



## 5G revolutionises textile factories

By Jens Kastner, Otis Robinson 22 July 2024

WTiN investigates the implementation of 5G connectivity within textile factory environments. Jen Kastner reports.

### Understanding the commercial readiness scale

WTiN's Commercial Readiness Scale gives an indication of what stage of commercialisation a product is at. It ranges from Emerging: a research stage development; Scaling: the product is being produced on a small but growing scale, and Commercialised: the product is well-established and ready to purchase.

Emerging

Scaling

Commercially ready

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## Summary

Traditional textile factories and manufacturing plants use wired networks, which can prove challenging in future as those environments digitalise, interconnect and demand higher data processing speeds. Highly secure, private 5G networks – ones that function only in a strictly defined local setting – can provide these opportune processing speeds that many contemporary textile factories require for data processing, security and device connectivity within their factory architecture. Furthermore, 5G networks enable more flexible plant layout design, which means manufacturers can use their production space more efficiently.

## Operational benefits

Private 5G networks are becoming increasingly important for textile manufacturers seeking to digitally transform their production processes. These networks enable wireless connections among various components and stages within the manufacturing environment, enhancing automated control and data collection capabilities.

Unlike public 5G networks, where telecommunication majors own all frequencies and make them accessible to whoever pays subscription fees, private 5G networks are usually owned by their users, disconnected from other networks and function only in a strictly defined local setting. By limiting all usage to strictly defined access, private 5G is highly secure and provides the speed, bandwidth and availability that many companies need to maintain necessary data processing volumes, security and device connectivity within their data architecture.

"The use of 5G can significantly reduce the complexity of wired networks within manufacturing plants, which in turn provides operational benefits beyond automation and data monitoring," said Dr Di Fan, assistant professor at The Hong Kong Polytechnic University's School of Fashion and Textiles.

Speaking to WTiN, he added that "the wireless nature of 5G allows for more flexible plant layout design, enabling manufacturers to use their production space. Additionally, the reduction of cables can decrease the complexity of the plant's infrastructure, potentially reducing safety hazards associated with a cluttered p: English >

environment.”

## 5G-based Chinese infrastructure

In China, many new industrial parks are constructed with 5G infrastructure, allowing companies, including smart textile manufacturers, to leverage this technology from the outset. Furthermore, major network service providers, such as Beijing-based China Mobile, offer specialised services to assist firms in establishing their own private 5G networks.

The adoption of 5G technology is a key component of China's national economic growth strategy, with the government promoting 5G integration across various industries to enhance connectivity and drive technological innovation. Local governments are offering financial incentives to encourage firms to embrace this advanced network infrastructure. For instance, the government in Shenzhen, Guangdong province, during 2022 implemented a subsidy programme that provides a 20% reimbursement to companies purchasing 5G modules, stressed Fan.

At the 2023 World 5G Conference held in December, in Zhengzhou, Henan province, the Fujian Changle Jinyuan Textile's 5G Smart Factory Project was selected as one of the top ten 5G application cases in 2023. Headquartered in Changle, Fujian province, Fujian Changle Jinyuan Textile is a major cotton spinner, with annual output by value exceeding Chinese Yuan Renminbi CNY10bn (US\$1.4bn).

“After internal evaluation, the 5G application of this project can increase machine utilisation by 22%, reduce abnormal downtime by 13%, reduce production quality problems by 30%, and achieve 100% product quality and process traceability,” said Li Jie, deputy director of the China Unicom (Fujian) Industrial Internet Research Institute, in an interview with [local media](#) at the sidelines of the conference. “This set of 5G private network can help Jinyuan Textile connect its different factories across the country and facilitates automation of transportation logistics and quality detection.”

Looking at the greater China region, Taiwanese textile producers have also been jumping on the 5G bandwagon. According to Taiwan government data on recipients of a subsidy for private 5G networks, New Taipei-based Eclat, Taipei-based [Taiwan Taffeta Fabric](#), Changhua-based Honmyue Enterprise, Taipei-based Far Eastern New Century and Tainan-based Everest Textile have all recently deployed private 5G networks or are preparing such moves.

Taffeta, for its part, has established private 5G networks to help operate and adjust hundreds of weaving looms, dealing with staff shortages. It also uses private 5G networks for immersive simulation-based cloth inspection training to overcome potential delays.

“To adjust the weaving looms for less downtime, they first need the 5G network to connect all the production machines to calculate and get real time production data,” explained Vicky Sun, business development manager at Saviah Technologies, a Taipei-based 5G core network software provider that supplies private 5G networks.

“And then AIoT [Artificial Intelligence-driven Internet of Things] applications assist in adjusting and arranging the weaving looms to fit their production requirement by real time,” said Sun: “Sometimes the production machines are modularised, so when you have new orders, the machines can be adjusted to fit the production styles quickly.”

She added that there are many problems that cannot be solved with WiFi, given that it is inaccurate and interruption-prone, making it difficult to control sophisticated equipment, especially if the equipment is spread over a wide factory floor area.

Ningbo, Zhejiang province, China-based Youngor Garment Manufacturing is one company making progress – it has built a 5G multi-park private network with unified management and production linkages in Ningbo, Hunchun, Jilin province; and Ruili, Yunnan province. A spokesperson said in a March 2023 interview with Chinese language media that before it employed private 5G networks in 2023, it tried connecting the equipment with WiFi but failed because the WiFi signal was delayed, its anti-interference was weak and there were blind areas in signal coverage.

With the 5G networks, Youngor claimed that the response speed of finished products for advanced custom-made suits has been reduced from the original 15 days to 5-7 days thanks to private 5G networks. At the same time, the batch order production cycle has been shortened by 35% and the single-station production efficiency has increased by 25% (3).

## Hurdles to adoption

As for the remaining hurdles for widespread adoption of private 5G networks in textile factories, Fan pointed out it requires a substantial initial investment, encompassing not only the construction of the necessary infrastructure but also the procurement of machinery that is compatible with 5G communication.

“Furthermore, the use of 5G necessitates a redesign of the operational process to integrate the 5G system into the current production workflow, which can disrupt the current production,” Fan said.

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"This process demands meticulous network planning, reconfiguration of current human and production resources, and harmonisation with existing IT systems," he told WTIN. "Lastly, security concerns are paramount. Although 5G networks are equipped with advanced security features, the introduction of new network technology can introduce vulnerabilities, particularly in the realm of critical industrial operations where the stakes are high."

## Key takeaways

In the contemporary textile factory many problems cannot be solved with WiFi given that it is inaccurate and interruption-prone, which makes it difficult to control sophisticated equipment, especially if the equipment is spread over a wide factory floor area. This leaves opportunities for private 5G networks to better support the manufacturing process. In China, many new industrial parks are constructed with 5G infrastructure, allowing companies – including smart textile manufacturers – to leverage this technology from the outset. The adoption of 5G technology is a key component of China's national economic growth strategy, with the government promoting 5G integration across various industries to enhance connectivity and drive technological innovation. Regarding widespread adoption of 5G networks in textile factories, hurdles to adoption include (a) substantial initial investment, (b) the construction of necessary infrastructure, (c) the procurement of 5G-compatible machinery, (d) a redesign of operational processes to integrate the new 5G system, (e) meticulous network planning and (f) harmonisation with existing IT systems.