

**FANUC**

# Smarte Automatisierung: CNC & Roboter

## FANUC vereinfacht Integration der Automation in die Maschine

Jürgen Barth, Dipl.-Ing.  
Key Account Manager  
FANUC Deutschland GmbH  
[Juergen.Barth@fanuc.eu](mailto:Juergen.Barth@fanuc.eu)

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# FANUC: Kurze Übersicht

**60**  
years of  
experience

More than  
**680,000 robots,**  
**22 million motors and**  
**4.5 million CNCs**  
installed worldwide



**60%** market share  
in CNC technology



## We are the automation champions

FANUC's production capacity is unique. With thousands of robots working day and night to manufacture our products, we have the most automated production facility in the industry. As a result, we clearly understand your needs – supplying you with tried and tested products we know you can rely on.

Product life  
cycle support



Easy  
customisation

  
**Lifetime**  
spare parts supply  
guaranteed

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**33%**

**1 R&D engineer**  
to every  
**2 members of staff**



**264 locations**  
supporting  
**108 countries**

***Service First***

Worldwide support



# intelligent automation – 100% FANUC

FANUC is the only company in its sector to develop and manufacture all its major components in-house. Every detail, both hardware and software, undergoes stringent quality control checks as part of an optimised chain. FANUC solutions are reliable, predictable and easy to repair. They are made to run and provide you with the highest uptime on the market.

## Robot Welding Cells

Multi-robot welding cells – easy automated welding thanks to seamless connectivity and a single user-friendly CNC interface.

## Fiber and CO<sub>2</sub> Laser

fiber and CO<sub>2</sub> laser Seamless fiber and CO<sub>2</sub> laser packages for efficient automated laser cutting.

## Visual Bin Picking

gives robots the ability to identify and pick loose parts and even bags from a bin.

## Vertical Machining Centre

Retool in just 0.7 seconds – FANUC ROBODRILL, our vertical machining centre, is designed for maximum productivity in milling and drilling.

## Injection Moulding

High-precision electric injection moulding – with the FANUC ROBOSHOT a-SA series.

## Delta Robots

Ultra-fast picking, assembling and sorting – FANUC's range of delta robots are ideally suited to high-speed handling processes requiring a great deal of versatility.

## ROBOCUT Wire EDM

Replace up to 8 steps, including pre-machining, hardening, finishing and fixturing, with one ROBOCUT wire-cut EDM machine.

## 1 kg to 2.3 tonnes

Lift up to 2.3 tonnes – choose from over one hundred robots with payload capacities ranging from 1 kg to 2.3 tonnes.

## Dual Check Safety

Allows robots and CNC machines to meet safety standards without the need for external hardware or extended safety areas.

## Collaborative Robots

No need for safety fences – FANUC collaborative robots allow easy integration into human workspaces for even more efficiency and improved health and safety.

## SCARA Robots

The solution for high-speed precision applications, such as assembly, pick and place, inspection and packaging – FANUC SCARA series robots.



Optimised energy usage – intelligent energy management

## IoT

Production monitoring, ZDT, FIELD system

# FANUC CNC line up

With more than 60 years' experience FANUC offers the widest range of CNC systems in the industry from best value controls with powerful functionality, to high-performance control systems for complex machines – all with fast programming and ease of use, guaranteeing the highest quality and short processing times.

## CNC Series 0i-MODEL F Plus

Basic CNC model for multiple control applications

The CNC Series 0i-MODEL F Plus provides the ideal basic solution for multiple control applications. Ready to use, it boasts latest generation hardware and a complete package of standard software. To maximise productivity on more specific applications, it can be easily customised using a range of additional functions. Combining unbeatable value for money with unrivalled performance and reliability, it includes features and functions usually associated with high performance systems.

### Features

- iHMI for intuitive and user friendly operation
- 15" screen for comfortable work
- High workability and customization function
- Easy, Fast and Fine Machining
- QSSR Available

## CNC Series 30i/31i/32i-MODEL B Plus

High-performance CNC for complex machine tools

The FANUC Series 30i/31i/32i-MODEL B Plus controls are ideal for highly complex machines with multiple axes, multi-path, and high-speed high-precision machining requirements. The hardware and innovative software provide the highest performance, precision and surface quality.

