

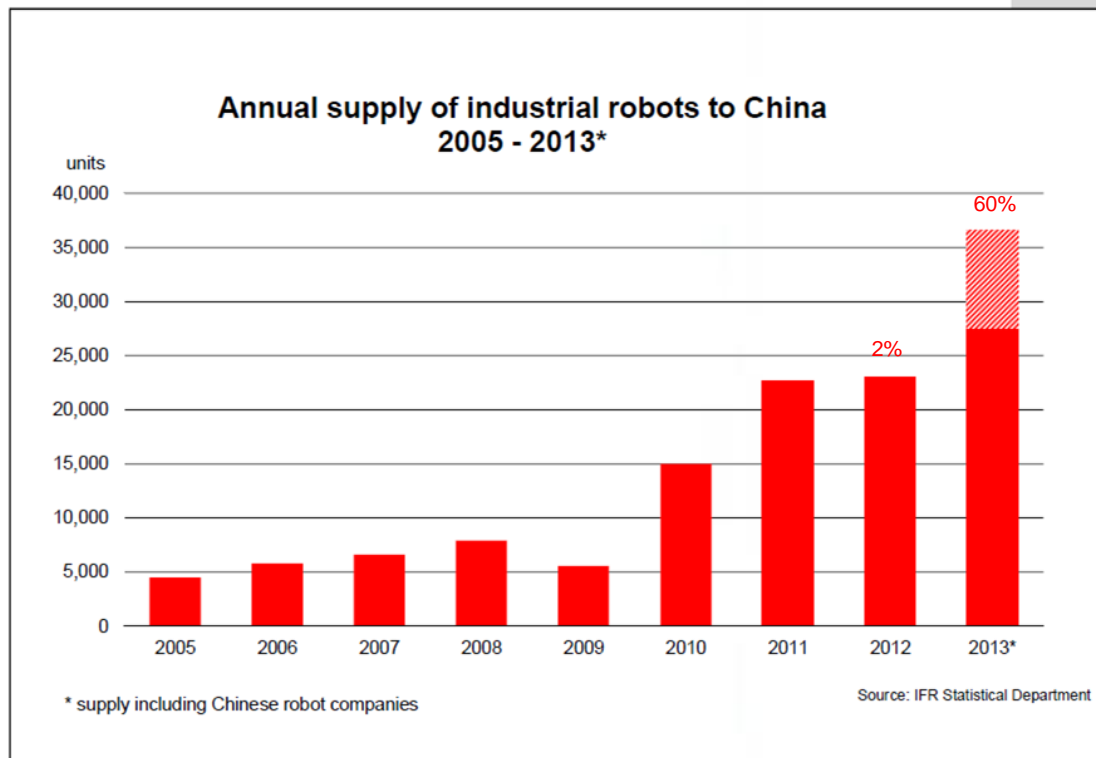
Dr. SACK Stefan—CEO of Comau China  
史蒂芬·赛克博士 — 柯马中国首席执行官

