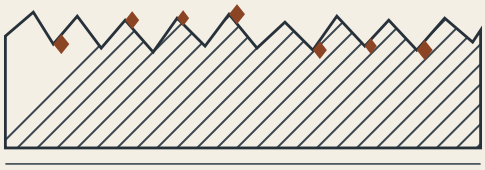
A BENCH REFERENCE

Surface Preparation *for* Parkerizing

Stripping, blasting, degreasing, and staging a firearm so the phosphate has bare, active steel to grow on — the longer half of the job.

BLASTED PROFILE — SECTION



THE BENCH REFERENCE
TECH GUIDES & SHOP MANUALS
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BENCH REFERENCE 02 · REFINISHING

Surface Preparation for Parkerizing

Parkerizing is the most forgiving finish to apply and the least forgiving to prepare. The bath itself asks little of you — clean steel, the right temperature, enough time in the solution. Everything that decides whether the finish comes out even, dark, and durable happens *before* the part is ever wet. This reference covers that work: stripping, blasting, degreasing, and staging a firearm so the phosphate has bare, active steel to grow on.

It does not cover mixing or running the bath — that is the next document. Read this one as the longer half of the job, because it is. A part that goes into the tank poorly prepared cannot be rescued by the tank.

UNDERSTAND THE COATING

>01 — What the Bath Needs From You

Phosphating is a conversion coating, not a paint film. The acid bath dissolves a microscopic layer of iron off the surface and grows zinc- or manganese-iron phosphate crystals in its place. The coating is built *from* the steel, so the bath can only work where it can reach bare, chemically active iron. Anything between the solution and the steel — oil, old finish, burnished metal, a fingerprint — leaves a hole in the crystal structure that no amount of tank time fills in.

Pick the phosphate for the finish that comes after it. **Zinc phosphate** grows a finer, tighter crystal in a lighter gray. It is the industrial standard base under paint and spray-on coatings — the fine tooth anchors the film without building thickness. **Manganese phosphate** grows a coarser, darker crystal that holds oil in its pores. It is the right call for a bare-park working gun that will live under an oil film, and the wrong one under paint if it is laid heavy.

> **BENCH RULE**
> If the part is getting painted, run zinc, run it light, and never let oil touch it after the tank. Oil in the crystal is the single most common reason paint flakes off a parked gun.

BEFORE ANY WORK STARTS

>02 — Material Triage

Walk the parts tray before you touch a blast cabinet. Phosphate grows on carbon and low-alloy steel — barrels, receivers, trunnions, pins, most furniture hardware. It will not grow on what is not steel, and it grows differently on steel that has been hardened or plated.

- **Carbon and chrome-moly steel** — parks dark and even. This is the home field.
- **Case-hardened and high-hardness parts** — take the coating, but read lighter and grayer than mild steel from the same tank. Expect the bolt to be a shade off the receiver. That is metallurgy, not failure.
- **Stainless** — the passive chromium layer shrugs the acid off. It will sit in the tank and come out shiny. Leave it out.

- **Chrome plating and chrome-lined surfaces** — same story. Bores and chambers get plugged, not parked (Section 07).
- **Aluminum, zinc castings, polymer** — never in the tank. The acid eats the first two and the temperature warps the third.
- **Springs** — park fine, but small wire sections lose diameter to aggressive blasting. Strip them chemically and blast with a light touch, or leave original springs alone entirely.

Pitted surplus steel deserves a decision now, not after the tank. Phosphate follows the surface it is given — it will coat the inside of every pit faithfully and hide nothing. Draw-file or dress what offends you before blasting, or accept the honest history.

TAKE IT APART

>03 — Disassembly, All the Way

The tank gets parts, not assemblies. Solution trapped in a seam between two assembled parts keeps reacting after the rinse, and it will bleed rust-brown stains out of the joint for weeks. Heat soak also relaxes whatever tension is holding a masked assembly together. Tear the gun down to single pieces of steel: pins out, springs out, sights off, every screw on the bench.

Photograph the gun before the first punch lands, then again at each stage that is not obvious in reverse. Stage small parts in labeled trays by group — front end, fire control, furniture hardware — because a blasted, parked pin looks exactly like every other blasted, parked pin.

> **EXCEPTION**
> Riveted assemblies stay riveted. A barreled, riveted receiver goes through as one unit — that joint is permanent and the bath treats it as one part. The rule is against *removable* joints, not built ones.

BACK TO BARE STEEL

>04 — Stripping the Old Finish

The phosphate needs bare metal, so whatever is on the part now comes off completely. How it comes off depends on what it is.

Bluing and old parkerizing strip cleanly under the blast nozzle — both are thin conversion coatings and the abrasive removes them as it cuts the profile. No separate chemical step is needed on a part that is getting blasted anyway.

Paint and bake-on coatings are tougher than they look. Blasting through an intact paint film loads the media with paint dust and doubles your cabinet time. Chemical stripper first, scrape and wash, then blast what is left.

Active rust and scale get knocked down mechanically. Heavy scale will hide sound steel or deep pitting underneath — you find out which when it is gone, and Section 02 applies to what you find.

> **HARD RULE**
>
> Never blast an oily part. The nozzle does not remove oil — it drives oil into the fresh profile and spreads it through the media, which then contaminates every part that follows. Degrease *before* the cabinet as well as after.

