1. Project Overview

WSU Tech is soliciting fixed-price proposals for the design, build, integration, installation, and commissioning of an automated robotic cell capable of receiving, identifying, warehousing, inventorying, picking, packing, and shipping individual parts.

The cell shall accept individual parts from an operator via a safe-access parts window, as well as palletized orders delivered by autonomous mobile robot (AMR). Parts are identified (AI vision), warehoused, and inventoried upon receipt. Parts can subsequently be picked, loaded into boxes, and shipped out via AMR. Defective parts are staged and shipped to rework via a dedicated AMR order.

The cell is built around **two FANUC M-20iB/25 robots, each on a 3-meter Gudel 7th-axis rails**, operating in a caged cell of approximately **16 ft × 16 ft** (see Attachment A — Cell Layout Drawing).

2. Scope of Supply

The successful bidder (the "Integrator") shall provide a turnkey system including, at minimum:

1. All mechanical design, electrical design, controls design, and safety design of the cell
2. Supply of all equipment listed in Section 4, except where noted as Owner-furnished
3. Fabrication of custom end-of-arm tooling (EOAT) with integrated vision
4. Cell guarding/fencing, access doors, parts window assembly, and all safety devices
5. All robot, PLC, HMI, vision, and AMR fleet programming required to execute the workflows in Section 5
6. Inventory tracking/warehouse logic (part ID database, storage location management)
7. Installation, integration, and commissioning at the Owner's facility
8. Factory Acceptance Test (FAT) and Site Acceptance Test (SAT)
9. Documentation, training, and warranty per Sections 8–10

Owner-furnished items, facility utilities, floor preparation, and network infrastructure boundaries: TBD — bidders shall state assumptions and exclusions explicitly.

3. Cell Layout & Dimensional Requirements
Reference Attachment A. All dimensions are approximate unless noted; final layout is subject to design review approval.

- **Cell footprint:** approximately 16 ft × 16 ft, fully caged
- **Robot tracks:** two parallel 3 m rails (Robot A north side, Robot B south side), each mounted on **2 ft risers** (floor to bottom of rail)
- **Rotary table:** 3 ft diameter (3–4 ft acceptable), centered between the two robot tracks, with **24 in. minimum clearance** from the rotary table edge to each robot track
- **Box conveyor:** runs along the east wall between the two tracks, approximately **20 in. wide (18–24 in. acceptable); must accommodate the specified boxes**. Wall/window clearance of approximately 18–20 in. Conveyor is **split into two independently controlled sections** at the parts window area. Conveyor butts up to (or nearly to) the window/wall
- **Maintenance walkway:** clear walkway alongside the conveyor run; 18 in. minimum clearance maintained between Robot B track and adjacent equipment
- **Inbound area (northwest):** AMR stand / inbound pallet position with light-curtain-protected opening in the west cage wall for AMR-with-cart entry
- **Outbound area (southwest):** AMR stand / outbound pallet position with light-curtain-protected opening in the west cage wall
- **Unpack/pack (load/unload) table:** 18 in. × 5 ft, north wall, for unloading parts from boxes or loading parts into boxes
- **Box storage table:** adjacent to the unpack/pack table, north wall, holding a stack of empty boxes
- **Parts shelves:** south wall, for storage of individual parts; diversity of bin sizes for a diversity of parts (from CNC chess pieces at the small end to soup cans/bottles at the large end). Example basis of design: Uline H-3128BLU slanted wire shelving with 18 × 11 × 10 in. bins
- **Parts window:** southeast corner, operator-facing pass-through (see Sections 4.9 and 5.3)
- **Defect staging table:** 18–24 in. × 36–48 in., west-center of cell, near outbound
- **Robot controller placement:** south wall, inside the cell; **teach pendant accessible from outside the cell**
- **Personnel access doors:** two — one in the west cage wall, one at the northeast corner
- **All connection to equipment connection to electrical, pneumatic, ethernet and/or wifi should be included in the quote.** Location of access and connections can be provided upon request.

3.1 Working-Plane Constraint (Mandatory)
The base of all objects inside the cell shall be **≥ 2 ft (24 in.) above the floor** to preserve sight lines for under-equipment safety area scanners. This applies to, at minimum: the rotary table underside, both rail undersides, all packing/staging table undersides, and the conveyor underside.