### Features

- iHMI for intuitive and user friendly operation
- up to 96 axes, 24 spindle axes and 15 paths
- cycle time reduction with fast cycle-time technology
- high quality machining with fine surface technology
- flat design and abundant display lineup [10.4", 15", 19", 21.5"]
- increased SRAM memory
- excellent usability for simultaneous 5 axes machining
- enhanced user interface and standardization of customize function
- easy operation of robot from CNC (QSSR)
- easy connection with peripheral equipment





# Maximise productivity with a robotic machine tending solution

## Benefits of Robotization:

### Increased Turnover

Higher machine utilisation. Machines can run through the night and at weekends without the requirement for an operator resulting in an increase in production and revenue. Increased machine tool usage leads to a faster return of investment for the machine tool and automation.

### Efficient use of skilled labour

Robotization allows skilled operators to set up and operate multiple machines, increasing efficiency and reducing costs.

### Improved Quality

High quality can be achieved with an automated process which ensures the highest quality is maintained and costs reduced.

### Increased Flexibility

Robotization allows to more quickly respond to changing production requirements.

- Parts load and unload
- Measurement and Inspection
- Chuck jaw exchange
- Tool change
- Deburring

## FANUC Robot models for machine tending

FANUC has a wide range of robot types and models such as compact high speed and high payload, which can be applied to all processes like load / unload for machine tools and inspection. Robots can be installed inside machine tools. With rail and gantry mounting options, robots are able to tend multiple machine tools.



Small/Medium Size Robots      Heavy Load Robots      Collaborative Robots





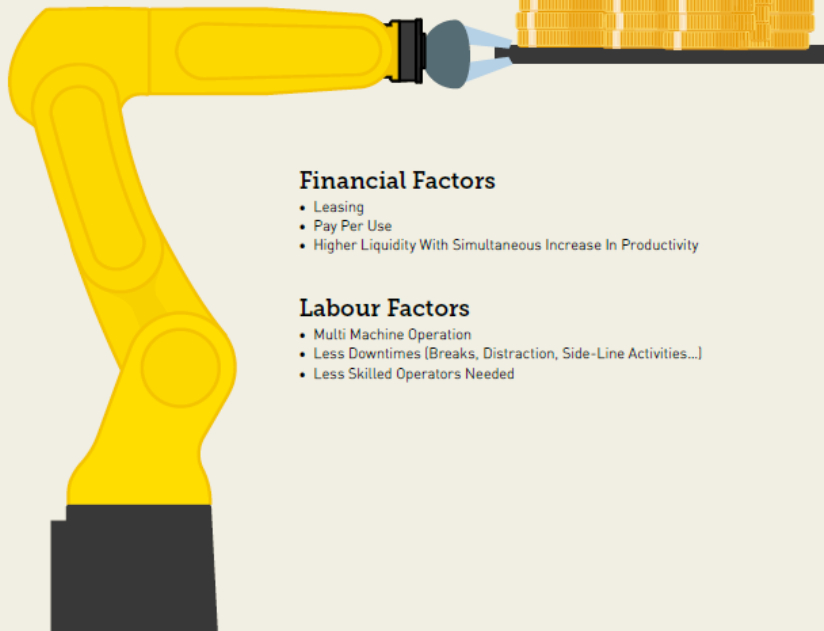
# Return on Investment (ROI)

FANUC products are especially designed and built to make our customers more efficient, increase productivity and lower the total cost of ownership.

## Factors influencing the ROI

### Investment Factors

- Longer Machine Times ("Ghost Shift")
- Constant Increased Quality
- Scalable Production



### Financial Factors

- Leasing
- Pay Per Use
- Higher Liquidity With Simultaneous Increase In Productivity

### Labour Factors

- Multi Machine Operation
- Less Downtimes (Breaks, Distraction, Side-Line Activities...)
- Less Skilled Operators Needed

## Example 1

Low-Cost Automation	
<b>Initial investment</b>	EUR 100,000.00
incl.:	
- robot and gripper,	
- electric power system,	
- assembly and installation,	
- start-up,	
- CE compatibility,	
- operator training	
<b>Total Cost of Ownership* (TCO)</b>	EUR 4,800.00
<b>Saving*</b>	
- labour cost reduction (man-hours)	EUR 101,760.00
- miscellaneous	EUR 5,745.00
<b>Profit Increase*</b>	EUR 16,968.00
resulting from increased production	
<b>Total benefit from automation*</b>	EUR 124,473
<b>Payback in months</b>	10.03
Calculation based on the following scenario:	
- 2 shifts, 5 days per week, 48 weeks p.a.	
- Hourly operator cost: EUR 25	
- Machining cycle time: 5+1 min	
[1 minute for changing the part - manual operation]	
- Output increase: 10%	
[due to faster parts change by automation]	
- Profit per part: EUR 2,50	
- Less scrap, TCO, less downtimes	

