

Robotics Presentation

Robotics Presentation



- Robotics Business Unit
- Strategy
- Products
- Solutions
- Aftermarket

COMAU GLOBAL NETWORK



Manufacturing Plants:

✓ Turin – Italy

- One of the major players in the manufacturing of **high quality industrial robots**
- Wide range of integrated solutions
- **40 years** experience in Automation



Manufacturing Area



- World Class Manufacturing
- Increased production capacity
- Higher productivity
- Lower Work in Progress
- 100% Quality and Product certification



40 years of Automation



'70/'90



'90/'00



'00/'14

POLAR robot
and CRC 85
controller



1978

1982

SMART 6.50 R
robot and MCS
controller



SMART 6.30 P
interpress robot



1985

1987



COMAU ROBOTICS
begins its commercial
activity

C3G 9000
controller



1990

1993

SMART-3
6.125 robot
family



SMART S2
Robots



1994

1998

SMART
robot
range with
C4G
controller



SMART H4
"Hollow Wrist"

2003

2005

SMART Laser for
remote laser welding



WiTP
(Wireless Teach
Pendant)

2006

2007

NJ family



NJ4 "Hollow
wrist" family

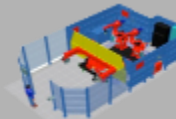
2008/09

New
Control Unit
C5G



2010

ATHOMO Cell



SMART PAL

2011/2012

2013



TP5



Racer



C5 Compact



C5G



ISO 14001

since 2004

Environmental Management System Certification

ISO 9001

since 1995

Quality Management System Certification

OHSAS ISO 18001

Since 2010

Occupational Health and Safety Management Standard

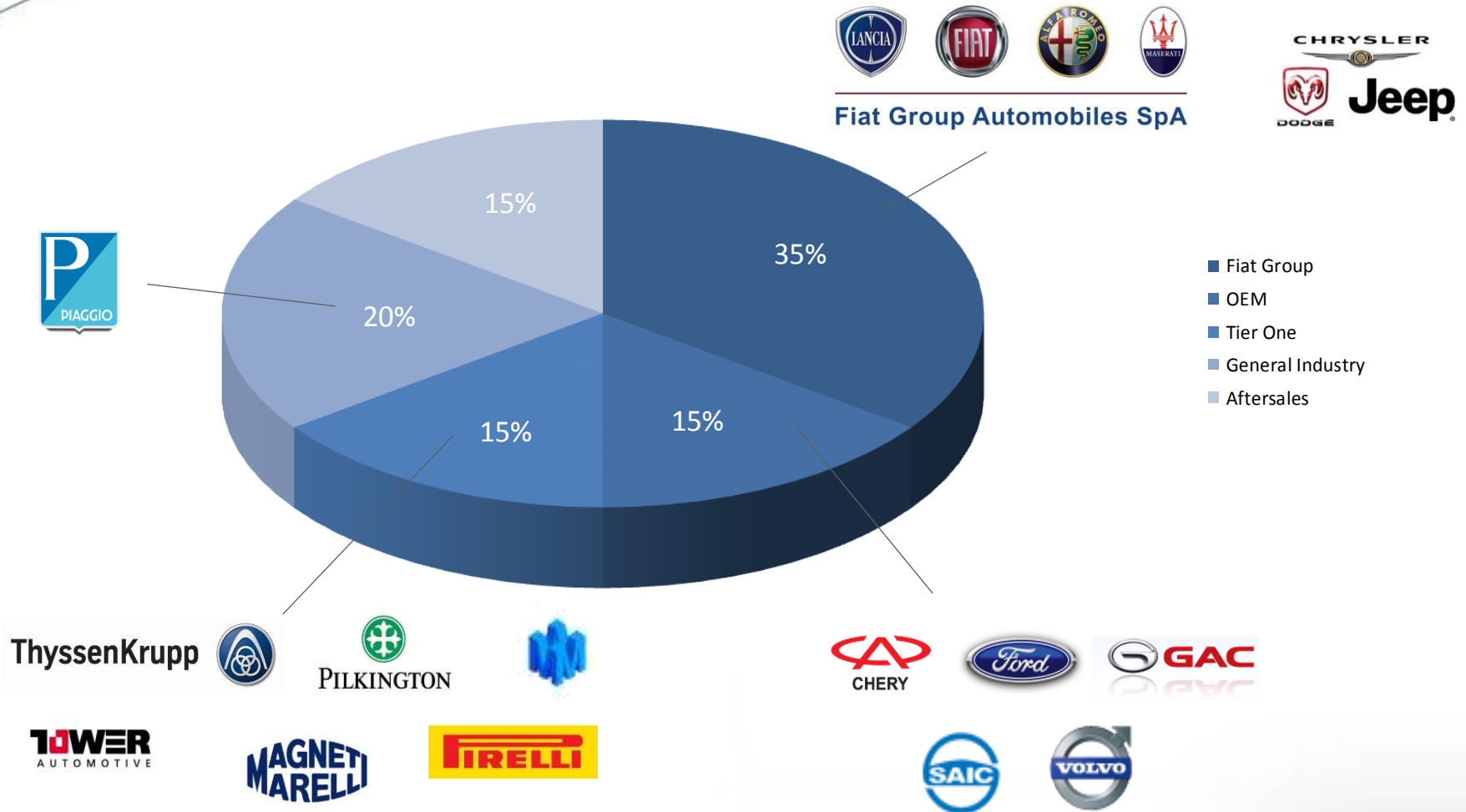


FORD Motor Company's Q1 Award

Comau Robotics was given in 2004 the Q1 Certification by Ford Motor Company.