4. Major Equipment Specifications

#	Item	Specification	Qty
4.1	Robots	FANUC M-20iB/25-**ROBOTS WILL BE PROVIDED**	2
4.2	7th axis	Güdel 3 m rail, each on 2 ft risers-**RAILS AND RISERS WILL BE PROVIDED**	2
4.3	PLC	Allen-Bradley GuardLogix (safety-rated)	1
4.4	Safety area scanners	Keyence; 1–2 interior (safe-resume verification after maintenance entry), 1–2 exterior (slow-down boundary near cage)	4
4.5	Door/window safety	Rockwell GuardLink safety latches on all cage access doors and the parts window door	lot
4.6	Status indication	GuardLink light stacks	lot
4.7	Light curtains	Keyence, with LED break-point indicators, at both AMR openings	2 sets
4.8	AMR	**OTTO 600 with liftable carts (preferred)**; OTTO 100 with liftable carts as alternate. 2–4 carts. ***Detailed product documentation must accompany quote***	1 AMR, 2–4 carts
4.9	Parts window	"Double-door" style interlocked box with AI camera for part identification and a powered feed conveyor delivering parts out of the box toward Robot B	1
4.10	EOAT	Custom end-of-arm tooling with integrated vision, capable of handling the full part and box range	2
4.11	Box conveyor	~20 in. wide, two independently controlled sections, sized for specified boxes	1
4.12	Rotary table	3 ft diameter (3–4 ft acceptable); textured rubber/silicone (or equivalent) top surface so parts stay in place during indexing	1
4.13	Boxes/totes	Stackable straight-wall plastic totes, approx. 18 × 24 in. footprint, 6–10 in. height. Example basis of design: Uline S-19509BLU (24 × 15 × 7½ in.)	lot
4.14	Parts shelving	Slanted wire shelving with removable bins, mixed bin sizes. Example basis of design: Uline H-3128BLU	lot
4.15	Tables	Unpack/pack table 18 in. × 5 ft; box storage table; defect staging table 18–24 in. × 36–48 in. All with ≥24 in. underside clearance	3

Named makes/models establish the basis of design. Substitutions may be proposed as clearly identified alternates with justification, but Allen-Bradley/Keyence/OTTO platform reflects Owner standardization and is strongly preferred.

5. Functional Requirements — Cell Workflows

5.1 Receiving (AMR inbound)

1. AMR mutes the inbound light curtain and drops off a cart with box(es) at the inbound stand
2. Robot A de-palletizes: moves boxes from the cart to the unpack/pack table
3. Robot A places individual parts on the rotary table for handoff and places emptied boxes in box storage
4. Robot B picks parts from the rotary table and sorts them into the correct parts bins; each part is identified and inventoried

5.2 Outbound (order fulfillment)

1. Robot B picks ordered parts from shelving and hands off via the rotary table
2. Robot A retrieves an empty box and the parts, and fills the box at the load table
3. Robot A hands the packed box to Robot B via the box conveyor
4. Robot B picks the box from the conveyor and stacks it on the AMR cart at the outbound stand
5. AMR mutes the outbound light curtain and picks up the cart when ready

5.3 Operator part addition (parts window)

1. Operator presses the unlock button/HMI at the window; the cell reaches a safe state before unlocking
2. Robot B stops any work near the window and reduces speed; the window conveyor section stops
3. Operator places part(s) in the window and presses the lock button/HMI
4. Window shuts and locks; cell resumes full-speed operation
5. AI camera scans and identifies the part(s)
6. Window conveyor feeds parts out of the window box toward Robot B
7. Robot B sorts the parts into storage; inventory is updated

5.4 Defect handling

1. Defective parts are stored on the defect staging table
2. A defect "order" loads defective parts onto an individual AMR cart for shipment to rework

5.5 Inventory & identification

- Every part entering the cell (AMR inbound or operator window) shall be identified by AI camera/vision and logged to inventory with its storage location
- The system shall support picking by part identity for outbound and defect orders

Throughput / cycle-time requirements: TBD. Bidders shall state the sustained parts-per-hour rate and inbound/outbound order cycle times their proposed system achieves.