## Example 2

High-End Automation	
<b>Initial investment,</b>	EUR 250,000.00
incl.:	
- robot and gripper,	
- automation system,	
- control system,	
- electric power system,	
- peripheral devices,	
- assembly and installation,	
- start-up,	
- CE compatibility,	
- operator training	
<b>Total Cost of Ownership* (TCO)</b>	EUR 9,600.00
<b>Saving*</b>	
- labour cost reduction (man-hours)	EUR 217,036.80
- miscellaneous	EUR 12,211.54
<b>Profit Increase*</b>	EUR 30,542.40
resulting from increased production	
<b>Total benefit from automation*</b>	EUR 250,190.74
<b>Payback in months</b>	11.99
Calculation based on the following scenario:	
- 3 shifts, 6 days per week, 48 weeks p.a.	
- Hourly operator cost: EUR 25	
- Machining cycle time: 5+1 min	
[1 minute for changing the part - manual operation]	
- Output increase: 10%	
[due to faster parts change by automation]	
- Profit per part: EUR 2,50	
- Less scrap, TCO, less downtimes	

\* Per annum



# FANUC Robotization Solutions

## Many interface connections

between FANUC CNC and Robot



### Plug & Play connection

Save time and money by connecting a robot to a FANUC CNC via a common control platform. With FL-net or I/O LINKJ all you need is a simple cable. All components are supplied by a single source in a single package.

### Your advantages:

#### Quick and easy data exchange

Data transfer between CNC and robot via standard interfaces. You can display CNC-related information on the robot's Teach Pendant controller screen, or display the robot status on the CNC screen.

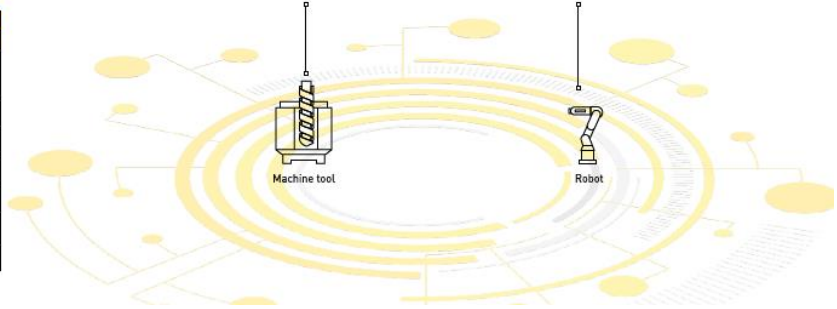
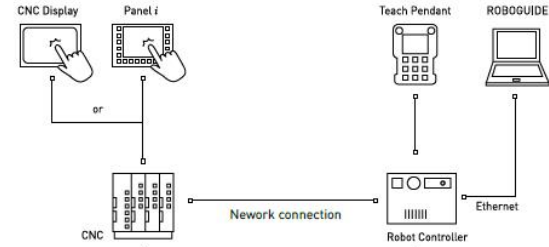
#### Control of the robot via CNC

Axes, grippers, status, etc. can be controlled via CNC.

#### Customizable screens

The ability to create custom screens allows you to view robot and CNC information on a single page so you have everything under control at a glance.

Industrial Network Options				
Network	FANUC CNC		FANUC Robot	
I/O Links	No additional hardware or SW option required	30/31/32/35i-B 30/31/32i-B Plus 0i-MF/TF Plus 0i-MF/TF	No additional hardware or SW option required	R-30iB (Mate) Plus
FL-net	Fast Ethernet Board SW option		Std Ethernet Port SW option	
EtherCat	Not available		EtherCAT Slave Board SW option	
DeviceNet (Master & Slave)	DeviceNet Master or Slave Board SW option		DeviceNet Master or Slave Board SW option	
EtherNet/IP (Scanner & Adaptor)	Fast Ethernet Board SW option		Std Ethernet Port SW option	
PROFIBUS-DP (Master & Slave)	PROFIBUS DP Master or Slave Board SW option		PROFIBUS DP Master or Slave Board SW option	
PROFINET I/O Controller (Controller & Device)	Fast Ethernet Board SW option		PROFINET Master or Slave Board SW option	



# FANUC Robotization Solutions

## CNC - QSSR

### Control and monitor the robot with the CNC

Designed with people that are unfamiliar with robots in mind, FANUC QSSR (Quick & Simple Start-up of Robotization) allows easy connection between a machine tool and a robot.

#### Your advantages:

##### Easy connection/setting

- Easy connection of CNC and robot with just one ethernet cable (FL-net).
- Easy connection by setup guidance on CNC display screen (HMI).

