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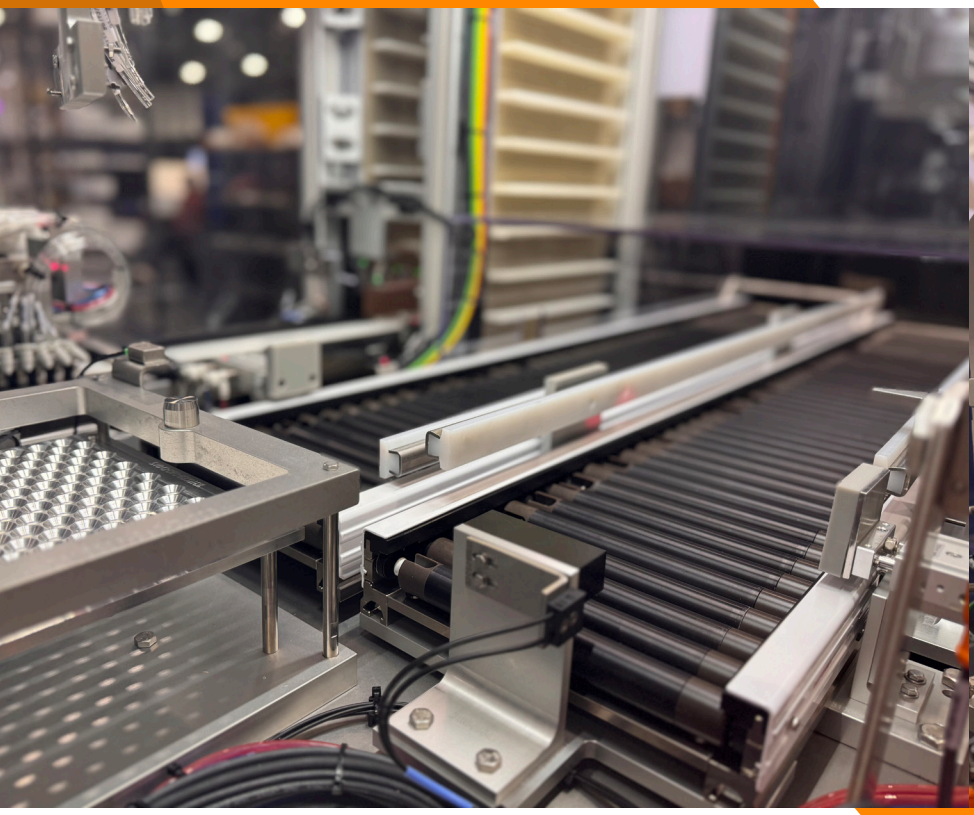
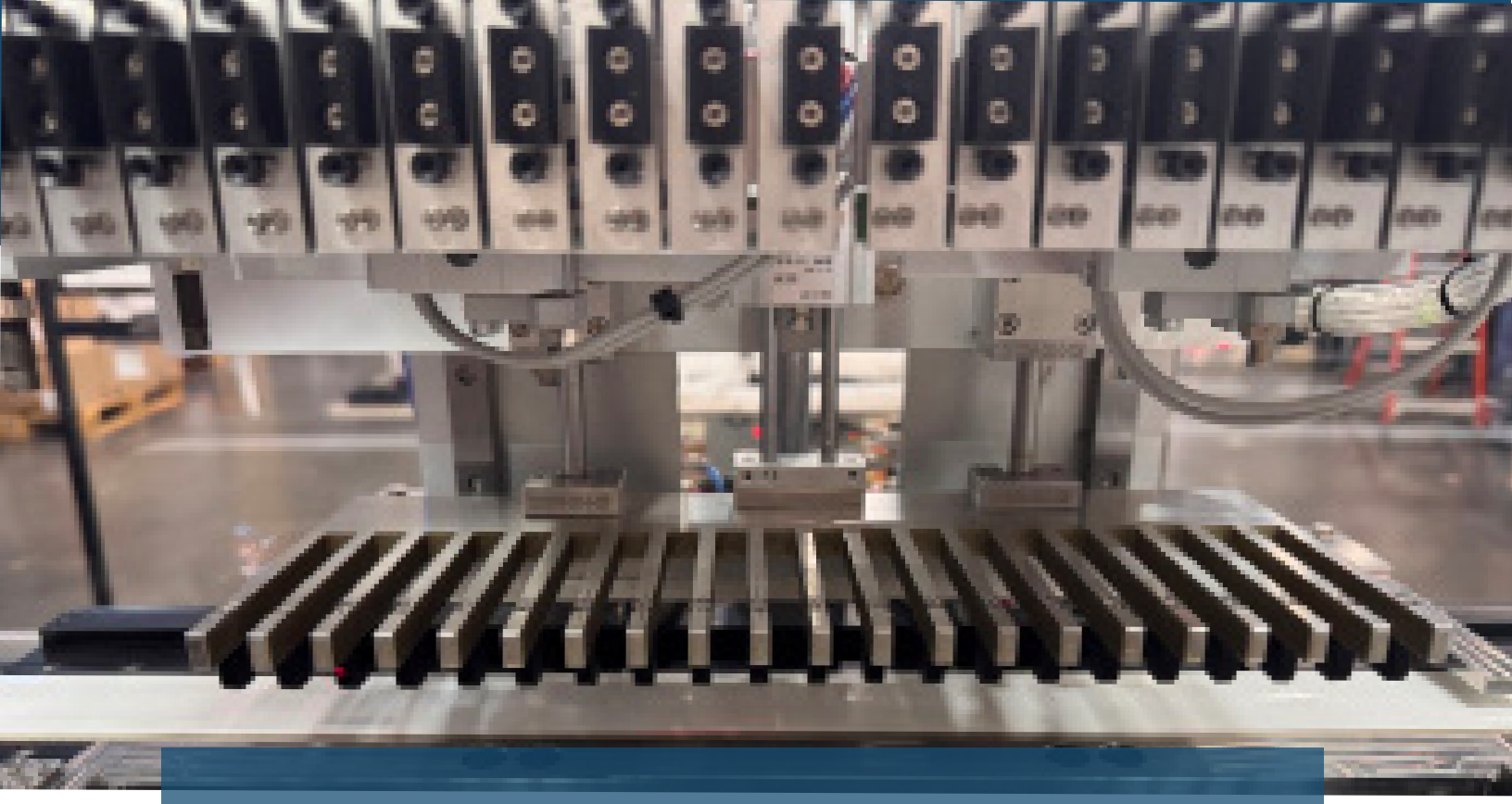
CASE STUDY



