

Amp-Hour

Shop software for plating and anodizing: the manual

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How the parts fit together

Amp-Hour is one database for the shop. Each screen is a view of the same records, so a number entered once (a tank volume, a part price, a thickness reading) is used everywhere it matters. This chapter follows the records through a job and names the screen where each step happens.

The records

Customer

Who owns the parts and pays the invoice. Carries terms, contacts, packaging rules and portal access. Everything below hangs off a customer.

Part

A customer part number with its process, specification, thickness range, price and packing instructions. Receiving a job for a known part fills the job in.

Process and routing

A finish you sell, with the ordered steps that make it: tank, time, temperature, current density, work instructions. The routing is copied onto every job that uses the process and printed on its traveler.

Tank

A bath with a volume, an operating window and chemistry limits. Routing steps point at tanks, so the traveler names the tank and the floor scan logs amp-hours against it.

Job

One lot of parts with a routing, a quantity, a customer PO and a due date. The job carries labor, runs, rejects, readings, costing and the documents raised against it.

Shipment, certificate and invoice

Shipping a job creates the shipment (packing slip, carton labels), the certificate of compliance (readings, gauge, operations) and the invoice, which posts to receivables and the ledger.

A job from quote to cash

1. Sales: the customer and part exist (Customers, Parts). A quote prices the work by piece, pound, area or lot; winning it converts to a job.
2. Receive job: quantity, customer PO, due date. The part brings the process, the process brings the routing, the job gets a number and a traveler. If the part is held as customer stock, the job draws its quantity from that stock.
3. Schedule: the board shows every open lot by stage; capacity shows load against hours per work center.
4. Shop floor: scan the traveler barcode to start an operation, log the run (amps, minutes, pieces), complete it. Amp-hours accumulate on the tank. A step at an outside vendor raises a PO and a vendor slip, and comes back with a count.
5. Tanks: titrations are compared with the limits; the addition is computed from tank volume and issued from inventory when posted. Out-of-limit readings notify managers and appear on the dashboard.
6. Quality: QC records thickness readings; a step that requires them cannot close without them. Rejects

carry a reason code; serious ones become NCRs and CAPAs. Gauges carry calibration dates that the certificate quotes.

7. Ship: packing slip, carton labels, certificate of compliance and invoice in one step. Customers with portal access download their certs and invoices.
8. Books: the invoice posts to accounts receivable and the general ledger; receipts clear it; aging and statements follow. Vendor bills, inventory and payroll hours post on the other side. Reports read the same tables.

What feeds what

Inventory	Tank additions, job issues and maintenance parts draw stock down; purchase orders and receiving bring it in; the reorder report watches minimums.
Purchasing	POs for chemicals and supplies, and POs raised by outside-processing steps. Bills against POs post to payables.
Maintenance	Work orders against tanks and equipment; PM templates generate them on an interval; downtime is recorded; calibration dates on gauges flow to certificates.
Compliance	The wastewater log is checked against the permit limits in Setup; hazardous-waste containers and manifests, permits and the SDS library are kept for their retention periods.
Precious metals	Daily prices and the part's metal factor produce the surcharge line on quotes and invoices; reconciliation compares metal bought with metal plated.
Time	Clock punches build timesheets with overtime; labor logged on operations costs the job.
Notifications and messages	Tasks, out-of-limit readings, PMs due, portal requests and messages between staff all land in the bell; Messages is direct and group chat with links to records.
Settings	Team and roles, the customer portal, billing, appearance and modules, custom fields and terminology, import and export, security.

Roles

Administrator	Everything, including team, billing and settings.
Manager	Production, quality and accounting; can invite staff.
Office	Sales, shipping and accounting.
QC	Production, quality and shipping; no accounting.
Operator	Shop floor terminal and time clock.
Customer	Their own jobs, certificates and invoices in the portal.

Getting started

A new shop lands on a checklist that is computed from its own data, with a starter kit of work centers, materials, reject codes and 25 process routings.

The trial and the sample shop

Start a trial creates your account and your shop. The trial runs 14 days on the Professional plan and needs no card. A promotion code from a flyer or an email, entered on the sign-up form or later under Settings > Billing, makes the trial longer; one code per shop. The sign-up form has a box, checked by default, labelled "Include sample data (customers, tanks, processes, jobs)". Leave it checked and the shop opens with 13 tanks, 9 open jobs, real routings and a few weeks of history, so you can see how a job, a traveler, a tank analysis and a cert connect before you enter anything of your own.

The Getting started page lists a job through the shop in order: receive a job, print its traveler, scan it on the shop floor terminal, record a titration on a tank, record thickness at QC, ship it, then look at the dashboard. When you have seen enough, the shop owner presses "Clear sample data and start my shop" and types CLEAR. Every sample customer, part, job, tank, invoice and record is deleted; your login, settings and chart of accounts stay. Nothing in the sample shop is billed or visible to anyone else.

The tour and the manual

A shop that starts without sample data, or one whose sample data has just been cleared, is offered a guided tour: a spotlight walks through the sidebar and every main screen in about five minutes, one short card at a time, with Back, Next and End tour. It can be restarted at any time from the name menu in the top bar. The last card links to the manual, which describes every screen and how the parts connect, as a web page at amphour.io/manual and as a PDF at amphour.io/manual.pdf.

The checklist

Getting started sits in the sidebar under Overview for administrators and managers until the list is complete. It is not a wizard with a saved position: each step is checked against the shop's tables, so it stays true however the data got there, typed, imported or created by the starter kit.

Step	Done when
Company details	Name, phone and address are set, as they print on travelers, packing slips, certs and invoices
Logo and colors (optional)	A logo is uploaded under Settings > Appearance
Work centers	At least one work center exists
Processes and routings	At least one process has routing steps
Tanks	At least one active tank exists
Your team	A second staff login exists or an invitation is outstanding
Customers and parts	At least one customer and one part

Receive the first job and print its traveler	A job exists
Run it on the floor	An operation has been completed
Ship and invoice	A shipment exists
Equipment and calibration (optional)	A piece of equipment exists
Choose a plan (optional, hosted shops)	A subscription is active

Company details, the starter kit and team invitations are done right on the page; the rest link to the screen where the work happens. The dashboard shows a card with the next step until a manager hides it.

The starter kit

"Choose from the starter kit" opens a picker. Everything in it is editable afterwards under Setup, and items that already exist in your shop are skipped.

Standard work centers

13 of them, from Receiving / Inspection through the pretreat, anodize, plating, electroless nickel, passivation, bake and paint lines to Final Inspection and Pack & Ship, each with a labor rate and an overhead rate for job costing.

Base materials

16 materials with process notes: 7075 is etch-sensitive, 2024 smuts after etch, high-strength steel gets blast and no acid pickle, 17-4 PH prefers citric passivation.

Reject reason codes

15 codes, from adhesion and blistering to rack marks and count short.

Precious metals

Au, Ag, Pd and Rh with a base price for the surcharge.

Processes you run

25 processes grouped by family: anodize, chem film, zinc, zinc-nickel, nickel, copper, tin, silver, hard gold, passivation, black oxide, phosphate, e-coat, powder, polish, strip and rework. Each has its spec, a default price and unit, a minimum lot charge, a thickness range and an ordered routing with time, temperature, current density, voltage and work instructions per step.

Routings are written without tanks, because every shop's tanks are its own. Each step that needs one carries an instruction such as "Tank: assign your sulfamate nickel tank to this step under Setup > Processes" until you do.

Your team

Office and QC people are invited by email from the checklist or from Settings > Team, with a role for the batch: Office, Manager, QC or Administrator. If the server has no email configured, the invitation links are shown for you to send yourself. Operators do not need an email address: give them a shop-floor login (shop ID, username, password) for the Shop floor terminal and the Time clock.

Role	Can reach
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Administrator	Team, billing, settings, audit trail, and everything below
Manager	Production, quality, accounting; can invite staff
Office	Sales, shipping, accounting
QC	Production, quality, shipping; no accounting
Operator	Shop floor and time clock
Customer	Their own jobs, certs and invoices in the portal

Bringing in your lists

Settings > Data has a CSV template for each of customers, parts, inventory items, vendors, materials, processes, tanks, racks, training courses and permits. Download the template, fill it in, save as CSV and upload. Rows with a code that already exists are updated, and references such as a part's customer or process can be given by code or by name. The same page has a full backup download and CSV and JSON exports.

A 30-minute screen share on your own parts and processes can be booked at any time, onboarding and import help come with the Business plan, and support@amphour.io answers questions on every plan.

Jobs, travelers and routings

A job is a lot of customer parts with a routing copied from the process. The traveler prints that routing with a barcode per operation, the floor logs what actually happened in each tank, and anything outside the window is recorded as a deviation.

