



BUILDING TOMORROW'S SYSTEMS TODAY!

TEST BED FACILITY

AUTO-ID LAB CAMBRIDGE (UK)

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OVERVIEW

- Research at the Cambridge Lab
 - focus and approach
 - facilities
 - activities to date
 - future activities
- Call for interaction with industry
 - problems, issues, thoughts



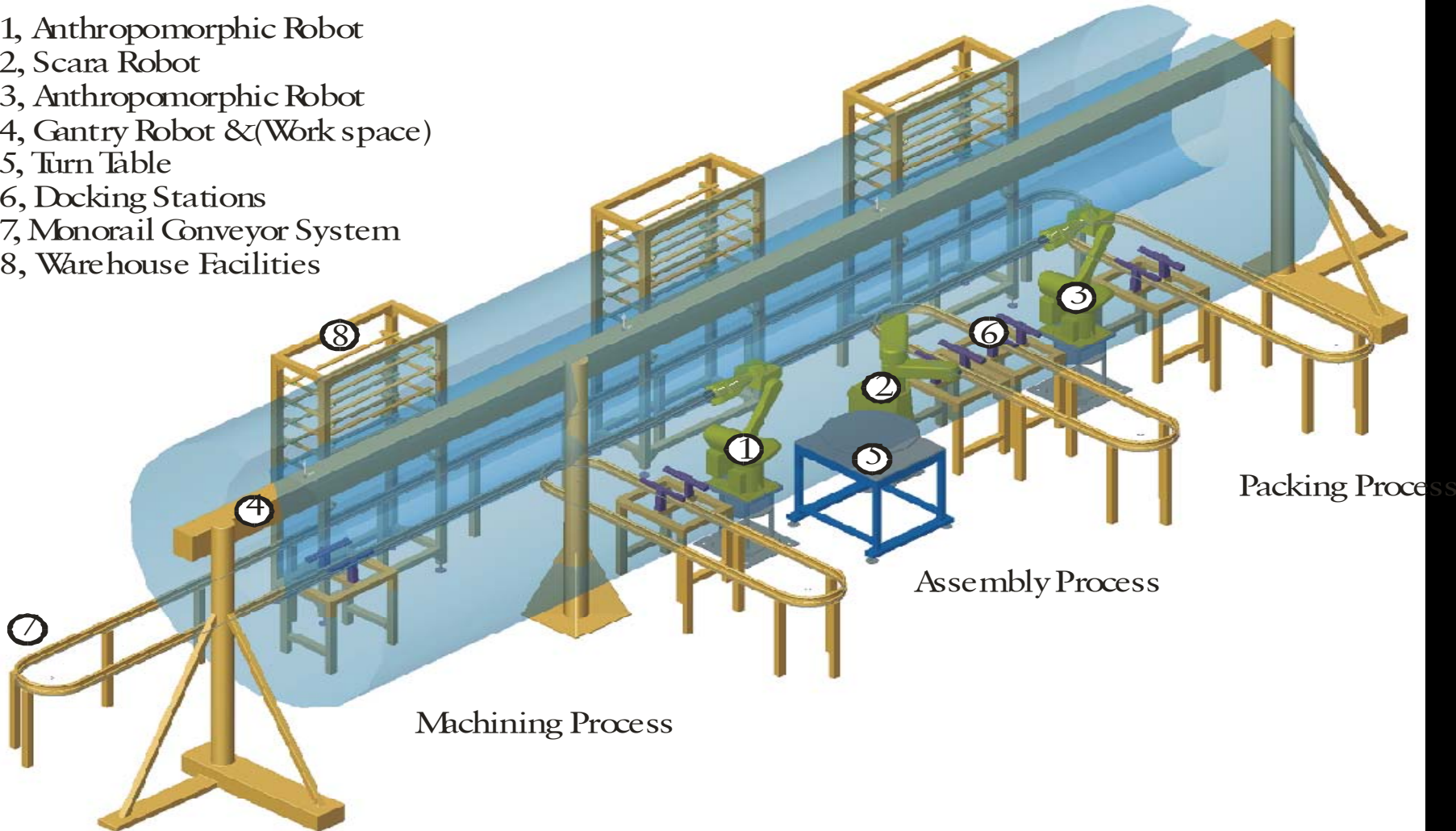
CAMBRIDGE RESEARCH FOCUS AND APPROACH

- Auto-ID for control
 - Making decisions and actions automatically in near real-time based on sensed information including Auto-ID.
- Research approach
 - industry-driven
 - flexible components as building blocks
 - sophisticated applications from component interactions
 - generating test data that can be used in design of new systems and simulation tools



