

Intake — Plant Automation Operations Notes

- **Date:** 2026-03-19
- **Submitted by:** Russ Assistant
- **Topic / Chapter Area:** Development / Construction Workflows; Vendor Management & Procurement; Reporting Cadence

Raw Input

Plant automation model for modular facility operations (hybrid robotic + human workflow), including station order and priority framing for capital deployment.

Target Flow: Inlet to Output

1. CNC chassis & subfloor framing (automated)
2. Automated wall panel fabrication (FrameCAD F150i)
3. Robotic wall erection & roof truss setting
4. Robotic spray foam insulation (Graco Reactor E-30 + AI scanner)
5. Robotic drywall install (Hilti Jaibot + overhead gantry)
6. Robotic spray texture & paint
7. Automated exterior siding & window frame
8. Plumbing & HVAC rough-in (human-led)
9. Electrical rough-in & panel integration (human-led)
10. Flooring & tile (human-led)
11. Kitchen & bath fixtures (human-led)
12. QC & punch list (human-led)
13. CNC cabinet install (hybrid)
14. Final wrap & load prep (human-led)

Operations Notes to Convert into SOP Content

A) Production Design Principle

- Apply automation where repeatability, speed, and precision drive fast payback.
- Keep skilled human stations where judgment, fit/finish, and final QA determine outcome quality.
- Require explicit handoff criteria between robotic and human stations.

B) Station-Level SOP Requirements (draft checklist)

For each station, document:

- Standard inputs and pre-check conditions
- Tooling/equipment list
- Safety checks and lockout references
- Cycle-time target and max variance
- Quality acceptance criteria
- Handoff trigger to next station
- Escalation path when station fails tolerance

C) Capital Expansion Phasing (linked to operations)

- **Phase 1 (Fast Payback):** throughput/rework reduction equipment and station reliability controls
- **Phase 2 (Medium Payback):** line-balance, labor productivity, and consistency upgrades
- **Scale (Strategic Long-Term):** multi-line expansion and replication-ready controls

D) KPI Alignment (full-stack)

Track by station and roll up weekly:

- Throughput and cycle time
- Rework rate / first-pass yield
- Labor hours per unit
- Cost per door
- Safety incidents and near misses
- Downtime by cause
- Handoff defects by station

E) Procurement / Vendor Notes

- Priority purchase sequencing should follow Phase 1/2/Scale logic.
- Include commissioning checklist and warranty/service SLA expectations per equipment vendor.
- Require spare-parts criticality list and lead-time risk rating.

What This Should Become

1. Draft chapter section in `02-drafts/`:
 - “Plant Automation & Hybrid Workflow SOP Framework”
2. Draft chapter section in `02-drafts/`:
 - “Automation Equipment Procurement & Commissioning Controls”
3. KPI appendix draft with station-level scorecard template.

Needed Decisions

1. Confirm final equipment model list by station (for formal SOP naming).
2. Confirm which stations are mandatory automated at launch vs. optional in Phase 2.
3. Confirm weekly KPI threshold values (green/yellow/red ranges).

— Added by Russ Assistant, 2026-03-19