Processes and routings

Under Setup > Processes each finish has a code, a name, the specification it is certified to, a default price and unit, a minimum lot charge, a thickness range in mil, in, µin or µm, a revenue account and, for silver and gold, the precious metal that drives the surcharge. Below that is the routing, the ordered steps copied onto every job for the process. A step holds:

Operation, work center, tank

What is done, which line does it, and the tank it is done in.

Operating window

Process time and temperature minimum and maximum, current density in A/ft²; and typical voltage. Target amps for the lot are computed from current density, part surface area and quantity.

Must start within

Hours allowed since the previous step: bake within 4 h of plating, dye within 30 minutes of anodize.

QC step

Cannot be signed off without thickness readings when the job has a thickness spec.

Outside processing

Done by a vendor, with the vendor, lead time and cost per piece.

Standard labor minutes, work instructions, safety notes

Minutes feed costing and capacity; the text prints on the traveler.

A step with a material and the same sequence number replaces the general step for jobs on that material, so 7075 gets a shorter deox and high-strength steel gets blast instead of pickle without a second process. A process sheet prints per process and material.

Receiving a job

Receive job asks for the customer, part, process, material, quantity and weight, then the customer PO, packing list number, lot or heat number, received and due dates (due defaults to five days out) and a priority from P1 hot to P5 low. Choosing a part fills in its process, material, masking and special instructions, and computes racks used from pieces per rack. Price, minimum charge and thickness tolerance default from the part or the process and can be changed on the job. "Save and print traveler" opens the traveler; "Save and receive another" keeps the form for the next lot.

The job page

Everything about the lot is on one page: the job information, the routing with each operation's tank, window, target amps, logged runs and good and reject counts, thickness readings with a pass or fail against the spec, rejects, labor, chemicals issued, attachments, and every shipment, cert, invoice, rework job, split lot, NCR and lab test tied to the job. Finance roles also see job costing: labor, overhead, chemicals and outside processing against revenue, with a projected margin while operations remain.

Actions along the top: Print traveler, Edit, Place on hold with a reason (which prints "ON HOLD. Do not process." on the traveler), Release hold, Split lot, Open NCR, Issue cert, Ship, Cancel and Reopen. Office roles can add, edit or remove operations on one job.

Status	Meaning
Received	No operation has started
In process	At least one operation is running, done or at a vendor
On hold	Operations cannot start
Complete	Every operation is done; ready to ship
Shipped	Shipped in full; no longer editable
Cancelled	Closed without shipping

Status is derived from the operations, not set by hand.

The traveler

The traveler is a one-page form with the shop header, a QR code and Code 39 barcode for the job, and a field grid: customer, PO, packing list, lot, priority, part and revision, dates, process and spec, thickness, material, quantity, weight, area and rack. Material cautions, masking and special instructions print in a box with the part image. The operations table has one row per step with the tank and its chemistry, the parameters and target amps, and write-in cells for start, stop, good, reject, operator, date and inspector. Under each row are the instructions, the safety note (or the tank's PPE) and the operation's barcode (50008-30). Then a grid for thickness readings and signature blocks. Print travelers from Job Orders prints a batch, one per page.

Logging runs and deviations

Log run on an operation records a load: tank, load quantity, time, temperature, amps, volts and the amp-hour meter reading (left blank, amp-hours are amps times time). The same fields appear in the Complete dialog if no run has been logged yet. Time or temperature outside the window, or volts more than 25% above the typical voltage, mark the run as a deviation, with the reason stored on the run and shown on the job in red. Amp-hours logged against a tank are added to that tank's count since the last brightener addition.

Rejects, rework and split lots

Rejects are recorded when an operation is completed or from the job page: quantity, reason code, the operation they were found at, internal or customer source, and a disposition of strip and replate, scrap, use as is or return to customer. Strip and replate creates a linked rework job at priority P2 with the same part,

process, spec and lot number and a zero price. Split lot moves some pieces to a new job numbered 50008-2 that keeps the routing and the progress made so far.

Schedule, capacity and the shop floor

The schedule board shows every open lot by the work center it is waiting at. The shop floor terminal runs an operation from a scanned traveler barcode and records labor, the run and the counts without anyone touching a keyboard.

The schedule board

Schedule, under Production, draws one lane per work center in the order set on the work center and places each open job in the lane of its next operation. A ticket shows the job number and priority, customer code and part number, process code and quantity, the next operation with a Running badge once it has started, the due date, and a progress bar of operations done. Late lots are red, lots due by tomorrow are amber, and lots on hold are marked. Extra lanes appear when needed: At vendor, for operations out at an outside processor with the vendor and the expected return date; No work center; and Ready to ship. A filter box narrows the board to a job number, customer, part or process.

Capacity

Capacity, for office roles, turns the standard labor minutes on open operations into a backlog in hours per work center and divides by the work center's capacity in hours per day to give days of work. Each row shows the open operations, how many are already late, and a bar against the busiest center; more than three days of backlog is marked. Daily capacity is edited on the same page. Below is a load table for the next ten days: the hours due by each day per work center, with a cell turning red where they exceed the capacity available by then.

The shop floor terminal

Shop floor is made for a tablet or a PC with a barcode scanner at each line. The page is a scan box, a camera button, the time clock and a list of active labor. Scan the job barcode on the traveler and the terminal shows the job: customer, part, process and spec, quantity and thickness tolerance, then the next open operation. Scan an operation barcode (50008-30) and it opens that step instead. The operation panel shows the tank code and chemistry, the operating window, the target amps for the lot, the work instructions, the safety note, and any warning: tank out of service (which blocks the start), last analysis out of spec, analysis overdue, or the step started past its limit since the previous one.

Start

Opens a labor entry for the operator at their hourly rate (or the work center rate) and marks the operation running. An operator is on one clock at a time; starting a new operation closes the previous one.

Stop

Closes the operator's labor without completing the operation.

Readings

On a QC step: thickness readings and the gauge used. A QC step with a thickness spec cannot be completed without them.

Complete

Asks for rejected pieces, the reason code and notes, and, for a tank step with no run logged yet, the actual time, temperature, amps and volts. Out-of-window values are saved as a deviation. After the last operation the terminal says the job is ready to ship and clears for the next scan.

A job on hold shows "ON HOLD. Do not process." in place of the buttons. Outside-processing steps point the operator to the job page, where the office sends the lot out and receives it back. The Active labor card lists who is on which job and operation right now.

Barcode scanning

USB and Bluetooth scanners work in keyboard mode with an Enter suffix, and you do not have to click into a field first: the app recognizes the burst of keystrokes anywhere on the page. On the Shop floor and Time clock pages the scan goes into the terminal or the badge kiosk; elsewhere it opens the record. Phones and tablets use the camera instead, from the button in the top bar and on the terminal, reading the QR and Code 39 codes on travelers, tank sheets, packing slips and labels. Browsers only allow the camera on HTTPS, so a self-hosted server also listens on port 3443 with its own certificate; Setup > Barcode Scanning shows a QR code for that address, a scan tester and printable labels.

Scanned	Opens
J50008 or 50008	The job, at its next open operation
50008-30	Operation 30 of job 50008
A tank code	The tank page
An inventory SKU	The chemical or item
A shipment, PO or cert number	That document
An equipment ID	The gauge, rectifier or oven

Labor and job cost

Every Start is a labor entry with the operator, the operation, the start time and the rate. Stop or Complete closes it and computes minutes and cost; a hold or a cancel closes any open labor on the lot. The job's costing card rolls the entries up by operation against the standard minutes and adds the work center's overhead.

Racks

Racks, under Production, keeps the fixtures: rack ID, type (rack, barrel, basket, fixture, wire or jig), capacity in pieces, a dedicated process, condition, the last recoat or strip date, a recoat interval and the next recoat due. A part's pieces per rack computes racks used when a job is received, and the rack and count print on the traveler.

Two jobs on one rack: loads

When lots from different jobs or customers go into the tank together, build a load on the terminal instead of starting each job on its own. Scan the first traveler and press Add to a load; scan the next and press Add to load. The load panel on the right lists the jobs with their pieces and the share of the run each one carries. The piece count is editable: a rack can take part of a job, and the rest stays with the job for a later load; the

operation stays open until the last pieces have been through, and the job page shows how many have run. Shares are by plated area when every part has one and by pieces otherwise. Jobs that run in a different tank are refused. Jobs whose time, temperature or current-density windows differ, or more pieces than the rack holds, are allowed with a warning, because one of them will record a deviation.