6. Safety Requirements

1. The cell shall be designed to a documented risk assessment per ANSI/RIA R15.06 (and ISO 10218-2), with safety functions implemented in the GuardLogix safety PLC
2. **AMR openings:** light curtains with LED break indicators; muting only by authenticated AMR entry sequence
3. **Area scanners:** 1–2 interior scanners to verify the cell is clear before restart after any maintenance/personnel entry; 1–2 exterior scanners establishing a slow-down boundary around the cage exterior
4. **Access doors and parts window:** GuardLink-interlocked safety latches; the parts window shall follow the safe unlock/lock sequence defined in Section 5.3
5. **Status visibility:** GuardLink light stacks indicating cell state (running, safe/unlocked, faulted)
6. **Working plane:** the ≥24 in. under-equipment clearance of Section 3.1 shall be maintained so floor-level scanner coverage is unobstructed
7. Teach pendant shall be usable from outside the cage
8. Integrator shall supply the risk assessment, safety circuit drawings, and safety function validation records at SAT
9. Any emergency shutoffs should be provided.

7. Controls, HMI & Integration

- Allen-Bradley GuardLogix PLC as cell master; robot controllers, conveyor sections, rotary table, vision, window interlocks, and AMR call/muting logic integrated under PLC coordination
- Operator HMI providing, at minimum: window unlock/lock, cell start/stop/reset, fault display, and order initiation (inbound receipt, outbound order, defect order)
- Two conveyor sections independently controllable (window section stops during operator access)
- AMR fleet software integration for cart delivery/pickup calls and light-curtain muting handshakes
- Inventory database with part ID, storage bin location, and quantity; interface/export requirements **TBD**

8. Deliverables & Documentation

1. Mechanical layout and detail drawings (native CAD + PDF)
2. Electrical, pneumatic, and safety schematics
3. PLC, HMI, robot, and vision source programs with backups
4. Risk assessment and safety validation report
5. Bill of materials with spare parts recommendations
6. Operation and maintenance manuals
7. As-built documentation package at SAT completion
8. Any relevant data connection/collection information

9. Testing & Acceptance

- **FAT** at Integrator's facility demonstrating all Section 5 workflows prior to shipment
- **SAT** at Owner's site: sustained demonstration of receiving, outbound, operator window, and defect workflows, plus safety function verification (light curtain muting, scanner zones, window interlock sequence, e-stops)
- Acceptance criteria and demonstration durations: **TBD — to be finalized at design review**

10. Training & Warranty

- On-site operator and maintenance training (scope/hours: **TBD** — bidders shall propose)
- Minimum 12-month warranty on the integrated system from SAT acceptance; bidders shall state warranty terms and available service/support plans

11. Proposal Requirements

Each proposal shall include:

1. Firm fixed price, itemized by major subsystem (robots/rails, safety, conveyor/rotary, AMR & carts, EOAT/vision, controls, installation, training)
2. Project schedule from PO to SAT, with design review, FAT, and installation milestones
3. Preliminary cell layout confirming the Attachment A arrangement and Section 3 clearances
4. Description of EOAT concept and vision/part-ID approach
5. Stated throughput capability (Section 5 note)
6. Exceptions, exclusions, and assumptions — explicitly listed
7. Relevant experience: at least two comparable robotic integration references
8. Warranty and support terms

12. Open Items / Clarifications (to be resolved before final issue)

Item	Status
Throughput / cycle-time targets	TBD by Owner
Part weight range and full size envelope	TBD by Owner (payload within M-20iB/25 25 kg capacity incl. EOAT)
Facility utilities (power, compressed air), floor spec, network/IT	TBD by Owner
Owner-furnished vs. Integrator-furnished AMR and fleet software	TBD
Inventory system interface to Owner systems (ERP/WMS)	TBD
Proposal due date, project budget, and desired completion date	TBD
Rotary table final diameter (3 ft per drawing; 3–4 ft per narrative)	Confirm at design review

---

Work to take place at NCAT Expansion Building 400. 4004 N Webb Road, Wichita, KS 67226

Robotics Training Center =Room 144

Work to commence approximately mid-October, robots and rails may not be available and later coordination may take place.

