ZION PROFESSIONAL SERIES

THE PROFESSIONAL GUIDE TO GRINDING, POLISHING, COATINGS, TOOLING & FLOOR SYSTEMS

A field-first technical manual for contractors, operators, estimators and floor-system professionals.

Concrete • Machines • Diamond Tooling • Repairs • Densifiers
Coatings • QA • Safety • Business

MASTER TECHNICAL EDITION

34 chapters • 6 job walkthroughs • field quick cards • crew QA systems

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MASTER TECHNICAL EDITION

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ZION

Concrete equipment • Diamond tooling • Floor systems • Education

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ABOUT THIS EDITION

A field guide built around decisions, not memorized recipes

This edition was rebuilt from ZION's original Concrete Polishing Mastery Guide into one integrated reference covering concrete, grinding, polishing, repairs, resinous coatings, tooling, job execution, quality control and contractor business systems.

The central editorial change is simple: this book separates universal principles from product-specific instructions. Concrete varies. Machines transfer load differently. Tooling manufacturers label grits differently. Densifier chemistry, coating cure windows and moisture limits vary by product. Therefore, values in this guide are starting points for controlled field calibration unless a value is explicitly identified as a manufacturer specification or project specification.

Use the book in three modes. Read it front-to-back to build trade knowledge. Jump to a chapter when diagnosing a field problem. Print the appendices and use them as truck-ready QA cards and crew checklists.

STANDARDS STATUS - LIVE VERIFICATION COMPLETED SEPTEMBER 9, 2026

The standards and regulatory references in this edition were checked against official OSHA, ASTM, ICRI, ACI/ASCC, Concrete Polishing Council, ADA/DOJ and U.S. EPA sources. Applicability still depends on the task, product system, contract and jurisdiction; verify current requirements again before contractual reliance or a future dated edition.

SPEC CHECK	Manufacturer technical data sheets (TDS), safety data sheets (SDS), equipment manuals, project specifications and current regulations take precedence over generic field guidance in this book.

CRITICAL	This guide is educational. Safety, environmental and code requirements change by task and jurisdiction. Verify current requirements before work begins.

HOW TO USE THIS BOOK

IF YOU ARE...	START HERE
New to the trade	Parts I-III, then Chapter 26: Complete Job Workflow
Selecting a grinder or tooling	Chapters 5-12
Troubleshooting a polish	Chapters 11, 12, 28 and 30

IF YOU ARE...	START HERE
Installing coatings	Part V plus Chapters 4 and 29
Estimating or selling	Part VII and the appendices
Running a crew	Chapters 26-31 plus Appendix C

CONTENTS

The Professional Guide

CONTENTS — CONTINUED

APPENDICES

PART I

UNDERSTANDING THE SLAB

Read the material before choosing the machine.

1

FOUNDATIONS

Concrete as a Grinding Substrate

The floor is not a uniform material. Grinding behavior is controlled by the surface you actually touch: paste, aggregate, curing history, finishing, moisture, contamination and abrasion response.

FIELD NOTE	In this chapter: hydration and surface paste • why PSI is not a tooling selector • aggregate and abrasiveness • surface zones

1.1 Concrete in contractor language

Concrete is a composite of cementitious binder, water, fine aggregate, coarse aggregate and admixtures or supplementary cementitious materials. Hydration produces calcium-silicate-hydrate (C-S-H), the primary binding phase responsible for much of hardened cement paste strength. Polishing modifies the near-surface zone; densification later reacts with available calcium-bearing phases to improve abrasion resistance and reduce dusting.

For the flooring contractor, the important point is not the chemistry formula. It is that the top few millimeters can behave very differently from the interior of the slab. Power-troweling, curing compounds, carbonation, previous treatments and abrasion can create a surface that is harder, denser or more contaminated than compressive-strength data suggests.

CRITICAL	Do not convert a nail scratch, Mohs scratch, machine amperage or diamond wear rate into an estimated compressive strength. Surface hardness and compressive strength are different properties.

1.2 Compressive strength vs. surface hardness

PROPERTY	WHAT IT TELLS YOU	HOW TO USE IT
Compressive strength (psi)	Bulk structural strength from concrete testing or project records	Useful project context; not a stand-alone diamond-bond selector.
Surface hardness	Resistance of the near-surface paste/aggregate to scratching	Use a concrete hardness pick kit or manufacturer-approved field method as one input.

PROPERTY	WHAT IT TELLS YOU	HOW TO USE IT
Abrasiveness	How rapidly the slab wears the tool matrix and generates fines	Observe during a controlled test cut; drives bond-life decisions.
Aggregate mineralogy	Hardness and fracture behavior of exposed stone	Expect major changes when moving from cream into aggregate.

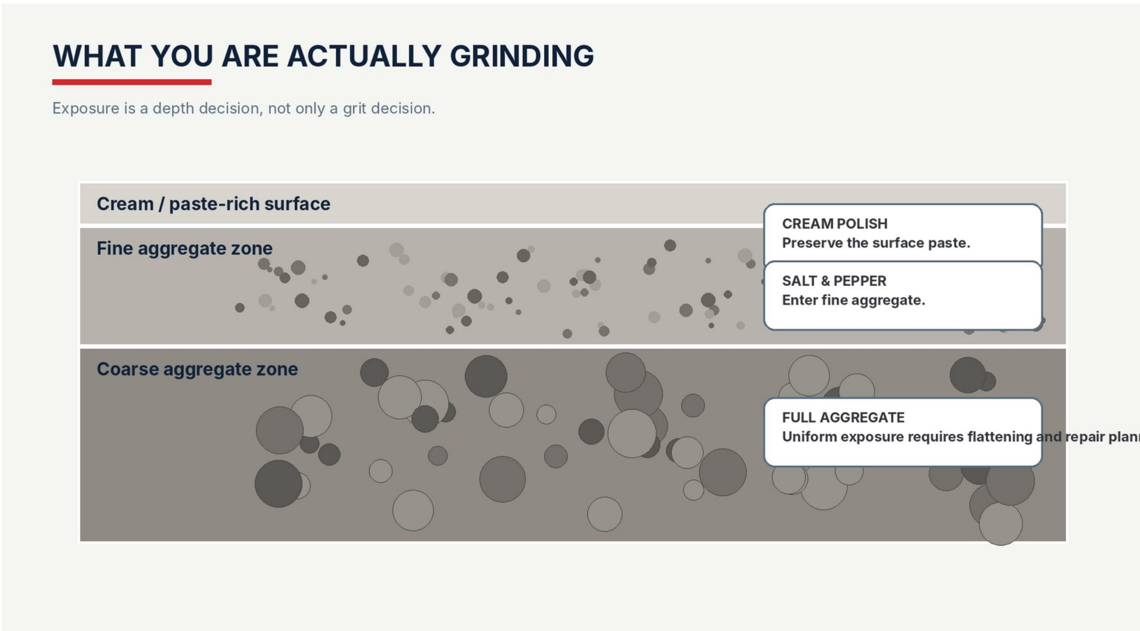

Figure 1. Exposure is a depth decision. Once the cream layer is removed, it cannot be recreated by polishing.

1.3 Water-cement ratio and finishing history

Lower water-to-cementitious-material ratios often correlate with denser, stronger paste; higher ratios often correlate with higher porosity and weaker paste. But a contractor rarely knows the exact mix, and field behavior can be changed by curing, finishing, SCM content, age and surface treatments. Use mix data when available, but confirm what the slab does under your tooling.

Over-troweled or burnished zones can resist wetting and densifier penetration even when the rest of the slab absorbs normally. Conversely, weak laitance may powder under a coarse tool and consume bond rapidly. Map these variations before production.