Start load puts every operation into running and splits the operator's clock across the jobs by share. Complete load takes one run for the whole rack (time, temperature, amps, volts) and a reject count per job. The amp-hours post to the tank once and the tank's event log shows one cycle with every job number; each job's own run record carries its share of the amp-hours and its tank time, so job costing stays right. Counts, rejects, QC readings and completion stay per job. Production > Loads lists every load with its jobs, pieces, amp-hours and result, and the job page marks an operation that ran in a load with its load number.

Tank chemistry

Each tank carries its volume, operating window and the chemistry limits you analyze against. Enter the titration and the addition is computed from the tank volume and issued from inventory when you post it; brightener is replenished from the amp-hours the floor logs.

Setting up a tank

New tank, under Tanks, records what the bath is and how it is run:

Identity

Tank ID, name, function (cleaner, etch / deox, strike, plate, anodize, seal, passivate, rinse and so on), chemistry such as "Sulfamate nickel", line and location.

Working volume and temperature

Volume in gallons or liters, and the operating window in °F or °C.

Equipment

The rectifier from the equipment list, the anodes, filtration and agitation.

Schedules

Analysis interval in days and the next analysis due; last makeup, a dump interval and the next dump due.

Amp-hour replenishment

The additive from inventory and how much of it is consumed per 1,000 amp-hours.

Status and safety

In service, out of service or dumped; the PPE text, which prints on travelers and the tank sheet.

Control parameters

The Chemistry tab holds the parameters you titrate or measure: name, unit, minimum, target, maximum and the analysis method, each with the latest value, red when it is out, and a trend sparkline. A parameter can name the stock item that corrects it and how much of that item raises the parameter by one unit in 100 gallons (or liters) of bath. That one number turns a titration into an addition.

Recording an analysis

Record analysis opens a form with one row per parameter showing the limits, the target and the method. As each result is typed it is flagged in spec or out of spec. The analysis is stored with every value and the limits that applied at the time, the next analysis date moves forward by the interval, and the result is reported in one line: in spec, or which parameter is low and by how much.

For every parameter below target that has an additive on file, the recommended addition is $(\text{target} - \text{actual}) \times \text{additive per unit} \times (\text{tank volume} \div 100)$. Raising nickel by 1 g/L in 100 gallons of sulfamate bath takes about 0.556 gallons of 180 g/L concentrate. The recommendations appear right after saving and stay on the tank page until posted. Post additions lets you edit each quantity to what was actually added; stock items are issued from inventory at their unit cost, and the addition is tied to the analysis that called for

it.

Amp-hour replenishment

Every run logged against the tank from the traveler or the terminal adds its amp-hours (metered, or amps times time) to the tank's lifetime total and to the count since the last brightener addition. The tank page recommends that count times the rate per 1,000 A·h alongside any addition from analysis; posting it resets the count.

Additions

Add chemical posts an addition no analysis called for: a stock item or a non-stock description such as a DI water top-off, the quantity, and a reason of analysis, amp-hour, routine, makeup or other. The Additions tab lists every addition to the tank with the chemical, quantity, reason, cost (for finance roles) and who posted it; the Additions log under Tanks shows the same across all tanks for a date range with a cost total.

Makeup, dumps and events

The Makeup tab holds the recipe for a full working volume, in order of addition: stock chemicals or water, the amount, unit and instructions for each line, with a warning when stock on hand is short. Log event records what happened to the bath:

Event	What it does
Makeup	Optionally issues the recipe from inventory, sets the tank in service, resets the amp-hour count and schedules the next dump
Dump	Marks the tank dumped
Filter change, anode change, carbon treatment, dummy plating, cleaning, heater / cooling, other	Dated and noted in the Events tab

Mark out of service and Mark in service, on the Details tab, take a reason and log it as an event. Starting an operation in a tank that is out of service or dumped is blocked; a tank out of spec or overdue for analysis gives a warning instead.

SPC

The SPC tab draws an individuals chart for each parameter over the last 30 analyses: the points, the mean, control limits at three sigma, and the spec band dashed. Western Electric rules flag drift: a point beyond 3 σ ; 2 of 3 beyond 2 σ ; 4 of 5 beyond 1 σ ; 8 in a row on one side of the mean, and 6 rising or falling in a row. Cpk is computed against the limits with 1.33 as the target. Rule violations across all tanks are listed on the Quality page.

Procedures and the tank sheet

The Procedures tab holds written procedures per tank, typed as safety, operating, makeup, analysis, maintenance or dump, each with a revision. Print tank sheet produces a form with the tank's barcode, its

volume, temperature, rectifier, anodes, agitation and filtration, the schedules, the PPE, the control limits with the method and the correcting chemical for each, the makeup recipe, every procedure in full, and a blank log for analyses and additions written at the tank.

Quality

Quality is built into the job: QC cannot sign off a step that needs thickness readings until they are entered, and every reject carries a reason code and a disposition. NCRs, CAPAs, lab tests, training, controlled documents and gauge calibration live under the same menu.

The Quality page

Quality opens on a strip of counts, each a link: open NCRs, open CAPAs, overdue CAPAs, training expiring within 30 days, documents due for review and failed tests in the last 90 days. Below it are the recent NCRs, the CAPAs with owner and due date, the SPC rule violations on tank chemistry, rejects by reason over 90 days and NCRs by source over twelve months.

Thickness readings and QC sign-off

Readings are entered on the job page or from the Readings button on the shop floor terminal: one or more values in the job's unit (mil, in, µin or µm), the location on the part, and the gauge from the equipment list. The job shows n, minimum, maximum and average with a pass or fail against the tolerance, and each reading outside it is marked. When the job has a thickness spec, a QC operation cannot be completed until at least one reading exists; the Complete dialog says so. The readings, the gauges and their calibration dates are snapshotted onto the cert at shipment.

Rejects

Rejects are recorded when an operation is completed, on receipt from an outside processor, or from Record reject on the job: quantity, reason code, the operation they were found at, the source (found in-house or a customer return) and a disposition. Strip and replate creates a linked rework job; the other dispositions are scrap, use as is and return to customer. The Rejects page lists every reject event for a date range and source with totals of pieces rejected, reworked and scrapped, a Pareto of reasons and the reject rate by process. Each row has a button that opens an NCR pre-filled with the job, quantity and reason.

NCRs

A nonconformance report is numbered by the shop's own sequence and opened from NCRs, from a job (Open NCR) or from a reject.

Field	Values
Source	Internal, customer, supplier, audit
Severity	Minor, major, critical
Customer, job, part, quantity affected	Linked records; the NCR appears on the job page
Description, containment, root cause	Text; root cause as 5 whys or fishbone
Disposition	Rework, scrap, use as is, return to customer, repair, regrade

Cost of quality, owner

The owner is notified when the NCR is assigned to them

Status

Open, investigating, corrective action, closed

Close NCR requires a disposition and takes the root cause. Open CAPA creates a corrective action from the NCR, copying its description and root cause, and moves the NCR to corrective action.

CAPAs

A CAPA is corrective or preventive, with a source (NCR, audit, customer, internal, management review), the related NCR, a title, problem statement, root cause, action plan, owner and due date, 30 days out by default. Status moves through open, in progress, verify and closed. Action items are tasks assigned to people with their own due dates; they show on the CAPA and in each person's Tasks list. Record verification writes how effectiveness was checked, for instance no recurrence in 60 days. Marking it effective closes the CAPA and its NCR together; not effective puts the CAPA back in progress.

Lab tests

Lab tests records salt spray, adhesion, hull cell, thickness audit, hardness, solderability, porosity, seal quality, coating weight and embrittlement tests, each with the date, the specification or method (ASTM B117 96 h, ASTM B571, ASTM F519), duration in hours, a pass, fail or pending result, readings, the equipment used and the job or, for a hull cell, the tank.

Training matrix

Courses are defined under Setup > Training courses with a code, title, renewal period in months and the roles that require them. Training shows the matrix of people against courses: each cell is current with its expiry date, expiring within 30 days, expired, or missing for a required course, and blank where the course is not required for the role. Record training takes the employee, course, completion date, an expiry (from the renewal period if left blank), the trainer and a score.

Controlled documents

Documents holds procedures, work instructions, forms, specifications, policies, the quality manual and drawings, each with a number, a revision starting at A, an owner and a review date. A new document is a draft. Approve records the approver and the effective date and sets the next review a year out; a document is approved by a manager, administrator or QC other than its owner. Revise on an approved document archives the approved text into the revision history, requires a change summary and opens the next revision as a draft. Make obsolete withdraws a document while keeping it for the record.

Equipment and calibration

Equipment & calibration keeps rectifiers, ovens, thickness gauges, thermometers, pH meters and other instruments with a serial number, work center, calibration interval and next due date, and a maintenance interval and next due date. Log entry records a calibration, preventive maintenance, repair or tank analysis with a pass, adjusted or fail result and the readings. A pass sets the next due date from the interval; a fail puts the equipment out of service. Every change in these records is written to the audit trail with who made it and when.