CAMBRIDGE RESEARCH FACILITY

- 1, Anthropomorphic Robot
- 2, Scara Robot
- 3, Anthropomorphic Robot
- 4, Gantry Robot & (Work space)
- 5, Turn Table
- 6, Docking Stations
- 7, Monorail Conveyor System
- 8, Warehouse Facilities





CAMBRIDGE RESEARCH FACILITY

- Robots
 - anthropomorphic
 - SCARA
 - gantry
- Monorail
- Machine tool
- Storage system
- Web-cam monitors
 - overall view of lab
 - details of specific operations

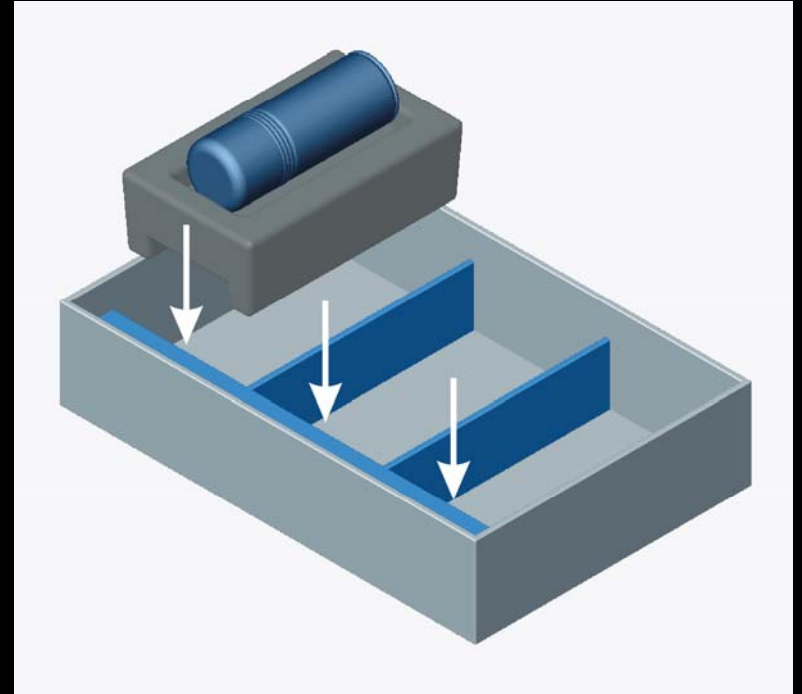
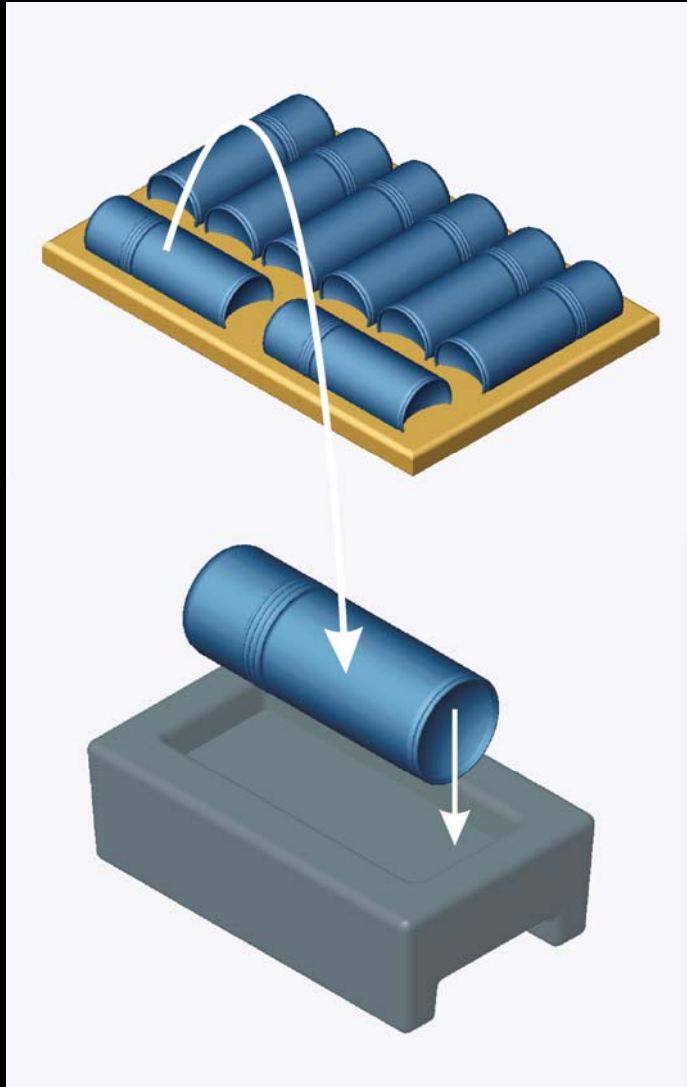


