

Does Your Robot Need a Tool Changer?

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Product Manager – Standard Tool Changers

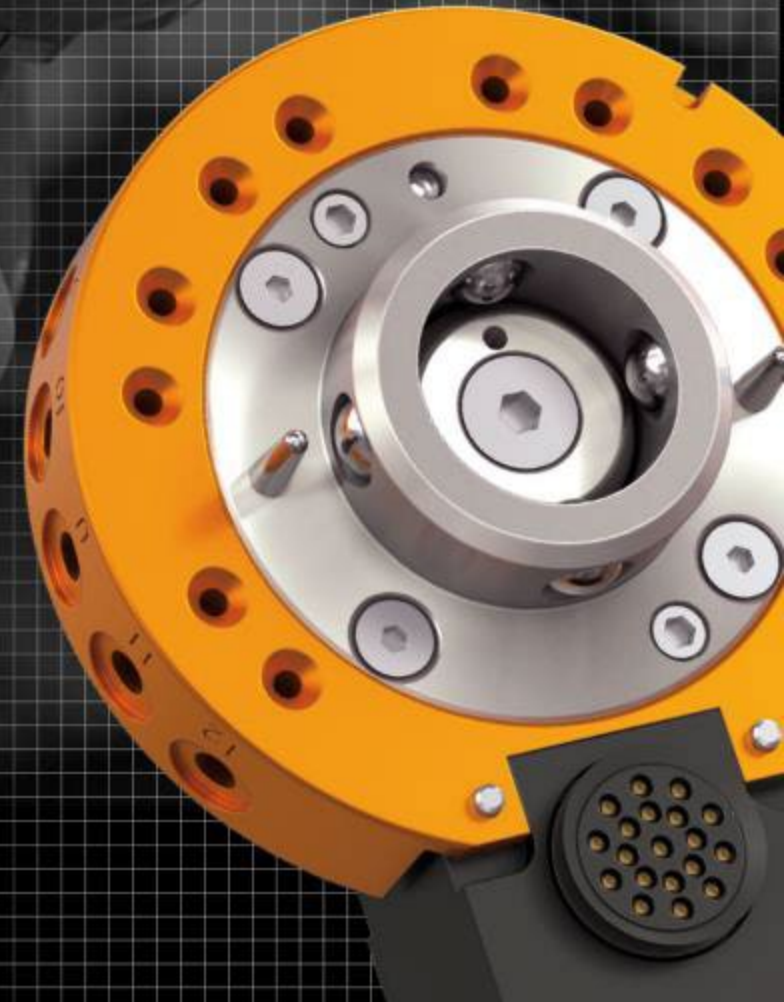
ATI Industrial Automation

Agenda:

- **Robotic Tool Changing Adds Value!**
- **Why is Material Handling Successful?**
- **‘Can You Automate?’ vs. ‘Should You Automate?’**
- **What’s Next For Robots?**
- **Smarter Automation**

Maximizing Robot Value

Robotic tool-changing technology enables the use of multiple end-effectors in one cycle



What is a Robot Tool Changer?

- A quick-change coupling device that provides **flexibility** in robotic applications to automatically exchange between various end-effectors, like:
 - Grippers jaws; vacuum cups
 - Servo motors
 - Spot-welders or riveters
 - Paint nozzles; liquid dispense
 - Inspection & vision tools
 - Surgical implements



Tool Changing Adds *Value!*

▪ Flexibility

- Adapt to new process and product
- Ability to manufacture multiple SKUs

▪ Future-Proofing

- Maximize efficiency amidst uncertainty
- Faster addition of new models

▪ Space Savings

- Do more [work] with less [robots]

