive manufacturing:** 3-D printing is expected to bring about a huge shift by bringing flexibility in the manufacturing process by catering to customised demands. It is used in high-end fashion products. The benefits of manufacturing using 3-D printing are: less raw material requirement, less wastage, creation of identical complex objects repeatedly, reduction in lead times and costs. Use of 3-D printing will cover industries from education to fashion to aerospace. Although 3-D printing has been utilised in the fashion industry, it is yet to make substantial progress. Iris van Herpen, considered the forerunner of 3-D printed haute couture, prints dresses in collaboration with i.Materialise. Danit Peleg is a fashion



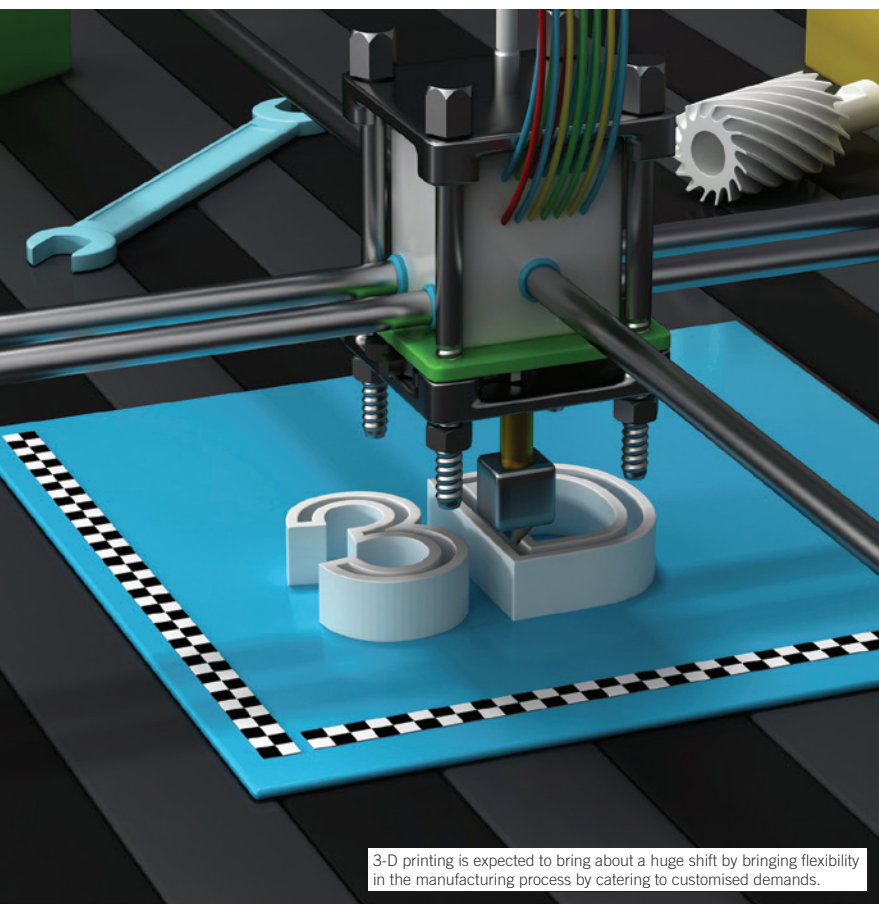
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- ♦ **Internet of Things (IoT):** The Internet of Things allows machine-to-machine interaction and exchanges of data through the Internet. This helps in making decentralised decisions by technology itself thereby making the decision-making process efficient. Application of IoT in textiles are in e-textiles and automated monitoring of factory operations. Other applications include predictive maintenance of equipment, increasing efficiency of weaving and embroidery machines, product development, digital printing to reduce time and costs, virtual reality—garment fit, prevention of textile production losses, guided sales processes, improved post-sales experience, etc.

All these technologies could wholly transform the way we think about, produce, wear, and even buy clothes and other textile items.



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### Indian Textiles and Apparel Towards Textiles 4.0

There exists an IT gap in the Indian textiles and apparel (T&A) sector, and also a lack of integration along the value chain. Indian T&A manufacturers need to bridge this gap immediately through IT implementation in their respective organisations and connecting the supply chain from end-to end if they hope to successfully move towards Textiles 4.0. The supply chain must be able to process real-time data and immediately service the customers accordingly. The Indian T&A sector is in need of a technological revamp which can be brought about by adopting the following:

- ♦ **Initiating experiments with technology through pilots:** Companies can start implementing small-scale preliminary studies or pilots to investigate whether a particular technology is feasible for a full-scale system. Pilots are easier to conduct and involve less investment.
- ♦ **Upgrading information technologies and systems:** Timely upgradation of IT systems and processes will be crucial to stay ahead of the competition.
- ♦ **Building a talented workforce through proper training:** High-performance training is the need of the hour. People need to unlearn the traditional/outdated methods and relearn the skills required by the industry today. It is important for our workforce to upgrade their skills to be able to operate the advanced technological systems.
- ♦ **Pursue new forms of partnership to develop technology and markets:** It is difficult to continuously evolve company systems and processes as and when technology evolves, and many may not know how. Hence, a company should keep the option open to work in partnership with technology providers, consultants and other experts to remain competitive in the global landscape.

Technological advancement is the most effective instrument for growth and change. Currently, the Indian economy is going through a pivotal phase with high economic growth and large investments coupled with government's bold initiatives. The textiles industry lies at the core of this development owing to its contribution to the economy as well as high employment generation potential.

Adoption of Industry 4.0 tools and technologies in the T&A sector would result in increased efficiency, reduced lead time as well as reduced production time, improved product quality and delivering finest service to the buyers, thereby impacting the global landscape. Hence, it is becoming increasingly important for Indian T&A manufacturers to gear up and be alert and flexible enough to adopt these cutting-edge technologies to remain competitive in the global marketplace.**FF**

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**INDUSTRY 4.0** 