This Certification is given by FORD to its best suppliers. The Q1 Award recognizes organizations that have sustained level of excellence in their systems and performance, resulting full customer satisfaction.

Robotics Markets 2010-2014



Robotics Main Customers

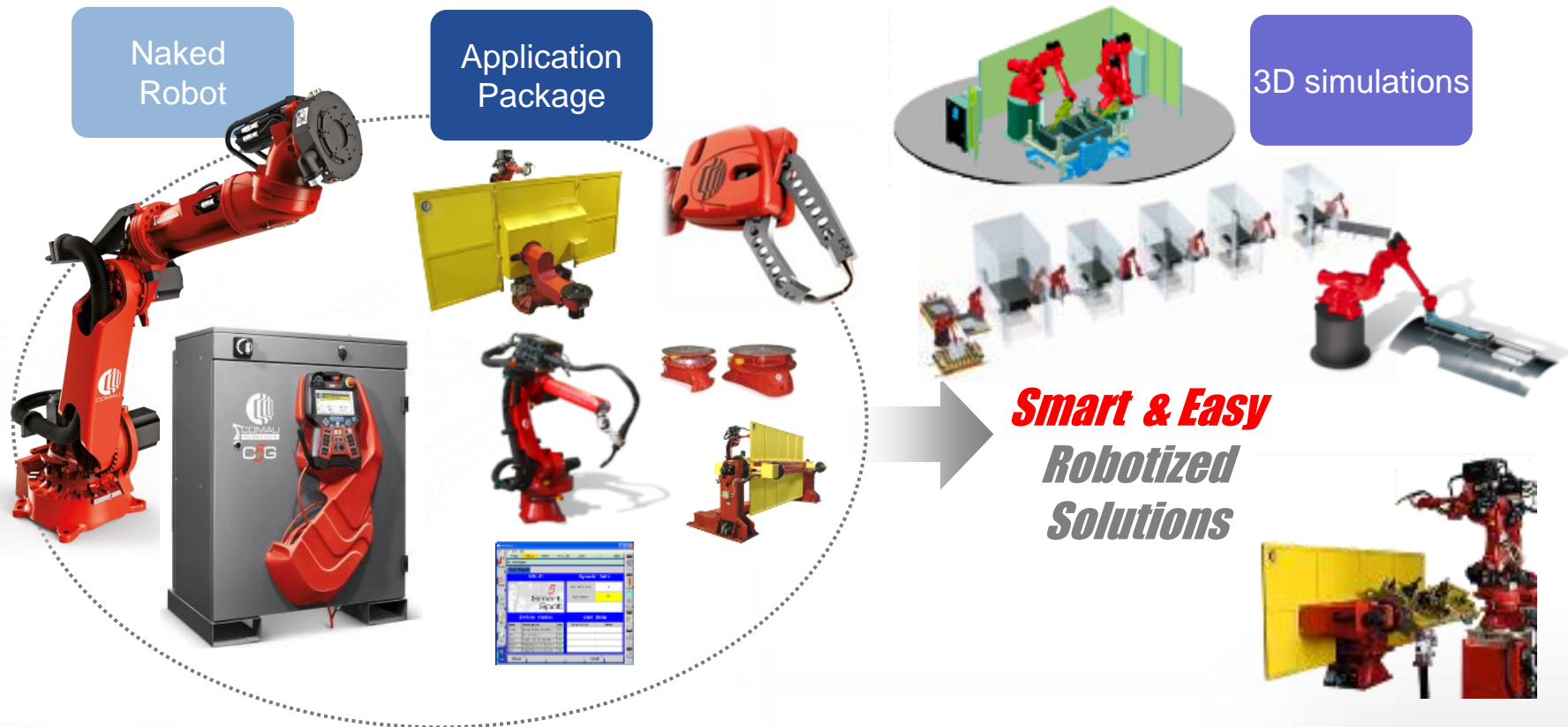


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Comau is **continuously investing in Robotics** in order to have **robots** and **packages** as a source of innovation and competitive advantage in the **applications** field.



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Smart NJ4 *Hollow wrist*

- **100% INTEGRATED DRESSING**

Real hollow wrist robot range from **90 to 270 Kg** of Payload: the actual mechanical overall dimensions are never increased by external cables

- **NEVER BREAK DOWN**

Comau Robotics technology of the “integrated dressing” provides certainty of long duration, reduction of break-downs and saving in terms of cost for service cables replacement

- **8 YEAR FULL WARRANTY**

Comau Robotics guarantees the integrated dressing for 8 years of continuous work, on 3 shifts, 365 days per year

- **HIGHER PERFORMANCES**

Agile and light structure, allow higher performances and efficiency On Body Shop Systems