2014-Oct-21st

## ***Robotics*** Presentation

# What's the Market?

**China: biggest and fastest growing market**  
**impressive share of Chinese robot suppliers**



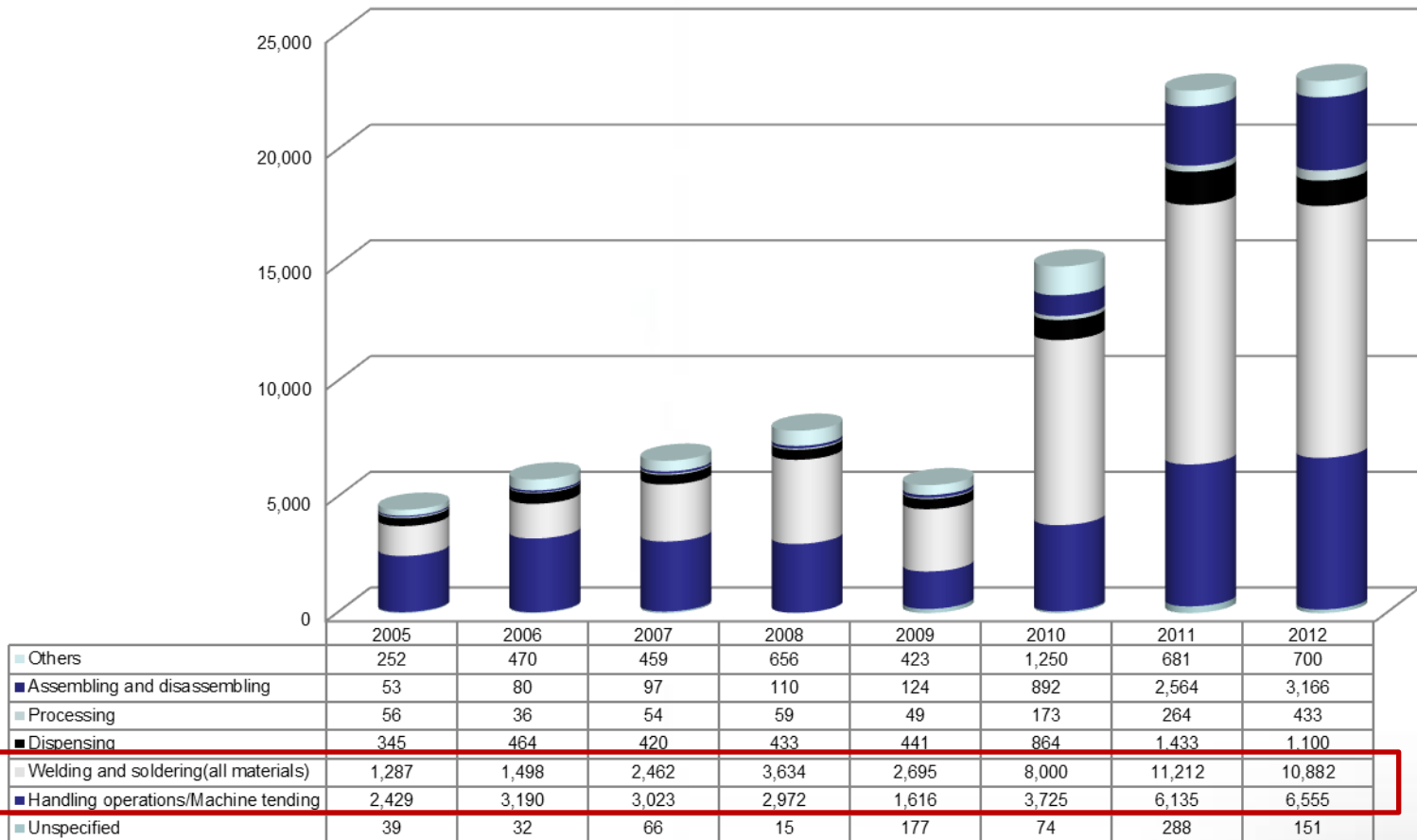
8 • 09 July 2014

Hosted by



# Where's the market...

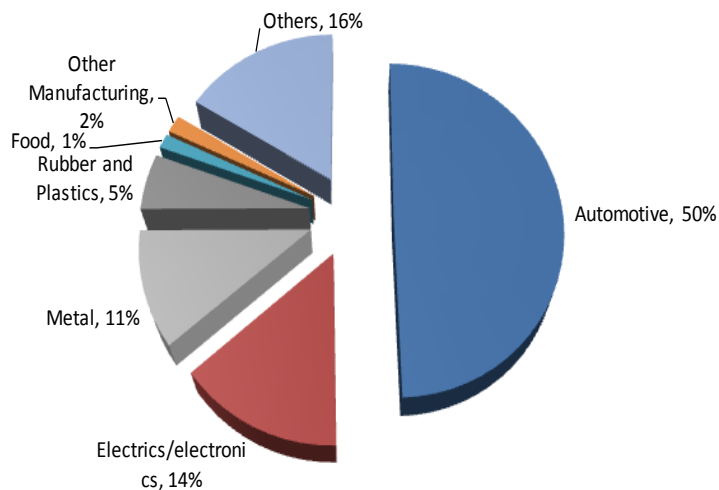
## China Industry Robotics installation by application



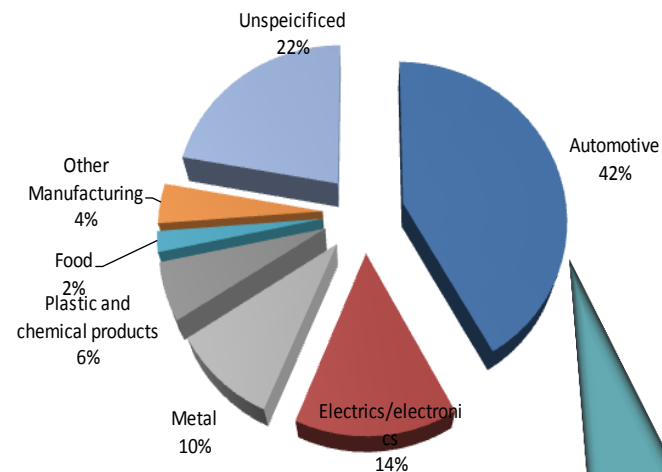
Welding and handling are top 2 application, account for 76%.

## China Industry Robotics installation by Industry

Estimated Distribution by Industry Group of Industry robots supplied in 2011



Estimated Distribution by Industry Group of Industry robots supplied in 2012



Automotive including OEM and Tier 1, around 10,000 in 2012;