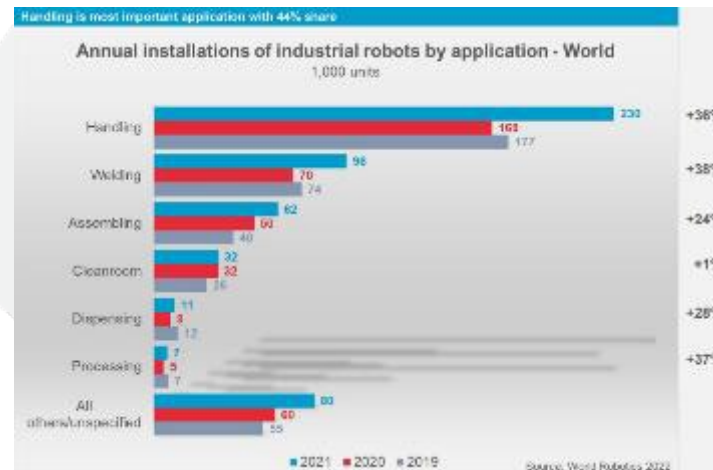
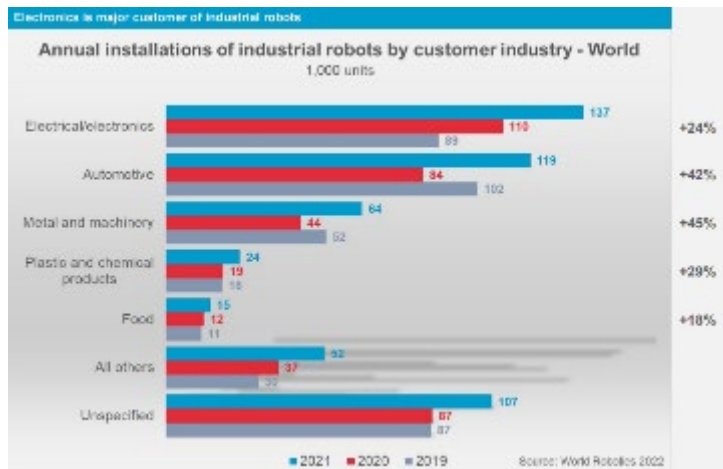
▪ Serviceability

- Exchange spare tools to quickly take offline for service



Industries & Applications for Tool Changers

- **Q:** Where are Tool Changers used?
- **A:** Tool Changers can be used anywhere robots are found. They serve the very same industries and applications.



Why Material Handling?

Material Handling is simple

- High repeatability
- Easy to automate
- Point A to B

Robots are great at using:

- Mechanical grippers
- Vacuum grippers
- Pick and Place



IFR reports that material handling (followed by welding) was the top application in 2022 in the Americas, Europe, and China

Can vs. Should

Answer the right questions to determine the best approach for your application

Pros and Cons of Tool Changer Automation

Automation ideal for applications with...

- Lower volume production, longer cycle times
- Pre-production
- Uncertain process

Challenges to consider in design...

- Weight
- Cable management
- Environment



Can You? vs. *Should* You?

■ Considerations

- Reconnection time
- PM & maintenance
- Utility pass-throughs (air, signals, power, etc.)

■ Solutions

- Discrete I/O vs. Ethernet/IP or other bus protocols
- Location of controller
- Fastener feeding

■ Review each automation project *carefully*...



Maximize Flexibility

Problem:

- Design a manufacturing line capable of supporting a variety of joining methods for multiple SKUs in limited space

Solution:

- One robot with tool changer and modules to support 4 different processes: MH, Weld, Rivet, FDS



What's Next?

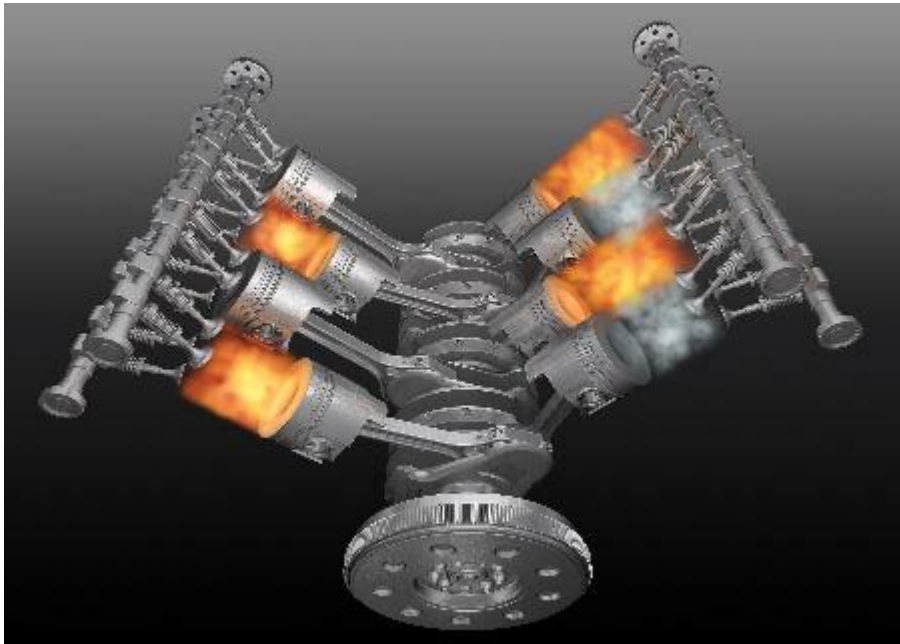
Innovative robotic application requirements call for new and different end-of-arm tools