- **POWER SAVING**

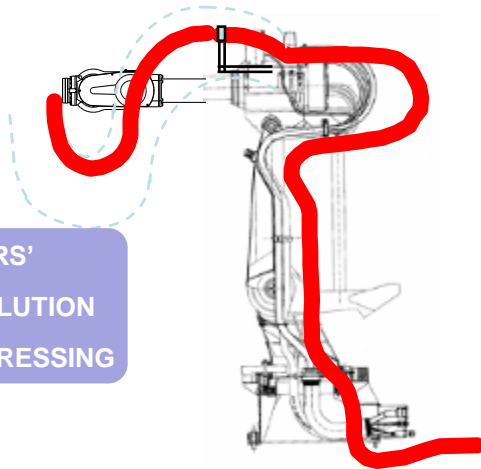
Agile and light structure, allow higher performances and an important energy saving, up to 25% more than the other similar models



FULL INTEGRATED DRESSING
8 Years Warranty

Smart NJ4 Advantages

COMPETITORS'
TRADITIONAL SOLUTION
WITH EXTERNAL DRESSING

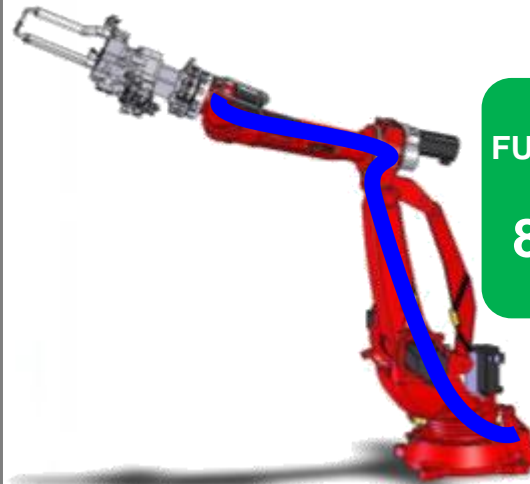


Unpredictable product life

- Unknown torsion, bending & stretching
- Frictions, wears

Risk of

PRODUCTION STOP



FULL INTEGRATED DRESSING
8 Years Warranty

Comau Hollow Wrist advantages:

- No offset flange - gun
- Easier access through tooling
- Better access through framing gates
- Simplified tooling design
- No risk of snagging
- Best results from OLP
- Also available in SHELF version

Small Payload Robots

With payloads from **6 to 16 kg**, models typically used for arc-welding, machine tool tending, assembly, handling, sealing applications.

This robot family features high repeatability (up to 0.05 mm) and suit to all the applications requiring the highest speed and precision.



Smart ARC4
5 – 1.9



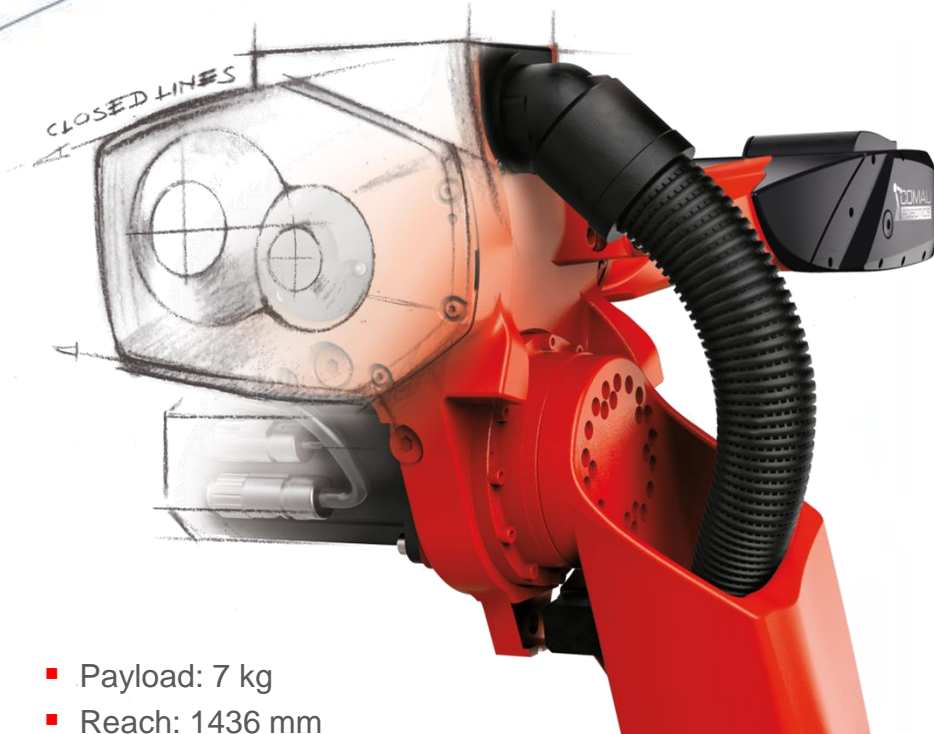
Smart SiX
6 – 1.4



Racer
7 – 1.4



Smart NS
12 – 1.85
16 – 1.65



New

- Payload: 7 kg
- Reach: 1436 mm
- Assembly position: floor, ceiling, sloped (45° max)
- Compact size
- High stiffness for more precise applications
- The world's fastest in class
- Low energy consumption



Designed to **Perform**

Smart NJ *Medium Payload*

With payloads from **16 to 60 kg**, models typically used for arc-welding, machine tool tending, assembly, handling, sealing and polishing applications.

This robot family meets your automation versatility needs, ensuring highest quality and high repeatability (up to 0.06 mm). Available in **FOUNDRY (IP67)** version.