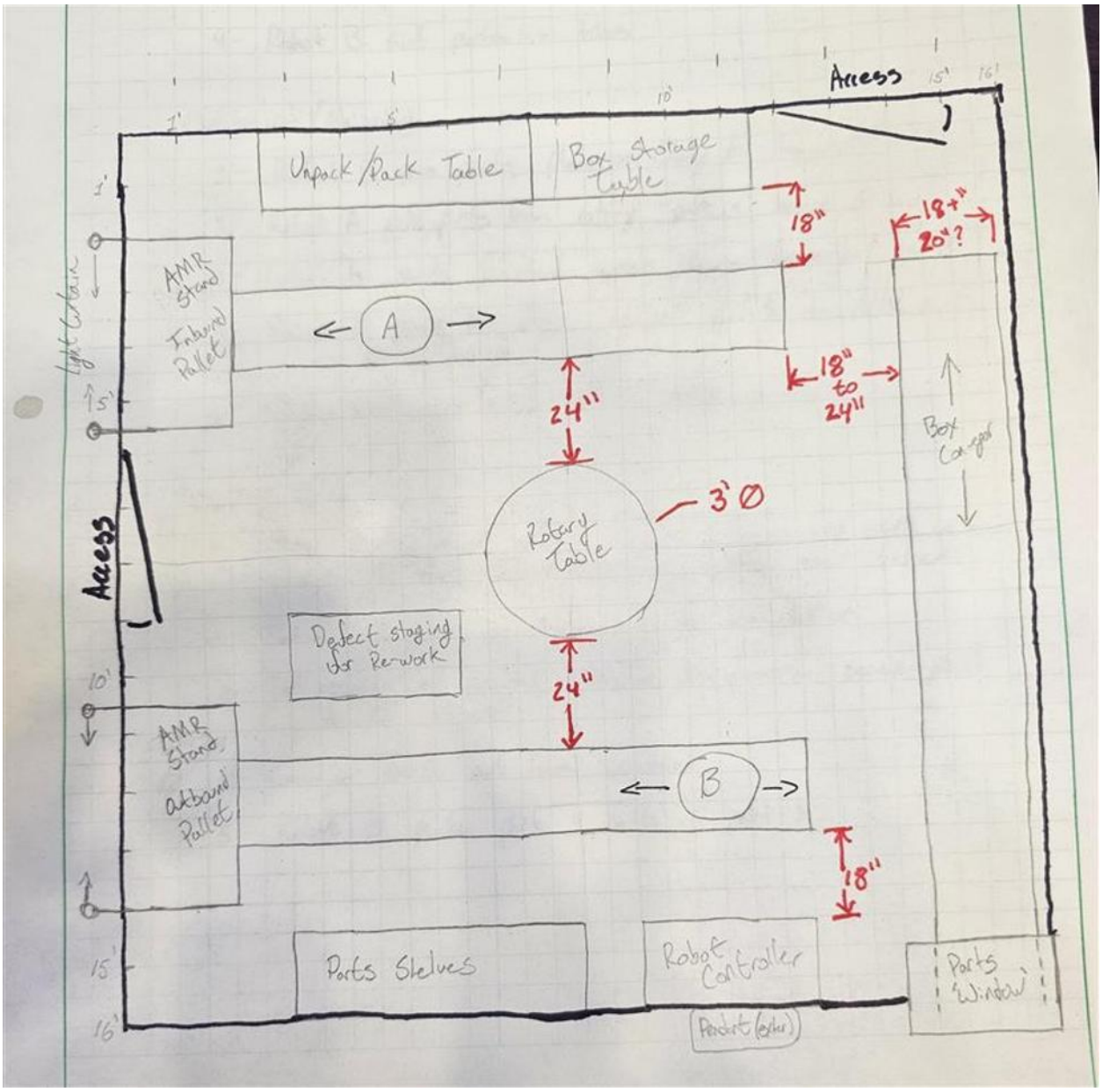
Loading dock access, work is on first floor with overhead door access, lab entrance is double 4-0 door

Work will need to be coordinated with General Contractor, Crossland Construction

Attendance of required safety briefing with GC may be required.