CAMBRIDGE RESEARCH FACILITY

- Auto-ID hardware
 - networked readers
 - EPC'ed tags
 - Sun savant application servers
- Auto-ID software infrastructure
 - savant
 - filters
 - PML server
- Interfacing infrastructure
 - Auto-ID <-> factory automation
 - agent-based intelligent system



CAMBRIDGE RESEARCH FACILITY



- Packing
- Assembly



CAMBRIDGE RESEARCH FACILITY



Specific items; generic capability





CAMBRIDGE RESEARCH ACTIVITIES (PHASE 1)

- Vastly reduced uncertainty
 - inventory
 - detecting and resolving disturbances
 - unpacking of multiple streams of goods inwards
- Mass customisation
 - mixed-box packing
 - late-stage mass customisation
- Traceability
 - of packed components
 - product recalls
 - quality control of packed boxes



CAMBRIDGE RESEARCH ACTIVITIES (PHASE 2)

- Handling last-minute changes
 - production negotiated with available resources
 - resource failure: rescheduling
 - rush orders: rescheduling, unpacking,
 - materials shortages: rescheduling, unpacking
 - business drivers changing believes of resources
- Remote monitoring and operation
 - web-based view of lab, via cameras and sensors
 - web-based operation



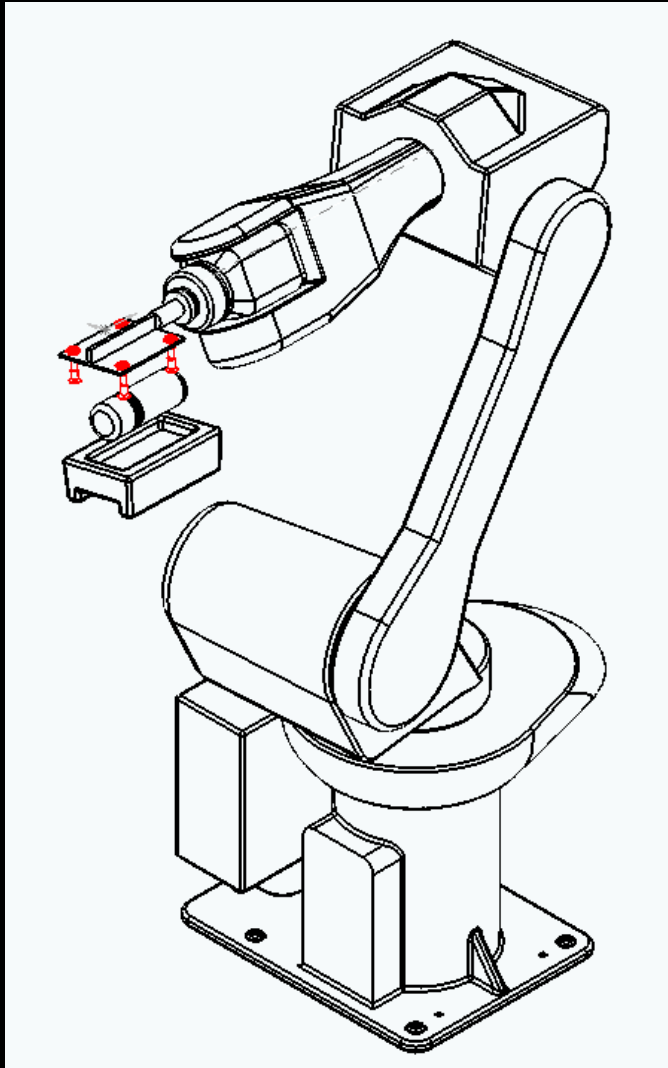
FACILITATING ADOPTION



- Adoption path
 - business process
 - software systems
 - hardware
- Add-on hardware components
 - easy to deploy (ethernet based)
 - easy to integrate (TCP/IP, SOAP etc)
 - flexible (before and during operation)
- Also supports production line mods