Customer returns

When a customer sends parts back, open the return from the shipped job's page with Customer return (RMA). It asks how many pieces, the reason code, what the customer reported, their own reference number, and the disposition: rework at no charge, replace, credit, scrap, or evaluate first. The return gets its own number (RMA1, RMA2 and so on, with the prefix you choose), is linked to the original job, and is recorded as a customer reject so the reject statistics show it.

With the rework disposition a new job opens at once at priority 1 and no charge, carrying the original routing, part and specification, marked with the return number and the original job. If the parts have not arrived yet, untick "The parts are already here" and the rework job waits on hold; Parts received releases it and sets its quantity to what actually came back. Shipping the rework job closes the return by itself. Credit, replacement, scrap and evaluation returns are closed by hand with a line on how they were resolved and, for credits, the amount.

Quality > Returns lists open returns, those in rework and closed ones; each has a printable return authorization to send the customer and to travel with the parts, and a link to open an NCR for the complaint. The Quality page counts open returns.

Certs, shipping and packaging

Shipping closes the job. One screen takes the completed jobs for a customer, records the shipment, prints the packing slip and carton labels, issues the certificate of compliance and, if you want, raises the invoice.

Ship completed jobs

Open Shipping > Ship. The Ship Jobs page lists every job in Complete status, with a tab per customer and a count on each tab. The table shows job, part number, process, customer PO, quantity ordered, shipped so far and rejected, then three cells you can edit per line: Ship qty, Cartons and Weight (lb).

- Ship qty starts at the good count from the last completed operation, capped at what is still owed (ordered minus shipped minus rejected). Pieces dispositioned to scrap or rework are left out; rework pieces ship on their own rework job.
- Cartons is proposed from the part's Pieces per Carton / Bag and recalculates as you change the quantity.
- Weight is prorated from the part weight on file.

Below the lines you enter Ship date, Carrier (a pick list of common carriers, or type your own), Tracking / PRO and Notes. The button is Ship and print packing slip. Untick a line to leave that job for a later shipment.

A job that ships short stays Complete with the shipped quantity recorded, so it shows up again on the next Ship Jobs visit. When shipped quantity reaches ordered minus rejected, the job moves to Shipped. Shipping needs an Office, QC, Manager or Administrator login; "Create the invoice now" is shown to Office, Manager and Administrator.

Shipments

Shipping > Shipments lists each shipment with customer, ship date, carrier, tracking, pieces, invoice number (or a "not invoiced" badge) and status. A shipment page shows the contents, carrier, tracking, ship-to address, who shipped it, notes and the certificates issued with it. From here you print the packing slip or carton labels, open or create the invoice, and void the shipment.

Void returns the shipped quantities to the jobs, sets them back to Complete and removes the certs issued for that shipment. A shipment that has been invoiced cannot be voided until the invoice is voided first.

Packing slip and carton labels

The packing slip (form PO-PKS-01) prints with the shipment number as a Code 39 barcode and a QR code, ship date, carrier, tracking, carton count, gross weight, terms from the customer record, sold-to and ship-to blocks, and a line per job: our job, customer PO, part number and revision, description with lot number, finish and specification, quantity and cartons. Packing instructions and notes print under the lines, and the slip ends with sign-off cells. The ship-to address is the customer's Ship-To Address, or the billing address when that is blank.

Carton labels print one per carton at 4 by 3 inches: ship-to, carton n of N, part number and revision, quantity

in this carton, customer PO, our job, finish code, description, lot number and the shipment barcode.

Packaging spec on the part

Packaging lives on the part record.

Pieces per Carton / Bag

Sets the carton count that Ship Jobs proposes and the label quantities.

Packaging Type

Carton, bag, bag in carton, tray, tote, skid, customer container or bulk.

Packing Instructions

Free text, for example layer counts, VCI paper, no staples, label format. It prints in the Packing block of the traveler with the carton count for the full lot, on the job page and on the packing slip. Blank uses the customer's Default Packing Instructions.

Certificate of compliance

When a customer has Cert of Compliance Required ticked, shipping issues a cert per job on the shipment. The cert is a snapshot taken at that moment, so a later edit to the part or process does not change a cert already issued. The document (form PO-COC-01) states:

- Customer, customer PO, our job number, shipment number, lot or heat number.
- Part number, revision, description, base material, quantity shipped and ordered.
- Process code and name, and the specification on the process.
- The thickness requirement with the count, minimum, maximum and average of the readings on the job, and a result of CONFORMS, NONCONFORMING or NOT MEASURED.
- Each gauge the readings were taken with, its serial number, last calibration and calibration due date.
- The operations performed, with the tank, time, temperature, amps and volts logged on each run, the completion date and the operator.
- The certification statement, from Shop Setup > Company settings or the Cert Statement Override on the process, a note when the parts were stripped and refinished under a rework job, and a signature block with the signer name and title from settings.

Quality > Certs lists every cert with job, customer, part number, customer PO, quantity, shipment and issue date, and opens each one for printing. On a job in Complete or Shipped status the Issue cert button issues a fresh copy, for a customer who asks for one with updated readings. Cert numbers come from Document numbering in Company settings.

What the customer gets

If Email When Jobs Ship is on for the customer, the customer's contacts get an email per job with the shipment number, carrier and tracking, and a link to the shipment in the customer portal. Portal users see the shipment, print the packing slip and open their certificates under Certificates.

Customers, parts, quotes and pricing

Sales in Amp-Hour is three screens: Customers, Parts and Quotes. The part record holds the price, the finish and the thickness tolerance, so a quote, a job and an invoice all start from the same numbers.

Customers

Sales > Customers lists every customer with code, name, city, state, phone, terms and active flag. The customer record carries billing address, a separate Ship-To Address, phone and email, Terms (days), Credit Limit, Tax Exempt, Industry and Sales Rep, plus the switches that drive the rest of the system:

Cert of Compliance Required

On by default. Shipping issues a cert per job for this customer.

Default Packing Instructions

Used on the traveler and packing slip when a part has none of its own.

Customer Portal Access

Lets invited contacts sign in to see their jobs, certs, invoices and quotes.

Email When Jobs Ship, Email Invoices

Send the shipment notice and the invoice to the customer's contacts.

Custom fields added under Settings > Fields appear on the customer form as Additional fields.

The customer page opens with a strip showing open balance, sales year to date, open jobs and parts on file, and buttons for Receive job, New quote, New part and, for finance roles, Statement. Below are Contacts (name, title, phone, email, primary flag), the Activity and follow-ups log, the parts on file with process and price, recent jobs with due date and status, and either invoices or quotes depending on your role.

An activity is a note, call, email, visit, follow-up or complaint with a subject, notes, a follow-up date and a done flag. When a portal user submits a quote request it lands here as a follow-up activity, and everyone with an Office, Manager or Administrator role gets a notification.

Parts

A part belongs to one customer and carries Part Number and Revision, Description, Material (from the materials master, which selects material-specific routing variants) and a material description such as 6061-T6, the Process / Finish, Customer Price, Price Unit and Minimum Lot Charge, thickness min, max and unit, surface area and weight per piece, drawing revision, masking and special instructions, pieces per rack, a Barrel Plated flag, the packaging fields, a Precious Metal Factor and a part image.

The part page shows the image and a job history for that part number with customer PO, quantity, received and due dates and status. Customers and parts import from CSV under Settings > Data.

Pricing

Prices are per unit, and the unit is one of each, lb, sqft, sqin, lot, rack, barrel or hour. Each line also has a minimum lot charge; the extended amount is the greater of quantity times price and the minimum. The lookup order is the same everywhere a price is needed:

Value	Taken from Falls back to
Unit price	Customer Price on the part Default Price on the process
Price unit	Price Unit on the part Price Unit on the process
Minimum lot charge	Part Process
Thickness min, max, unit	Part Process

Picking a part on a quote line or on Receive job fills these in; you can still type over them for that quote or job. For finishes on a precious metal, the part's metal factor and the daily metal price add a surcharge line at invoicing. That is covered under Precious metals.

Quotes

Sales > Quotes lists quotes with customer, date, valid-until date, line count, total and status, with tabs for All, Draft, Sent, Accepted, Converted and Lost. New quote asks for the customer, an Attention name and a Valid until date, which defaults to 30 days out. Each line has:

- Part: an existing part number for that customer, or New P/N with a typed part number and description.
- Process, quantity, price, the per unit, minimum charge and lead time in days (default 5).
- Extended, computed as you type, with the quote total at the bottom.

Choosing an existing part fills the process, price, unit, minimum charge and description from the part. On a new-part line, choosing the process fills the process defaults. Notes and terms print on the quote. Status is set by hand to Draft, Sent, Accepted or Lost.