Smart NJ
16 – 3.1

Smart NJ
40 – 2.5

Smart NJ
60 – 2.2

Offset wrist
available



Smart NJ High Payload

With a payload from **110 to 220 kg**, models representing the state of the art in mechanical design, with parallelogram structure. This family offers top performance in terms of speed, robustness, reliability and precision. All models can be mounted in floor and ceiling position. Available in **FOUNDRY (IP67)** version.



Smart NJ
110 – 3.0



Smart NJ
130 – 2.6

Smart NJ
165 – 3.0



Smart NJ
220 – 2.7

Smart NJ4 Black Wrist

Comau offers the advantages of its “hollow wrist” technology which allows customers to house their customized robot dressing inside the forearm, rather than externally as in conventional robots.

This solution guarantees an unequalled level of performance and significant savings in maintenance costs.



Black Wrist

90 – 2.2

110 – 2.2

170 – 2.5

175 – 2.2

220 – 2.4

220 – 2.7

**The General Industry
Hollow Wrist Robot**



Smart NJ ***Heavy Payload***

Strongest models for the most demanding applications, with a payload from **290 to 500 kg**

A wide working area for heavy duty applications. The SMART NJ heavy duty family are the best in class about ratio between max payload up to 500 kg and 3.0 m reach with a floor space-saving base.

Available in **FOUNDRY (IP67)** version.



Smart NJ

290 – 3.0

370 – 2.7

370 – 3.0

420 – 3.0

450 – 2.7

500 – 2.7



Smart NJ Press booster

Boost your Productivity

- Dedicated robots series for **PRESS SHOP AUTOMATION**
- Faster than standard robots, also SHELF version
- Double Motor on AX 1
 - More power and acceleration
 - Minimizes the time to load/unload each press
- Lower cycle time, increased productivity



Smart PAL

Advanced solutions in palletization, for the most demanding cycle times.

These robots are specifically designed for heavy duty applications, where high speed and precise executions are required. With a wide operating area and robust construction, this family will boost your business

Smart PAL

180 – 3.1

260 – 3.1



Smart PAL

470 – 3.1

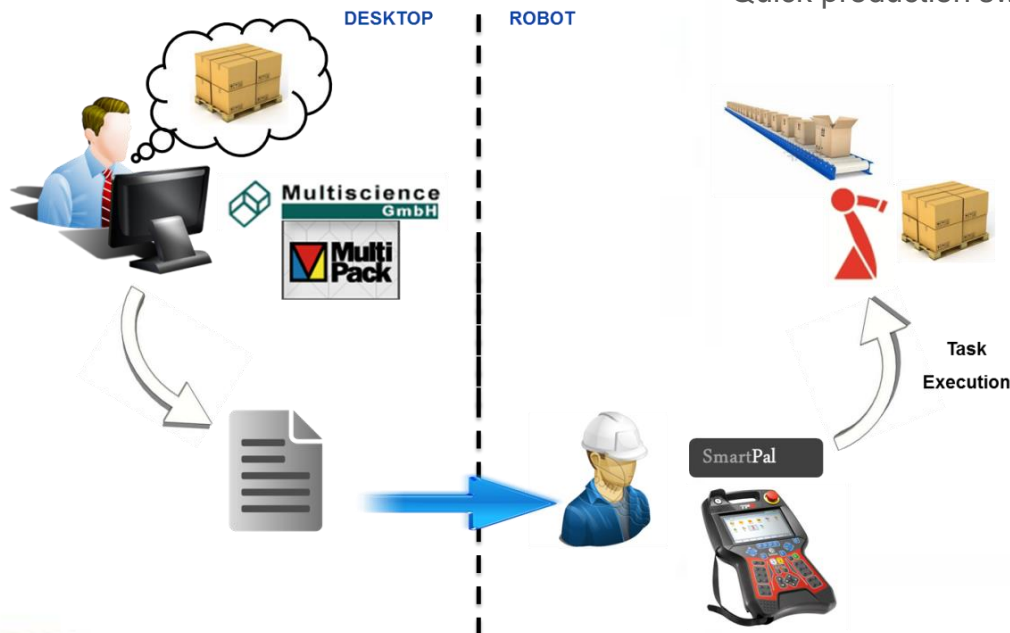




Smart PAL setup wizard

Palletizing becomes **Easy**

- Easy configuration of palletizing process with Comau robots
- Low robot programming and PDL2 skills requested
- Touch oriented user's interface with new TP5 teach pendant
- Fast production startup
- Quick production switchover



Smart Dual Arm



Human **Dexterity**

- Human-like approach for high dexterity operations
- Payload (each arm): 10 kg
- 13 axes completely managed by a single C5G control
- Cooperative motion and synchronized movement among the arms and torso
- Hollow wrist arms for easier management of application equipment (grippers, tools,...)
- Integrated sensors via Open control (vision, force, safety,...)
- New paradigm for the use of dual-arm robotics within high-performance industrial environments
- Full support of Open control architectures increases system flexibility and enables deployment of customized motion algorithms

Remote 3D **Laser Welding**



- Based on the CO2 remote laser application experiences (COMAU Agilaser).
- High displacement speed of the laser beam and large working volume
- System driven by the standard C5G Control Unit & specific COMAU software to verify reachability, collision, welding angles
- Dedicated User interface