ZION METHOD	Treat every large slab as multiple zones until proven otherwise. Hardness-test and test-cut the field, perimeter, doorways, cold joints and visibly different pours separately.

2

SITE ASSESSMENT

Reading a Slab Like a Professional

A profitable job begins before the grinder is unloaded. The site visit should identify everything that can change tooling, production, chemistry, appearance, schedule or warranty.

FIELD NOTE	In this chapter: surface conditions • coatings and contaminants • flatness and exposure risk • documentation

2.1 What to look for

OBSERVATION	POSSIBLE CAUSE	FIELD RESPONSE
Chalky or weak surface	Laitance, weak paste, weathering	Remove weak material before final system; test depth of sound concrete.
Dense shiny trowel marks	Burnished/power-troweled surface	Expect slower opening and inconsistent absorption; test multiple zones.
Water beads	Sealer, curing compound, densifier or contamination	Identify treatment; do not assume a single coarse grit will remove every chemistry.
Rubbery coating	Elastomeric coating, mastic or adhesive	Use removal tooling selected for coating thickness and softness; manage heat.
Brittle coating	Old epoxy, urethane or paint	PCD or aggressive metal may be appropriate; test to minimize substrate damage.
Dark/oily areas	Oil, grease, plasticizer or chemical contamination	Degrease/extract and confirm wetting; some contamination can be too deep to warrant.
Hollow sound/spalls	Delamination, poor repair, void or weak topping	Map, sound and repair before polishing or coating.

2.2 Flatness, highs and lows

A grinder follows the floor. High spots receive more contact and expose aggregate first; low spots may retain cream. This is why “uniform aggregate exposure” can require far more material removal than a client expects. A straightedge, laser or floor-elevation map lets you explain that risk before it becomes a dispute.

Do not promise uniform aggregate based on a sample photograph unless the slab has been evaluated. The correct scope language distinguishes a target appearance from an absolute guarantee.

FIELD NOTE	A premium site visit produces a floor map: zones, cracks, joints, contamination, coatings, drains, access, power, moisture test locations and photos. That map becomes the estimate, crew plan and change-order evidence.

2.3 Document before touching the floor

☐ Timestamped overall photos and close-ups of every defect.

☐ Floor plan with approximate square footage by zone.

☐ Existing coating type and thickness where known.

☐ Hardness observations and test-cut location.

☐ Crack/joint classification and repair expectation.

☐ Moisture test method, location and results where relevant.

☐ Power, water, ventilation, access and waste-disposal constraints.

3

FINISH DESIGN

Exposure, Finish & Appearance Classification

Polish level, aggregate exposure and visual clarity are separate decisions. A professional scope states each one rather than hiding everything behind one ambiguous finish label.

When CPC terminology is used, specify aggregate exposure separately using the current Concrete Polishing Council classes: Class A - Cement Fines (Cream Finish); Class B - Fine Aggregate (Salt and Pepper); Class C - Full Aggregate Exposure. Specify optical appearance separately using CPC Levels 1 through 4. The two classifications answer different questions.

FIELD NOTE	In this chapter: aggregate exposure • grit endpoint • gloss vs. reflection clarity • sample acceptance

3.1 Separate the finish into four specifications

SPECIFICATION	EXAMPLES	WHY IT MATTERS
Aggregate exposure	Cream / light sand / salt-and-pepper / medium aggregate / large aggregate	Controls how deep you grind and how much flatness variation becomes visible.
Polish sequence endpoint	400 / 800 / 1500 / higher manufacturer-defined step	Describes the mechanical finishing stage; grit labels are not perfectly interchangeable across brands.
Optical appearance	Matte / satin / gloss / high clarity / defined gloss units if specified	Gloss and image clarity are optical properties, not the same thing as surface roughness.
Protection system	Penetrating treatment, stain protector, microfilm guard, maintenance protocol	Controls stain response, traffic recovery and owner expectations.

SPEC CHECK	Use project-defined terminology when a specification governs. If the project only says “high-gloss polished concrete,” create a written sample and record the aggregate exposure, tooling endpoint, chemistry and acceptance criteria.

3.2 Mockups are contracts in concrete

A representative mockup should be made on the actual slab whenever appearance is critical. Locate it where concrete condition is typical, run the intended sequence and chemistry, then obtain approval. Photograph it under the same lighting used for final inspection.

For large projects, preserve the approved mockup until final acceptance. It establishes what “salt-and-pepper,” “high gloss,” edge appearance and repair visibility mean on this slab rather than in a brochure.

4

TESTING

Moisture, Contamination & Site Assessment

Coating failures are often blamed on the product after the real failure occurred during assessment. Moisture, contamination and substrate condition must be evaluated against the requirements of the exact system being installed.

FIELD NOTE	In this chapter: ASTM moisture methods • manufacturer limits • contamination screening • site-readiness protocol

4.1 Moisture methods

METHOD	WHAT IT PROVIDES	PROFESSIONAL USE
ASTM D4263-24 - Plastic Sheet	Qualitative indication of capillary moisture beneath a sealed sheet	Useful screening before coatings. It indicates moisture presence; it is not a quantitative MVER or in-situ RH test.
ASTM F1869-23 - Calcium Chloride	Quantitative MVER from the surface of a bare concrete floor	Use only where applicable and where the system/specification accepts it. The method does not apply to gypsum concrete, floors containing lightweight aggregate, or testing over coatings, reactive penetrants, patching or leveling compounds.
ASTM F2170-19a - In-Situ RH	Quantitative relative humidity within the concrete slab	Follow the active test method and compare results to the exact flooring/coating manufacturer limits. Results describe the slab condition at the test locations and time tested.

CRITICAL	There is no universal “3 lb MVER” or “75% RH” cutoff for every coating. Modern systems vary widely. Compare documented test results to the current TDS for the exact primer, mitigation system and coating assembly.

4.2 Contamination screening

Water-break behavior is a useful cleanliness check after degreasing: clean, open concrete tends to wet more uniformly; persistent beading or fish-eye-like separation suggests contamination or residual treatment. It does not identify the chemistry by itself.

Oil can migrate deeply. Silicone, tire dressing, release agents and previous maintenance products can create localized adhesion failures. When contamination is severe, consider removal depth, sacrificial test areas, specialized cleaners or a written exclusion rather than promising a coating warranty you cannot support.

4.3 Site-readiness gate

☐ Power confirmed by voltage, phase, available amperage and breaker location.

☐ Extension-cord plan sized for equipment and run length.

☐ Water and drainage plan documented.

☐ HVAC/temperature/relative humidity within product range.

☐ Adjacent surfaces protected; airborne dust migration controlled.

☐ Slab defects and repair scope approved.

☐ Moisture data complete when required.

☐ Client-approved finish sample or system description attached to scope.

PART II

MACHINES, POWER & EXTRACTION

Understand the system that turns motor power into controlled surface change.

5

EQUIPMENT

Grinding Machine Architectures

A grinder is a system of motor, drive, gearbox, head geometry, tooling interface, weight transfer, dust control and operator control. Brand names matter less than understanding how the machine behaves.

FIELD NOTE	In this chapter: planetary vs. rotary • active/passive systems • drive architecture • selection by job

5.1 Planetary and rotary behavior

MACHINE FAMILY	STRENGTHS	LIMITATIONS / WATCH-OUTS
Single-disc rotary	Compact, aggressive, versatile for prep and edges of small floors	Operator technique strongly affects flatness and scratch uniformity; can create directional patterns.
Planetary grinder	Overlapping tool paths, stable production, strong polishing consistency	Different planetary designs rotate/orbit differently; do not assume every three-head machine has the same motion.
Ride-on grinder	High production on large open floors, substantial head load	Transport, power, slab access and skilled operation become project constraints.
Walk-behind single-phase planetary	Accessible for residential/light commercial work	Lower head load and power can slow hard/non-abrasive slabs; tooling selection becomes more important.