##### Easy programming

- Control Robot from CNC by G-code programming (Manual handle, G-code).
- Easy to create a robot program to load/unload by guidance menu.
- Auto generation of robot program by using ROBOGUIDE technology.



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#### QSSR CONNECT



QSSR CONNECT simplifies the automation of machine tools with robots, e.g. for loading and unloading. Guidance functions enable an easy setup of the connection and start-up of CNC and robot.

- Easy ladder development for robot connection by using function block
- Easy robot operation by M code in machining program
- Check machine tool and robot status on CNC screen

#### QSSR G-CODE



Control robot as a loader by CNC G-code program which is familiar for machine tool user.

Positioning by using manual handle of machine tool and specify passing point on CNC screen to create a robot program with one touch.



QSSR - ROBOCUT a-C400iB and Collaborative Robot CR-7iA

# FANUC Roboguide: Beispiel mit Machine Tool Generation Wizard

The image displays the FANUC Roboguide software interface. On the left, a vertical sidebar shows a list of machine tools (1 to 7) with various icons. The main window is titled 'HandlingPRO - Subscription - (87 days left) - MachineCell1' and contains a tree view of the robot controller and programs. A 'TP Program: Template interface Utility' window is open, showing a flowchart with nodes like 'start\_point1', 'Relay\_3384', 'PartPlace', 'Relay\_3385', and 'Waiting'. A red box highlights this window with the text 'Graphic Template for easy programming'. To the right, a 3D model of a machine tool is shown, with a red box highlighting it and the text 'Layout will be generated automatically'. The bottom of the screen shows the 'ROBGUIDE' status bar with 'Robot Controller1', 'JOB1', and 'No robot errors'.

Layout will be generated automatically

Graphic Template for easy programming



## Applications examples for small/medium size parts



### Machine tending

Smart machine tending is much easier to integrate than you would imagine, robots provide an extremely flexible machine tending solution. Rotating chain loaders offer another method of loading and unloading your blanks and parts. Whatever solution you choose, control and seamless coordination is provided by your machine's CNC



### Tool changing

With a wide range of tool changing station mounting options, including top mounting, some types of robot serve as highly efficient tool changers. Capable of working with a huge range of tools, these models can handle any number of tools regardless of their weight.



### iRVison System

To speed up processes involving parts bins, vision based bin picking solutions enable robots to identify, select and load parts from a container. Sometimes boasting uptimes of 99.97 %, this automated machine tending technology dramatically speeds up even the fiddliest of picking tasks.



### Injection moulding

Robots are invaluable when it comes to injection moulding. From part removal, to screw cutting, degating, labelling, laser marking and adding inserts, they increase throughput across a varied range of tasks and negate the risk of damage.

#### Robot-Model



#### LR Mate series Small, fast, versatile

This nuclear-size sized robot is your best compact solution for fast handling and processing parts.



#### M-10 series Slim wrist design for easy access

Designed for easy integration into small work cells.



#### M-20 series A footprint that fits

Ideally suited for narrow work cells, linear cable routing avoids cable interference.



#### CRX series Lightweight and easy to program

No need for safety fences. Easy to connect and easy to program.

## Applications examples for heavy or large size parts



### Unmanned machining

Tending machines is a job that most people are unwilling to do. Good robots by contrast provide 720 hours of seamless production, multi-tasking between cells, loading and unloading parts and the ability to link up to eight machines



### Flexibility on a small footprint

Compact and space saving, cleverly designed vertical machining centres add additional flexibility to already crowded production environments without the need for additional floor space.



### Load multiple machines

With a range of rail, floor, wall and ceiling mounting options to save space and expand your robot's work envelope, some makes of robot are ideally suited to tending multiple machine tools - increasing your throughput and maximising production time.

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### Robot-Model



#### M-710 series High mechanical rigidity

Ideal for force applications such as grinding and deburring when equipped with a FANUC force sensor



#### R-1000 series Built for speed

Every component in the R-1000 series has been optimized built to deliver maximum speed and reliability.



#### R-2000 series The do-it-all versatile all-rounder

Capable of handling almost any gripper is ideally suited to an almost unlimited range of applications.

# FANUC Robotization Solutions

## Robot Functions



### IRVision System

FANUC's fully robot integrated visual detection system that enables each robot works as precisely as a human operator. All types of vision are applicable, ranging from 2D to 3D Vision Sensor. [FIND MORE](#)



### 3D Robot Simulation

Visualise and simulate your automation ideas before installation with FANUC's offline simulation software - ROBOGUIDE. [FIND MORE](#)



### Zero Downtime (ZDT)

ZDT is a preventive and diagnosis function, that monitors your production in real time, to ensure that downtime doesn't happen.



