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Fair Friend Group

Implementing Autonomous Mobile Robot Collaboration Using 5G-integrated DDS Technology for Enhanced Factory Operation



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Introduction

Fair Friend Group (FFG)

Industry: The largest machine tool group in the world

Headquarters: Taipei, Taiwan

Global Presence: 50 manufacturing bases worldwide and has 37 machine tool brands

Website: <http://www.ffg-tw.com>

ADLINK, FFG and III joined forces to equip FFG-Anest Iwata's Hsinchu Hukou factory with 3 major applications: AMR, AOI, and AR Smart Glasses, which will not only increase the yield rate by 15% but also reduce the production cost by 20%.



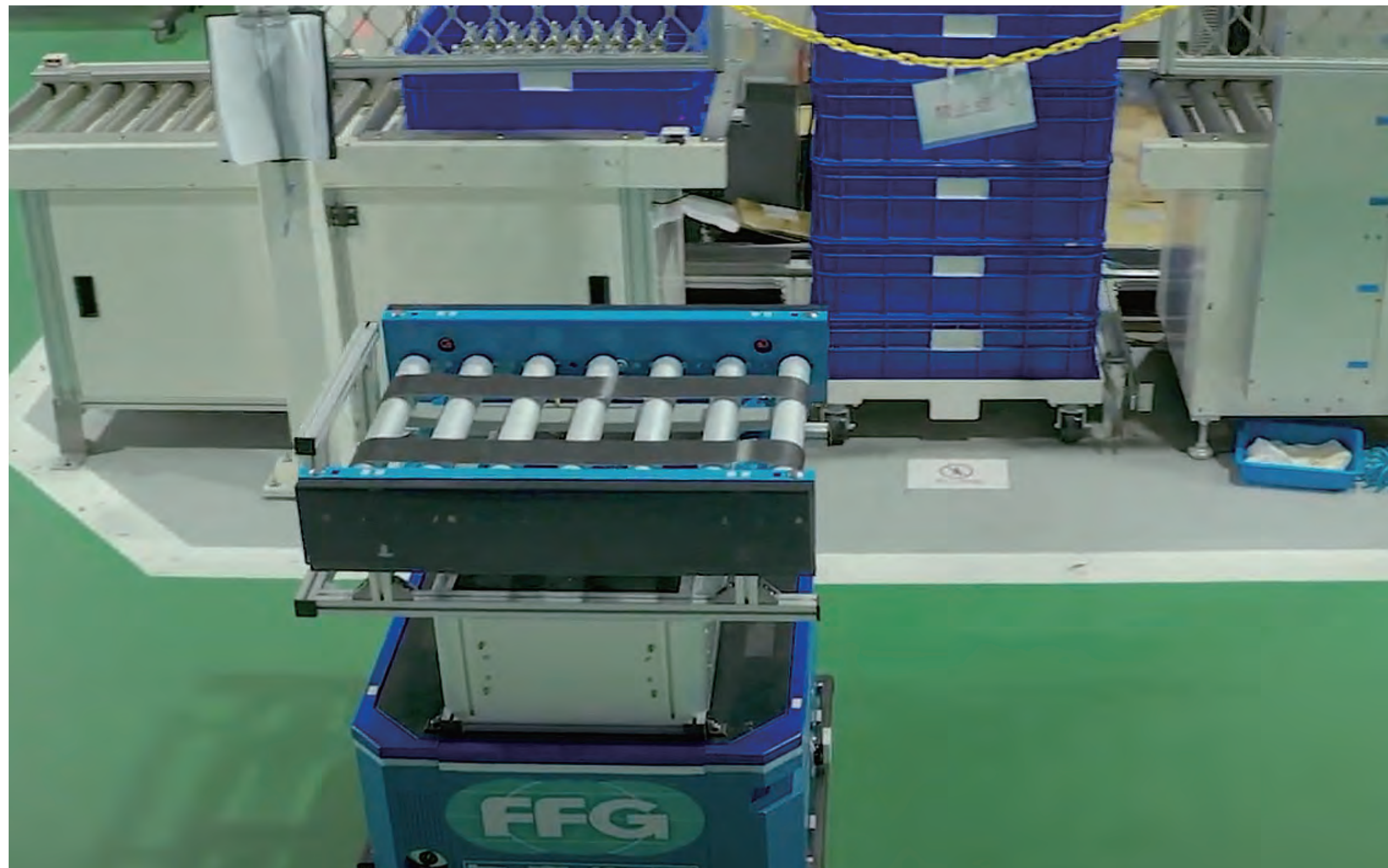
Mr. Chin-Yu Lin, General Manager of FFG's Smart Manufacturing and Data Service shares this insight: The top priority of Smart Factory is efficiency. With AMR deployment, the goal of lights-out factories can now be achieved by preventing the workers' distraction. Also, Private 5G(p5G)-integrated DDS technology can adjust transportation routes according to production procedures rapidly and improve the production flexibility.



