



How to use:

This tool looks at many of automation tools that receive considerable media attention, and helps you cut through the hype.

1. 13 Tool cards for details.

The cards below provide explanation and details for each tool, and let you assess whether or not it might be useful and realistic for your specific situation.

For any tool of interest, tick its Go triggers and Stop rules.

- ▶ If no Stop rules and ≥ 2 Go triggers are ticked, consider a pilot.
- ▶ If any Stop rule is ticked → Park. Consider the Prep step(s) first.
- ▶ Or, it may be better to look for alternatives, check the tool cards below for a “Better starting point”.

2. Quick 1-page screener

Get an immediate overview of your options.

1. Plant-wide digital twins

What it is: Whole-site 3D plus live-data models.

Purpose: Model operations to test scenarios, de-risk changes, and align decisions.

Use when: When you already model a few flows and can keep models current.

Go triggers (tick ≥ 2):

- ☐ Using flow sim on key lines
- ☐ Stable routings/CTs + owner

Stop rules (any = Park):

- ☐ No capacity to keep model current
- ☐ No integration path

Prep steps (if Park): Start bottleneck flow sim; agree model governance

Minimum pre-reqs:

- ☐ Stable routings & cycle times
- ☐ Named model owner & refresh cadence
- ☐ Live-data interface defined
- ☐ Change control in place

Common failure modes:

- ▶ Stale models
- ▶ Scope creep & high upkeep cost

Better starting point: Bottleneck flow simulation + VSM with measured CTs.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked and no safety/compliance blocker.

Owner: Process engineering | **Effort:** High



2. Black-box AI planners

What it is: Automatic schedules from opaque models.

Purpose: Generate feasible schedules to improve adherence and reduce expediting.

Use when: When routings and times are accurate and one owner maintains master data.

Go triggers (tick ≥ 2):

- ☐ Accurate routings & times
- ☐ Clean constraints/calendars
- ☐ Objective hierarchy agreed (service, x/overs, WIP)

Stop rules (any = Park):

- ☐ Messy/stale data
- ☐ No planning rulebook/ownership

Prep steps (if Park): Clean master data; adopt transparent APS first

Minimum pre-reqs:

- ☐ Accurate routings & times
- ☐ Constraint list and calendars
- ☐ Freeze horizons & override policy defined
- ☐ Clear rulebook & KPIs

Common failure modes:

- ▶ 'Black box' gaming
- ▶ Stale inputs

Better starting point: Transparent APS with visible rules; layer learning later.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked.

Owner: Planning | **Effort:** Medium

3. Heavy custom MES/ERP

What it is: Large bespoke builds mirroring today's quirks.

Purpose: Standardize execution, compliance, and traceability across operations.

Use when: When processes are standardized and standard modules cover most needs.

Go triggers (tick ≥ 2):

- ☐ Processes standardized ($\geq 80\%$)
- ☐ Standard modules fit most needs
- ☐ Fit-to-standard policy signed

Stop rules (any = Park):

- ☐ Processes vary by site
- ☐ No API/integration strategy

Prep steps (if Park): Harmonize processes; fit-gap on standard modules

Minimum pre-reqs:

- ☐ Standardized processes
- ☐ Fit-gap documented
- ☐ Open interfaces available, API strategy in place
- ☐ Change control & versioning

Common failure modes:

- ▶ Vendor lock-in
- ▶ Expensive upgrades

Better starting point: Use standard modules with small extensions and open APIs.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked.

Owner: IT + Operations | **Effort:** High



4. Fully autonomous AMR fleets (messy sites)

What it is: Dozens of robots with dynamic routing.

Purpose: Automate internal transport to cut touches, travel, and cycle time.

Use when: When aisles are 5S, traffic rules exist, and pick/put points are defined.

Go triggers (tick ≥ 2):

- ☐ 5S aisles/markers
- ☐ Traffic rules tested
- ☐ Pick/put points defined

Stop rules (any = Park):

- ☐ Frequent ad-hoc exceptions
- ☐ No manual workaround

Prep steps (if Park): Pilot one lane/loop; markers; exception SOPs

Minimum pre-reqs:

- ☐ Clear traffic rules & markers
- ☐ Defined pick/put points
- ☐ Throughput & traffic simulation completed
- ☐ WMS handshake tested

Common failure modes:

- ▶ Aisle clutter
- ▶ Exception handling chaos

Better starting point: Start with one lane/loop or disciplined tuggers; then expand.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked and safety hazards addressed.