CRITICAL	There is no universal “one head counter-rotates while two rotate the other direction” rule for planetary grinders. Gear trains, belt systems and independently driven heads vary by manufacturer. Learn the specific machine’s kinematics from its manual.

5.2 What to compare when buying

SPEC	ASK THIS	WHY
Working width	What is the real productive width with my tooling?	Controls lane count, transport and edge distance.
Motor / VFD	What input power, output power and overload	Determines site-power requirements and

SPEC	ASK THIS	WHY
	protection are used?	torque control.
Head load	What measured load reaches the grinding head in each weight position?	More meaningful than total shipping weight.
Tool interface	What tooling families, segment counts and adapters fit?	Affects lifetime operating cost and flexibility.
Dust shroud	How is the shroud sealed and adjusted?	Capture efficiency is critical for silica control.
Serviceability	How are belts, bearings, gear oil, seals and electrical components accessed?	Downtime can cost more than purchase-price differences.

6

ENGINEERING

Head Load, Contact Pressure & Production Dynamics

The original guide treated head pressure as a universal pound range. A more useful model follows the load from the machine to the actual diamond contact area.

FIELD NOTE	In this chapter: operating weight • transferred head load • tool contact area • speed and production

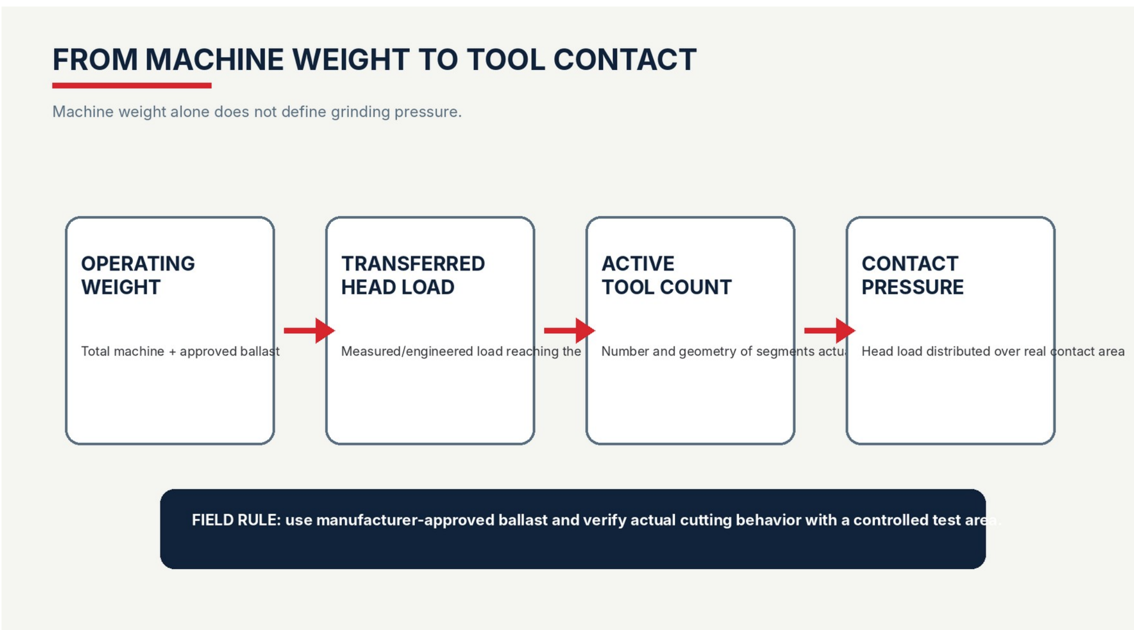

Figure 2. Machine operating weight is only the first input. Actual contact pressure depends on load transfer and tool contact area.

6.1 Four variables control the cut

VARIABLE	INCREASE IT AND...	RISK
Transferred head load	Potential cutting force rises	Overload, excess heat, segment damage, tracking problems.
Active segment count	Load per segment generally falls	Too many segments can reduce aggression

VARIABLE	INCREASE IT AND...	RISK
		on a light machine.
Travel speed	Dwell per area falls as speed rises	Too fast leaves previous scratch; too slow may overcut or generate heat.
Head/planetary speed	Changes scratch density and cutting dynamics	Too much speed can glaze tooling or heat resin pads depending on system.

CONCEPTUAL CONTACT-PRESSURE MODEL

Average tool pressure ≈ transferred head load ÷ total active contact area

This is a comparison tool, not a substitute for manufacturer engineering data. Actual dynamic loading is non-uniform and changes as the machine moves.

ZION METHOD

When evaluating a ZION machine, publish measured grinding-head load for each factory weight position and the recommended segment count. That gives contractors a repeatable starting point instead of an arbitrary “maximum head-pressure” number.

6.2 Lane overlap is different from scratch density

ADJACENT LANE OVERLAP

Overlap % = (working width − lane step-over) ÷ working width × 100

Use this only for lane planning. Scratch density inside each lane depends on machine kinematics, head speed, tool geometry and travel speed.

Do not use a dimensionally invalid formula that multiplies travel speed by pass spacing and divides by head diameter. Instead, calibrate travel speed with a controlled test strip. Mark a known distance, time the pass, inspect the scratch under raking light and record the setting that removes the previous pattern without overworking the slab.

7

POWER

Electrical Planning, Cords & Generators

Lost production often begins at the panel: wrong voltage, undersized conductors, excessive cord length, weak generators or nuisance trips. Plan power as part of the bid.

FIELD NOTE	In this chapter: single vs. three phase • voltage drop • cords and connectors • generator planning

7.1 Record the nameplate before the job

☐ Rated voltage and phase.

☐ Full-load current / input current.

☐ Recommended breaker or overcurrent protection.

☐ Connector type and cord gauge recommended by manufacturer.

☐ VFD requirements and generator compatibility.

☐ Vacuum/extractor electrical load on separate circuits where required.

7.2 Voltage drop

Long or undersized extension cords increase voltage drop and heat. The machine may still run while the motor, VFD or contactor is operating outside ideal conditions. Use the equipment manufacturer's cord guidance and qualified electrical planning for high-current jobs. Minimize adapters and temporary connections.

Generators should be selected for more than average watts. Motors and VFD-driven equipment can impose starting and harmonic demands. Use a generator approved for the machine, with stable voltage/frequency and sufficient continuous and transient capacity.

CRITICAL	Never improvise electrical connections, bypass protection or assume a receptacle can support a machine because the plug fits. Use qualified personnel where electrical work is required.

8

SILICA CONTROL

Dust Extraction Engineering

A vacuum is not an accessory. It is part of the grinding system. Capture at the shroud, airflow under real hose losses, separation, filter cleaning and sealed collection all affect performance.