Print produces the Quotation (form PO-QTE-01) with quote number, dates, customer address and the line table with process and specification, price per unit, minimum lot charge, lead days and extended amount. A standing note says that precious-metal prices are based on the metal price on the quote date and that a surcharge applies when the market price exceeds the base.

Convert a quote to jobs

Convert to jobs opens a dialog where you enter the customer PO, tick the lines the customer ordered and set the quantity received for each. Every ticked line becomes a job at the quoted price, unit, minimum charge and lead time, with the line description carried into the job notes. A line quoted for a new part number creates the part on the customer's part master with the quoted process and price, so the next order for that part is already priced.

While some lines are still unconverted the quote shows Accepted; once every line has a job it becomes Converted, is read-only and can only be printed. Converted quotes cannot be deleted; any other quote can be deleted from its page.

Reports

Analysis > Reports has Sales by customer, Sales by process, Job profitability and On-time delivery, each with a date range and CSV export.

Customer-owned stock

Some customers send bulk parts to be held at the shop and then release a quantity at a time with a purchase order. Tick Customer stock held here on the part. The part page then shows a Customer stock card with the pieces on hand, a Receive stock button for each shipment from the customer (quantity, their packing list or PO number, a note) and an Adjust button for count corrections and pieces returned to them, with the history of every movement, who recorded it and which job drew it.

Sales > Customer stock lists every stocked part with customer, pieces on hand, open job quantity and the date of the last receipt, with a Receive button on each row.

On Receive job, choosing a stocked part shows the balance on hand and a Draw from customer stock box, ticked by default. Saving the job takes its quantity out of the balance and the job page shows Drawn from customer stock. If the quantity is more than is on hand the job is refused with the shortfall; you can receive the missing stock first, untick the box, or confirm and let the balance go negative until the next shipment arrives. Editing the job quantity moves the draw with it, splitting a lot divides it between the two jobs, and cancelling the job puts the pieces back.

Outside processing

Polishing, heat treat, NDT, paint: some steps leave the building. In Amp-Hour an outside step is an operation on the routing like any other, with a vendor, a lead time and a cost. Sending the lot out writes the PO and prints the packing list; receiving it back counts the pieces in and completes the step.

Mark a step as outside processing

On a process routing under Setup > Processes, each step has an Outside processing checkbox. Ticking it exposes three more fields:

Outside vendor

The vendor from the Vendors master who normally does this step.

Vendor lead time (days)

Sets the expected return date when the lot is sent out.

Vendor cost per piece

Goes on the purchase order the send-out creates.

When a job is received the routing is copied onto it, so the step shows an "outside" badge with the vendor name on the job page, and the printed traveler marks it (OUTSIDE: vendor) with the lead time and the standing instruction to print the vendor slip, count out, record the PO, count in on return and send rejects to NCR. Vendors are kept under Shop setup > Vendors with address, phone, terms and a default expense account.

Send the lot out

On the job page an outside step has a Send out button in place of Start and Complete. The dialog asks for:

- Vendor, preset from the routing.
- Quantity sent, preset to the good count from the previous completed operation, or the job quantity if nothing has been completed yet.
- Expected back (days), preset from the vendor lead time.
- Vendor cost per piece.
- Instructions to vendor, which print on the vendor slip.
- Create a purchase order for this work, ticked by default.

Send and create PO puts the operation into At vendor, records the date, quantity and expected return, stops any labor running on the step, and creates an open PO on the vendor with one line for the work, the quantity, the unit cost and the vendor's expense account. The PO is linked to the job and is listed under Payables > POs like any other. The job header shows an "at vendor" badge, and on the Schedule board the job moves to the At vendor lane with the vendor name and the return date. A job on hold, cancelled or shipped cannot be sent out.

Vendor packing list

After the send-out the Outside processing packing list (form PO-OSP-01) opens for printing; it is also available from the Vendor slip button on the step and the Slip button on the Outside processing page. It carries the job number as a Code 39 barcode and a QR code, a ship-to block with the vendor's address and phone, a return-to block with your company name, job number and PO number, the date sent and expected back, your customer and their PO, lot or heat number, then one line with part number and revision, description, material, the work required (the operation name, its routing instructions and your instructions to the vendor), quantity sent and a blank Qty back cell. A handling block repeats the part's masking requirements and the material's processing notes, says not to mix with other lots and to return every piece including rejects tagged, and names the next operation on return. Sign-off cells are Counted out by, Carrier / driver, Received at vendor, Counted in by and Date back.

Track what is out

Production > Outside processing lists every lot at a vendor, oldest expected return first, with the job and priority, customer, part number, operation and your instructions, vendor, PO number, quantity sent, date sent, due back and the job's own due date. The subtitle counts the lots out and how many are overdue; an overdue return is flagged in red. Each row has Slip and Receive buttons. The History tab shows every outside step that has been sent, with the quantity returned.

The same lots appear on the Dashboard under Outside processing and maintenance with how many days late they are, and in the At vendor lane on the Schedule board.

Receive the lot back

Receive back on the job page opens a dialog that states what was sent, to whom and when, and asks for Quantity returned (preset to the quantity sent), Rejected at receipt, a reject reason code, a disposition (Rework, Scrap, Return to vendor, Use as is) and notes such as the vendor's packing list number or shortages. Receive then:

- Completes the operation with the returned count as its good quantity less rejects, so the next step and later Ship Jobs work from the right number.
- Marks the PO line received and the PO as Received, so Payables can enter the vendor's bill against it.
- Writes any rejects to the reject log against this step with the reason and disposition.
- Warns you if the count is short of what was sent, and records the shortage in the audit trail.

Undo on a completed outside step puts it back to At vendor rather than Running.

Cost

The vendor's bill, entered from the PO under Payables, carries the job number on its lines. Job costing on the job page shows it as Outside processing next to labor, overhead and chemicals, and the Job profitability report has an Outside column.

Maintenance

Maintenance tracks what is broken, what is down and what is due. Anyone can report a problem against a piece of equipment or a tank; the work order carries the downtime, the labor and the parts, and PM templates raise their own work orders when the interval comes round.

Report a problem

Maintenance > Work orders has a Report a problem button, and the same form is on every equipment page and tank page under Maintenance history. It asks for one line on what is wrong, the Equipment or the Tank, a type (repair, PM, inspection, safety, improvement), a priority (low, normal, high, urgent), who to assign it to, a Needed by date and details. The last checkbox, "The asset is down now", marks the equipment or tank out of service and starts the downtime clock as the order is created.

Any login can report a problem. An urgent order gets a due date of today and a notification to every manager and administrator; a high priority order is due in two days. Assigning the order notifies the person it went to.

Work orders

The Maintenance page opens with a strip of counts: Open, Urgent, Down now, PMs due in 30 days and Downtime hours in the last 30 days. If anything is down, a red banner names the asset and the order, with the time it went down. Tabs split the list into Open, Mine (assigned to or reported by you), Waiting on parts and Done. Each row shows the WO number, priority, the problem with its type, reporter and date, the asset, who it is assigned to, due date and status. A side card lists the most worked assets over 90 days with the number of orders, downtime hours and parts cost.

Status	Meaning
Open	Reported, nobody assigned.
Assigned	Someone is named on it. Set when a person is assigned.
In progress	Start work was pressed; the start time is recorded.
Waiting on parts	Set by hand from Edit.
Done	Completed with a resolution.
Cancelled	Stays in the history as cancelled.

Work the order

The work order page shows the problem and details, assignment, Needed by, the PM template it came from, start and completion times, the resolution, labor minutes and downtime. Buttons along the top:

Start work

Sets In progress and assigns the order to you if nobody else is on it.

Mark down / Back in service

Runs the downtime clock. Down sets the equipment or tank status to out of service; back in service

returns it and adds the elapsed minutes to the order. An out-of-service tank blocks operators from starting a run in it.

Issue parts

Issues a stock item and quantity from Inventory to the order at weighted-average cost; the parts and their cost are listed on the order.

Edit

Title, type, priority, assignment, due date, status, labor minutes so far, details and the checklist.

Complete

Asks what was done and the labor minutes. A repair needs a resolution. Completing while the asset is down ends the downtime and puts it back in service.

Cancel

Office roles only. An order with parts issued cannot be deleted, only cancelled.

A checklist is one item per line. Ticks save as you go, so a technician can work through it over a shift. Completing a PM with unticked items is refused unless you tick "Complete anyway", in which case the skipped items are noted in the resolution. The reporter is notified when the order is done.

Every completed order on a piece of equipment writes an entry to that equipment's Calibration and analysis log, and a completed PM sets the equipment's Last Maintained and Next Maintenance Due from its maintenance interval.