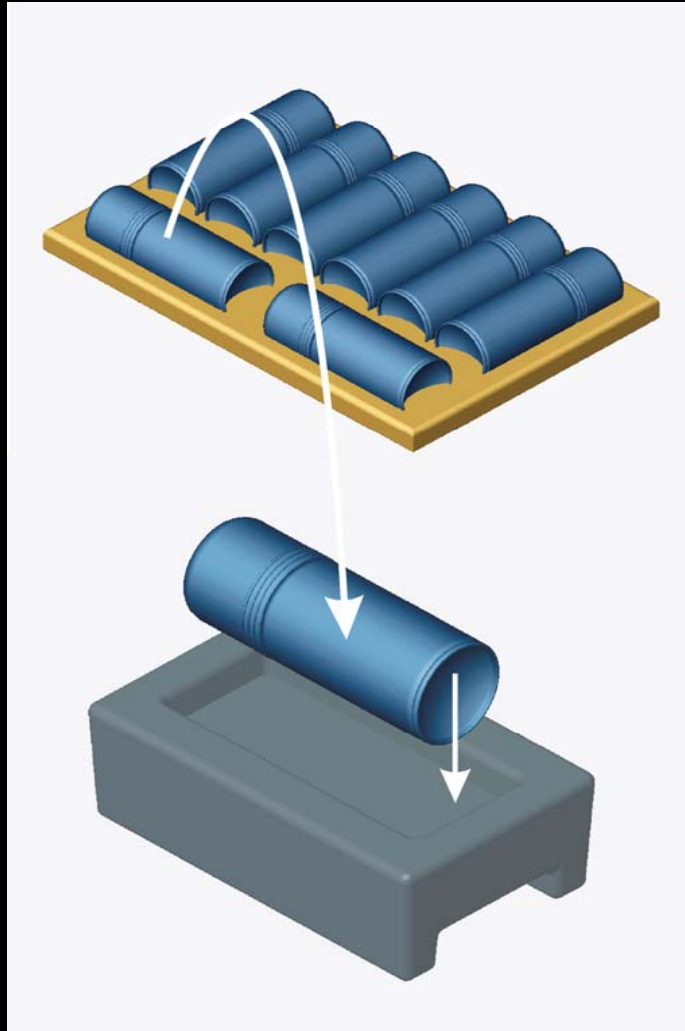
ENHANCING MATERIAL HANDLING



- High level recipes can be interpreted differently by different styles of equipment.
- Real physical data about products (inferred - size, location, orientation) can be used by production equipment.
- Enhance the operation of flexible material handling and fixturing systems.



REUSABLE PLASTIC CARRIERS



- Identity and status information of reusable pallets through various flexible assembly scenarios.
- Addition of extra sensory information, weight, temperature, used/free locations.
- Link production process information to location of product on the carrier. (Traceability)
- Reducing inventory uncertainty.



ENHANCING LOCATION INFORMATION

- Identity and location are different
- RFID gives unique ID, but not unique location
- Integrating RFID with the automation environment
 - tagged items *moving* past readers
 - readers integrated into robotic systems
 - end-effector
 - linear axes
- RFID reader performance testing