FIELD NOTE	In this chapter: capture system • CFM vs. static pressure • pre-separation • filter cleaning and compliance

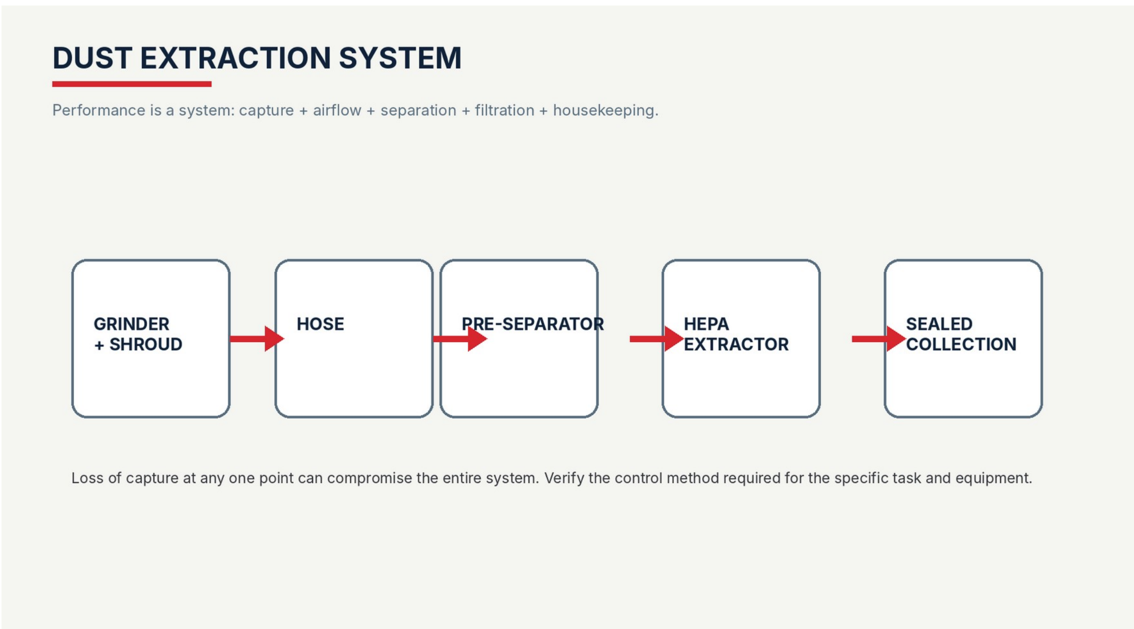

Figure 3. Dust control performance depends on the complete capture and collection path, not a filter label alone.

8.1 CFM is not enough

Airflow moves dust; static-pressure capability helps maintain that airflow through hoses, bends, separators and loaded filters. A high-CFM extractor can still perform poorly if the shroud leaks, the hose is too small, filters are blinded or the collection container is not sealed.

Match the dust collector to the grinder manufacturer's requirements and the control method required for the task. Do not publish one universal CFM number for every machine size.

8.2 Pre-separators and automatic filter cleaning

A cyclonic pre-separator removes much of the heavy concrete dust before it reaches the primary filters, extending filter life and preserving airflow. Automatic or pulse filter cleaning helps maintain performance during continuous grinding. Bagging systems should minimize worker exposure during disposal.

Inspect the shroud brush/skirt, hose cuffs, pre-separator seals, filter condition and bag connection before each shift. A small air leak at the floor can matter more than an impressive vacuum specification on paper.

SPEC CHECK	For respirable crystalline silica, use the current OSHA construction silica rule and Table 1 where applicable, together with the grinder and dust-collector manufacturer instructions. H13/H14 terminology is not a substitute for the actual regulatory control requirements.

PART III

DIAMOND TOOLING & GRINDING STRATEGY

Make the tool wear correctly, then make every scratch intentional.

9

TOOLING

Diamond Bond Science

A diamond tool must do two things at the same time: fracture the concrete and continuously expose fresh cutting crystals. Bond selection controls that second job.

FIELD NOTE	In this chapter: hard/soft bond logic • glazing • tool loss • manufacturer bond families

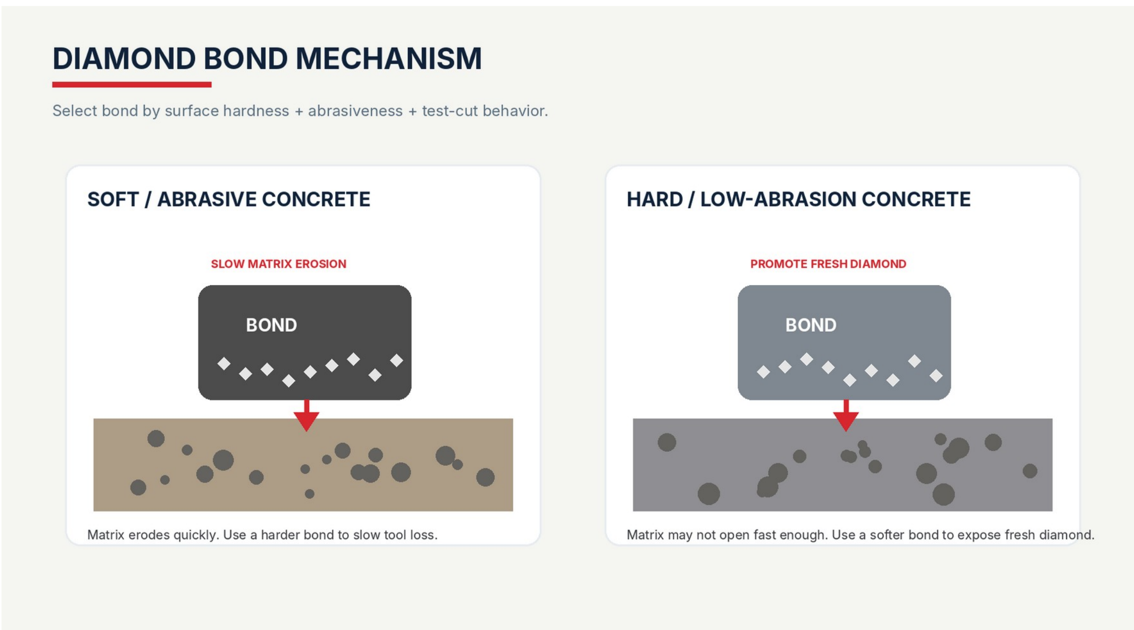

Figure 4. The bond matrix must wear at a rate that continuously exposes effective diamond without shedding it prematurely.

9.1 The correct bond explanation

Soft or highly abrasive concrete tends to erode the metal matrix quickly. A harder bond slows that erosion so useful diamond remains supported. Hard or low-abrasion concrete may not erode the matrix quickly enough; the surface can polish the metal around the diamond and the tool glazes. A softer bond sacrifices matrix faster so fresh diamond is exposed.

This is why "hard concrete = soft bond" is only a shorthand. The full decision is surface hardness + abrasiveness + machine load + tool design + wet/dry condition.

SYMPTOM	LIKELY TOOL BEHAVIOR	FIRST RESPONSE
Tool path looks polished; little material removed	Glazing / insufficient matrix wear	Try a softer/open bond or manufacturer conditioning method; confirm speed/load.
Segments disappear unusually fast	Matrix erosion too rapid	Try a harder bond, reduce aggression, confirm wet/dry strategy.
Heavy deep scratches but slow flattening	Too few active cutting points or inappropriate geometry	Evaluate segment geometry, head load and lane pattern.
Uneven segment wear	Head/plate issue, floor flatness or machine tracking	Inspect machine and contact pattern before changing grit.

FIELD NOTE

Track tool cost per square foot by slab behavior, not only by product SKU. A “cheap” set that wears twice as fast can be the most expensive tool on the truck.

10

TOOLING

Tool Geometry & Removal Tooling

Grit is only one part of tooling behavior. Segment shape, contact area, leading edges, bond volume and specialty inserts can change the cut dramatically.