PM schedule

Maintenance > PM schedule holds the PM templates. A template names the task (rectifier cooling fan and filter, anode basket inspection, heater and thermostat check), the Equipment or Tank, Every (days), Next Due, estimated minutes, who to assign it to, a checklist and notes.

When a template's next due date arrives, opening Maintenance creates a work order of type PM from it, titled with the task and the asset code, carrying the checklist with every item unticked, assigned to the named person (who is notified) and due on the template date. A template that is already overdue creates its order at high priority. Only one open order exists per template at a time. Completing the order moves Next Due forward by the interval.

Equipment and tank pages show the PM schedule for that asset, its work order history and downtime over 90 days. Equipment & calibration is the companion list, with calibration and maintenance due dates per gauge, rectifier and oven; it is covered under Quality.

Where it surfaces

Urgent and overdue work orders and anything down are on the Dashboard under Outside processing and maintenance. Notifications for assignments, urgent orders, PMs due and completed orders go to the bell in the top bar and the Notifications page. The module can be switched off under Settings if your shop does not use it.

Environmental compliance

A plating shop answers to a wastewater permit, the hazardous waste rules and whoever inspects the SDS binder. Amp-Hour keeps those records next to the production records they come from, and flags the ones that are about to be late.

Compliance dashboard

Environmental > Compliance opens with six counts: samples in the last 30 days (with the last sample date and pH), exceedances in the last 90 days, containers on the accumulation clock (with the oldest in days), manifests awaiting the signed copy, permit deadlines in the next 90 days and chemicals without an SDS. Each count links to its page. Below are a 30-day effluent pH chart with your limits and the minimum and maximum read, the permit and report deadlines table, the containers on the clock with their days, and the chemicals missing an SDS.

Wastewater log

Log sample, on the dashboard and on Environmental > Wastewater, records one self-monitoring sample: date and time, sample point (Final effluent, Clarifier outlet, Equalization tank, Cyanide destruct, Chrome reduction, or your own), pH, flow in gallons, temperature, and concentrations in mg/L for total chromium, nickel, zinc, copper, cadmium, lead, silver, cyanide, TSS, oil and grease and TTO. Each field shows the limit beside it. A notes field holds the corrective action.

On save the sample is compared with the limits. A sample within limits is marked in compliance; one outside is marked as an exceedance with the parameter, the value and the limit written out, and every administrator, manager and QC user gets a notification. The log page lists samples for a date range with the out-of-limit values in red, the result badge, the exceedance text, notes and who took the sample. Delete is there for duplicate or mistaken entries only; the page says so.

Limits are entered under Shop Setup > Company settings as Discharge limits, per your permit. The sample shop ships with pH 6 to 9 and the 40 CFR 433 daily maximums for metals. The log exports to CSV from Analysis > Reports (Wastewater discharge log).

Hazardous waste

Environmental > Hazardous waste has two tabs, Containers and Manifests.

Container

Label or ID, waste stream (F006 WWT sludge, spent plating bath, spent acid, spent caustic, cyanide waste, chromium waste, filter cartridges, contaminated PPE and rags, used oil, universal waste, other), contents, EPA waste codes such as F006, D002, D007, container size (55 or 30 gal drum, 5 gal pail, 275 gal tote, roll-off), Accumulation Start Date, storage location and status.

Status

Accumulating, full or shipped. The days on the clock count from the accumulation start; a container shows amber past 60 days and red past 75.

Manifest

Manifest tracking number, ship date, transporter, designated facility (TSDF), waste description and codes, quantity and unit, disposal cost, and whether the signed copy has come back.

Ship on a manifest opens a form for the manifest details and lists every container on site with the full ones pre-ticked. Recording it marks the ticked containers shipped and links them to the manifest. The Manifests tab shows each manifest's signed-copy state: Awaiting, or Overdue with the day count once 35 days have passed without the facility's copy, with a Mark received button that stamps today's date.

Permits

Environmental > Permits holds permits and registrations: wastewater discharge, air, hazardous waste (EPA ID), storm water, fire and hazmat, business license, Nadcap, ISO / AS9100, ITAR or other, with the issuing agency or registrar, permit number, issued and expiry dates, how many days before expiry to start renewal (default 90), reporting frequency (monthly, quarterly, semiannual, annual), the next report due date, the responsible person and the permit conditions. A permit expiring within 90 days or a report due within 30 days appears on the dashboard. Permits import from CSV under Settings > Data.

Safety data sheets

Environmental > SDS lists every inventory item in the chemical, precious metal and anode categories with its location and SDS. An SDS can be a link to the supplier's sheet (the SDS Link field on the item) or a PDF or image uploaded on this page, up to 10 MB. Items with neither show a red "missing" badge and are counted on the dashboard.

Retention and roles

The wastewater and hazardous waste pages state the three-year retention that applies to those records. Samples can be logged by any staff login; recording manifests, marking copies received, deleting samples and uploading SDS files need an Office, QC, Manager or Administrator role. Every action is in the audit trail under Setup. Shops that do not need the module can switch it off under Settings, which removes the Environmental group from the menu.

Inventory and purchasing

Inventory is what is on the shelf: chemicals, anodes, salts, masking, packaging and supplies, each at a weighted-average cost. Purchasing is the POs that bring stock in, the receipts against them and the vendor bills that follow.

Items

The Inventory page lists every item with its on-hand quantity, reorder point, unit cost and location. Open one for the fields below and its transaction history.

SKU and name

The SKU prints on PO lines and tank addition records.

Category

Chemical, anode, masking, rack/fixture, packaging, supply or precious metal.

Unit of measure

gal, lb, kg, ea, tr oz. Every quantity on the item is in this unit.

Qty on hand

Entered once as an opening balance. After that it changes only through transactions.

Reorder point and reorder qty

Drive the reorder report and the quantity on an automatic PO.

Unit cost

The weighted average, recomputed on every receipt.

Preferred vendor, location, SDS link

The vendor is who the reorder report buys from. Chemicals and precious metals without an SDS link are flagged on the Compliance page.

Receiving, issuing and adjusting

The item page shows On hand, Average cost and Value, then the transactions: date, type, quantity, cost, the job or PO referenced, notes and who posted it. Three buttons post transactions.

- Receive takes a quantity and a unit cost and recomputes the average: $(\text{on hand} \times \text{old cost} + \text{received} \times \text{new cost}) \div \text{new total}$. Office roles and QC can receive.
- Issue takes a quantity and an optional open job. Issued to a job, the value lands in that job's materials cost; left as "Shop use / tank add", it is expensed without one. Any staff login can issue. Each issue posts a journal entry: debit chemicals and supplies expense, credit inventory.
- Adjust takes a signed quantity for a count correction and posts the matching entry.

Tank additions issue stock without a visit to this page: post an addition on a tank, pick the stock item, and the quantity is issued with a note naming the tank and the reason. See Tank chemistry.

Reorder report

The Reorder report lists every active item at or below its reorder point with on hand, reorder point, reorder quantity, quantity already on open POs and the preferred vendor; the Dashboard shows the same low-stock list. Create POs for items not on order writes one open PO per preferred vendor, one line per item, at the reorder quantity (or twice the reorder point minus on hand when none is set) and the current cost, noted "Auto-generated reorder". Items with no preferred vendor, or already on an open PO, are skipped.

Purchase orders

POs live under Payables with tabs for Open, Received, Closed, Cancelled and All. New PO asks for the vendor, an expected date, an optional open job when the PO is for outside processing, and lines. A line is a stock item, which fills in the description, cost and reorder quantity, or a non-stock description with its own quantity, cost and GL account. Sending a routing step to a vendor from the job creates its PO automatically; see Outside processing.

The PO prints as form PO-PUR-01 with the PO number as a barcode, order and required-by dates, vendor and ship-to addresses, the lines with quantities received so far, a total and an Authorized by signature line. It can be edited only while open with nothing received. The buttons on it:

Button	What it does
Receive	A line-by-line form with the outstanding quantity filled in. Stock lines go into inventory at the PO cost. The PO becomes Partial or Received.
Enter bill	Shown when something is received and not yet billed. Takes the vendor's invoice number and date and bills the received, unbilled amount. A fully received PO closes when billed.
Close	Ends an open or partial PO you will not receive more against.
Cancel PO	Only while nothing has been received. A PO with receipts is closed instead.

Vendor bills and payments

Bills, Vendor payments and A/P aging are for administrators, managers and office staff. A bill from a PO puts stock lines on the inventory account and non-stock lines on the line's GL account, or the vendor's default expense account. Enter bill by hand for anything without a PO: vendor, vendor invoice number, bill date, a due date (blank uses the vendor's terms), and lines with a description, GL account, an optional job for outside processing charges and the amount. The same invoice number cannot be entered twice for one vendor. A bill debits the line accounts and credits accounts payable.