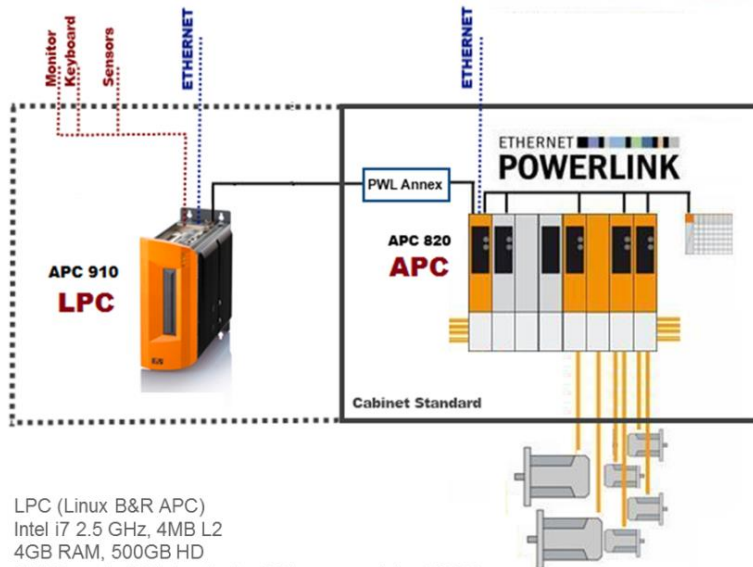
This advanced technology allows to get rid of the geometrical constraints due to the application of welding guns or torches

Robot Control Units



- **High processing power**
 - Incredible performances with low energetic consumption
- **Modular system for drives unit and I/O**
 - C5G: Modular system for drives up to 16 axis in “multi-arm” configuration (with application box option), function of the robot model
 - C5Compact: Modular system for drives up to 8 axis, function of the robot model
- **Compact dimensions**
 - 800x500x1100 mm (C5G)
 - 550x500x550 mm (C5Compact)
- **Free and ergonomic space for application functions integration**
- **Energy saving system**
- **No needs of external transformer for 500V power supply**
- **MTBF increasing**
- **MTTR decreasing**, thanks to system’s modularity
- **Performance improvement**
- **Noise reduction**
- **Power supply saving**

Robot Open Controller



LPC (Linux B&R APC)
Intel i7 2.5 GHz, 4MB L2
4GB RAM, 500GB HD
5 USB ports, PCI standard + PCI express slots, RS232

- **C5G open controller:** to become the real drivers of the robot's motion
- Open approach adds to Robot Control Unit further power of an External Personal Computer for programming automated robotic cells and integration with external sensors to simplify the implementation of **complex manufacturing applications**
- For universities and research centers Open architecture permits to develop new **innovative motion strategies**
- COMAU Open Community



Vision Algorithm:

- Look & Move
- Visual servoing

Interaction Algorithm:

- Force control
- Impedance control

CAD Planning:

- Surface movements
- Complex Interferences

TP5 Teach Pendant

Simple as a Touch

Family feeling

- The ease of use allows quick learning by the user via a 'natural evolution' in respect to the previous versions
- Full compatibility with existing applications that have been developed by customers for the C5G platform

- 30 times **higher performance** than the previous model thanks to more efficient software components and the latest generation processors

- 7" WIDE **touch screen** provides simplified and faster interaction

- Optimized operations, even when using only the keyboard, for **enhanced use** in difficult production environments

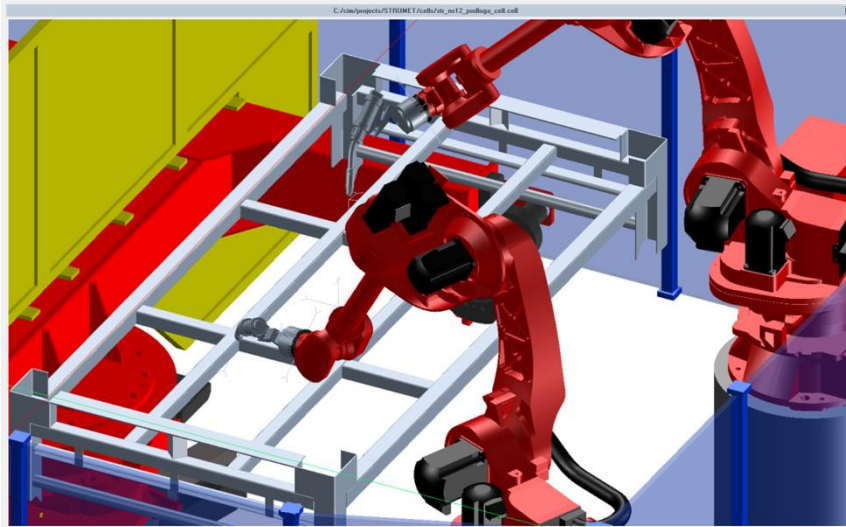
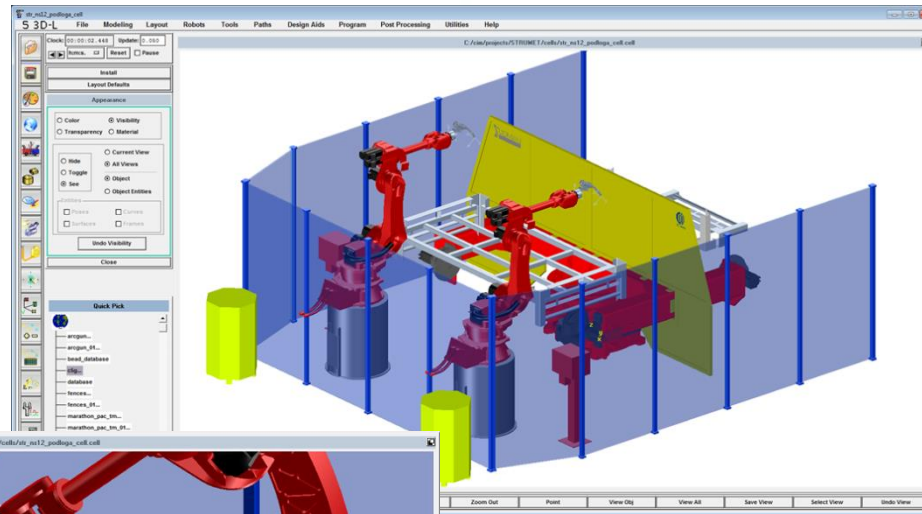
- **Simplified keyboard** designed to locate keys more easily during the programming phase thanks special tactile references on the membrane