FIELD NOTE	In this chapter: segment geometry • PCD • bush hammers • ceramic/transitional tools

TOOL FAMILY	PRIMARY JOB	WATCH-OUT
Single/double bar metals	General grinding and flattening	More bars usually increase contact area and may reduce aggression on light machines.
Arrow/leading-edge designs	Aggressive coating residue and concrete removal	Can leave pronounced scratch; follow with a refining step.
PCD	Thick/soft coating removal, adhesives, elastomeric material	Can gouge concrete. Use the correct PCD orientation and sacrificial bars where designed.
Bush hammer	Texture creation, coating removal, exposure	Produces an aggressive profile; not a polishing grit.
Ceramic / copper / hybrid transitional	Bridge metal scratch into a resin-ready surface	Terminology varies by manufacturer; judge by scratch replacement, not label alone.
Resin pads	Refinement and optical development after surface is ready	Heat, contamination and debris can damage finish rapidly.

SPEC CHECK	Grit numbers are manufacturer-specific performance categories. A “100” metal, “100” ceramic and “100” resin are not guaranteed to leave equivalent scratch size. Validate the manufacturer progression and the actual scratch pattern.

11

TOOL SELECTION

Hardness, Abrasiveness & the Test-Cut Method

The fastest way to stop guessing is to separate hardness from abrasiveness, then let a controlled test cut confirm the bond.

FIELD NOTE	In this chapter: Mohs-style field hardness • abrasiveness clues • test-cut ladder • documentation

11.1 Three-part tooling decision

INPUT	QUESTION	EVIDENCE
Surface hardness	How resistant is the near-surface concrete to scratching?	Hardness picks / manufacturer field test; multiple locations.
Abrasiveness	How rapidly does the floor consume the bond and create fines?	Observe segment wear, dust/swarf character and cutting behavior.
Test cut	Does this exact tool/machine combination cut efficiently and leave the intended scratch?	Timed test strip, tool inspection, raking-light scratch check.

11.2 Test-cut ladder

- Mark a representative 50-100 ft² test zone.
- Record machine, weight position, tool SKU/bond, grit, RPM setting and wet/dry condition.
- Run a timed, repeatable pass pattern.
- Measure production by area/time; inspect segment face for glazing or rapid loss.
- Inspect scratch uniformity under low-angle light.
- Change only one variable at a time: bond, segment count, speed, load or travel.
- Record the winning setup on the job sheet before production begins.

ZION METHOD	Build a ZION field database from actual jobs: slab hardness band, observed abrasiveness, tool SKU, machine, head-load position, square feet per hour and tool wear. That dataset becomes the foundation for the future tooling-selector app.

12

PROCESS

Grit Progressions & Transitional Tooling

Every step has one job: replace the previous scratch with a finer, uniform scratch. Do not advance because the schedule says so; advance because the floor passes inspection.

FIELD NOTE	In this chapter: progression logic • transitional tools • cream vs aggregate • scratch acceptance gates

12.1 Universal progression rule

The exact grit numbers vary by tool manufacturer and finish system, but the logic does not. Coarse tools establish flatness/exposure or remove contamination. Intermediate metal tools remove the deep scratch. Transitional tooling converts the metal scratch into a resin-manageable profile. Resin steps progressively refine the surface. Protection and burnishing come only after the mechanical finish is consistent.

The common failure is not “wrong final grit.” It is incomplete scratch replacement at an earlier step.

FINISH TARGET	TYPICAL STARTING STRATEGY	ACCEPTANCE BEFORE ADVANCING
Cream / minimal exposure	Use the least aggressive tool that opens the surface without cutting through cream	Uniform opening; no unintended aggregate exposure; contamination removed.
Salt-and-pepper	Coarser metal to establish light exposure, then refine	Exposure visually consistent within slab flatness limits; coarse scratch fully replaced.
Full aggregate	Aggressive flattening/exposure, often multiple metal steps	Aggregate distribution acceptable; lows/highs disclosed; repair/grout complete; scratch uniform.
Coating prep	Choose tooling for required profile and contaminant/coating removal	Actual surface profile and cleanliness meet coating system requirement.

CRITICAL	Do not make “hybrid pads required above 3,500 psi” a universal rule. The universal rule is that the last metal scratch must be refined enough for the next tooling family. The bridge may be ceramic, copper, hybrid or another manufacturer-designed transition.

12.2 Raking-light gate

Use a bright portable light at a low angle to reveal scratches, waves, debris lines and edge mismatch. Inspect after every major transition, not only at the end. When a previous-grit scratch survives into high polish, the cheapest repair is to return to the earliest step that can reliably remove it—not automatically to a memorized grit number.

13

PROCESS

Wet vs. Dry Grinding

Wet and dry grinding are not competing religions. They are process choices with different cutting, tooling, dust, cleanup and environmental consequences.

FIELD NOTE	In this chapter: cutting behavior • tool life • slurry • when to choose each

DRY GRINDING	WET GRINDING
Immediate visibility and easier transition to dry polishing when extraction is excellent.	Cooling can reduce glazing and heat on some hard/low-abrasion slabs.
Requires effective source capture and silica-control system.	Generates alkaline slurry that must be contained and managed.
Dust can contaminate adjacent spaces if containment is poor.	Slurry can mask scratch pattern until cleaned; cleanup time is significant.
Some tooling is optimized for dry use.	Some metals cut more freely and last differently when wet.

SPEC CHECK	Follow the tooling manufacturer's wet/dry rating. Never assume water is safe around a machine or electrical setup unless the equipment is designed and approved for wet operation.

13.1 Selection logic

- Use dry when dust capture is proven, the tooling is designed for it and cleanup/inspection speed matters.
- Use wet when the tool manufacturer recommends it, heat/glazing demands it or the application benefits from slurry-assisted cutting.
- Price wet work for containment, extraction, settling, disposal and cleanup—not only grinding time.
- Never allow slurry to migrate to drains, soil or public discharge points without a compliant disposal plan.

14

EXECUTION

Edges, Corners & Detail Work

Most clients judge the perimeter at eye level and under raking light. Edge quality is not a cleanup task; it is a parallel polishing process.

FIELD NOTE	In this chapter: grit matching • edge exposure • corners and door frames • ergonomics and dust

14.1 Match the field in real time

Do edge work at each relevant field stage whenever practical. Saving all edges for the end makes it difficult to match scratch depth, aggregate exposure and sheen. Edge tools often cut more aggressively because of higher pressure per contact area, so blindly matching printed grit can still create a mismatch.

Feather the perimeter into the field rather than creating a narrow overworked band. Use low-angle light after each transition. Around door jambs, columns and corners, choose detail tools that preserve the same scratch logic as the main floor.

FIELD NOTE	If the field is beautiful but the first 4-6 inches along every wall are dull, the client sees the failure every time light runs across the room.

PART IV

REPAIRS & POLISHING CHEMISTRY

Repair what the grinding reveals, then use chemistry only where it adds value.

15

REPAIR

Pinhole Grouting, Patches, Pop-outs & Spalls

Grinding reveals the slab's history. Pinholes, aggregate pullout, old anchors, honeycombing and failed patches must be treated as part of the finish—not hidden as surprises.

FIELD NOTE	In this chapter: grout timing • patch compatibility • spalls • repair visibility

15.1 Pinhole grouting

Full aggregate and heavily ground floors often expose small voids around aggregate. A grout coat can fill those voids before final refinement. Grout chemistry, cure time and removal method vary by system; follow the grout manufacturer's instructions.

The practical sequence is usually: establish exposure and major flattening, clean thoroughly, apply grout across the surface, force material into voids, remove excess, cure, then refine/remove the film without pulling the repair back out. Densifier timing depends on the grout system.

SPEC CHECK	Do not standardize "peanut-butter consistency" or a universal 4-hour cure for every grout. Prepackaged cementitious, polymer-modified and reactive grout systems behave differently.