Owner: Logistics engineering | **Effort:** High

5. Advanced shuttle AS/RS (volatile SKUs)

What it is: High-density automated storage with shuttles/lifts.

Purpose: Densify storage and speed retrieval in high-volume, stable mixes.

Use when: When SKU mix and volumes are stable with clear storage logic.

Go triggers (tick ≥ 2):

- ☐ Stable SKU mix/velocity
- ☐ Density economics work
- ☐ Recovery plan defined

Stop rules (any = Park):

- ☐ Volatile/seasonal mix
- ☐ Shaky WMS slotting

Prep steps (if Park): Improve slotting; VLMs; selective AS/RS zone

Minimum pre-reqs:

- ☐ Stable mix & velocity
- ☐ Recovery plan for outages
- ☐ WMS slotting logic
- ☐ Service & spares defined

Common failure modes:

- ▶ Idle/blocked on mix swings
- ▶ Tight coupling failures

Better starting point: Slotting + simple densification; VLMs for small parts; selective AS/RS in one zone.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked.

Owner: Warehouse engineering | **Effort:** High



6. Deep-learning vision everywhere

What it is: Neural nets for inspection in all stations.

Purpose: Detect defects automatically at speed where patterns vary.

Use when: When presentation is controlled and you can maintain datasets/models.

Go triggers (tick ≥ 2):

- ☐ Controlled lighting/presentation
- ☐ Labeled good/bad sets
- ☐ GR&R capability proven

Stop rules (any = Park):

- ☐ Variable lighting/fixturing
- ☐ Few labeled defects

Prep steps (if Park): Pilot rule-based vision; build image library

Minimum pre-reqs:

- ☐ Controlled lighting/background
- ☐ Curated good/bad image sets
- ☐ Label quality reviewed
- ☐ Fixture/gauge stability

Common failure modes:

- ▶ Sample bias
- ▶ Model drift
- ▶ Bottlenecks shift to handoff points

Better starting point: Rule-based vision or gauges where possible; targeted DL where it wins.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked.

Owner: Quality engineering | **Effort:** Medium

7. Private 5G (single small site)

What it is: Dedicated cellular network for the plant.

Purpose: Provide deterministic wireless for critical mobile devices/workcells.

Use when: When many mobile devices need low latency/QoS or strict isolation.

Go triggers (tick ≥ 2):

- ☐ Many devices need QoS/latency
- ☐ Security isolation required
- ☐ Wi-Fi saturated

Stop rules (any = Park):

- ☐ Wi-Fi 6 can meet needs
- ☐ No isolation requirement

Prep steps (if Park): RF survey; harden Wi-Fi (coverage/roaming/segmentation)

Minimum pre-reqs:

- ☐ RF survey complete
- ☐ Device inventory & profiles
- ☐ Security policies set
- ☐ Operational need beyond Wi-Fi 6
- ☐ On-site spectrum/licensing feasibility done.

Common failure modes:

- ▶ Overkill vs Wi-Fi
- ▶ Complex upkeep

Better starting point: Harden Wi-Fi (segmentation, roaming, coverage) before 5G.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked.

Owner: IT/OT networking | **Effort:** Medium



8. Blockchain traceability

What it is: Shared, immutable ledger across partners.

Purpose: Provide shared, tamper-evident chain-of-custody across partners.

Use when: When many parties agree to one ledger and regulation demands it.

Go triggers (tick ≥ 2):

- ☐ Regulated chain
- ☐ Multi-party agreement
- ☐ Customer/auditor mandate for shared ledger

Stop rules (any = Park):

- ☐ Partners unwilling
- ☐ Low added value vs EDI

Prep steps (if Park): Strengthen MES/WMS lot trace; standardize ASNs

Minimum pre-reqs:

- ☐ Consortium agreement
- ☐ Data standards & mappings ready
- ☐ Onboarding plan
- ☐ Legal/compliance cleared

Common failure modes:

- ▶ High coordination cost
- ▶ Unclear added value
- ▶ Governance drift across partners

Better starting point: Strong internal lot traceability in MES/WMS + clean ASNs.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked.

Owner: Supply chain | **Effort:** Medium

9. RPA for core operations pain

Purpose: Automate repetitive clerical tasks and bridge system gaps.

What it is: Bots mimicking clicks for workflows.

Use when: When clerical tasks are stable and high volume.