Challenges

Traditional manufacturing industries are faced with rising demand for customized goods, while having to resolve recruitment difficulties simultaneously. Therefore, it is inevitable for factories to move from the current manned automated operations towards Smart Factory trends. Moreover, “unexpected shutdowns” can be a serious hidden problem in manufacturing industries. This year, due to pandemic lockdown restrictions, technicians were unable to assist the accidental shutdowns immediately.

Future smart factories intend to improve production yield rates and efficiency while dealing with challenges like the COVID-19 pandemic. Models of an independent single-unit machine operation is no longer sufficient and will be replaced by autonomous collaboration between stationery and mobile robots to achieve this inter-communication.

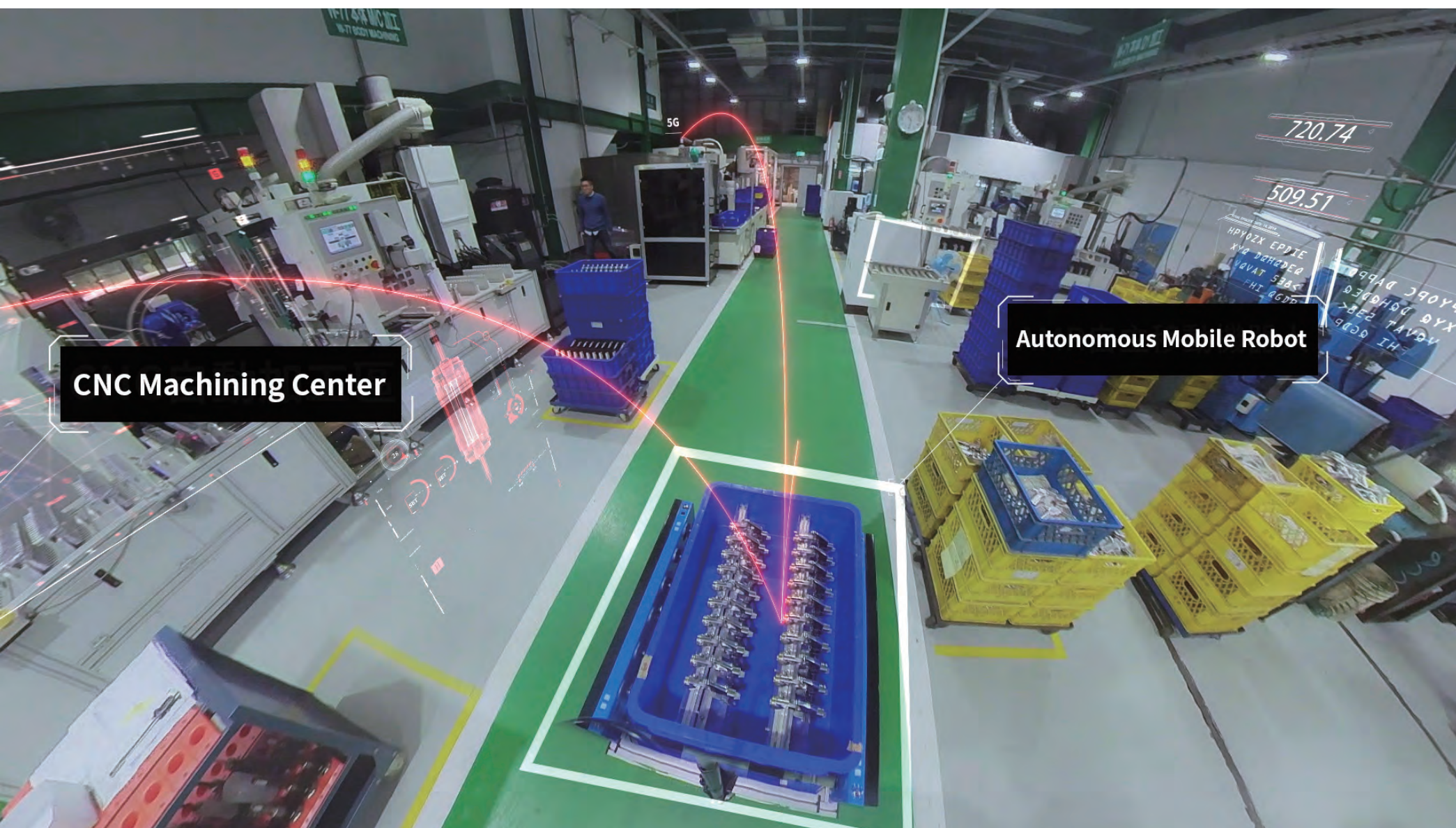


The Fair Friend Group (FFR), who specializes in machine tool manufacturing, has realized that labor shortage and changes in demands require urgent needs for logistics upgrades, inspection improvements, and enhanced technical services. As such, FFR teamed up with ADLINK in 2017 to plan construction for smart factories.

The key to improving operational efficiency in future factories: enable machines to implement autonomous collaboration

FFG's General Manager, Mr. Chin-Yu Lin, also points out, "When deploying Smart Factory solutions, one must take manufacturing flexibility, factory expansion, and speedy line switches into account. DDS as a middleware is applicable to both wired and wireless manufacturing environments, as well as those with multiple wireless technologies. Featuring high reliability, DDS combined with p5G(Private 5G) low-latency and high-speed transmission will greatly enhance the sensitivity and response speed of automation equipment such as robots."

ADLINK acquired the DDS technology from the UK-based company, PrismTech, in 2015. Its previous applications were mainly in the aerospace and defense (A&D) sector. DDS has greatly improved the disadvantages of the traditional client/server architecture by adopting the pub/sub architecture for distributed peer-to-peer communication. Featuring excellent stability and reliability, DDS as a middleware requires only a small installation cost for traditional factories without the need to replace the existing hardware facilities and equipment.



Smart Factory
with autonomous
collaboration
between
stationary and
mobile robots is
the future trend.