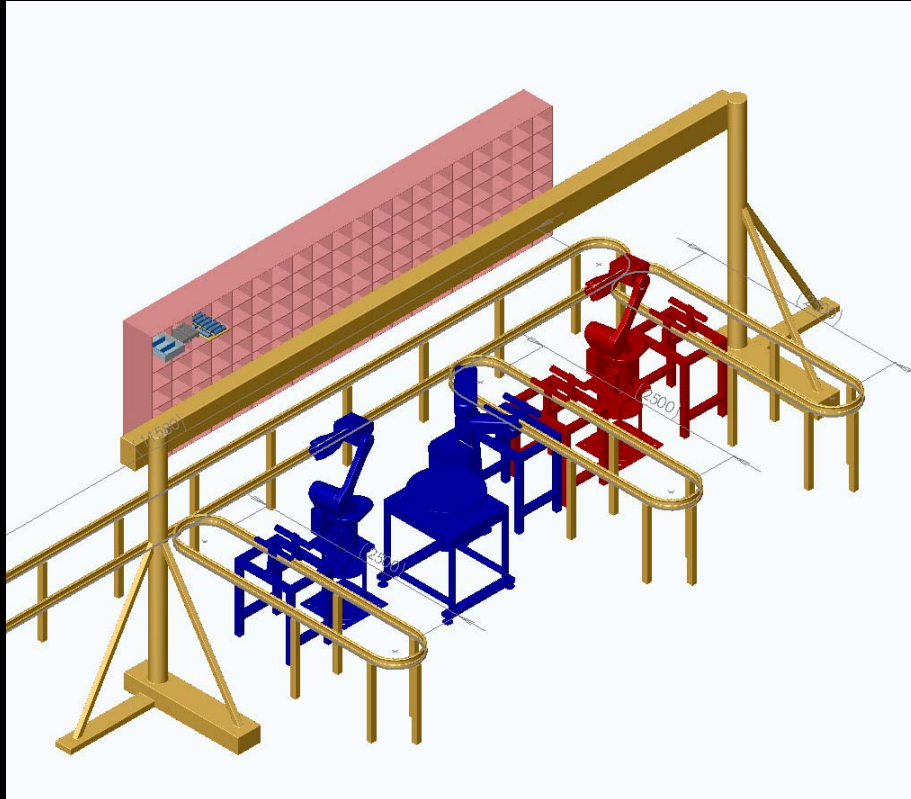


FLEXIBLE RESOURCE (LOCATION INFORMATION)





MINI SUPPLY CHAIN (OPTION 1)



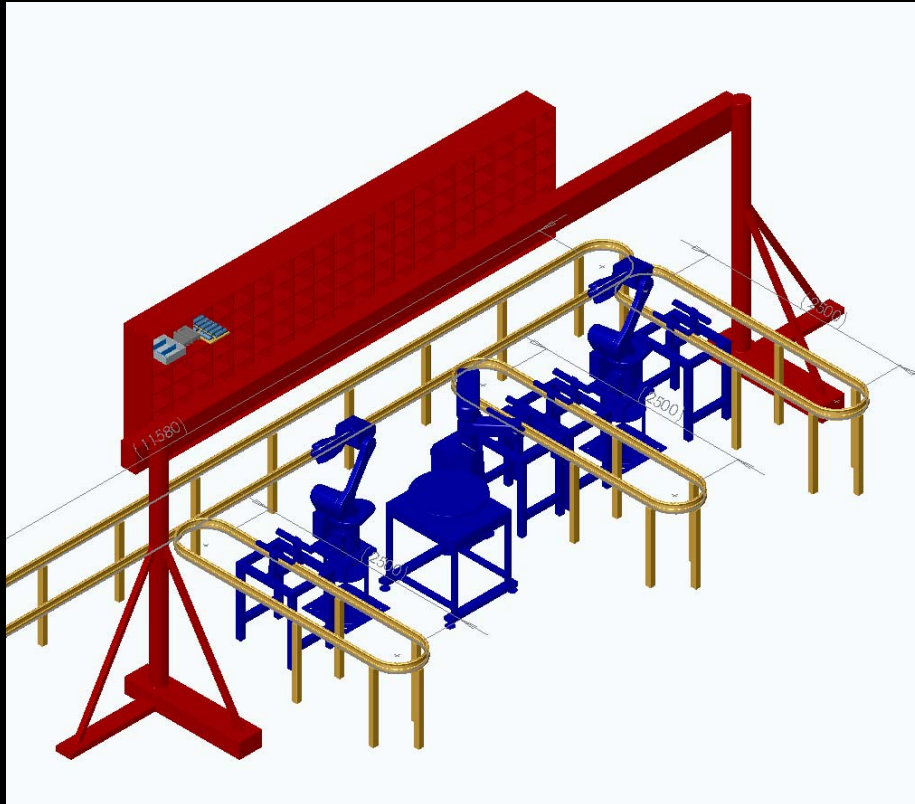
Extend operation to
'multiple organisations'

Different control systems
Different BIS

Packaging Facility (Red)
Assembly Facility (Blue)