Pay bills takes the vendor, date, method (check, ACH, wire or credit card), a reference number and the amount to apply to each open bill. The payment debits A/P and credits cash. Voiding a payment reopens its bills and posts a reversing entry; voiding an unpaid bill does the same. A/P aging buckets open bills by vendor into Current, 1 to 30, 31 to 60, 61 to 90 and over 90 days past due.

Vendors and reports

Vendors are set up under Shop setup with a code, name, address, phone, email, terms in days and a default expense account. Vendors and inventory items import from CSV under Settings > Data. Two reports cover

this area: Inventory valuation (on hand, average cost, value and quantity used in the period) and Chemical usage by tank (quantity and cost per chemical and tank, by reason). Both print and download as CSV.

Invoicing, receivables, ledger and time

The invoice is raised from the shipment, so what was shipped is what gets billed. Receipts, aging, statements, a double-entry ledger, the time clock and the reports are in the same system, so nothing is retyped into a second one.

Invoices from shipments

On the Ship page, ticking the invoice option raises the invoice with the packing slip and the cert. A shipment shipped without one shows a "not invoiced" badge in the Shipments list and an Invoice button on its page; the Invoices page has an Uninvoiced shipments button. Each shipped job becomes one line: job number, part number and revision, process and spec, pieces shipped, the billing quantity in the part's price unit, the unit price, and the minimum lot charge the first time a job is billed. A rework job prints "REWORK, no charge". When the process carries a precious metal, a surcharge is computed from the price on the ship date; see Precious metals.

The due date is the invoice date plus the customer's terms. Sales tax applies at the shop's rate unless the customer is tax exempt. Each line's revenue goes to the process's revenue account. With Email Invoices on, the customer's contacts get the invoice with a link to it in the portal.

New manual invoice is for charges that are not a shipment: expedite fees, tooling, strip-only work, engineering time. It takes a customer, date, customer PO and lines with description, quantity, unit price and revenue account.

The invoice page

Form PO-INV-01 prints with remit-to, bill-to and ship-to blocks, the customer PO, terms, due date and your job numbers, the lines, subtotal, surcharge, tax, total, amount paid and balance due. The foot reads "Make checks payable to" your company followed by the invoice terms text from Settings > Appearance. Above the document: Receive payment while the invoice is open, Void while nothing has been paid against it, and the journal entry it posted as. Voiding posts a reversing entry and frees the shipment to be invoiced again.

Receipts, aging and statements

Receipts lists every payment with its method, reference and the invoices it paid. Receive payment takes the customer, date, method (check, ACH, wire, credit card or cash), a reference, the amount, and how much to apply to each open invoice; with nothing picked, it applies oldest first. Voiding a payment reopens its invoices and reverses the entry.

A/R aging groups open invoices by customer into Current, 1 to 30, 31 to 60, 61 to 90 and over 90 days past due. Clicking a customer opens their Statement of account (form PO-STM-01): the aging row, an opening balance, every invoice and payment in the period with a running balance, and the open invoices. It covers the last 90 days by default and prints.

General ledger

Every invoice, receipt, bill, vendor payment and inventory transaction posts a balanced journal entry on its own; there is no month-end batch. The chart of accounts is edited under Shop setup, and the accounts the system posts to are set under Shop setup > Company settings.

Event	Debit Credit
Invoice	Accounts receivable Revenue per process, metal surcharge, sales tax
Customer payment	Cash Accounts receivable
Vendor bill	Inventory or the line's expense account Accounts payable
Vendor payment	Accounts payable Cash
Inventory issue	Chemicals and supplies expense Inventory
Void of any of these	A reversing entry dated today, linked to the original

The General ledger page shows the journal for a date range, filtered by source (invoice, payment, bill, vendor payment, inventory, manual), with an Open link back to the invoice or bill, and the chart of accounts beside it. New journal entry takes a date, memo and lines with running totals; the server refuses an entry that does not balance. Any account opens as a ledger with opening balance, each entry and closing balance.

Financials has three tabs: the income statement for a date range (revenue, cost of sales, gross profit, operating expenses, net income), the balance sheet as of a date (assets, liabilities, equity with current earnings, and a line that says Balanced or by how much it is not), and the trial balance. All print. Finance is for administrators, managers and office staff.

Time clock and timesheets

The Time clock page has your own Clock in / Clock out button and a badge punch box for a kiosk: scan or type a badge number and the screen shows who clocked in or out. Clocking out also stops any job labor the person still has running. The page lists everyone clocked in and the operation they are on.

Timesheets covers a date range, two weeks by default. The summary per employee shows regular hours, overtime (hours over 40 in a Monday-to-Sunday week), total, hours on jobs, utilization, and for office roles a gross pay estimate with overtime at time and a half. Below it are the punches; office roles can add, edit or delete one, and operators see only their own. Badge numbers and hourly rates are set under Settings > Team.

Reports

The Reports page runs one report for a date range, prints it and downloads it as CSV. The finance ones: Sales by customer and Sales by process (processing and metal surcharge separately), Job profitability (revenue, labor, overhead, materials, outside processing and margin per job), Labor by employee and Labor by work center. The Dashboard shows the finance roles open and overdue A/R, open A/P and sales this month.

Precious metals

For shops plating gold, silver, palladium or rhodium: the daily price is entered once, every invoice carries the surcharge the price list did not anticipate, and a reconciliation shows how much metal went into the tanks against how much went out on parts.

Setting up metals, processes and parts

A metal has a symbol, a name, a unit (troy oz) and a base price, the metal price your price list was built on. The starter kit creates AU Gold, AG Silver, PD Palladium and RH Rhodium with base prices you then edit under Shop setup, or from the Metals and base prices button on the Metal prices page. A process has a Precious Metal field; set it on your gold and silver finishes. A part has a Precious Metal Factor in troy ounces per pricing unit: the metal that goes onto one piece (or one pound, or one square foot, whatever the part is priced per). The surcharge needs both: a metal on the process and a factor on the part.

Entering prices

The Metal prices page shows each metal with its latest price, the change from the previous price, the date, a 90-day sparkline, the base price and the resulting surcharge per ounce. Office, manager and administrator roles enter prices in the form beside it: a price date and a price per metal. Entering a price for a date that already has one replaces it. Below is the 90-day price history. The Dashboard shows the current prices as well.

Nothing fetches prices from a market feed. Someone types in the morning fix, or the price your refiner quotes, and that is the price used from that date until the next entry.

How the surcharge is computed

When a shipment is invoiced, each line whose process carries a metal gets a surcharge:

$$\text{surcharge} = \text{metal factor} \times \text{billed quantity} \times (\text{price on ship date} - \text{base price})$$

The price on the ship date is the latest price entered on or before that date. When the price is at or below the base there is no surcharge. The line description names it, for example "AU surcharge @ \$2465.14/oz (base \$2350)", and the invoice prints a separate Precious metal surcharge line and a Surcharge row in the totals. In the sample shop, 20,000 pins at a factor of 0.00008 troy ounces each with gold at \$2,465.14 against a base of \$2,350 add \$184.22 to an \$8,400 invoice. The surcharge posts to its own revenue account, 4900 by default, so it is separate from processing revenue in the ledger and in the Sales by customer and Sales by process reports. Manual invoices carry no surcharge. The quote form tells the customer that prices for precious-metal finishes are based on the metal price on the quote date and that a surcharge applies when the daily price exceeds the base.

Metal in inventory

Gold salts, silver anodes and the like are inventory items in the category precious metal or anode, in troy ounces, with an SDS link like any other chemical. The sample shop carries AU-PKCN, potassium gold

cyanide at 68.3% Au, in the vault. Receive them against a PO like any other stock, and get them into the tank through a tank addition that names the item, so the issue is recorded against the tank. The reconciliation depends on both habits.

Metal reconciliation

The Metal reconciliation page, for administrators, managers and office staff, covers a date range (90 days by default) with one row per metal:

Purchased

Quantity received on inventory items in the precious metal or anode categories whose SKU or name contains the metal's symbol or name.

Added to tanks

Quantity of those items posted as tank additions in the period.

Plated out

Invoiced quantity times the part's metal factor, for every invoiced job whose process carries this metal.

Unaccounted

Added to tanks minus plated out, with the percentage. Shown in red when it exceeds 20% of what was added.

On hand

Quantity in stock and its value at the latest price.

Surcharge billed

Total surcharge invoiced for the metal in the period.

A large unaccounted balance is usually one of three things: drag-out to the rinse and recovery, a part factor that has not been checked against a stripped-sample assay, or an addition posted as a description instead of a stock item so it never counted. The page says as much under the table.