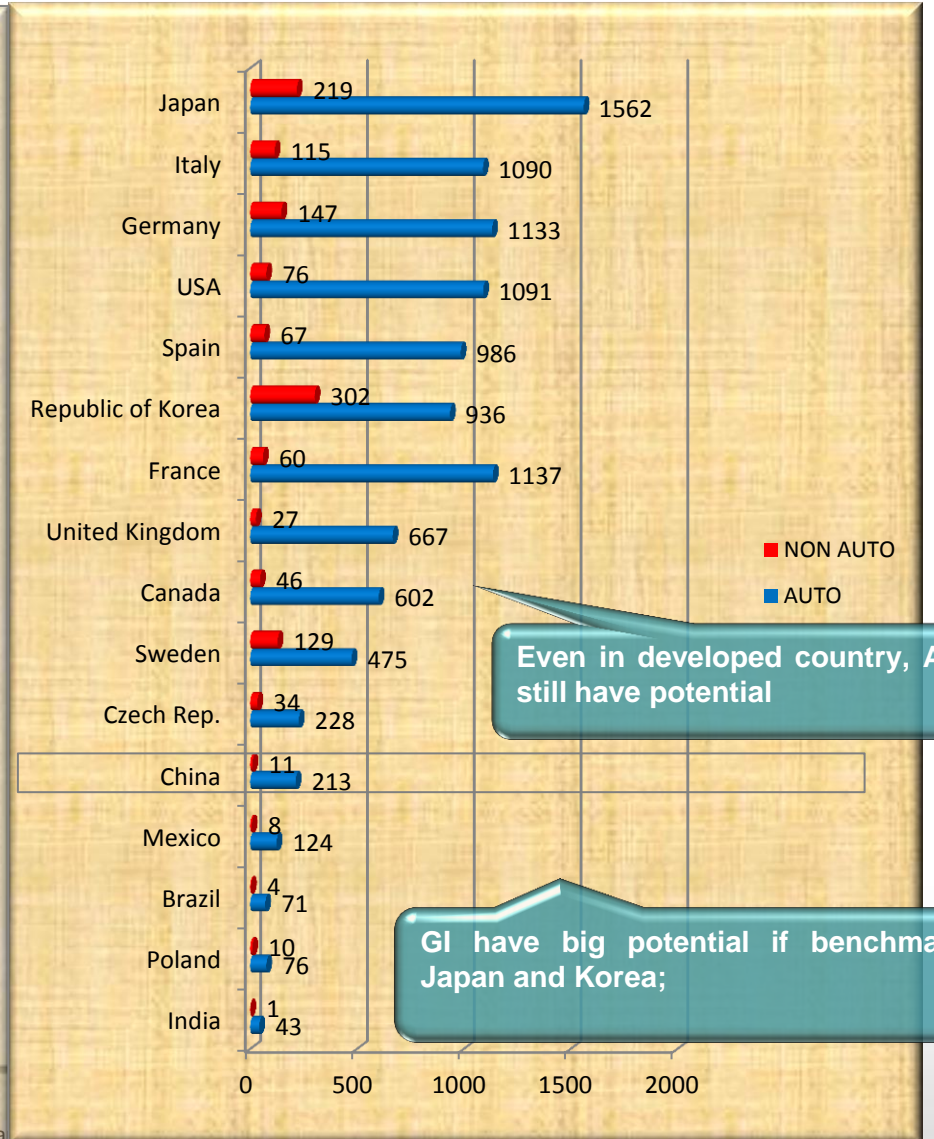
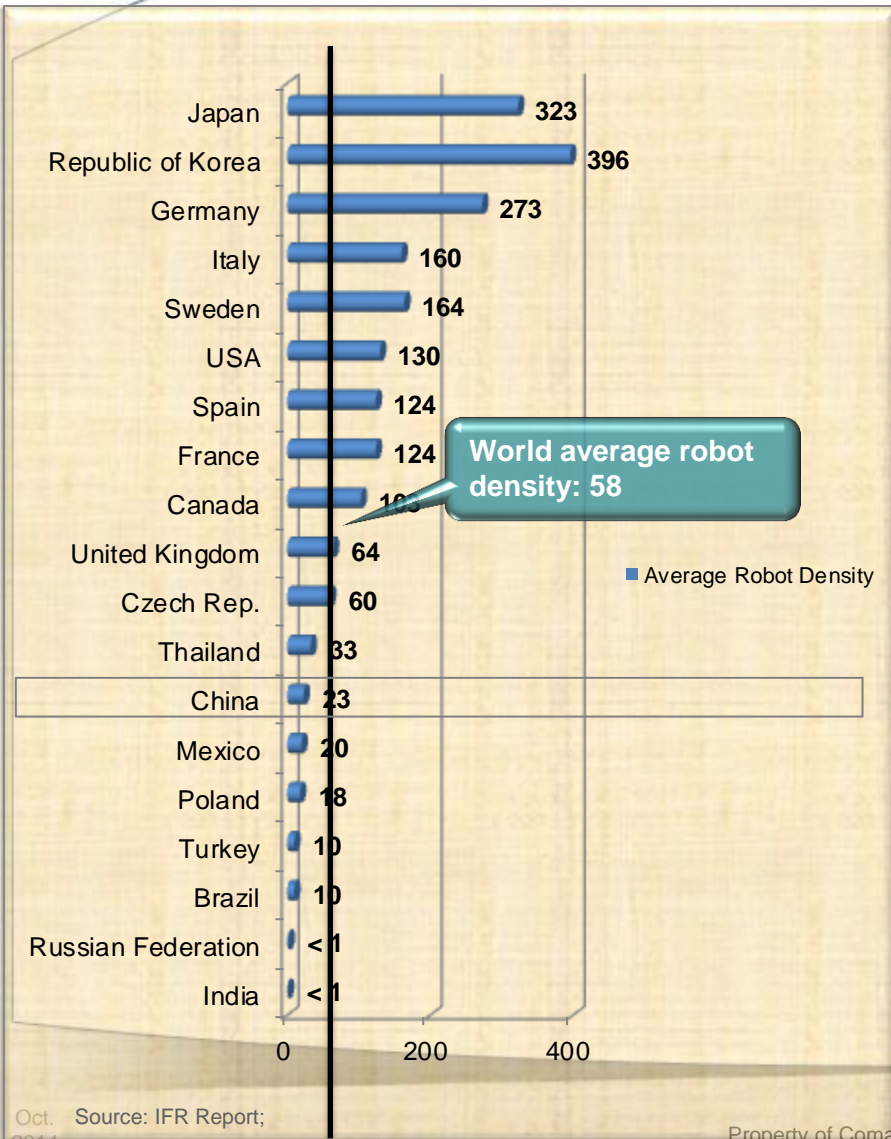


## Bonus of using Robots

- 1, Increasing production output rates  
增加生产效率
- 2, Improving product quality and consistency  
提升产品质量及一致性
- 3, Increasing flexibility in product manufacturing  
提升制造柔性
- 4, Improving quality of work for employees  
提升员工工作质量
- 5, Reducing material waste and increasing yield  
减少材料浪费以及提升产量
- 6, Saving space in high value manufacturing areas  
节省空间
- 7, Reducing costs  
减少成本
- 8, Robots create jobs  
机器人创造就业

# Potential Analysis

Robot Density (Robots number per 10,000 employee in manufacturing sector)