Go triggers (tick ≥ 2):

- ☐ Stable high-volume tasks
- ☐ Exception path documented
- ☐ No feasible API/system integration in near term

Stop rules (any = Park):

- ☐ Frequent format changes
- ☐ Underlying process debt

Prep steps (if Park): Fix process or integrate systems; keep RPA back-office

Minimum pre-reqs:

- ☐ Stable forms & formats
- ☐ Exception path documented
- ☐ Bot monitoring/alerts
- ☐ Source UIs stable or release-managed

Common failure modes:

- ▶ Bots break on format change
- ▶ Hidden process debt

Better starting point: Fix process or integrate systems; use RPA for back-office only.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked.

Owner: Process/IT automation | **Effort:** Low–Medium



10. Lights-out cells (high-mix, low-vol)

Purpose: Run unattended production with minimal labor on narrow product sets.

What it is: Unstaffed automated cells across many SKUs.

Use when: When one family runs with steady demand and fast changeovers.

Go triggers (tick ≥ 2):

- ☐ One family steady demand
- ☐ Quick-change fixtures proven
- ☐ Stable presentation

Stop rules (any = Park):

- ☐ High mix/unpredictable demand
- ☐ Long changeovers
- ☐ No remote alarm/telemetry response plan

Prep steps (if Park): Semi-automation with fixtures; staff exceptions

Minimum pre-reqs:

- ☐ Robust quick-change fixtures
- ☐ Stable presentation/tolerances
- ☐ Fallback manual mode
- ☐ Run-off test plan

Common failure modes:

- ▶ Changeover/tuning overhead
- ▶ Unplanned downtime

Better starting point: Semi-automation with good fixtures; staffed exceptions.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked.

Owner: Manufacturing engineering | **Effort:** High

11. AR/VR everywhere

Purpose: Guide complex, infrequent tasks and enable remote assistance.

What it is: Headsets or overlays for daily guidance.

Use when: When tasks are complex and infrequent, or remote support is needed.

Go triggers (tick ≥ 2):

- ☐ Complex, infrequent tasks
- ☐ Remote support needed
- ☐ Content modular & version-controlled

Stop rules (any = Park):

- ☐ Daily work faster with visual SOP
- ☐ No content owner/cadence

Prep steps (if Park): Build strong visual SOP; target AR to clear wins

Minimum pre-reqs:

- ☐ Usable with PPE/gloves
- ☐ Content owner & cadence
- ☐ Battery/charging plan
- ☐ Coverage survey (Wi-Fi/BT)
- ☐ Field tests with PPE/gloves passed

Common failure modes:

- ▶ Slower than clear visual SOP
- ▶ Battery/UX issues

Better starting point: High-quality visual SOP first; then AR where it beats it.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked.

Owner: Ops training | **Effort:** Low-Medium



12. Predict-everything maintenance platforms

Purpose: Predict failures across assets to cut unplanned downtime.

What it is: One platform claims to predict all failures.

Use when: When failure modes are known with good sensors and labeled history.

Go triggers (tick ≥ 2):

- ☐ Known failure modes
- ☐ Good sensors
- ☐ Labeled history + CMMS link

Stop rules (any = Park):

- ☐ Poor signal quality
- ☐ No response discipline
- ☐ Alert-to-WO conversion stalls

Prep steps (if Park): Start CBM checks tied to actions; expand selectively

Minimum pre-reqs:

- ☐ Mapped failure modes
- ☐ Good sensor coverage
- ☐ Labeled event history
- ☐ Response SOP & CMMS link

Common failure modes:

- ▶ Alert noise
- ▶ Model drift

Better starting point: Start with a few CBM checks tied to actions; expand selectively.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked.

Owner: Maintenance/reliability | **Effort:** Medium

13. Data lake first programs

Purpose: Enable cross-functional analytics by centralizing data (when use-cases exist).

What it is: Centralized data store before clear use cases.

Use when: When several ready use cases will consume shared data immediately.

Go triggers (tick ≥ 2):

- ☐ Multiple ready use-cases
- ☐ Data contracts/governance
- ☐ Named product owner+team for first 2 use-cases

Stop rules (any = Park):

- ☐ No owned use-cases
- ☐ Unclear costs/ownership

Prep steps (if Park): Deliver problem-tied datasets; integrate later

Minimum pre-reqs:

- ☐ Use-case backlog owned
- ☐ Data contracts & quality roles
- ☐ Cost model for storage/egress
- ☐ Security/governance defined
- ☐ Cost model for storage/egress

Common failure modes:

- ▶ Cost before value
- ▶ No owner

Better starting point: Build small, problem-tied datasets with one owner each; connect later.

Go/No-Go: Go if $\geq 3/4$ pre-reqs ticked.