Easy maintenance

Enhanced ergonomics

- Reduced overall weight
- Improved keyboard feedback when buttons are pressed





- Fast process to convert STEP/ACIS 3D model into **simulation** models
- Fast process to arrange complicated **3D robotized cells**
- **Easy** to program robot motion
- Collision detection capabilities
- High **accuracy** in cycle time estimation (RCS/ VRC)
- **OFFLINE robot programming**
- On line tutorial

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Arc Welding



- High performance “**Plug & Weld**” robotized cells
- Optimised management of welding operations and cell **efficiency**
- **Application software** for complete system management
- Dedicated iTP **user interface**
- Complete range of **optional devices** such as push-pull torch, TCP control devices, joint finding and tracking sensors, wire cutter, etc.
- New **positioners** range

Smart Positioners

SMART TR



Servocontrolled Rotating Table
Payload: 1000 ÷ 7000 kg

SMART MP



Positioner Modules

- **Standard** Comau Robots components
- Carry-Over axes/drives/ motors/gear-boxes
- **Integrated management** through C5G Control Unit
- Designed for **high productivity** plant
- **Safety** ICEPI certified

SMART PTDO



Horizontal Double Lathe
Payload: 250 ÷ 750 kg

SMART PTDV



Vertical Double Lathe
Payload: 250 ÷ 750 kg

SMART PTDORB



Orbital Double Lathe
Payload: 250 ÷ 750 kg
Available "single lathe"

- Cycle time **optimization**
- **"Multi-arm" technology** of C5G robot controller



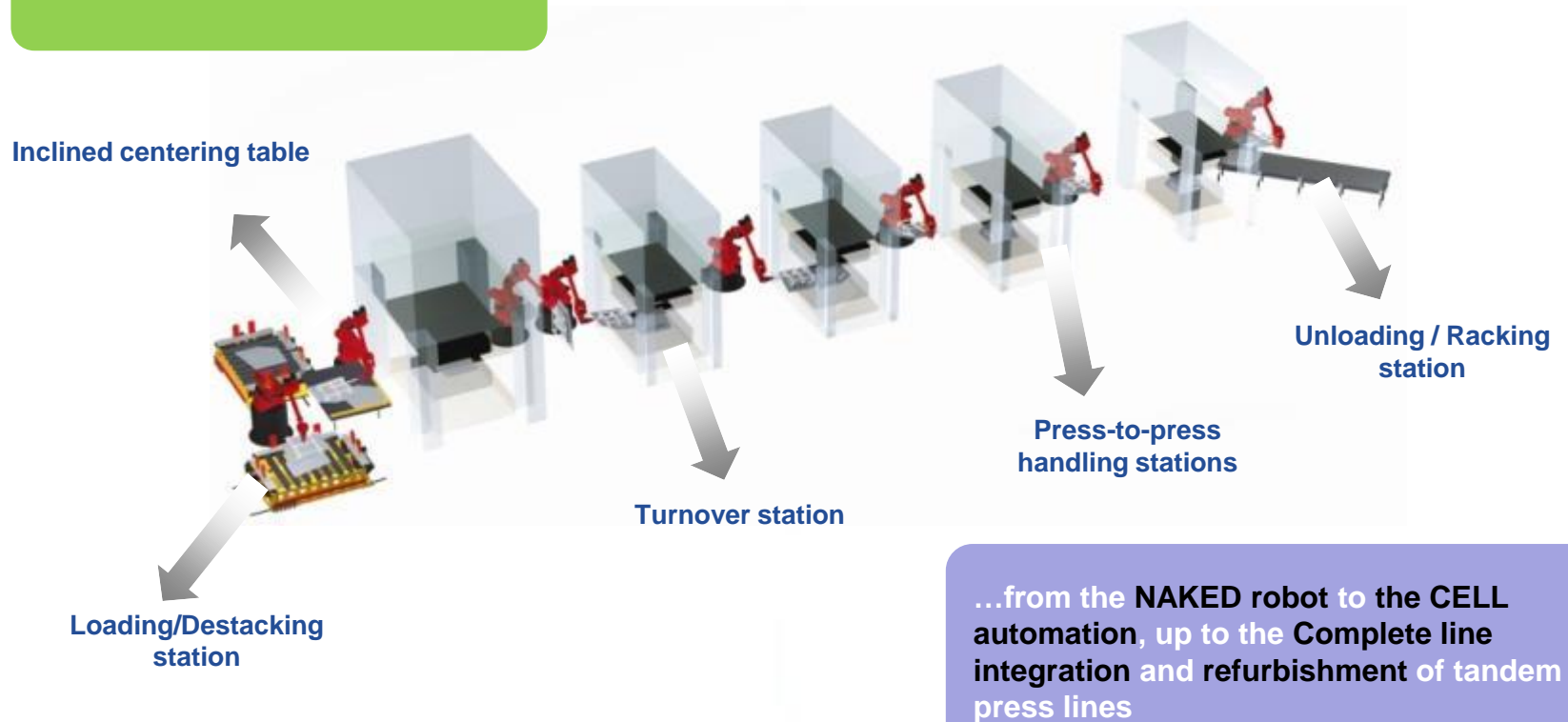
- **Long Experience:** first SPOT Welding Robot in 1978
- **Dedicated Robot Range:** Comau has developed original robot solutions to improve performance with **hollow wrist technology**
- **Dedicated Software package:** Comau has developed innovative SW packages with easy programming interface and optimized

