A PRACTICAL AUTOMATION CHECKLIST FOR FIXED AND FLEXIBLE BIN ENVIRONMENTS (PAGE 1/2)

The bin is part of the automated system. This checklist can help you assess whether your bin strategy is enabling or limiting your automation goals.

BIN ENVIRONMENT

- [ ] Fixed bins (must use existing totes)
- [ ] Flexible bins (redesign possible)

PART STRATEGY

- [ ] Single variant
- [ ] Mixed variants (future-proofing required)

PRIMARY OBJECTIVE (RANK 1-3)

- [ ] Throughput
- [ ] Reliability / Uptime
- [ ] Downstream placement accuracy

IF YOUR BINS ARE FIXED

Optimize Within the Constraint

1) Visibility & Reach Tuning

- [ ] Confirm robot reach at worst-case fill levels
- [ ] Validate safe robot approach angles across the full usable pick zone
- [ ] Adjust camera position to reduce “tunnel vision” at depth
- [ ] Improve lighting to reduce shadow zones near walls

2) Scene Refresh Strategy

A defined refresh strategy often separates stable cells from fragile ones.

- [ ] Define refresh method (shake, tilt, rake, re-bin, vibrate)
- [ ] Validate refresh improves presentation (not re-traps parts)
- [ ] Establish refresh trigger thresholds
- [ ] Test refresh at low and high fill conditions

3) Gripper Strategy & Zone Logic

- [ ] Ensure clearance near sidewalls
- [ ] Reduce drag/double-pick near bin lip
- [ ] Adjust compliance for constrained zones
- [ ] Define zone-based pick logic (top layer vs bottom layer strategy)

4) Bin Condition & Maintenance

- [ ] Remove damaged bins from circulation
- [ ] Monitor interior wear affecting reflectivity or snagging
- [ ] Standardize bin orientation within the cell (consider pins or guides)
- [ ] Implement cleaning schedule (dust, oil, debris)

IF BIN REDESIGN IS POSSIBLE

Consider Performance Multipliers

1) Slightly Sloped Sidewalls

Reduce traps, improve recovery.

- [ ] Reduce corner traps (creates obtuse angles at lower layers)
- [ ] Improve scene refreshing
- [ ] Increase pick success at lower fill levels

2) Prioritize Usable Pickable Surface Area Over Maximum Depth

Deep bins often shift the bottleneck from vision performance to robot reach.

- [ ] Prevent robot reach from becoming the bottleneck
- [ ] Improve approach consistency
- [ ] Reduce deep-zone failures

3) Eliminate Dead Zones

- [ ] Avoid internal ribs or ledges
- [ ] Minimize unreachable pockets
- [ ] Simplify interior geometry and avoid acute angles

4) Vision-Stable Interior Design

- [ ] Maintain consistent rim profile
- [ ] Control interior finish
- [ ] Consider matte interior surfaces for containing shiny, reflective, or dark parts

A PRACTICAL AUTOMATION CHECKLIST FOR FIXED AND FLEXIBLE BIN ENVIRONMENTS (PAGE 2/2)

Automation must survive real production variability, not just controlled demo conditions.

DESIGN FOR PLANT REALITY

- [ ] Ergonomics (weight when full, handling points)
- [ ] Stackable for storage
- [ ] Repeatable changeover and locating features
- [ ] Cleaning practicality
- [ ] Standardization across stations

VALIDATE UNDER PRODUCTION CONDITIONS

Test before deployment:

- [ ] Worst-case fill levels (consider overfilled and nearly empty)
- [ ] Real part conditions (oil, dust, acceptable variation)
- [ ] Measure and define required throughput, pick success rate, and exception rate
- [ ] Capture top 3 failure modes
- [ ] Define corrective strategy for each before scaling

QUICK SELF-ASSESSMENT

Select all that apply to you:

- [ ] We are currently evaluating bin picking
- [ ] We are locked into OEM totes
- [ ] We can redesign bins if needed
- [ ] We have not validated worst-case fill levels
- [ ] We do not have a defined refresh strategy
- [ ] We have not documented our top 3 failure modes
- [ ] Quality inspection is still manual at the bin

If you checked two or more, your project likely contains hidden stability risk.

If you can only adjust two things:

IF YOUR BINS ARE FIXED

1. Standardize bin condition and orientation
2. Define and validate a repeatable refresh strategy

IF BIN REDESIGN IS POSSIBLE

1. Slightly slope the bin walls
2. Increase usable pickable surface area

The bin is not just a container, it is part of the automation architecture.

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