Owner: Data/IT with Ops | **Effort:** Medium–High



Quick Screener — tool-specific gates

Tool	Go triggers (tick ≥2)	Stop rules (any = Park)	Prep steps (if Park)
Plant-wide digital twins	<input type="checkbox"/> Using flow sim on key lines <input type="checkbox"/> Stable routings + named owner <input type="checkbox"/> Live-data interface defined	<input type="checkbox"/> No capacity to keep model current <input type="checkbox"/> No integration path	Start bottleneck flow sim; agree model governance
Black-box AI planners	<input type="checkbox"/> Accurate routings & times <input type="checkbox"/> Clean constraints/calendars <input type="checkbox"/> One owner for master data	<input type="checkbox"/> Messy/stale data <input type="checkbox"/> No planning rulebook/ownership	Clean master data; adopt transparent APS first
Heavy custom MES/ERP	<input type="checkbox"/> Processes standardized, ≥80% <input type="checkbox"/> Standard modules fit most needs <input type="checkbox"/> API strategy in place	<input type="checkbox"/> Processes vary by site <input type="checkbox"/> No API/integration strategy	Harmonize processes; fit-gap on standard modules
Fully autonomous AMR fleets	<input type="checkbox"/> 5S aisles/markers <input type="checkbox"/> Traffic rules tested <input type="checkbox"/> Pick/put points defined	<input type="checkbox"/> Frequent ad-hoc exceptions <input type="checkbox"/> No manual workaround	Pilot one lane/loop; markers; exception SOPs
Advanced shuttle AS/RS (volatile SKUs)	<input type="checkbox"/> Stable SKU mix/velocity <input type="checkbox"/> Density economics work <input type="checkbox"/> Recovery plan defined	<input type="checkbox"/> Volatile/seasonal mix <input type="checkbox"/> Shaky WMS slotting	Improve slotting; VLMs; selective AS/RS zone
Deep-learning vision everywhere	<input type="checkbox"/> Controlled lighting/ background <input type="checkbox"/> Labeled good/bad sets <input type="checkbox"/> GR&R capability proven	<input type="checkbox"/> Variable lighting/fixtures <input type="checkbox"/> Few labeled defects	Pilot rule-based vision; build image library
Private 5G (single small site)	<input type="checkbox"/> Many mobile devices need QoS/latency <input type="checkbox"/> Security isolation required <input type="checkbox"/> Wi-Fi saturated	<input type="checkbox"/> Wi-Fi 6 can meet needs <input type="checkbox"/> No isolation requirement	RF survey; harden Wi-Fi (coverage / roaming / segmentation)
Blockchain traceability	<input type="checkbox"/> Regulated chain <input type="checkbox"/> Multi-party agreement <input type="checkbox"/> Standards/mappings ready	<input type="checkbox"/> Partners unwilling <input type="checkbox"/> Low added value vs EDI	Strengthen MES/WMS lot trace; standardize ASNs
RPA for core operations pain	<input type="checkbox"/> Stable high-volume clerical tasks <input type="checkbox"/> Exception path documented <input type="checkbox"/> Monitoring/alerts set	<input type="checkbox"/> Frequent format changes <input type="checkbox"/> Underlying process debt	Fix process or integrate systems; keep RPA back-office
Lights-out cells (high-mix, low-vol)	<input type="checkbox"/> One family steady demand <input type="checkbox"/> Quick-change fixtures proven <input type="checkbox"/> Stable presentation	<input type="checkbox"/> High mix/unpredictable demand <input type="checkbox"/> Long changeovers	Semi-automation with fixtures; staff exceptions
AR/VR everywhere	<input type="checkbox"/> Complex, infrequent tasks <input type="checkbox"/> Remote support needed <input type="checkbox"/> PPE-usable devices available	<input type="checkbox"/> Daily work faster with visual SOP <input type="checkbox"/> No content owner	Build strong visual SOP; target AR to clear wins
Predict-everything maintenance platforms	<input type="checkbox"/> Known failure modes <input type="checkbox"/> Good sensors <input type="checkbox"/> Labeled history + CMMS link	<input type="checkbox"/> Poor signal quality <input type="checkbox"/> No response discipline	Start CBM checks tied to actions; expand selectively
Data lake first programs	<input type="checkbox"/> Multiple ready use-cases <input type="checkbox"/> Data contracts/governance <input type="checkbox"/> Owned cost model	<input type="checkbox"/> No owned use-cases <input type="checkbox"/> Unclear costs/ownership	Deliver problem-tied datasets; integrate later