Reports

Metal price history lists every price entered with the base and the surcharge per ounce it produced, for a date range, as CSV or print. Sales by customer and Sales by process show processing and metal surcharge in separate columns. Shops that do no precious-metal work can switch the Precious metals module off under Settings > Appearance and the group leaves the sidebar.

Customer portal

A customer you invite signs in and sees their own jobs, shipments, certificates, invoices and quotes, and nothing of anyone else's. It answers "where is my order" and "send me that cert again" without a phone call.

Giving a customer access

Under Settings > Customer portal, press Invite on the customer's row and enter the person's email. The invitation is bound to that customer. The link is valid for 7 days. Portal users are free: they do not count toward the staff logins on your plan. A customer record has a Customer Portal Access switch, on by default; turn it off and every portal user of that customer is refused at sign-in. A portal user is bound to one customer, and every query the portal makes is filtered by that customer on the server. Portal users cannot open any staff page or call any staff route, and they do not take part in Messages.

What the customer sees

The portal sidebar has Jobs, Certificates, Invoices, Quotes, Request a quote and Account. Certificates, Invoices, Quotes and Request a quote appear only when the shop has them switched on under Settings > Customer portal. The home page carries your shop's name and phone, the note you wrote in settings if there is one, a strip with jobs in process, shipments in the last 30 days and the open balance, then two tables.

Jobs in process

Job number, the customer's PO, part number and revision, the finish, quantity, date received, promised date, a progress bar with the current operation (or "Ready to ship"), and status.

Recently shipped

The last 25 shipped jobs with quantity shipped and the promised date.

Opening a job shows the routing as a list of operation names with a check and a completion time for each one done. The customer sees the step names and when they finished; tanks, times, temperatures, readings and operator names stay inside the shop. The details card has their PO and packing list number, quantity and quantity shipped, received and promised dates and the lot number. Below it are the shipments for the job with date, pieces, carrier and tracking number, and the certificates.

Certificates, shipments and invoices

Certificates lists every cert of compliance issued to the customer with job, their PO, part number, quantity, shipment and date issued. Opening one shows the same certificate document the shop printed, with a Print button, so a customer who lost the paper copy gets it themselves. A shipment opens as the packing slip, with a button to each cert on it.

Invoices lists every invoice that is not void with the customer's PO, date, due date, total, balance and status. Each opens as the invoice document, printable, with your remit-to address and invoice terms text. Payment is not taken through the portal.

Quotes lists quotes once they are past draft, with date, valid-until date, total and status.

Requesting a quote

Request a quote is a subject line and a details box for part numbers, material, finish and spec, quantities, due date and whether drawings are available. Sending it creates a follow-up on the customer's record in your CRM, due today, with the details and the name of the person who asked, and every administrator, manager and office user gets a notification "Quote request from" that customer, linked to the customer page.

Email to customers

Two switches on the customer record send mail without anyone doing anything. Email When Jobs Ship sends a notice for each job shipped with the part, quantity, carrier and tracking number and a link to the shipment in the portal. Email Invoices sends each invoice as it is raised, with the number, total and due date and a link to the invoice in the portal. Both go to the customer's contacts with email addresses, the primary contact first.

The portal user's own account

Account lets a portal user change their name and password. Security gives them the same two-factor authentication, signed-in device list and security activity as staff. A portal user who also belongs to another shop switches between them under Account. A shop that does not want the portal switches it off under Settings > Customer portal. The pricing page is plain about it: every plan has the customer portal, and portal users are free.

Setting it up

Settings > Customer portal is one screen for administrators and managers. The top card holds the shop-wide switches: whether the portal is on at all, whether customers can request a quote, and whether invoices, quotes and certificates are shown. Below them is a note of up to 500 characters that appears at the top of every portal user's home page; shops use it for office hours or the name and number of the person to call about an order. An administrator changes the switches and the note and presses Save. Switching the portal off refuses every portal user on their next request. Switching one feature off removes its page from the portal sidebar and refuses the matching routes on the server, so a bookmarked link does not get around it.

Under the switches is a table with one row per active customer. The Portal access, Email when jobs ship and Email invoices columns are the same three switches as on the customer record, saved as soon as they are ticked. The Portal users column lists each person who has accepted an invitation, with their email and a Remove button, and each pending invitation with its expiry date and a Cancel button. Invite on the row opens the invitation form with the customer already chosen, so the only thing to type is the email address. The Team tab keeps staff; it links here for portal users.

Team, notifications, messages and security

Each person has one of six roles and the server checks it on every request, not just in the menu. Notifications tell people what needs them, messages let them talk about a job without leaving it, and Settings > Security shows every device and every sign-in on the account.

Roles

Role	Can do
Administrator	Everything, including team, billing, appearance, fields, data and settings.
Manager	Production, quality and accounting. Team and billing too.
Office	Sales, shipping and accounting: quotes, receiving jobs, shipping, invoices, bills, the ledger and reports.
QC	Production, quality and shipping. Receives jobs, signs off inspections and certs. No receivables, payables or ledger.
Operator	Shop floor and time clock: scan, log runs, complete steps, post tank additions, issue stock.
Customer portal	Their own jobs, certs, shipments, invoices and quotes, and nothing else. See Customer portal.

The sidebar hides what a role cannot use, and the API refuses it anyway. Receivables, Bills, Vendor payments, Finance and Reports are for administrators, managers and office staff. Receive job, Capacity, Ship, the PM schedule and Processes are for those three plus QC.

Adding people

Settings > Team shows how many staff logins the plan allows and how many are used, the members with their sign-in, role and last sign-in, pending invitations, and the role list. Invite by email takes an address and a role; the link is valid 7 days and an invitation can be cancelled before it is accepted. Add shop-floor login is for operators without email: a name, username and password, and they sign in with the shop ID, the username and the password. Either way a person gets a badge or clock number for the time clock and scanner, an hourly rate for labor costing, and a job title. Administrators can reset a password. Removing a member ends their access to the shop at once; their labor and sign-off history stays on the jobs.

The shop-floor terminal and the time clock kiosk run under one login, and customer-portal users are free, so the staff count is the people who sign in from the office and the line. The shop owner can transfer ownership to another administrator or delete the shop under Settings > Shop.

Notifications

The bell in the top bar shows the unread count and opens the latest notifications. The Notifications page lists all of them, and each one can be opened, marked read or unread, or deleted, singly or all at once. Notifications are written when something needs a particular person:

- An NCR is assigned to you as owner, or a task is assigned to you.

- A work order is assigned to you, a PM you are assigned comes due, a work order you requested is finished, or an urgent work order is opened (administrators and managers).
- A wastewater sample is out of permit limits (administrators, managers and QC).
- A customer requests a quote through the portal (administrators, managers and office staff).
- Someone writes to you in Messages.

Messages

Messages is built-in messaging between the staff of one shop. A direct conversation is the one thread between two people, reused each time either writes to the other; a group has a title and any number of members. The sidebar shows the unread count. A message can link a record so "look at this" lands on the right page: a job, tank, customer, part, quote, NCR, CAPA, work order, piece of equipment, shipment, invoice or PO. You get one notification per conversation until you open it. Customer-portal users do not take part.

Your account and its security

Settings > Account changes your name and password and shows if your email is confirmed. Settings > Security has four cards.

Two-factor authentication

Set up scans a QR code into any authenticator app and confirms with a six-digit code. Ten recovery codes are shown once, with copy and print. New recovery codes replaces the set. Turning it off takes your password and a current code, and signs out your other devices.

Shop policy

An administrator can require two-factor authentication for administrators and managers. Until an affected person sets it up, they can reach only their account and security settings.

Signed-in devices

Every open session with browser, address, sign-in time and last activity. Sign out any one of them or everywhere else.

Security activity

Your sign-ins, failures and lockouts, password and two-factor changes, devices signed out, exports and invitations. Administrators and managers also see the shop's activity: sign-ins by members, team changes, exports, backup downloads, data clears and every time Amp-Hour support entered the shop.

What the server does on its own

Passwords are at least 12 characters, checked against common passwords and your own name and email, and stored with scrypt. A session ends after 7 days idle and 14 days in any case. Ten failed sign-ins lock the login for 15 minutes, and a sign-in from a new browser and address sends you an email. Every change to a record is in the shop's audit log under Shop setup. Once a day the server snapshots every shop database, keeps 30 days and copies them off-site; an administrator can download the shop's whole database, a JSON export of every table or any table as CSV from Settings > Data at any time, and each download is written to the security log. The Security page covers the rest.

Reporting a problem

Report a problem, in the name menu at the top right, opens a short form: what happened and what you expected. The report goes to us by email with the page you were on, your shop and role, your browser and the last few errors the page recorded, so you do not have to describe them; we answer to the address on your account. A page that fails to load offers the same link. Reports are kept in our console until they are closed.