Attachment A — Cell Layout Drawing

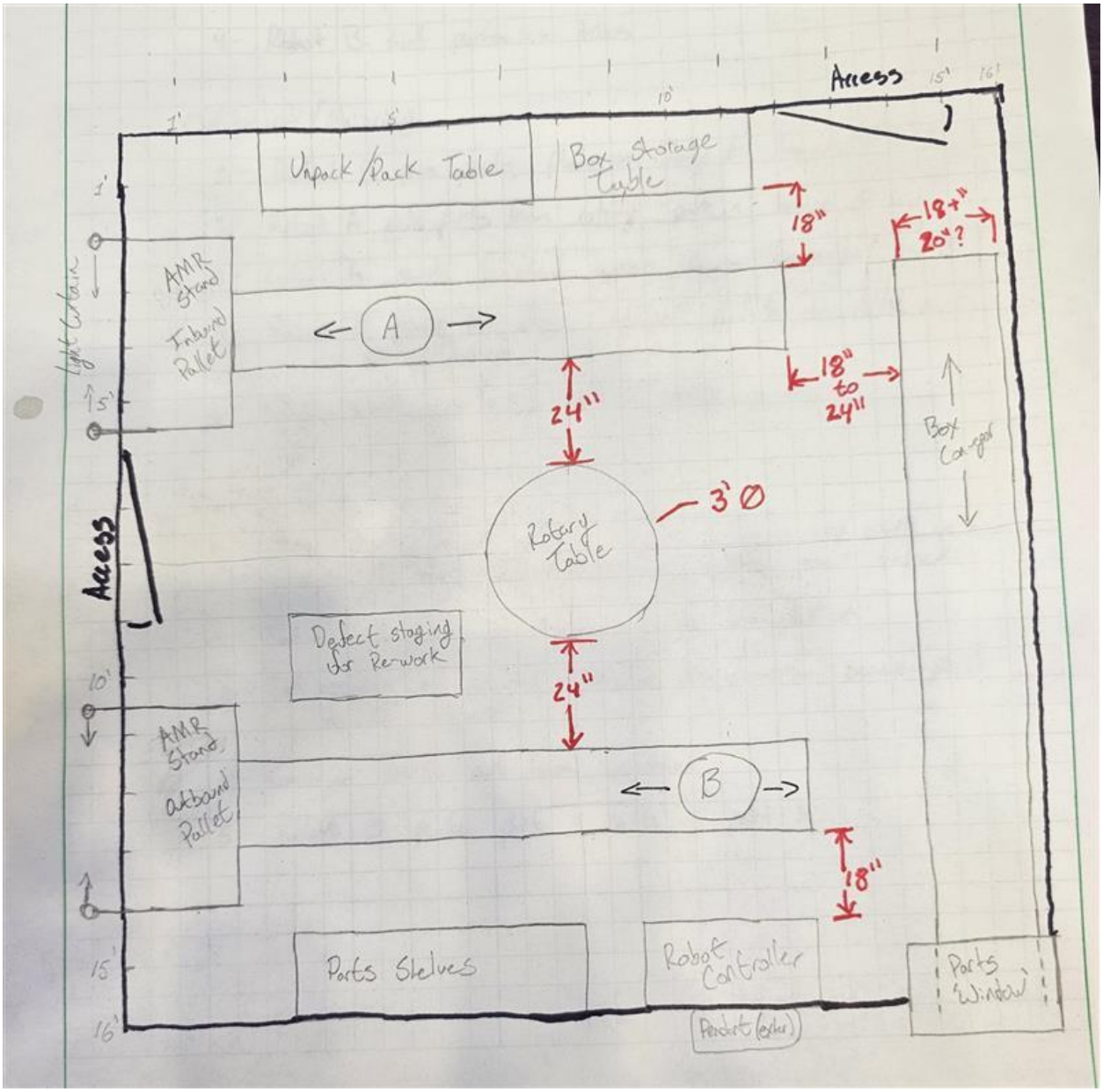
Plan view, ~16 ft × 16 ft cell. Robot A (north track) and Robot B (south track) on 3 m rails; 3 ft Ø rotary table centered with 24 in. clearance to each track; box conveyor along east wall (18–24 in. wide, two sections); parts window at southeast corner; inbound/outbound AMR stands with light curtains on west wall; unpack/pack and box storage tables on north wall; parts shelves and robot controller on south wall; defect staging west-center; personnel access doors at west wall and northeast corner; teach pendant external.


Access
Unpack/Pack Table
Box Storage Table
18"
18+"
20"?
AMR Stand
Inbound Pallet
A
18" to 24"
24"
Box Cargo
Rotary Table
3'Ø
Access
Defect staging for Re-work
24"
AMR Stand
Outbound Pallet
B
18"
Parts Shelves
Robot Controller
Pendant (other)
Parts 'Window'

Overview -

Robot cell capable of accepting individual parts via an operator, as well as palletized orders via AMR. Parts are ID'd, warehoused, and inventoried when received. Parts can be picked and loaded into boxes, then shipped out via AMR

Cell layout:



ITEM A and B on the Cell Layout drawing represent

Two 7-axis track robots (M-20iB/25) each with an inbound/outbound area on one end. Inbound/Outbound areas have opening for AMR w/ cart, light curtains control safety for entry.