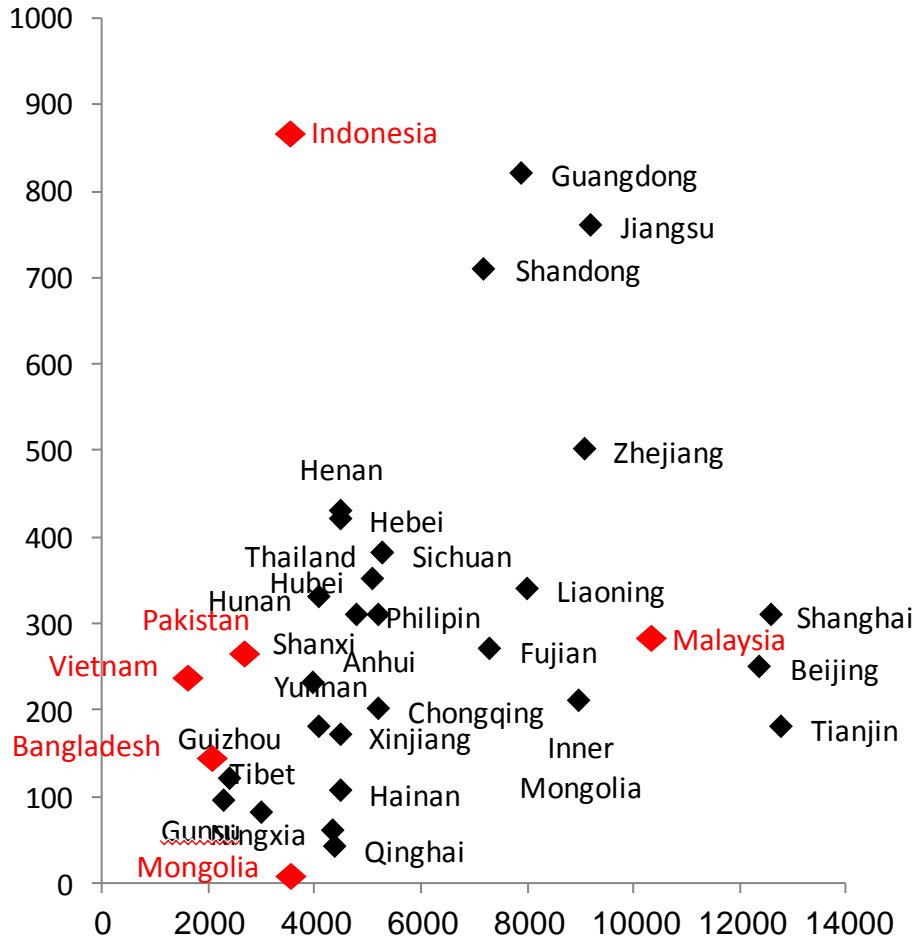


GI have big potential if benchmark Japan and Korea;