Automotive Production is Evolving

Traditional: *Internal Combustion Engine*

- High Volume Production
- Low Cycle Time
- Steel/Aluminum

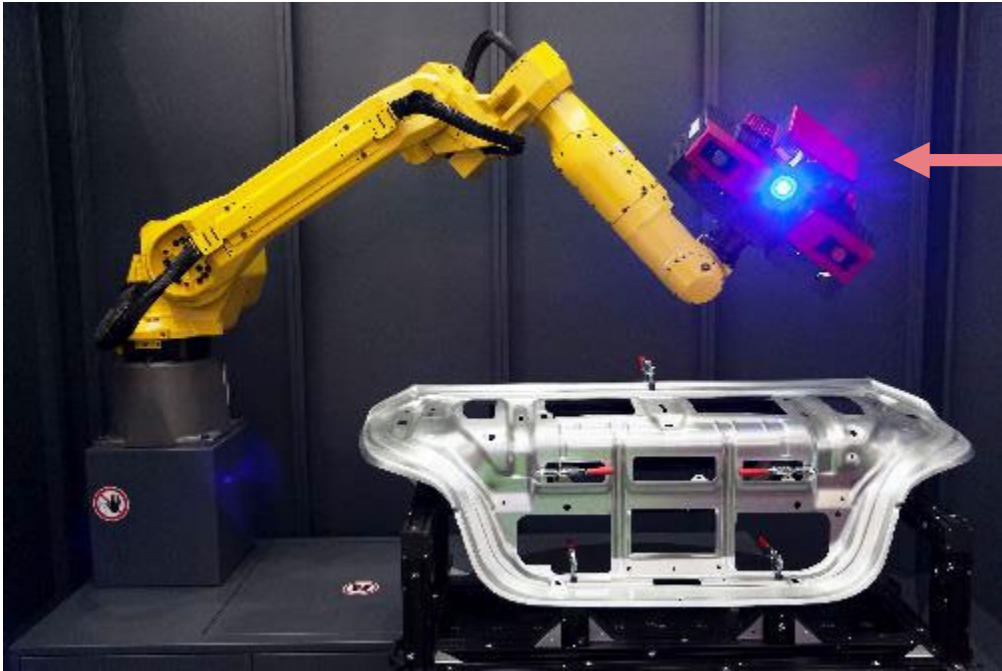


Changing To: *Electric Vehicle*

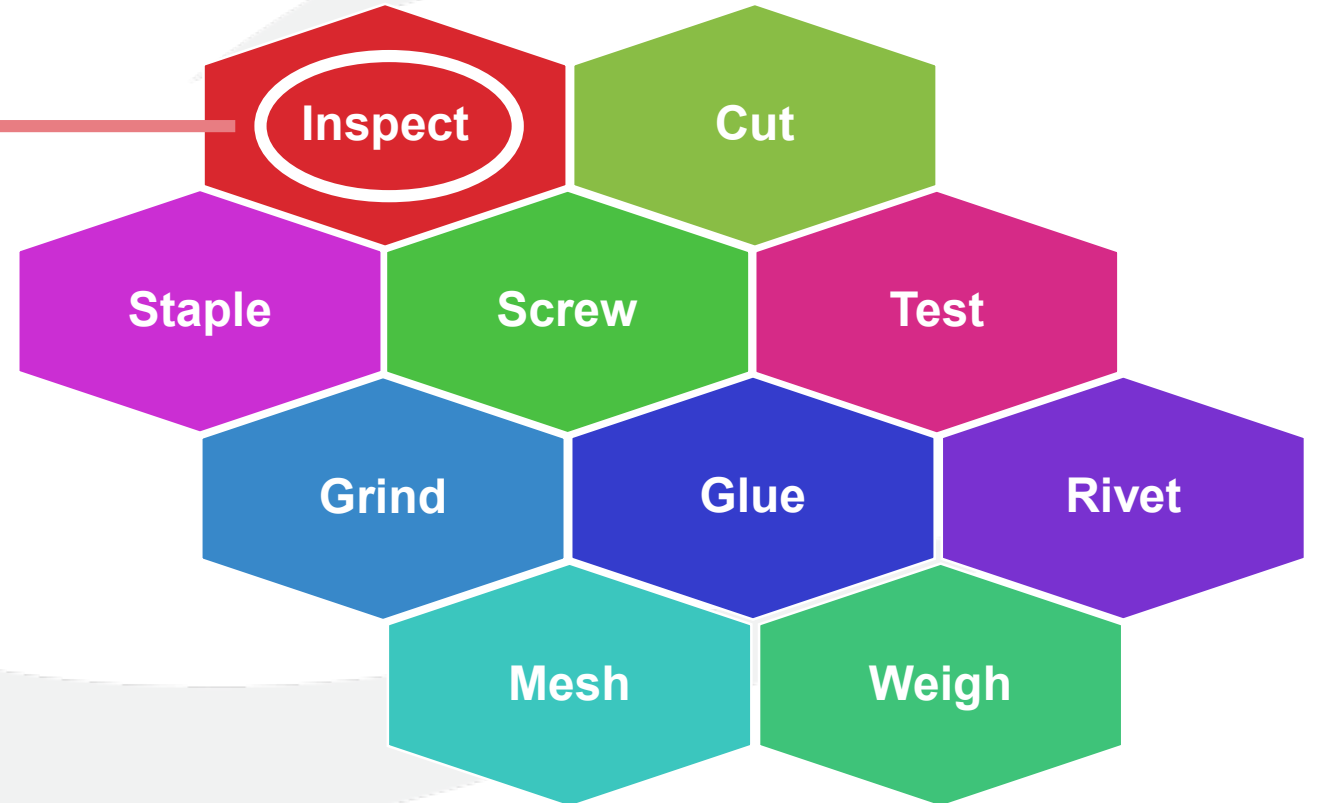
- Smaller Batch Size
- Longer Cycle Time
- Alternative Materials