15.2 Patches and spalls

DEFECT	REPAIR PRIORITY	FINISH EXPECTATION
Small pinholes	Fill for cleanliness and visual continuity	May remain visible as tiny color differences.
Aggregate pop-out	Remove unsound edges; use compatible patch	Repair color/aggregate may differ from original concrete.
Large spall	Square/undercut as system requires; rebuild sound edge	Disclose repair outline; decorative match is not guaranteed.
Old anchor hole	Clean depth and fill with compatible repair mortar/resin	Can be treated as an intentional feature or color-matched repair.

16

REPAIR

Joints, Cracks & Semi-Rigid Fillers

A contraction joint, isolation joint and random crack have different movement functions. Repair begins with identification, not with choosing a cartridge.

FIELD NOTE In this chapter: joint taxonomy • semi-rigid filler role • active cracks • expectation setting

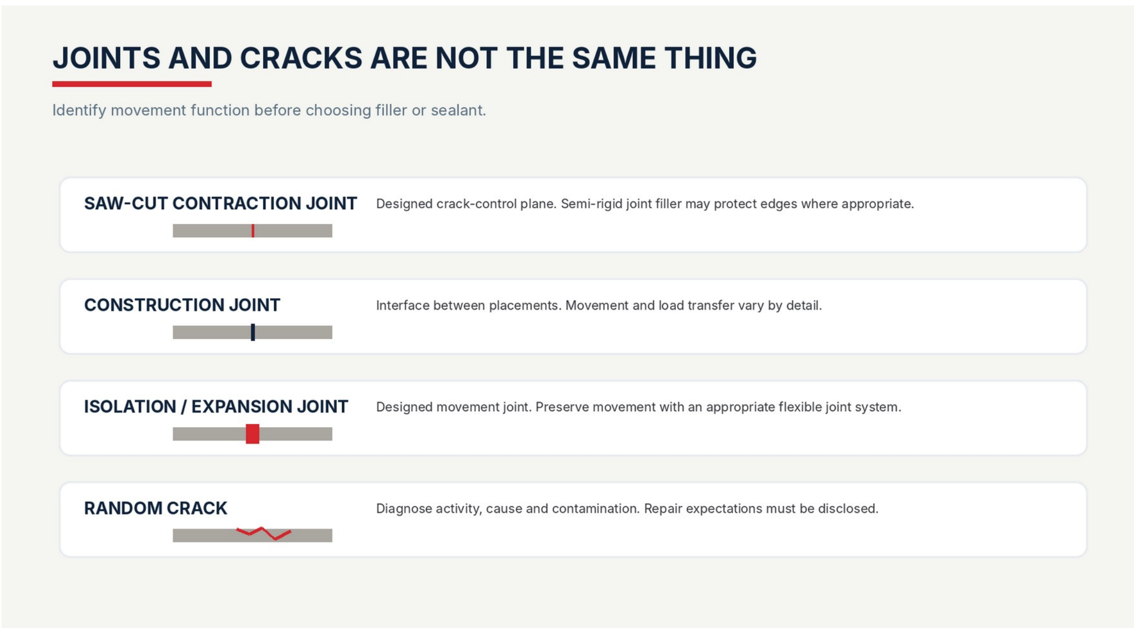

Figure 5. Identify the joint or crack function first. Designed movement joints must not be converted into rigid patches by accident.

16.1 Semi-rigid joint filler

Semi-rigid polyurea or epoxy joint fillers are commonly used to support and protect control-joint edges under hard-wheel traffic. They are not the same as highly flexible expansion-joint sealants. The correct material depends on joint function, movement, service conditions and whether the floor will be polished or coated.

For polished floors, a filled joint usually remains visible. Do not promise that cracks will “disappear completely.” A professional scope states whether the repair is structural, functional, cosmetic or all three.

16.2 Active random cracks

If a crack is moving, filling it flush with a rigid material can simply move the failure to the edge of the patch. Determine whether movement is ongoing and whether the condition requires engineering review. Flexible sealants can accommodate movement but do not polish flush like concrete. In many architectural floors, the correct solution is to stabilize what can be stabilized and disclose the visible repair as part of the finished floor’s character.

CRITICAL	Do not bridge designed isolation/expansion joints with a rigid coating or filler unless the system is specifically designed to accommodate that movement and the project detail allows it.

17

CHEMISTRY

Densifiers

Densifier is not a magic gloss chemical. It is a reactive treatment that can improve surface hardness and dusting resistance when the concrete is open, clean and able to accept the product.

FIELD NOTE	In this chapter: silicate families • porosity • application behavior • why universal dilution tables fail

17.1 What silicate densifiers do

Lithium, sodium, potassium and blended silicate densifiers react with available calcium-bearing phases in concrete to form additional cementitious reaction products within the near-surface pore structure. Product chemistry, solids, carrier and additives differ by manufacturer.

The practical goal is controlled penetration and reaction without leaving excess residue on the surface. Concrete that is extremely porous may absorb product rapidly; dense or previously treated concrete may accept very little.

FAMILY	GENERAL CHARACTER	FIELD NOTE
Lithium silicate	Common in polished concrete; generally low residue potential in well-formulated products	Do not assume “smallest molecule = deepest penetration” as the only selection rule; formulation matters.
Sodium / potassium silicate	Long-established densifier chemistries with different alkalinity and solids characteristics	Application and residue management are product-specific.
Colloidal silica / hybrid systems	Nano-scale silica dispersions or blended reactive systems	Follow the exact TDS; may be positioned for early-age or specialty performance.

17.2 Replace the universal titration table with a calibration protocol

- Confirm the floor is completely clean and free of grinding dust.
- Perform a small absorption/wetting test only as a field indicator—not as permission to dilute product.
- Read the TDS coverage range and application method.
- Apply a test section at the manufacturer rate.
- Watch absorption, wet edge, foaming/residue behavior and surface response.
- Adjust application quantity only within manufacturer instructions.

- Remove or redistribute excess before it dries if the TDS requires it.
- Document product lot, coverage and cure before resin polishing.

CRITICAL	Never publish a universal rule telling contractors to dilute a densifier 1:1, 3:2 or any other ratio unless that exact product's manufacturer permits it. Dense concrete normally absorbs less material than porous concrete, so coverage logic must be based on the product and substrate—not a reversed generic table.

18

CHEMISTRY

Guards, Stain Protection & Burnishing

A polished floor can have high mechanical gloss and still stain. Protection systems must be selected for the owner's exposure, maintenance program and appearance expectations.

FIELD NOTE	In this chapter: penetrating vs film-forming • stain protectors • burnishing • heat management

PROTECTION FAMILY	WHAT IT DOES	USE WHEN
Penetrating water/oil repellent	Reduces liquid uptake with minimal film	Appearance must remain natural and exposure is moderate.
Reactive/penetrating stain protector	Combines reactive chemistry and repellency depending on formulation	General polished-concrete protection where manufacturer system supports it.
Microfilm / topical guard	Creates a thin sacrificial film for stain and wear management	Retail, food, public spaces where predictable maintenance is important.
Film coating	Builds a true polymer film	When coating performance is desired rather than traditional exposed polished concrete.

18.1 Burnishing is a system step, not a universal RPM recipe

Burnishing can improve appearance, consolidate certain guards and remove minor haze, but the correct pad, machine speed and timing depend on the chemical system. The original guide's universal "mirror burnish" RPM/ft-min table created false precision.

Instead, follow the guard/pad manufacturer's burnish instructions. Start on a clean, cool floor, keep the machine moving, inspect for heat/discoloration and document the approved process on a mockup. A high-speed burnisher is not a substitute for incomplete scratch refinement.