### Dual Check Safety (DCS)

FANUC DCS is a smart integrated software solution designed to keep operators, robots and tooling completely safe. [FIND MORE](#)



### Extended Axis Control

Control software for auxiliary axes that move and are programmed together with the robot arm. An example is a rail unit carrying the robot arm where each programmed position defines also where the rail axis must be.



### Payload Identification

The Payload Identification is an integrated function that measures and sets the robot payload using an adjustable test motion of the robot axes J5 and J6.



### Palletising

Palletising motion instructions and registers for teaching simple palletising applications as needed for machine load/unload applications



### Soft Float

Minimize reactive forces and avoid damages and scratches on the workpiece with this function. For machine load/unload operations like extracting workpieces softly and fast out of injection moulding or die casting machines.



### Force Control Deburring Path Generation

The function Force Deburring supports deburring operations using a FANUC force sensor. In combination with IRVision, it automatically generates robot programs for deburring.

[www.fanuc.eu](http://www.fanuc.eu)

With more than 250 software functions for enhanced intelligence, motion, safety and productivity, plus a wide variety of high quality robot accessories, FANUC empower you to do more. For more details contact your local FANUC support team.



# Elevate productivity to the next level

FANUC IoT/AI solutions: ZDT, MT-LINKi, FIELD system

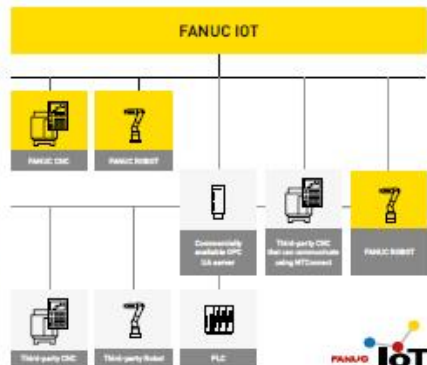
## ZDT (Zero Downtime) - Intelligent diagnostics for Robots

Unexpected downtime could represent very high costs. ZDT is FANUC's preventive and diagnosis function conceived to ensure that downtime doesn't happen. Thanks to a centralized system of Mechanical Condition Check, Process Status Check and Preventive Maintenance, ZDT constantly monitors each robot in order to proactively detect potential robot, controller, or process problems before unexpected downtime can occur. Notifications can even be seen via a smartphone.

## MT-LINKi overview on your production

FANUC MT-LINKi is a PC software that connects the machines in the factory by Ethernet. It collects, manages and makes visible various machine information.

It can connect not only machine tools with FANUC CNC, but also peripheral devices like PLCs corresponding to OPC communication and collect information. By MT-LINKi software the customer gains overview on production equipment and its utilisation. This could be a first step into Industrial IoT solutions.



## Connect, monitor, think & drive with FIELD system

FIELD system (FANUC Intelligent Edge Link & Drive system) is an open platform for the manufacturing industry which targets improvements in productivity and efficiency. Third party developers can freely develop and sell applications and converters for devices. Various devices on the shopfloor can be connected without barriers related to generation or manufacturer and centralised management of equipment and data, as well as the sharing of data are enhanced.



## FIELD system

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[+ FIND MORE](#)



# Global power

## Service first

With a global network covering every continent and more than 264 local offices, we are always there to meet your needs quickly and effectively, whenever you need us. In Europe, our extensive network of subsidiaries provides sales, technical, logistics and service support throughout the continent. That way you can be sure to have a local contact that always speaks your language.

Our open-minded and passionate team understands your needs – guiding you through your first steps in automation and providing support throughout the lifetime of your machine. Let's strive to improve your productivity!



99.9%  
spare parts availability

24/7

support

[WWW.FANUC.EU/SERVICE](http://WWW.FANUC.EU/SERVICE)

#### Lifetime OEM spare parts

As long as your machine is in service we will provide you with original spare parts - for a minimum of 25 years.

#### Efficient training

The FANUC Academy offers everything you need to upskill your teams and increase productivity – from introductory programs for beginners to courses tailored to the needs of expert users and specific applications.

**Service First**

# A strong partner

With three core product groups - CNC systems, industrial robots and CNC machines, FANUC is a leading global manufacturer of factory automation solutions. We also provide powerful networking solutions to make complex automation scenarios simple. And many more benefits to reduce your costs. Everything. Just everything from one supplier.

## Widest range of industrial robots in the world



## Productive, precise and reliable ROBOMACHINES

**FANUC ROBOSHOT**  
full electric injection moulding machines

**FANUC ROBOCUT**  
wire-cut EDM machines

**FANUC ROBODRILL**  
vertical machining centres





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