~20 inch wide conveyor (must fit boxes) spans side between each track, with room for a maintenance walkway. Conveyors butts up to window/wall, or nearly. Conveyor split into two parts for window area to have individual control

Inbound side has 18”x5’ load/unload table for unloading parts from boxes or loading parts in. Additional table for stack of empty boxes. Boxes approximately 18”x24”, with 6”-10” in height. Stackable plastic totes likely best

- Example: https://www.uline.com/Product/Detail/S-19509BLU/Straight-Wall-Containers/Straight-Wall-Container-24-x-15-x-7-1-2-Blue?pricode=WB1250&gadtype=pla&id=S-19509BLU&ad_group_id=152409161979&gad_source=1&gad_campaignid=20438404205&gbraid=0AAAAD_uetMsAyTfhuPsmwe-k_LuSkS_D&gclid=Cj0KCQjwi8nRBhDhARIsAHZf_paMWVgFWDQBD3KchQ0d6wvTZLxtLuCVzWsuvbHARQMDr6MpDAN7JjYaAu6uEALw_wcB

-

Outbound side has part shelves for storing individual parts, diversity of sizes for a diversity of parts (ranging from CNC chess pieces at small side, soup cans or bottles on large end)

- Example https://www.uline.com/Product/Detail/H-3128BLU/Chrome-Wire-Shelving/Slanted-Wire-Shelving-with-18-x-11-x-10-Blue-Bins?pricode=WA9520&gadtype=pla&id=H-3128BLU&ad_group_id=174447361578&gad_source=1&gad_campaignid=2137821

6891&gbraid=0AAAAAD_uetOSXhs6o96oJ7DB52xTAlHQK&gclid=Cj0KCQjwi8nRBhDhARIsAHZf_pbKvy7An7sCxyw-f5DNDjiCabidtIEbyqNzuToWvqGc-tOdtViFN_UaAhE2EALw_wcB

- 

3ft to 4ft rotary table between robot tracks for passing individual parts between robots. Textured rubber/silicone/etc top for parts to stay in place.

Parts window on outbound side, an operator can load individual parts into the system via window. “double door” style box with an AI camera to ID part, conveyor to feed out toward robot

18-24" x 36-48" table for defect staging near outbound

Cell Workflow:

Receiving

1. AMR mutes inbound light curtain, drop off cart w/ box(es)
2. Robot A un-pallet, move boxes to unload
3. Robot A places parts on Rotary for handoff, places empty boxes in box storage
4. Robot B picks parts from rotary table, sorts to parts bins

Outbound

1. Robot B picks parts, handoff via rotary table
2. Robot A grabs empty box and parts, fills at load table
3. Robot A handoff box via conveyor belt to B
4. Robot B picks box from conveyor, stacks on AMR card in outbound
5. AMR mutes lightcurtain and picks cart when ready