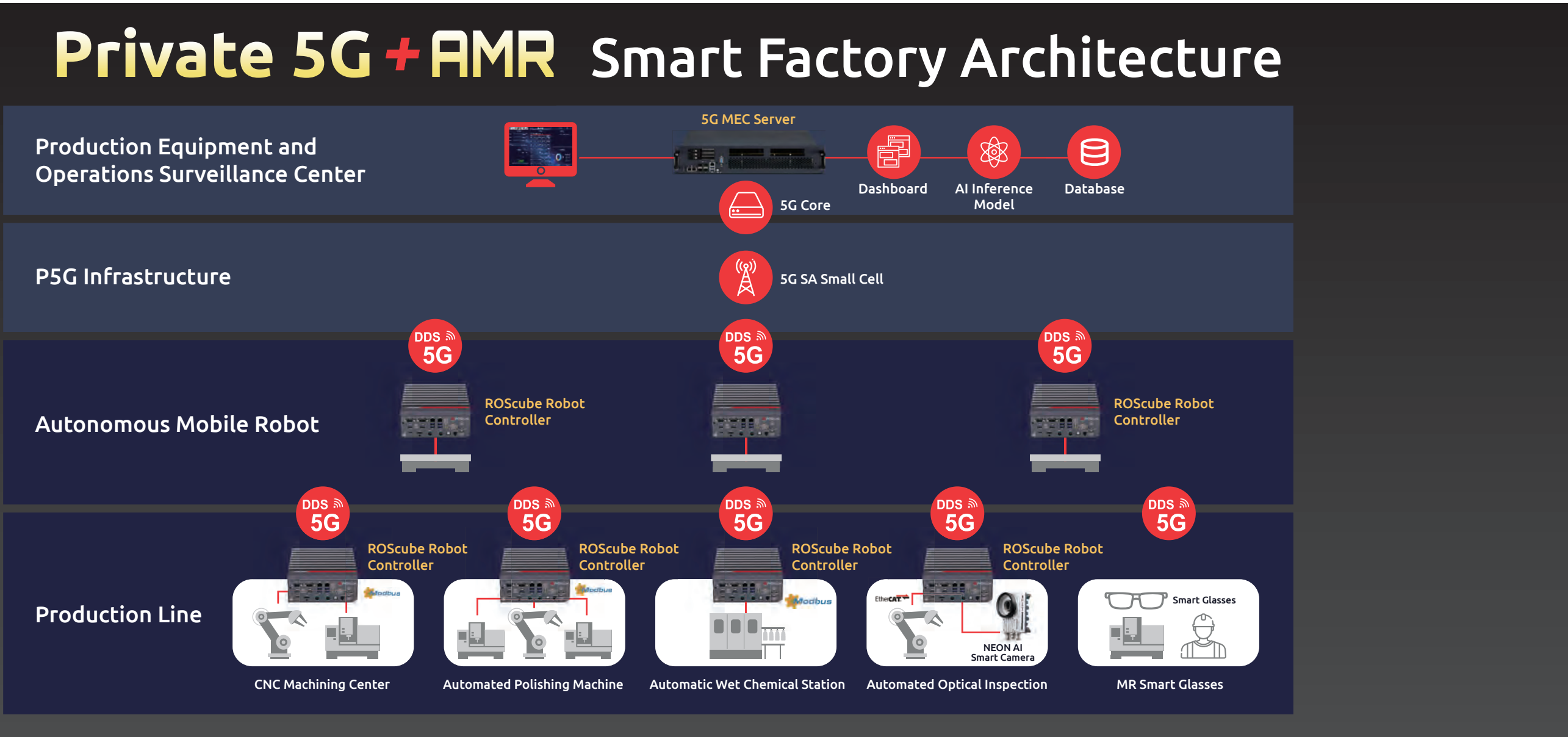
Mr. Chian-Hao Wang of the Advanced Robot Platform Group at ADLINK, share his view: Swarm Autonomy will be critical for future smart factories to enhance their operational efficiency. The key to Swarm Autonomy lies in the Data Distribution Service technology, which enables inter-machine communications with real-time data transmission plus rapid response.

p5G-integrated DDS speeds up robot response and creates real-time communication

Currently, the p5G-integrated DDS technology has been implemented in industrial grade spray gun production lines in Anest Iwata’s Hsinchu Hukou factory. This implementation includes three major applications: AMR, AOI, and MR (AR/RV) Smart Glasses bringing p5G factories to life.



Te-Jen Wang, Assistant Manager of Centre for Advanced Information Systems at the Institute for Information Industry (III), shares his view: DDS is equipped with a quality of service (QoS) mechanism which ensures the quality of data communication is a perfect match with p5G in providing excellent connections, including communication and data protocols.



The Production Equipment and Operations Surveillance Center incorporates p5G with DDS to enable real-time integration with production line information and connects with AMR to transport parts and components to various inspection divisions for enhanced productivity.