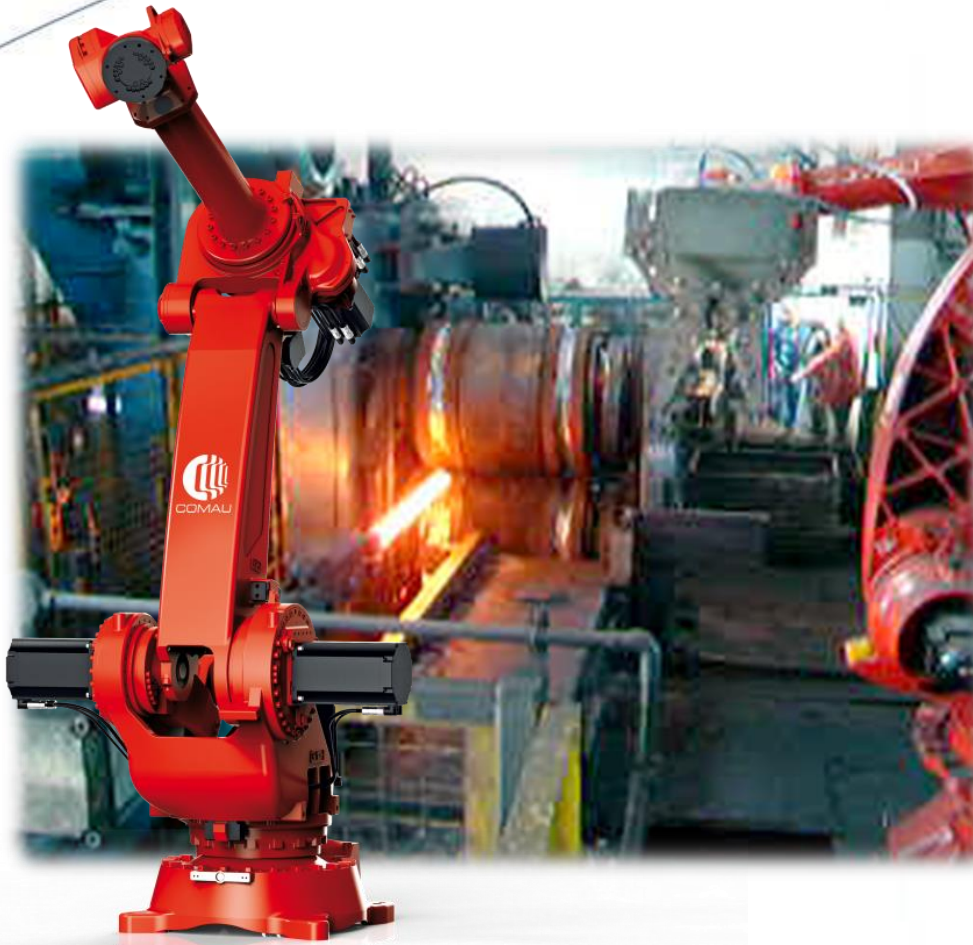


- **Long Experience:** first press line in 1984 over and more than 200 Press-Shops worldwide
- **Turn-key lines** for the major car manufacturing companies in Italy, France, Great Britain, Germany, Turkey, United States, Brazil, China, Korea, etc.
- **Dedicated Robot Range:** Smart PressBooster, robots conceived and manufactured purposely to be installed in press-shops, featuring **special engines and equipment**
- **Dedicated Software package:** innovative SW packages with easy programming interface and optimized line management
- **Top performance** in High Speed lines: production rates up to 16 parts/minute and line efficiency greater than 96%

Boost your Productivity

DIFFERENT LEVELS of
Solutions ...