New Applications? New Tools!



As robots are deployed in new industries, the need for more advanced EOAT increases



New Joining Technologies

- Must re-evaluate existing methods...
- New Materials call for new methods
 - Nut-runners
 - Adhesives
 - Flow-drill screws
- New Industries are using robots!
 - Residential & commercial construction
 - Food processing
 - Renewables



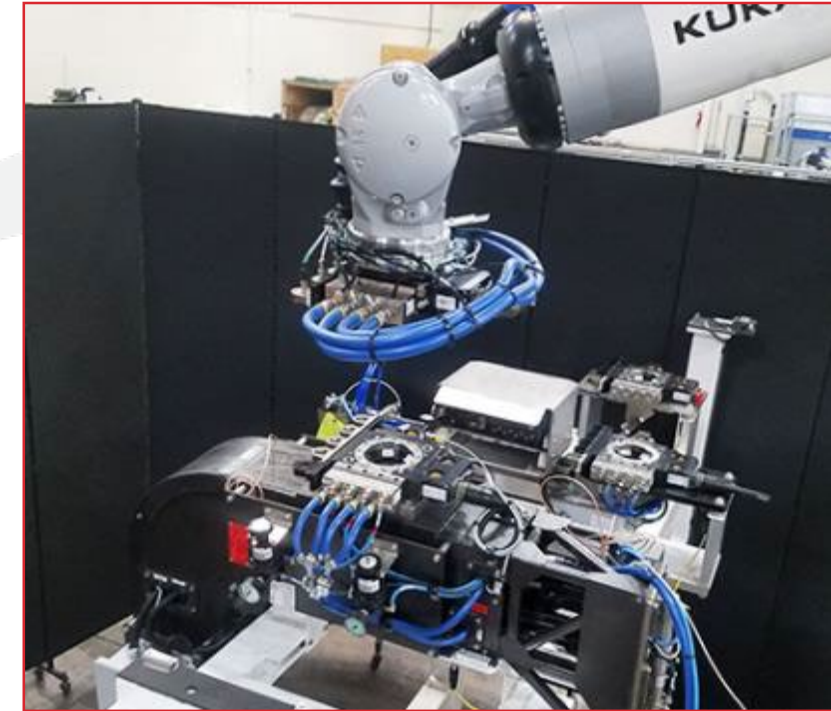
Working Smarter

Advances in EOAT
make new robotic
applications possible

Smart Automation

Innovation leads to new end-effectors

- Vision inspection, 2D & 3D
- Force & Torque Sensors
- Grinders & Sanders
- Non-destructive inspection



Industry 4.0

- More sensors
- More feedback
- More information = better process control

Takeaways for Robot Tool Changers

- Robots **can now do** more complex applications
- New manufacturing methods introduce new end-effectors
- Tool changing allows robots to use more tools interchangeably
- With the right tools, robots gain **flexibility, productivity, and serviceability!**



Endless Tool Changing Possibilities



Warehousing & Logistics
Autonomous Mobile Robots (AMR'S)



CNC Machine Tending



Metrology & Inspection



Robotic Agriculture



Additive Manufacturing
(3D Printing)



Modular Housing Construction

Rapid advancements in robot safety, sensing, and adaptability are opening new doors to automate tasks that were once too challenging.

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Thank you!