MINI SUPPLY CHAIN (OPTION 2)



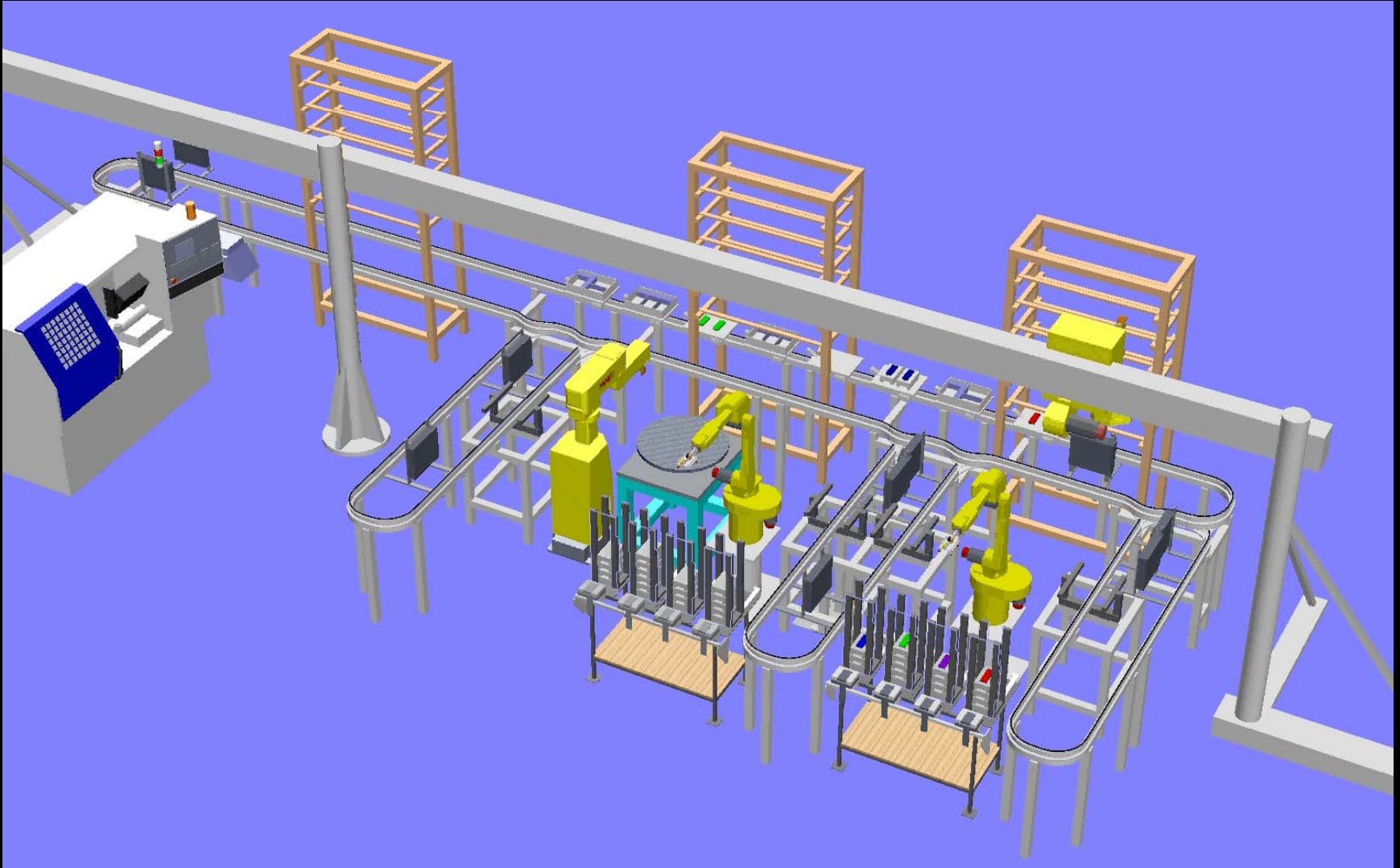
Extend operation to
'multiple organisations'

Different control systems
Different BIS

Storage Company (Red)
Manufacturing facility (Blue)



FUTURE SYSTEM





FUTURE

- Facility available for Auto-ID evaluation and prototyping
- Demo days, awareness evenings, workshops
- Sponsor systems under evaluation
Sun, Invensys
- Come and work with us!