- **Long Experience** in harsh environments and more than 1000 foundries
- Dedicated Robot Models, featuring **high reliability**, stiffness and robustness
- Foundry wrist: **IP67 Protection High-temperature**, Viton® protections, additional seals for harsh environments
- **Special robot** paintwork: temperature peaks up to 200° C, impact-resistant and hard-wearing, acid and alkalis resistant
- **Additional protections:** IP 67 motor connectors, foundry counter-balancing system (SMART NH)
- Experience in **all harsh environments**
applications: gravity casting, microcast or lost wax, deburring, pressure die casting, lost foam, part removal, cutting and grinding
- Experience in all material workings: aluminum, cast iron and steel, magnesium

Aftermarket services



- **Field Support:** to increase process reliability, product performance and maintain investment value
- **Emergency services**
 - Help desk
 - Service pack & **Preventive maintenance** activity
 - Smart Technology **Re-used solutions** in relation with Customers needs
- **Product Upgrades**
 - Reconditioning
 - Reconfiguration
- **Spare Parts Management:** to optimize Customers stock and assure continue production
- **Robotics Training Center** supplied at our Training College center or at Customer's facilities

Aftermarket services



SERVICE

- Help desk
- Commissioning
- Robot & plc programming
- Service
- Maintenance & refurbishment
- Support to production
- Field modification & retrofit
- Hardware & software upgrade
- Service contract management

AFTER MARKET Dept.

SPARE PARTS

- Supply of spares/repairs for at least 10 years after product end of production
- Quotes for obsolete material not in price list

SERVICE & TRAINING ITALY

SERVICE & TRAINING ROW

SERVICE CONTRACT & RE-USED SALES

SPARE PARTS & REPAIRS

TRAINING

- Training courses held by field skilled teachers
- Training area with 4 robotized cells and dedicated rooms
- Training in customer language at our site or customer's site
- Tailored courses on customer need

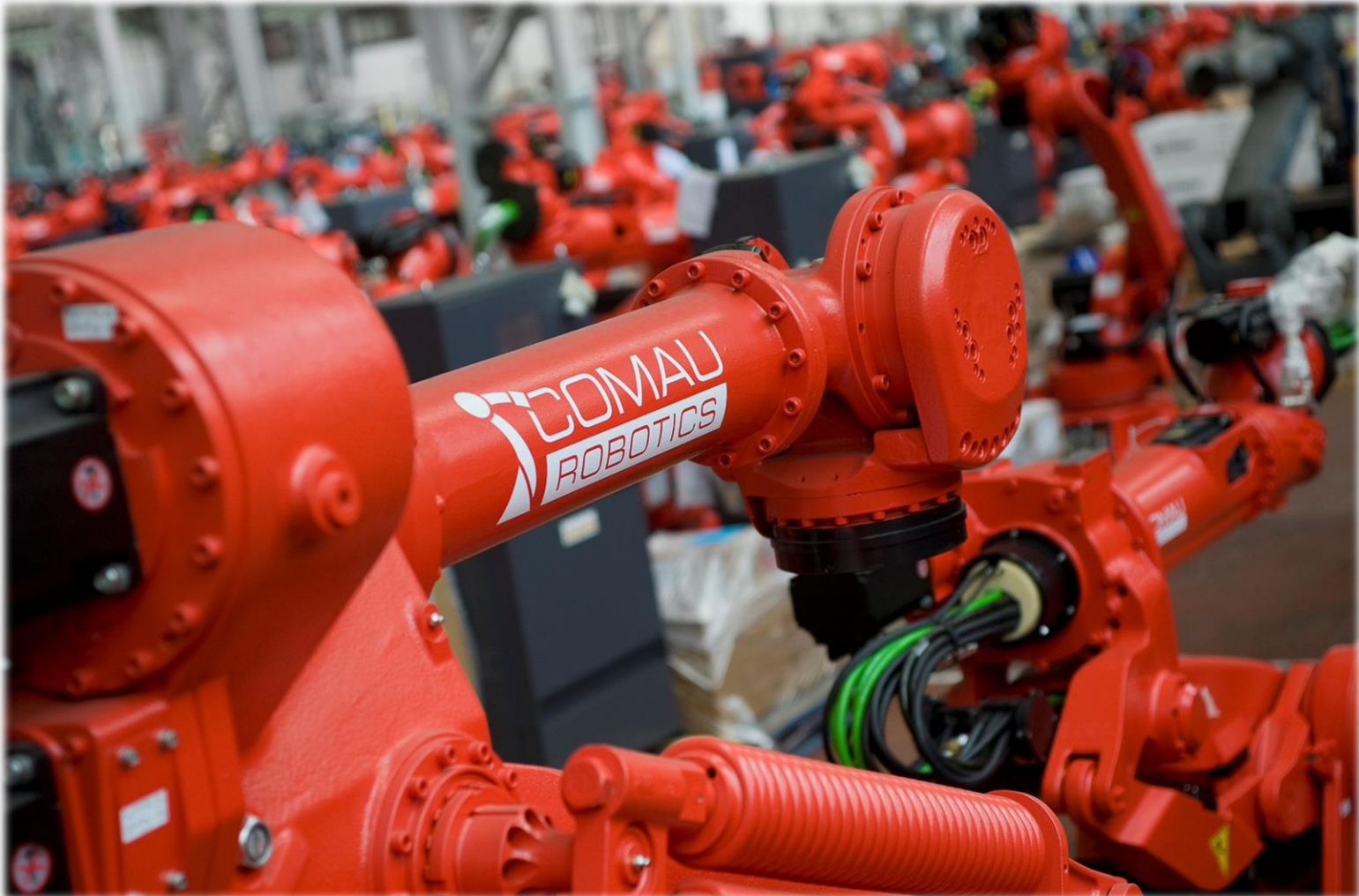
SERVICE CONTRACT SALES

- Maintenance & refurbishment contract
- Tailored service contract

REPAIRS

- Exchange repairs & revision on price list
- Quotes for repair obsolete material not in price list

Your robotics Partner





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