

AUTOMATED ELECTROPOLISH LINE

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01 THE PROBLEM

The electropolish line at Autocam Medical's East Paris plant is run entirely by hand: an operator clips screws into a frame, hangs it on the tank's dovetail, walks it through three rinse bays, then unloads it — one batch at a time.

- Operators work over a heated acid bath and its fumes.
- A skilled person is tied up for the entire job.
- Finish depends on operator timing, not process data.
- Throughput stops when the shift stops.

02 OUR SOLUTION

An automated cell wrapped around the existing EP line. A 6-axis robot loads screws into frames, runs the frame through the EP line on recipe, and returns finished screws to trays.



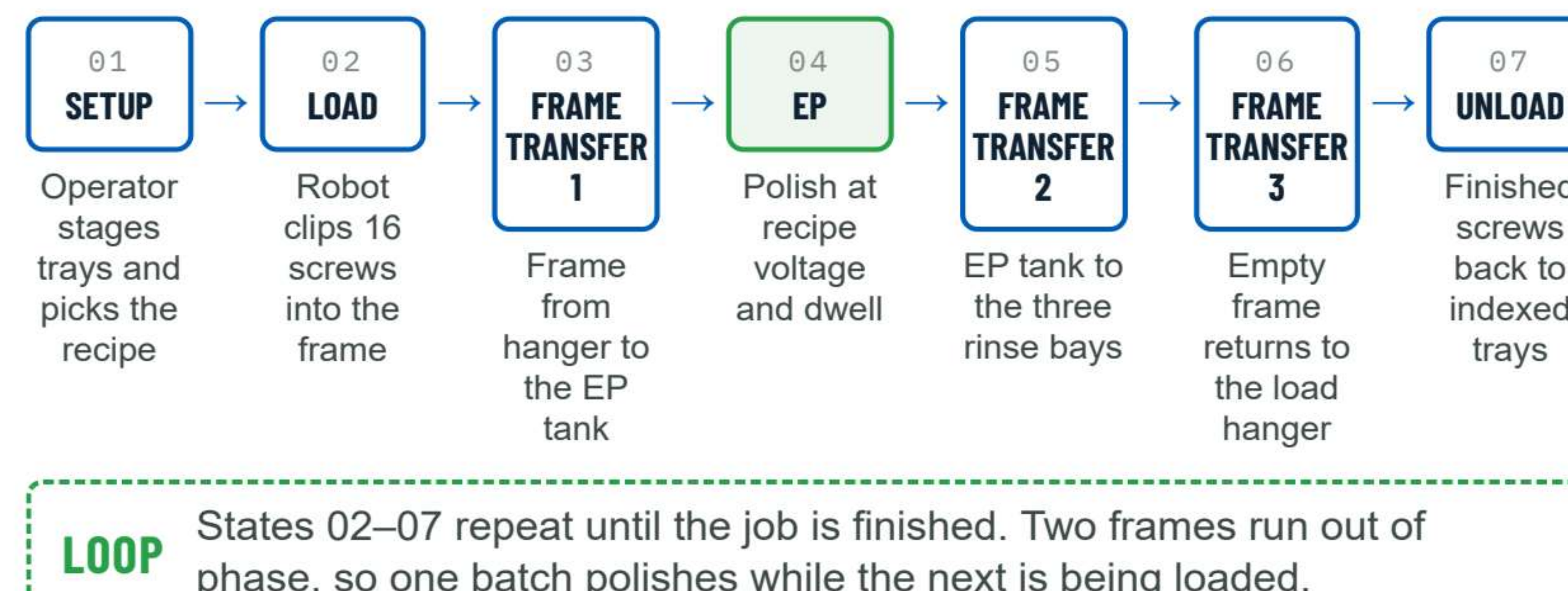
FIG. 2 — the cell at GVSU



FIG. 3 — operator HMI

HOW THE CELL RUNS

FIG. 1 — HIGH-LEVEL STATE FLOW



03 NOTABLE CHALLENGES

Screw handling — 16 clips per frame set the precision and degrees of freedom for the whole cell.

Anode amperage — available current at the anode caps the batch at 16 screws.

Acid environment — PTFE heaters, CPVC pump, IP65/67 interlocks survive acid mist.

Retrofit, not rebuild — tanks, hood, and clips all carried over.

04 TESTING & RUN-OFF

Run-off at GVSU: a 10-hour equivalent production shift without acid — batches of 50 screws run back to back until 550 screws are complete, at both extremes of the part envelope.

MAX DIA. × MAX LENGTH
Largest screw in the envelope — grip force, clip fit, frame load, and anode current at full size.

MIN DIA. × MIN LENGTH
Smallest screw in the envelope — part detection, self-alignment into the clip, no drops.

**ACCEPTANCE
CRITERIA**

±5 s
dwell-time
accuracy

±2 V
voltage
control

±15 °F
tank
temperature
control

<2%
scrap across
the run-off

05 KEY SPECIFICATIONS

Robot	Epson VT6-A901S · 900 mm · 6 kg
End effector	Zimmer electric grippers
Batch	16 screws / frame, two frames cycling
Tanks	1 EP bay (EPS 1375) + 3 rinse bays
Controls	CompactLogix 5069 + PanelView 5510
Safety	4 interlocked doors, E-stop string

06 THE BUILT SYSTEM



FIG. 4 — custom frame & clips



FIG. 5 — custom tray table



FIG. 6 — gripper jaws



FIG. 7 — control panel

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