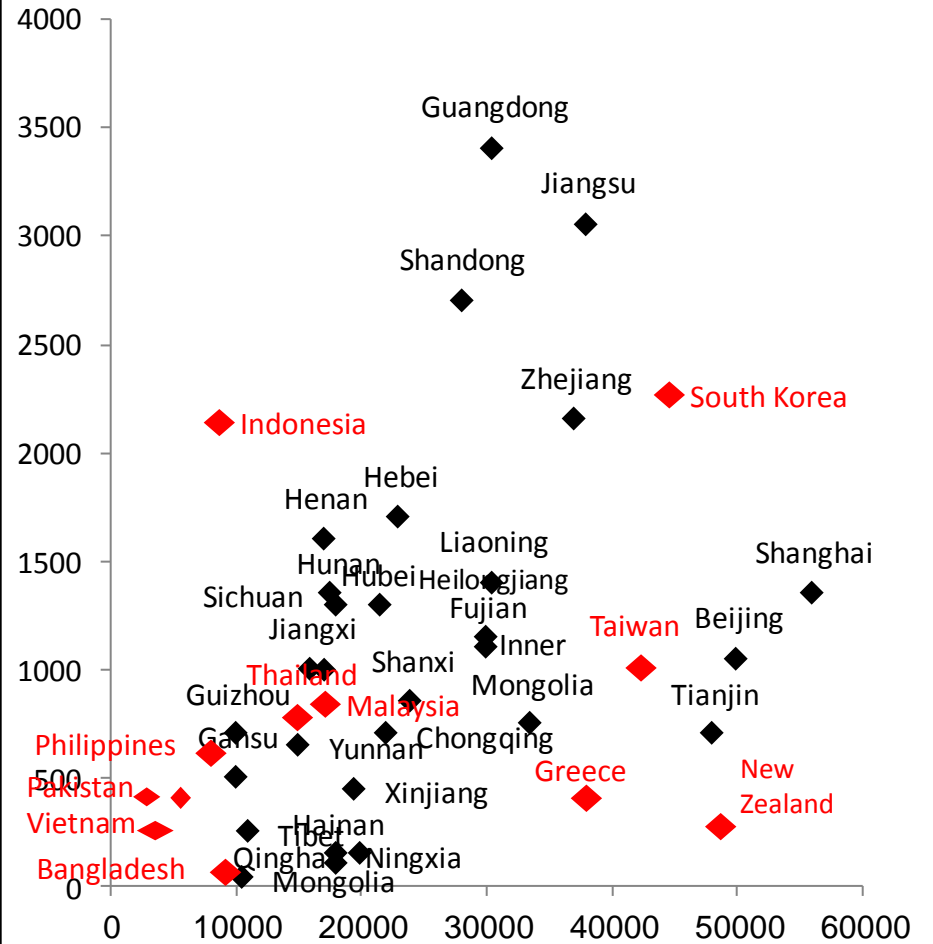
# China Provincial economy

Nominal GDP, billion of USD

## 2011



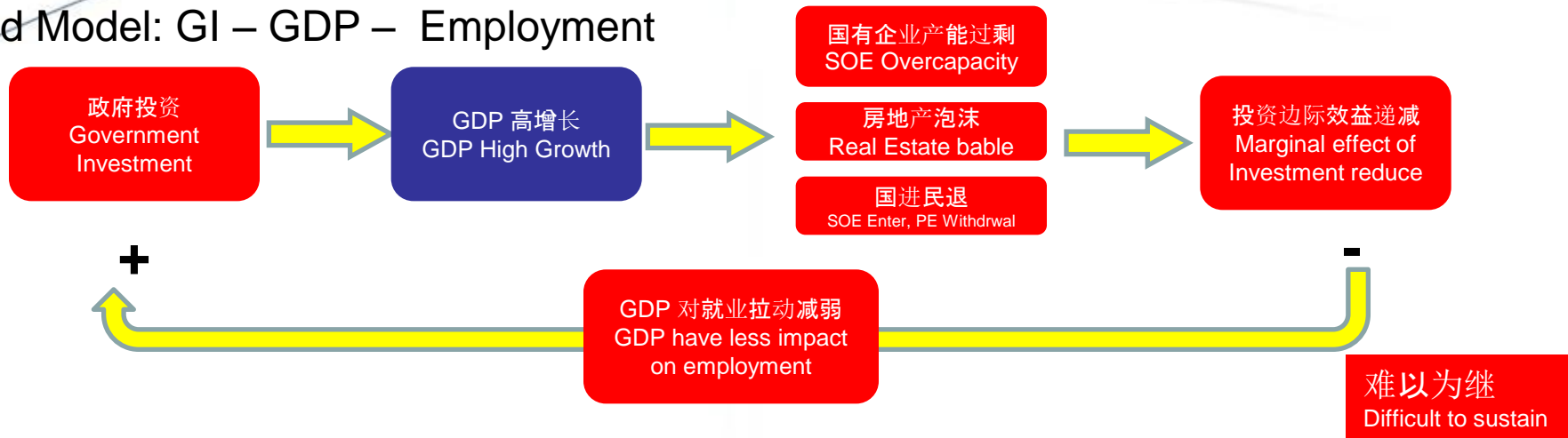
## 2021



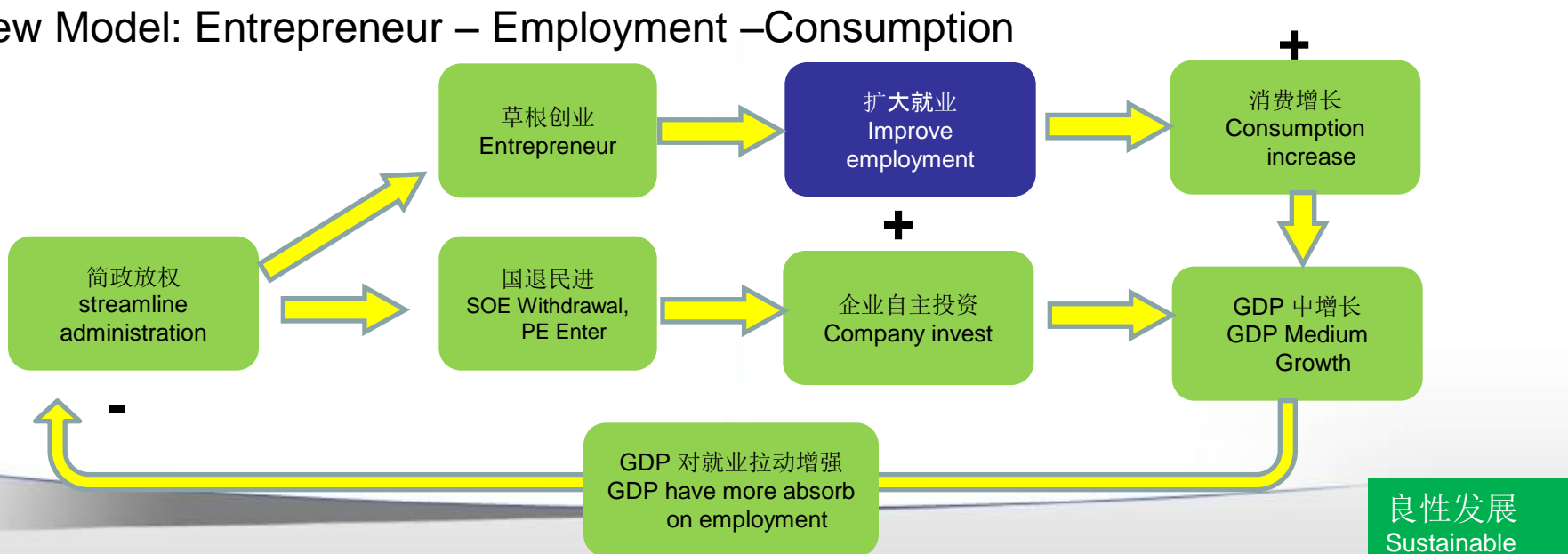
Per Capita GDP, USD

# Xi-Li New Model: Why and How?

## Old Model: GI – GDP – Employment



## New Model: Entrepreneur – Employment – Consumption





## One Child Policy...

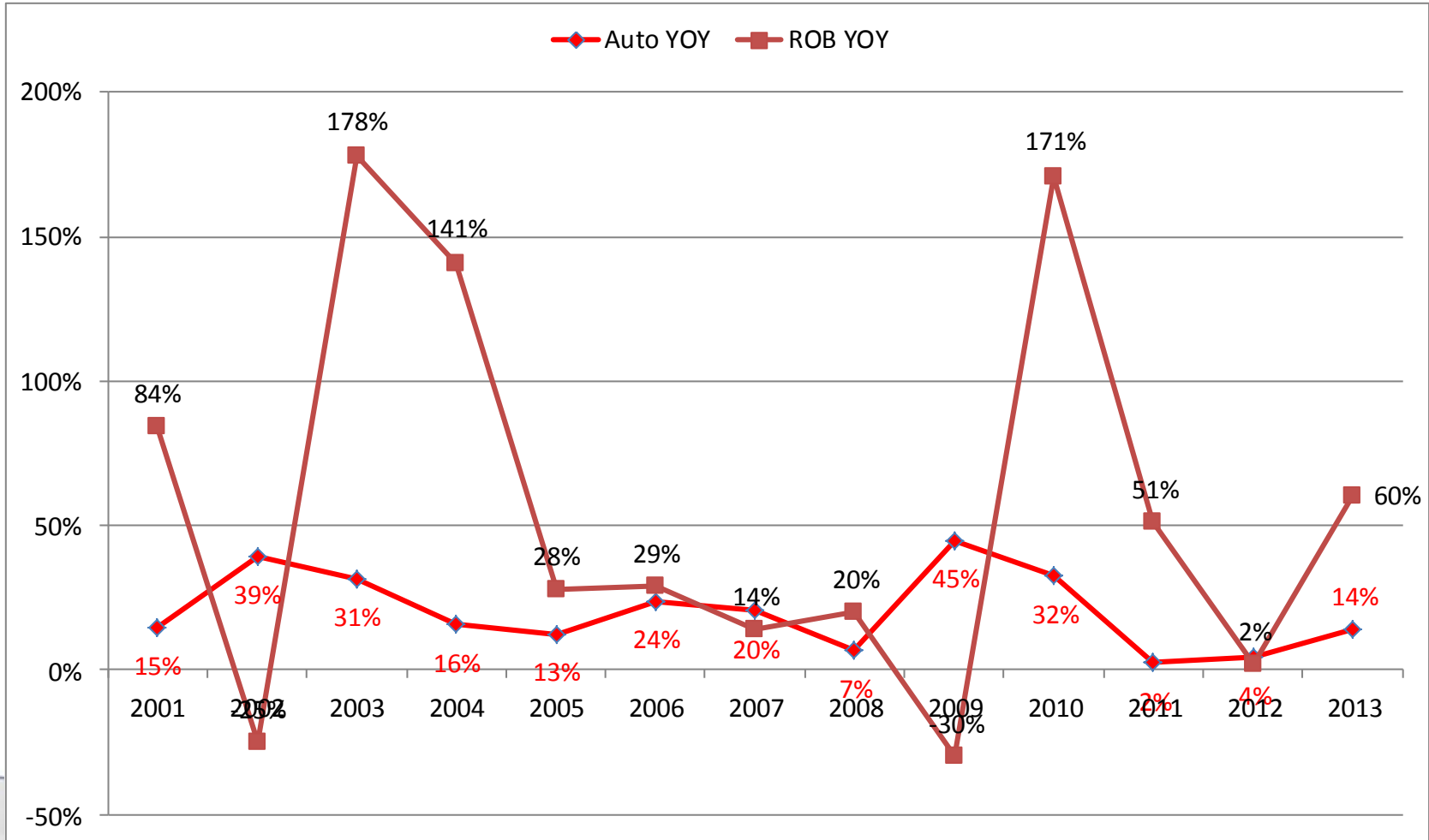


**New generation is spoiled generation, very few like to go to manufacturing industry**

# Robotics industry vs. Auto industry

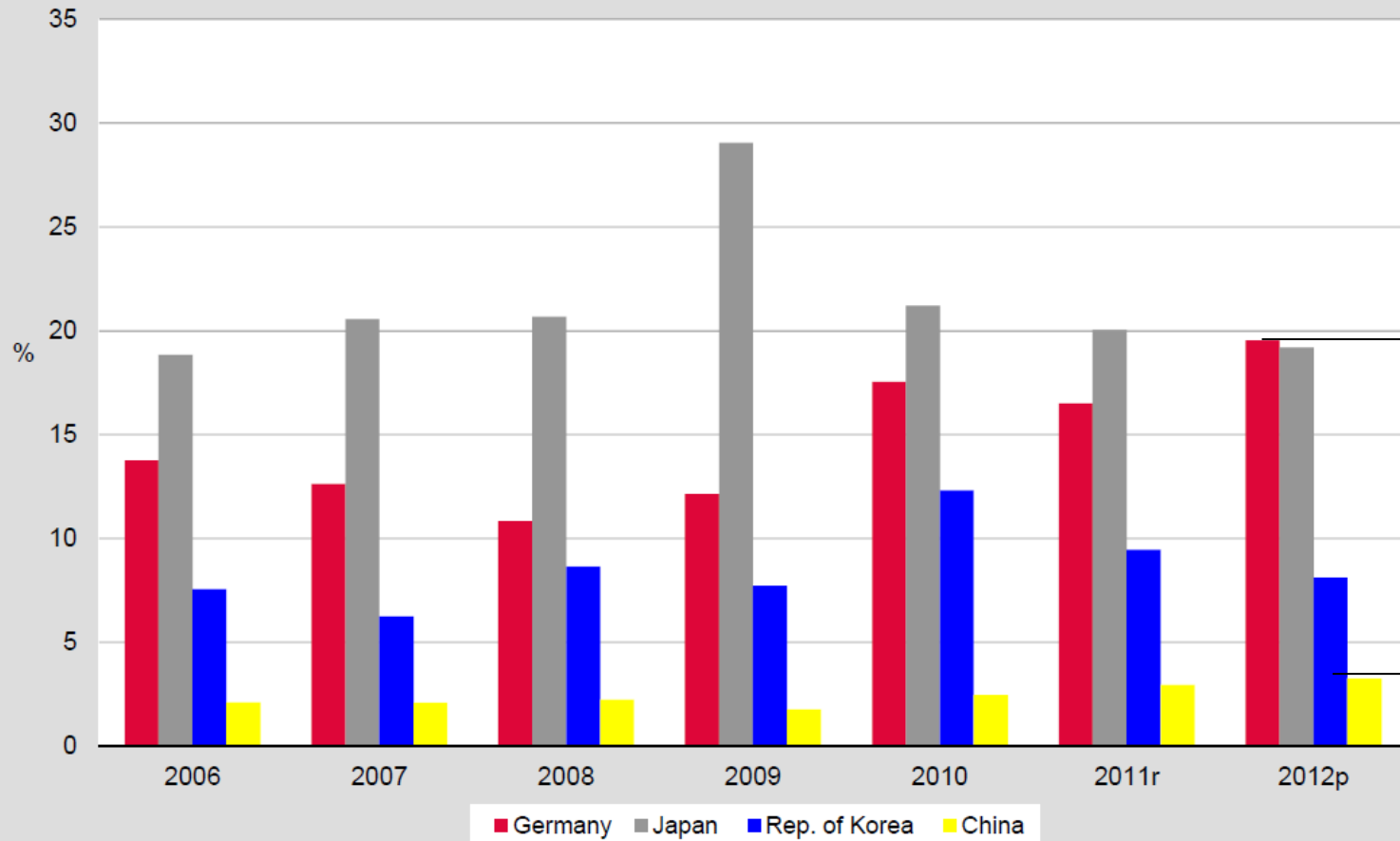
## Findings:

- 1) Rob YOY correlated to Auto YOY, but lag one year;
- 2) ROB CAGR is 2 times of Auto;



China produced 800K units M/C machine tools in 2012;

**Figure 2.7 Industrial robots as a percentage of machine tools**



Big gap means big potential



Shoe industry

# Application Industry Analysis

## Traditional

- Auto,
- Tier 1,
- 3C,
- Machine tool,
- etc...

all have **optimistic** YOY

## NON-traditional

labor intensive industry like:

- white goods,
- brick,
- Shoes

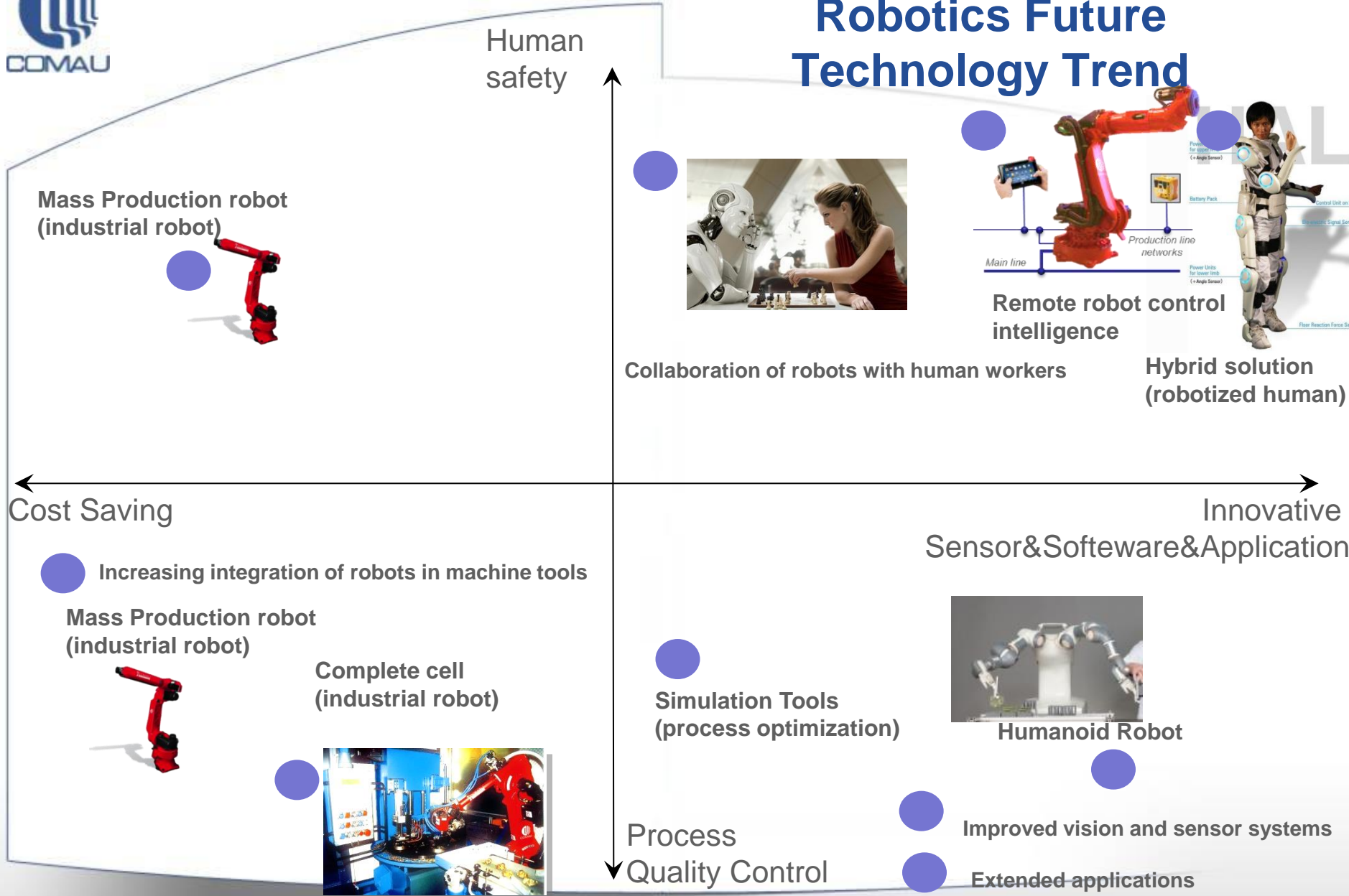
etc..

is **blue ocean** market;

**Conclusion:  
YOY in 5 years**

**>30%**

# Robotics Future Technology Trend



# Robotics Future Technology Trend



- 1, **Easy to use robots and flexible automation**  
简单易用和柔性自动化
- 2, **Collaboration of robots with human workers**  
人机互动
- 3, **New kind of robot generation**  
新一代机器人
- 4, **Improved vision and sensor systems**  
提升的视觉和传感器系统
- 5, **Increasing integration of robots in machine tools**  
机器人在机床的进一步集成
- 6, **Extended applications**  
应用范围的拓展



# ***Interesting Videos of COMAU Robotics***

Comau ROB  
Video

AISSO

## COMAU GLOBAL NETWORK



- A major player in the manufacturing of **High Quality Industrial Robots**
- Wide range of **Standard Products** and fully **Integrated Solutions**
- **>40 years** experience in Automation

### Manufacturing Plants

- Kunshan – China
- Turin – Italy

### R&D Center

- Turin – Italy
- Kunshan – China
- Pune – India (to be)

## Our Offer tailored to Your needs:

- “Naked” robots
- Peripherals
- Application packages
- Ready To Use cells
- Turn Key Solutions
- After Sales Service

Application Packages



After Sales



Naked Robot



Turn Key



Ready To Use Cells



Peripherals



## *General Purpose Robots*

With payloads from **6 to 650 kg**, models typically used for arc and spot welding, machine tool tending, assembly, handling, sealing applications.

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



# *Special Purpose Robots*



## **Smart NJ4** *Hollow wrist*

- **100% INTEGRATED DRESSING**

Real hollow wrist robot range from **90 to 270 Kg** of

- **REDUCED RISK OF BREAK DOWN**

The “integrated dressing” provides certainty of long duration and saving in terms of cost for service cables replacement

- **WARRANTY ON THE CABLE PACKAGE**

Comau Offers warranty for the integrated dressing without any inspection.

- **HIGHER PERFORMANCES**

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

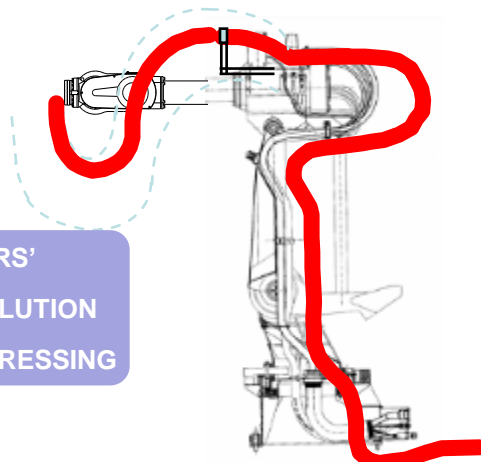
- **THINK “GREEN”**

Higher performances and with important energy savings, up to 25% more than other similar models