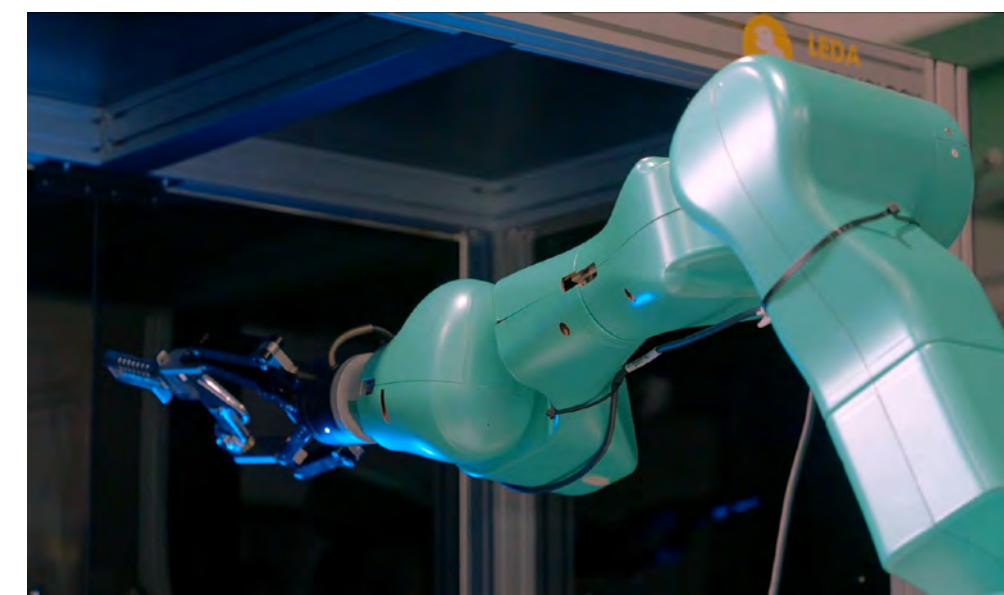
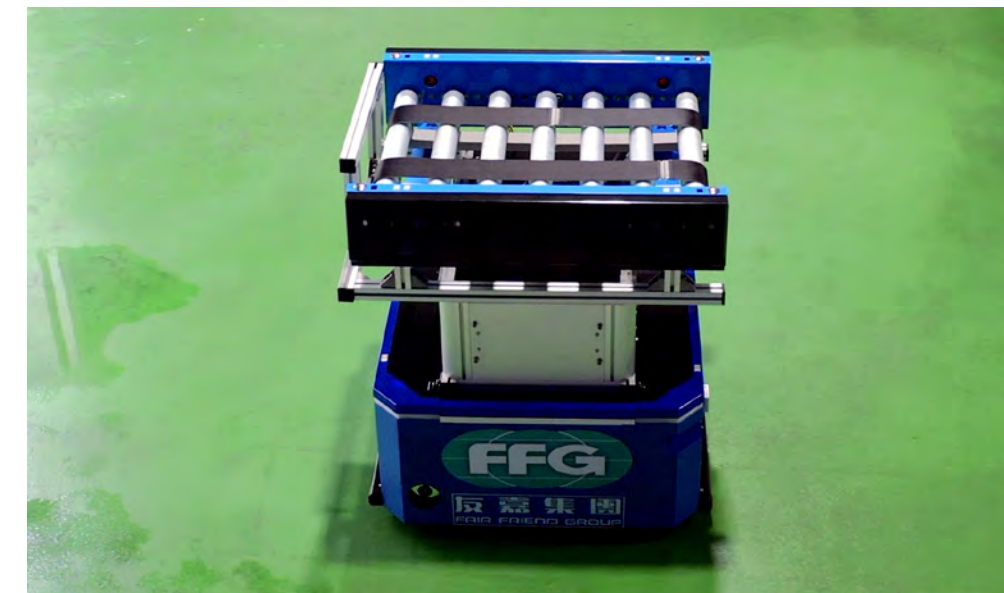
Shaping the future of smart manufacturing: ADLINK, FFG and III build p5G-integrated DDS Smart Factory Ecosystem

ADLINK, FFG and III have worked together to build Taiwan's very first p5G demonstration production line. Currently, 5G combined with DDS for Smart Factory applications is still in introductory stages outside of Taiwan.

For further applications, Te-Jen Wang, Assistant Manager in III, states that besides conducting advanced technology research, III will invite multiple manufacturers and p5G network equipment providers such as ADLINK to develop technologies for smart factory solutions.

Mr. Chian-Hao Wang believes that Smart Factory covers a wide range of operations which cannot be completed by just one company. Instead, building a comprehensive Smart Factory ecosystem requires a multitude of collaborating partners with both real-time software and hardware platform suppliers, such as Intel; sensor and system integration providers; and applications end users.

Helping clients fulfill these unmet needs, ranging from smart factory and smart city to autonomous vehicles is critical. The demand for peer-to-peer communication will undoubtedly increase, and ADLINK will integrate p5G communication technologies and ROS 2/DDS platforms to develop a set of software- and hardware-integrated solutions.



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