CRITICAL	Do not equate a specific Ra surface-roughness value with "mirror finish." Roughness, gloss and image clarity are different measurements. Chapter 28 separates them.

19

DECORATIVE

Decorative Staining & Color

Color turns substrate variability into a design feature—but also increases the need for mockups, chemistry compatibility and expectation control.

FIELD NOTE In this chapter: acid-reactive color • water/dye systems • neutralization • UV and protection

COLOR SYSTEM	CHARACTER	WATCH-OUT
Acid-reactive stain	Mineral reaction creates variegated, translucent color	Results depend on slab chemistry; neutralization/cleaning must follow product instructions before protection.
Water-based stain	Pigment/dye dispersion offers wider, more controllable colors	Compatibility with densifier/guard and UV exposure varies by product.
Concrete dye	Fine colorants can produce vivid translucent color	Some dyes have limited UV stability; use only where protected by the specified system.

SPEC CHECK Do not standardize a baking-soda neutralization recipe for every acid stain. Follow the stain manufacturer’s neutralization, rinsing and pH-verification procedure.

PART V

COATING & FLOOR SYSTEMS

Choose the assembly around the environment, not the product name.

20

COATING PREP

Surface Profile & Coating Preparation

Resinous floors fail at the interface. The substrate must be sound, clean and profiled to the requirement of the exact system.

FIELD NOTE	In this chapter: ICRI CSP concept • mechanical prep • edge prep • cleanliness verification

20.1 CSP is a measured/compared surface profile—not a grit chart

ICRI 310.2R-2013 Concrete Surface Profile (CSP) classifications describe benchmark profile severity for surface preparation. A 30-grit grinder can produce different profiles on different concrete with different machines. Therefore, “30-50 grit = CSP 2” is only a rough field expectation, not a specification.

When a coating specification requires a particular CSP, create the profile with appropriate equipment and verify it using the specified comparator or test method. Prepare edges, corners and repairs to the same intent as the field.

METHOD	COMMON USE	PROFILE CHARACTER
Diamond grinding	Thin-film to moderate-build coatings; removal of laitance and existing films	Controlled, generally lower profile; actual CSP varies.
Shot blasting	Large commercial/industrial floors	Uniform mechanical profile and high production when slab/access permit.
Scarifying / milling	Heavy removal, thick coatings, severe contamination	Aggressive profile; usually requires follow-up refinement.
PCD + grinding	Soft/thick coating removal followed by concrete prep	PCD removes film; a separate grinding step establishes final profile.

CRITICAL	”The coating failed” is often an incomplete diagnosis. Adhesion can be defeated by moisture, contamination, weak concrete, wrong profile, dust, missed recoat windows, mix errors, off-ratio material or cure conditions.

21

COATINGS

Epoxy Systems

Epoxy is a chemistry family with enormous range: primers, 100% solids body coats, moisture-mitigation systems, novolacs and decorative metallic systems behave differently.

FIELD NOTE In this chapter: solids and DFT • pot life vs working time • recoat windows • specialty epoxies

EPOXY TYPE	COMMON ROLE	NOTES
Waterborne / water-reducible epoxy	Primer or light-duty coating	Low odor; film build and moisture tolerance are formulation-specific.
100% solids epoxy	High-build body coat, broadcast base, grout coat	“100% solids” describes volatile content/volume solids, not automatically zero VOC or universal performance.
Novolac epoxy	High chemical-resistance environments	Often chosen for aggressive acids/chemicals; verify exact chemical-resistance chart.
Moisture-mitigation epoxy	Controls vapor transmission for compatible flooring systems	Requires specific substrate prep, thickness and test data; not interchangeable with standard epoxy.

21.1 Pot life is not the same as usable working time

Material in a mixing pail can heat rapidly because polymerization is exothermic. The practical working time on the floor can differ from the stated pot life. Stage crew, squeegees, rollers, spike shoes and broadcast material before mixing. Use measured mix ratios and full mechanical mixing of the container sides/bottom as the TDS requires.

Recoat windows are product-specific. If the window is missed, mechanical abrasion and cleaning may be required before the next coat.

SPEC CHECK Avoid universal claims such as “all 100% solids epoxy is zero VOC” or “epoxy requires 50-85°F.” Use the exact product’s TDS/SDS for VOC, temperature, humidity, dew-point and cure limits.

22

COATINGS

Polyurea & Polyaspartic Systems

Fast-cure systems can compress schedules, but speed increases the penalty for poor staging, hot material, moisture, thin spots and missed recoat windows.

FIELD NOTE In this chapter: fast-cure chemistry • UV stability • flake systems • temperature management

22.1 Understand the names

Polyurea is a broad reaction chemistry; polyaspartic coatings are a type of aliphatic polyurea chemistry engineered for manageable cure and UV stability. Product behavior varies widely. Some are designed as direct-to-concrete base coats; others are best used as UV-stable topcoats over epoxy or other body coats.

Do not market "polyaspartic" as automatically superior in every property. Evaluate adhesion, working time, UV stability, chemical resistance, abrasion, coefficient of friction, moisture tolerance and installed film thickness as a system.

22.2 Full-broadcast flake workflow

- Mechanically prepare to the system requirement and edge the full perimeter.
- Repair cracks/joints according to movement function; do not bridge movement joints blindly.
- Prime if required by system and slab condition.
- Apply base/body coat at specified spread rate.
- Broadcast flake to rejection while base remains open.
- Cure, scrape in controlled directions and vacuum thoroughly.
- Apply one or more clear coats at specified film build; add traction media if required.
- Protect from traffic until the exact product cure requirement is met.

FIELD NOTE In hot weather, the crew and material logistics determine success. Smaller mix sizes, staged broadcast bags and a defined cut-in/roll sequence can matter more than adding workers after material is already reacting.

23

INDUSTRIAL SYSTEMS

Cementitious Urethane & Industrial Resinous Floors

Commercial kitchens and food/process environments often demand more than conventional epoxy. Cementitious urethane is a major missing system in basic flooring guides.

FIELD NOTE	In this chapter: thermal shock • moisture tolerance • heavy-duty coves • industrial selection

Cementitious urethane (urethane concrete / polyurethane-cement) combines resin chemistry with cementitious and aggregate components to create a heavy-duty topping. Depending on formulation, these systems can offer strong thermal-shock resistance, moisture tolerance, chemical resistance and impact performance—reasons they are common in food, beverage, commercial kitchen and wet-process environments.

Thickness is part of performance. Many systems are installed substantially thicker than decorative garage coatings and may include broadcast aggregate and integral cove base. Selection must follow the manufacturer's service-temperature, chemical, moisture and substrate requirements.

ENVIRONMENT	SYSTEM QUESTION
Commercial kitchen / dish area	Hot-water washdown? grease? thermal cycling? slip requirement? cove detail?
Food plant	Sanitation chemistry, thermal shock, impact, downtime, drain details, substrate moisture.
Battery / chemical room	Exact chemical concentrations and contact duration; consider novolac/specialty resin systems.
Warehouse	Wheel traffic, impact, joints, moisture, UV at doors, line-marking and maintenance needs.

CRITICAL	"USDA compliant" should not be used as a blanket product claim unless the exact requirement and project authority are identified. Specify cleanability, seamless detailing, coves, chemical resistance and applicable food-facility standards instead.

24

SPECIALTY

Overlays, Microtoppings & Specialty Systems

When the original slab cannot deliver the requested appearance, an engineered topping may be the right floor rather than grinding deeper and deeper.