## *Smart NJ4 Advantages*

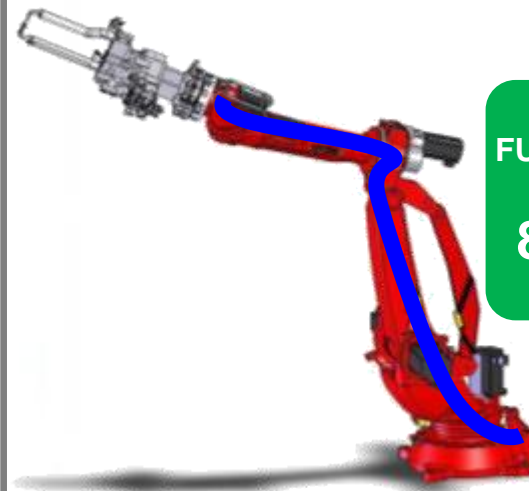
COMPETITORS'  
TRADITIONAL SOLUTION  
WITH EXTERNAL DRESSING



### 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

## **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**

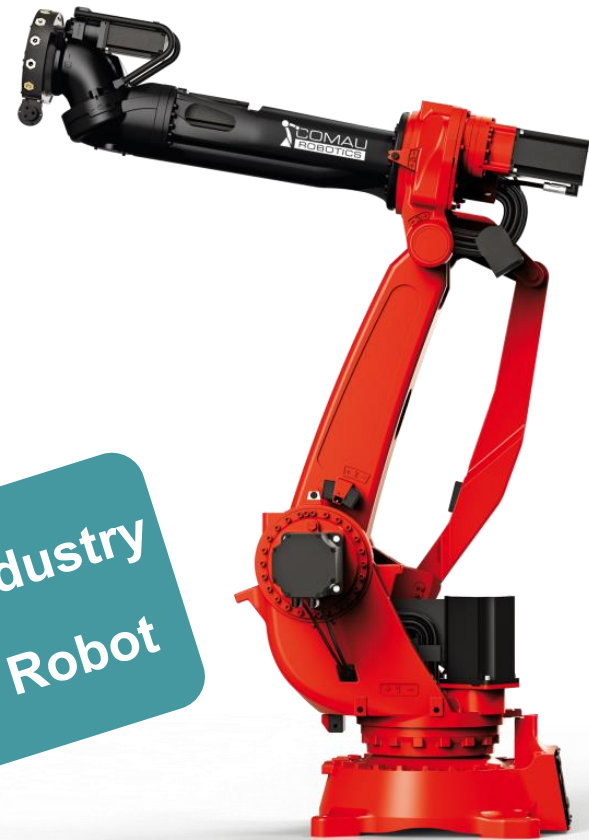
**110 – 2.2**

**170 – 2.5**

**175 – 2.2**

**220 – 2.4**

**220 – 2.7**



**The General Industry  
Hollow Wrist Robot**



# Racer



Designed to  
**Perform**

- 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

## ***Robot Control Units***



- **2 Variants**
  - **Standard, C5G**
    - 16 axis capability
  - **Compact, C5Compact**
    - 8 Axis
- **Performance improvement**
  - Improved MTBF
  - Reduced MTTR
- **C5G Open**
  - Open Controller Architecture
- **In C5G, space for application functions integration**
- **Energy saving system**
- **Noise reduction**



## ***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 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

## ***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

## *Spot Welding*



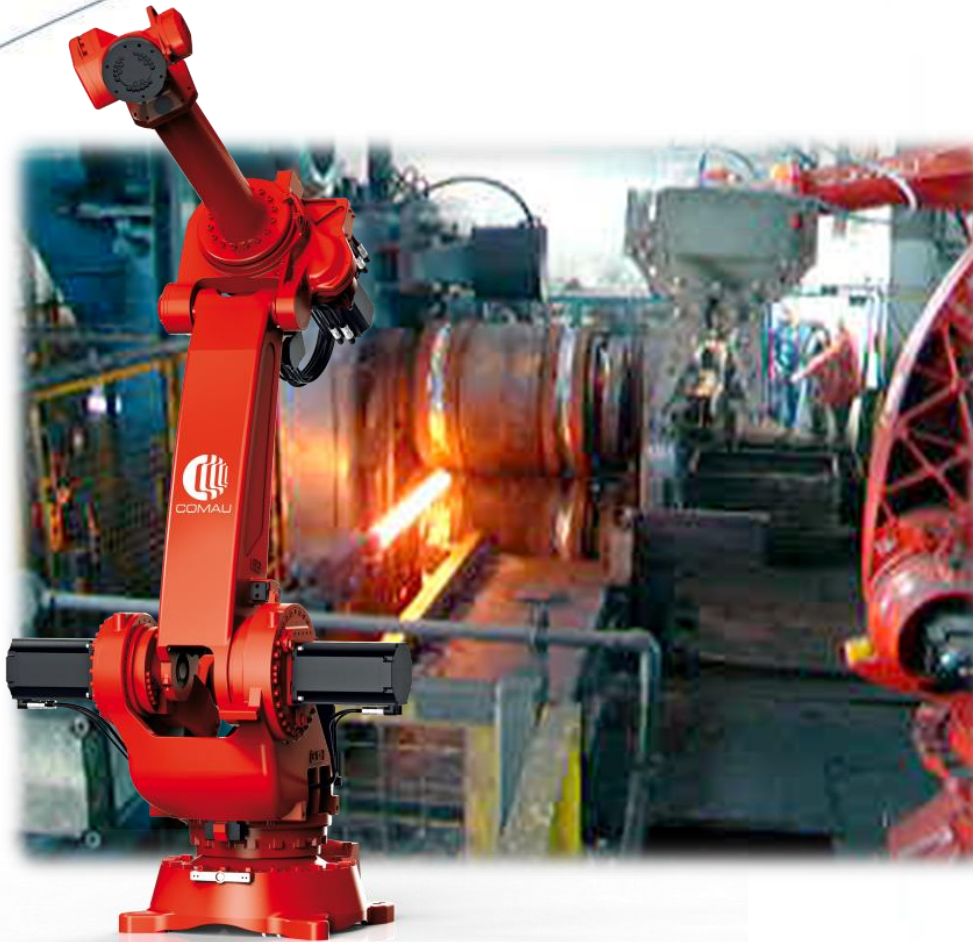
- **Long Experience:** first SPOT Welding Robot in 1978
- **Dedicated Robot Range:** Comau has developed original robot solutions to improve performance with **hollow wrist technology**
- **Dedicated Software** package: Comau has developed innovative SW packages with easy programming interface and optimized



## **PRESS** automation



- **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%



- **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

# *Training center*





# COMAU S.p.A.

Via Rivalta, 30  
10095 GRUGLIASCO (TO)

ITALY

[www.comau.com](http://www.comau.com)