Automated Tray-to-Tub or Tub-to-Tray Cell for Pre-Filled Syringe Handling

Automation NTH



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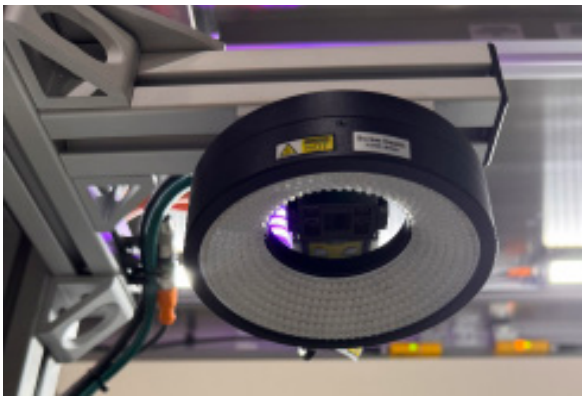
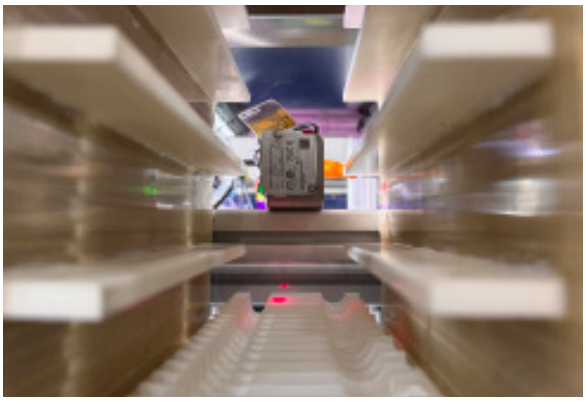
OVERVIEW



A leading pharmaceutical manufacturer approached Automation NTH with the need for an automated Tray-to-Tub Cell to streamline their pre-filled syringe handling process. The project required a solution that could meet strict performance, footprint, and handling requirement.

The manufacturer faced challenges related to manual handling inefficiencies, inconsistent throughput, and the risk of contamination. To address these issues, Automation NTH designed and implemented a fully automated system capable of accurately transferring syringes from trays to tubs with minimal human intervention. The solution incorporated advanced robotics, custom end-of-arm tooling, and vision systems to ensure precise placement and orientation of the syringes.



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CHALLENGES

1. **Compact Footprint:**
The entire cell had to fit within a 5′ x 7′ space, ensuring minimal use of valuable cleanroom real estate.

2. **High Throughput:**
The system needed to achieve a PFS transfer rate of at least 90 PPM (parts per minute).

3. **Operator-Friendly Loading:**
Rondo Tray Loading: Fully populated trays with 20 PFSs per tray.
Tub Loading: Empty nests (160-count Tub) to receive the PFSs.

4. **Gentle PFS Handling:**
No glass-to-glass contact to avoid breakage or contamination.
No "jarring" of Rigid Needle Shields (RNS) during transfer.

5. **Extended Operator Autonomy:**
Transparent material handling design enabling >3 minutes of walk-away time.

6. **Reduced Contamination Risk:**
Preferred solution would avoid tooling inside the PFS barrel I.D., minimizing contamination risks.