CUT THE TOOTH

>05 — Abrasive Blasting

Blasting does two jobs at once: it exposes chemically active steel, and it cuts the micro-profile that multiplies the surface area the crystal grows on. The standard for parkerizing is **aluminum oxide, 100–120 grit, at 60–90 PSI**. Coarser grit reads rough and shadows the final color; finer grit and glass bead burnish more than they cut, leaving a slick surface the phosphate grips poorly.

Keep the nozzle moving, square to the work, at a consistent hand-span distance. The finish you are about to grow is a photograph of the blast job — a spot you lingered on, a pass you feathered, a corner you missed all print straight through the gray. The done state is a uniform, dead-matte, light-gray surface with no shine anywhere, including inside corners and under handguard shadows.

Media wears out. Rounded, spent abrasive peens instead of cutting, and a peened surface is a burnished surface. If the cabinet is cutting slower this month than last month, the media is telling you something. Change it.

THE TOOTH THE FINISH KEYS INTO

THE RELIGION

>06 — Degreasing Discipline

From the moment the blast cabinet door opens, the part is a clean-room object. One bare-handed grab leaves enough skin oil to print a fingerprint into the finish permanently — the bath develops it like film. Nitrile gloves or clean hooks from here to the tank, no exceptions, no “just moving it.”

Degrease hot and degrease honest: a hot alkaline wash — Simple Green Industrial or equivalent at 140–160 °F, ultrasonic if the part fits — followed by a clean-water rinse. Dish soap and a scrub brush will do on a budget; what matters is the verification, not the brand. The test is the **water-break test**: pull the part from the rinse and watch the water. On clean steel it sheets off in an unbroken film. If it beads or crawls anywhere, there is oil there, and the phosphate will skip that spot. Wash again until the sheet holds.

Mind the air, too. Shop compressed air carries compressor oil unless it is filtered — blowing a part dry with wet air undoes the wash you just finished. Run a filtration stack on the dry-off line or let parts drip and go into the tank wet; wet is fine, oily is not.

CLOCK STARTS NOW

Bare, degreased steel flash-rusts in humid air in under an hour. Degreasing is not a prep step you bank for the weekend — it is the last thing that happens before the tank. Minutes, not hours.

PROTECT WHAT STAYS

>07 — Masking & Fixturing

Some surfaces are not invited. **Chrome-lined bores and chambers** get silicone or rubber plugs at both ends — the chrome will not take phosphate, but trapped solution will stain and creep at the edges of the lining. Plug bare bores as well unless you want park in the rifling; opinions differ, the plug does not. **Tight-tolerance threads** can go in open — the coating is around a ten-thousandth per surface — but plan to chase critical threads after, or plug them now with a high-temp silicone cap. **Gas ports** on a barrel that has them: a fitted plug keeps the port diameter honest.

Fixture with **stainless wire** bent into hooks through pin holes, sling loops, and magazine wells. Stainless takes no coating and donates no contamination, and a hook means the part hangs in free solution instead of lying against the tank bottom printing a contact shadow. Wire every part before the final degrease so that nothing needs handling after it — the part should go wash, rinse, water-break check, tank, without a hand ever closing on it again.

WHEN THE GRAY LIES TO YOU

>08 — Reading a Failed Surface

Most parkerizing failures are prep failures wearing a chemistry costume. The surface tells you which step it was. Diagnose from the table, fix the step, blast back to bare, and run it again — the one mercy of this finish is that the do-over costs only time.

WHAT YOU SEE	WHAT IT MEANS	THE FIX
Blotchy, mottled gray; soft patches	Oil or silicone on the steel — degrease was incomplete or the part was touched after	Re-blast, re-degrease, pass the water-break test before it gets wet again
A perfect fingerprint, developed in the finish	Exactly what it looks like — bare-hand contact after degrease	Re-blast the part; buy more gloves than you think you need
Bright or shiny areas that took no color	Burnished or missed blast coverage — spent media, feathered pass, shadowed corner	Fresh media, re-blast to uniform dead matte, check corners under raking light
Streaks or runs in the coating	Part flash-rusted or dripped contaminant while waiting for the tank	Close the gap between degrease and tank to minutes
Rust-brown weeping from seams, days later	Solution trapped in an assembled joint	Should have been disassembled — tear down, neutralize, refinish
One part lighter than the rest of the batch	Harder steel or different alloy — see Section 02	Nothing. That is the metal, and it is correct.

Pre-Bath Checklist — run it every time

01 Every part triaged — steel only, stainless and non-ferrous pulled out.

02 Gun stripped to single parts; riveted assemblies excepted; photos taken.

03 Old paint chemically stripped before any blasting.

04 Parts degreased *before* blasting — no oil into the cabinet.

05 Blasted with fresh 100–120 grit aluminum oxide to uniform dead matte.

06 Corners, shadows, and undercuts checked under raking light — no shine.

07 Bores, chambers, gas ports, and critical threads plugged.

08 Every part wired on stainless hooks — no part touches another, or the tank.

09 Final hot degrease and rinse; water sheets clean on every surface.

10 Tank at temperature and the path to it clear — the clock is running.

The bath only finishes what the bench already decided.

Strip it clean. Blast it even. Degrease it honest. Then let the tank do the easy part.

EMBACH ARMORY · THE BENCH REFERENCE · NO. 02