Operator add parts

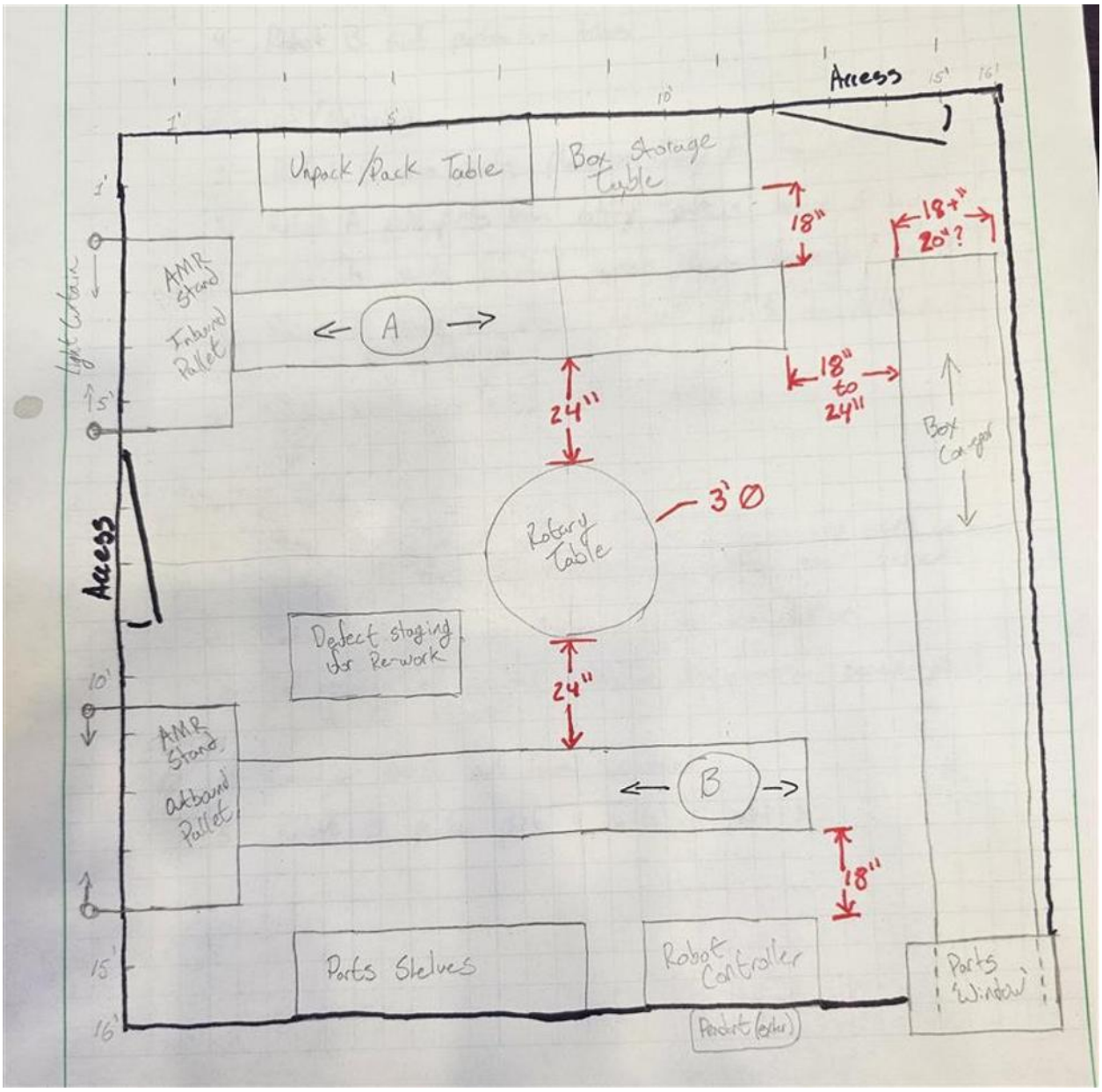
1. Press unlock button/HMI at window, cell becomes safe before unlocking
    a. Robot B stops any work near window, slows speed, window conveyor stops
2. Operator places part(s) in window, press lock button/HMI
3. Window shuts and locks, cell resumes at full speed
4. AI camera scans part(s) for ID
5. Window conveyor feeds out of box
6. Robot B sorts parts into storage

Defects

1. Defect parts stored on table
2. Defect ‘order’ loads parts onto individual AMR cart, ship out to “rework”

Specific parts:

- Robots: FANUC M-20*i*B/25
- 7th-axis: Gudel 3meter rail
    - 2ft risers for floor to bottom of rail
- PLC: Allen Bradley GuardLogix
- Safety
    - Area Scanners: 4x Keyence, 1-2 scanners inside for resume safety after maintenance, 1-2 external for slowdown boundary near cage
    - Guardlink safety latches for access doors to cage, window door
    - Guardlink lightstacks
    - Lightcurtains: Keyence, with LED break indicators
- AMR: OTTO 100 w/ liftable carts or OTTO 600 w/ liftable carts
    - 2 - 4 carts
    - OTTO 600 preferred
- Custom EOA Tooling w/ vision
- Working plane
    - The base of all objects must be >=2ft from the floor, for working with under-equipment area scanners
        - Rotary table underside
        - Rails undersides
        - Packing/staging tables undersides
        - Conveyor underside


Access
Unpack/Pack Table
Box Storage Table
18"
18+"
20"?
AMR Stand
Inbound Pallet
A
18" to 24"
24"
Box Cargo
Rotary Table
3'Ø
Access
Defect staging for Re-work
24"
AMR Stand
Outbound Pallet
B
18"
Parts Shelves
Robot Controller
Pendant (other)
Parts 'Window'