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FANUC as a Global Manufacturer of Industrial Robots

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Fanuc is a Japanese company, manufacturer of equipment for industrial automation which was founded in 1956. Today FANUC is the global leader in factory automation, providing high-tech products. The company name is an acronym for «Fuji Automation NUMerical Control» [1].

From its inception, when company founder Dr. Seiueemon Inaba first pioneered the concept of numerical control (NC), FANUC has been at the forefront of a worldwide manufacturing revolution. In Japan, FANUC had become the first company to build and operate an automated factory with NC machine tools and robots. With almost 60 years of experience in the development of computer numerical control equipment, more than 27,5 million products installed worldwide, FANUC is one of the leading global manufacturer of factory automation. With more than 100 models, FANUC offers the widest range of industrial robots in the world. Covering a diverse range of applications and industries, FANUC robots are easy to operate and provide complete flexibility thanks to a range of application-specific options, straightforward integration, payloads up to 2.3 t and maximum reaches up to 4.7 m [2]. Advanced and intelligent solutions have been applied to enhance motion, safety and productivity. One of these unique systems is FIELD system (FANUC Intelligent Edge Link & Drive). It is a FANUC developed Industrial IoT (Internet of Things) platform that allows manufacturers to connect production machines of different

generations from all manufacturers in a plant enabling comprehensive data analysis along the entire process chain [1].

The goal is to create a system that can be easily customized to flexibly respond to various automation needs, optimizing the effectivity and quality of the production process and improving predictive and preventative maintenance. FIELD system is backed by FANUC's worldwide Service and Support, making FIELD system the perfect choice as the backbone of a smart manufacturing strategy [1].

Today, in our fast-moving world, technology takes up a significant part of our lives. And of course, we cannot imagine it without robots. No production is complete without them. They make work faster, safer and cheaper. FANUC offers one of the broadest selections of industrial robots. All FANUC robots can be divided into collaborative robots, articulated robots, delta robots, palletizing robots, arc welding robots, top mount robots, paint robots, and SCARA Series [3].

A collaborative robot is a robot designed to work with humans and not to endanger a nearby worker. They always have special sensors to ensure its safety including optical, motion, and feedback sensors. Moreover, the software of such robots is focused on cooperation with humans. These robots do not get tired, which practically eliminates mistakes. Collaborative robots perform repetitive tasks with high precision. An example of a collaborative robot is CRX-10iA. Each manufacturing facility needs collection and placement. For example, collecting parts from a conveyor belt or laying them out for further operations. This robot has all necessary characteristics for this job. The CRX-10iA is highly protected against dust or oil leakages common in industrial environments. Because of its very low weight, the CRX can be easily installed in a broad range of applications such as automated guided vehicles (AGV). Its sensors are sensitive and

trigger an immediate safety stop at the touch of a human body [4].

Articulated robots are a whole family of articulated arm industrial robots designed for a wide variety of industrial applications including electric arc welding, packaging, picking, painting, and assembly operations. These robots are very compact that require very little installation space. At the same time, due to their well-thought-out design, they have a sufficiently large working radius and are distinguished by a high carrying capacity [5]. M-410 is one of them. It is the heavy-duty end-of-line palletizing specialist for loads weighing up to 700 kg! High wrist moments and inertia mean the M-410 can handle large grippers and heavy payloads at maximum speed. For better adaptability in handling different sized products, the M-410 can also be fitted with a servo hand that is controlled by the 6 axes servo. With models capable of handling anything from 110 to 700 kg payloads, whether it may be boxes, bags or slabs of concrete, there is a M-410 for every palletizing job [1]. Delta Robot is a kind of parallel robot. It consists of three levers attached to the base by means of cardan joints. The key feature is the use of parallelograms in the manipulator design, which allows maintaining the spatial orientation of the robot's actuator. One of the models of robots offered by FANUC is model M-3. M-3 robots are designed to maximize speed and versatility on high-speed small part handling and picking operations across a range of industries including food, pharmaceutical and electronics. Delta robots are especially popular in packaging lines, they are quite fast, some can handle up to 300 grips per minute [2]. Pallet robots is another kind of indispensable robots in production. These robots automatically pick up and place products on pallets. The equipment is used for storing goods in various packaging: paper boxes and packs, plastic and wooden boxes, cans, metal tanks. The palletizing robot is capable for stacking open and

closed top containers, boxes for exhibitions and other types of products. Such automatic systems are used in warehouses, logistics centers, exhibition pavilions.

Thus, we have considered the most popular models of robots that the company produces. For any job, FANUC can offer the right robot and there is certainly not a production operation that the robots of this company cannot do. Every year it introduces more and more modern technologies and improves her robots. And of course, none of this would have happened without people. FANUC strives to welcome young and ambitious people to its team.

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