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SOLUTIONS

To meet these stringent requirements, Automation NTH deployed an ISO 6-compliant FlexBase platform—a reliable, scalable foundation featuring fully integrated vision, controls, and Epson-based robotic tooling. The FlexBase solution offered several key advantages:

Efficient Material Handling:

- On the input side, the operator loads:
  - Incoming Tubs with empty nests.
  - Fully populated Rondo Trays with PFSs.
- On the output side, the operator offloads:
  - Full tubs containing the transferred PFSs.
  - Empty, stacked Rondo trays for disposal.

Automated Operations:

- Using Ignition Front End on a Tangent VITA KW 21 Flex-Arm mounted PC, the operator initiates the cycle with a simple start command.
- The system automatically moves Tubs, Nests, and Rondo Trays through the cell into their respective load and unload positions.

Vision-Guided Verification:

- Integrated vision confirms ready-state status of incoming materials.
- This ensures that all PFSs are properly accounted for, enhancing quality assurance.

Precision Robotic Transfer:

- Epson SCARA T-6 Robot was selected for its reach, payload capacity, and accuracy.
- Dual-tooling functionality enabled the robot to manipulate both PFSs and Nests efficiently in tight quarters.
- The PFSs were unloaded, re-pitched, and robotically transferred into pre-positioned Tub Nests with exceptional accuracy.

Seamless Tray Management:

- Empty Rondo Trays were automatically stacked and queued for easy removal by the operator.
- This automated tray management streamlined the process and reduced manual intervention.

Operator Autonomy:

- The cell's design provided over three minutes of walk-away time, allowing operators to focus on other tasks while the system ran independently.

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RESULTS

High Throughput Efficiency:
- Consistently achieved the 90 PPM PFS transfer rate, improving production capacity.

Compact Footprint:
- The entire system fit within the 4′ x 6′ footprint, maximizing floor space efficiency.

Operator-Friendly Design:
- The intuitive Ignition Front End interface and over 3 minutes of walk-away time enhanced operator efficiency and reduced fatigue.

Streamlined Workflow:
- Automated tray stacking and queue management reduced manual handling.
- Vision-based verification improved uptime because it reduced the possibility of breaking product if it was not presented correctly to the Repitch tooling

Enhanced Product Safety:
- Gentle handling techniques eliminated glass-to-glass contact, reducing breakage and preserving product integrity.
- No tooling inside the PFS barrel reduced contamination risks.

Scalable Flexibility:
- In addition to the Tray-to-Tub configuration, Automation NTH offers a Universal Tray & Tub solution, providing even greater versatility. This flexible system can:
  - Unload Rondo Trays into Tub Nests.
  - Or, unload Tub Nests into Rondo Trays.
- Both configurations deliver exceptional value while maintaining a small footprint—ideal for clean room environments with space constraints.

CONCLUSION

Automation NTH's Tray-to-Tub Cell demonstrates how advanced automation and precision robotics can transform pre-filled syringe handling. The solution offers superior efficiency, product safety, and operator autonomy—all within a compact and scalable design.

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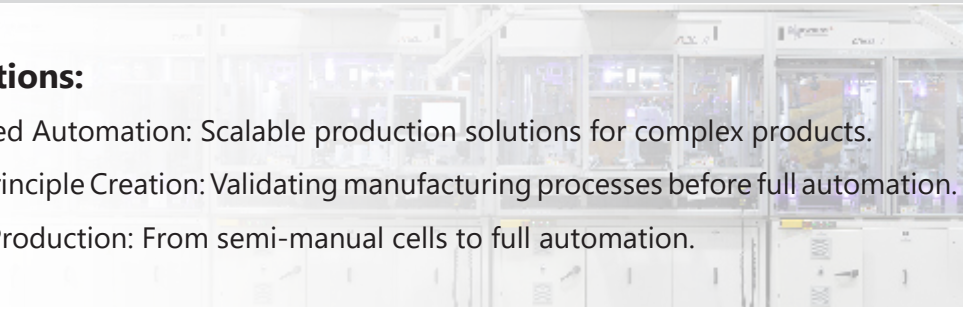
About NTH

Founded in 1999, Automation NTH is a trusted partner in automation for manufacturers, with our headquarters located just outside of Nashville, TN and additional offices in San Diego, CA. Our expertise transforms your manufacturing operations from manual processes to semi-automated and fully automated production. Whether scaling up from individual work cells or introducing fully integrated production lines, we deliver solutions that drive cost savings, enhance efficiency, and minimize risks. With a strong focus on robotics and controls, we ensure timely delivery of projects with strict adherence to budget.

Key markets we serve include:

- Medical Diagnostics
- Drug Delivery Systems
- Wearable Devices
- Therapeutic Devices
- Vascular Technologies

Our innovative approaches improve production capacity, product quality, and enable operator autonomy.



Our Solutions:

- Customized Automation: Scalable production solutions for complex products.
- Proof of Principle Creation: Validating manufacturing processes before full automation.
- Scalable Production: From semi-manual cells to full automation.

Services We Provide:

- Custom Automation
- Automation Consulting
- Equipment Optimation

Engineering Your Edge, Together!

Contact Us today at sales@automationnth.com

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