FIELD NOTE

In this chapter: self-leveling underlayments vs wear surfaces • microtoppings • decorative toppings • substrate movement

SYSTEM	TYPICAL ROLE	KEY RISK
Self-leveling underlayment	Flattening / receiving floor covering; some products are polishable wear surfaces	Do not assume every SLC can be polished or left exposed.
Polishable overlay	Creates a new cementitious wear surface designed for grinding/polishing	Primer, thickness, cure and moisture requirements are critical.
Microtopping	Thin decorative cementitious finish	Substrate movement can telegraph; sample color/texture before job.
Polymer-resin overlay	Decorative or functional resin surface	Chemistry and preparation requirements differ from cementitious systems.

SPEC CHECK

The original guide treated cure times and pricing as universal. For overlays, follow the exact system TDS for primer, placement thickness, cure before grinding and protective topcoat. Price from job cost, not a national “per-square-foot” assumption.

25

SAFETY / SPECIFICATION

Slip Resistance & Traction

A shiny floor is not automatically slippery, and a rough floor is not automatically safe. Traction depends on surface, contaminants, footwear, cleaning and the test method used.

FIELD NOTE In this chapter: no universal ADA COF number • traction media • wet conditions • maintenance

25.1 Correct the ADA myth

The 2010 ADA Standards for Accessible Design, Section 302.1, require floor and ground surfaces to be stable, firm and slip resistant. They do not prescribe a universal numerical coefficient of friction. The often-quoted 0.6 and 0.8 values came from older advisory guidance and should not be represented as current ADA requirements.

When traction performance is specified, use the test method, threshold and condition required by the project, manufacturer, authority having jurisdiction or applicable industry standard. Record whether testing is dry, wet, contaminated or otherwise conditioned.

TRACTION STRATEGY	EFFECT
Fine polymer / silica additive	Adds microtexture with relatively subtle visual change; durability depends on system.
Aluminum oxide / mineral broadcast	Aggressive, durable texture; can make cleaning harder and change appearance.
Broadcast quartz / aggregate	Creates high-profile resinous surface for industrial/wet areas.
Mechanical profile	Surface texture is built into substrate or coating; select carefully to preserve cleanability.

FIELD NOTE Traction and cleanability are often competing goals. Restaurants and kitchens need a surface that resists slip when contaminated but can still be effectively scrubbed. Build the maintenance program into the specification.

PART VI

JOB EXECUTION & QUALITY

Turn technical knowledge into a repeatable production system.

26

EXECUTION

The Complete Job Workflow

The best crews use gates: every stage is inspected and signed off before the next stage begins. This prevents small defects from becoming expensive polished defects.

FIELD NOTE In this chapter: pre-work gate • process gate • chemical gate • final acceptance

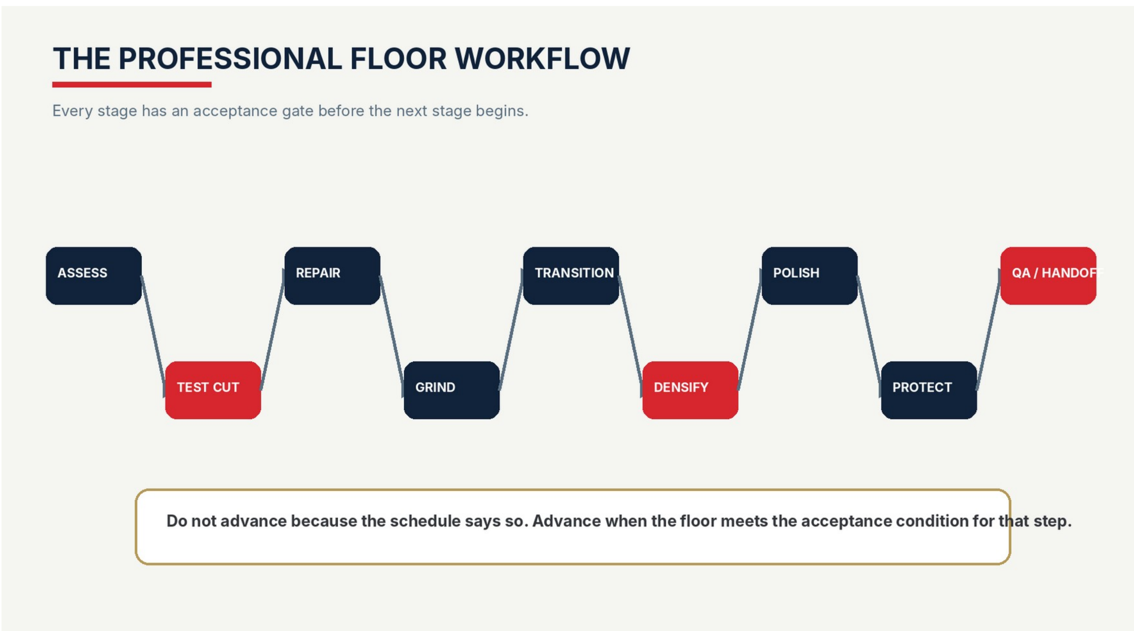

Figure 6. Professional execution is a sequence of acceptance gates, not a race through grit numbers.

26.1 Pre-work gate

☐ Scope and finish sample approved in writing.

☐ Substrate mapped: cracks, joints, repairs, coatings and contamination.

☐ Hardness/test-cut documented; tooling staged.

☐ Moisture results complete where system requires.

☐ Power, water, dust containment and slurry plan confirmed.

☐ Adjacent work protected; owner/GC notified of noise, access and cure restrictions.

26.2 Grinding/polishing gate

☐ Each grit replaces the prior scratch across field and edges.

☐ Tool wear is even; no glazing or missing segments.

☐ Floor is cleaned between contamination-sensitive steps.

☐ Repairs/grout are complete before the progression can trap defects.

☐ Densifier/guard timing follows product instructions.

☐ Raking-light inspection completed before moving to high-polish steps.

26.3 Final handoff

☐ Appearance compared to approved sample under agreed lighting.

☐ Edges/corners match field intent.

☐ Repairs/joints reviewed and disclosed.

☐ Protection/guard fully cured for allowed traffic.

☐ Owner receives cleaning chemistry, pads and maintenance frequency.

☐ Final photos and job record archived.

27

FIELD APPLICATIONS

Six Real Job Walkthroughs

These examples are not universal recipes. They show how the decision framework changes with the floor, system and risk.

FIELD NOTE	In this chapter: garage flake • retail polish • warehouse aggregate • commercial kitchen • cream polish • maintenance restore

JOB 1 — 600 ft² RESIDENTIAL GARAGE / FULL-BROADCAST FLAKE

Assessment: eight-year-old slab, localized oil contamination, one dormant random crack, no designed movement joint to bridge. Goal: durable decorative garage floor with UV-stable clear finish.

Sequence: degrease and extract until the concrete wets uniformly; mechanically prepare the slab and edges to the coating-system profile; repair the dormant crack with the specified repair material; vacuum and inspect; prime if required; apply base coat; full broadcast to rejection; cure and scrape; vacuum; apply the specified clear coat(s) with traction additive if requested; protect from vehicle traffic for the product-defined cure.

FIELD NOTE	The site visit creates premium value because the contractor can explain contamination risk, joint behavior, moisture testing and why the system is layered—not simply quote “one-day epoxy.”

JOB 2 — 4,200 ft² RETAIL SHOWROOM / SALT-AND-PEPPER POLISH

Assessment: burnished entry zone, otherwise consistent commercial slab. Test cut identifies one tooling setup for the field and a slightly more open bond at the dense entry.

Sequence: establish light exposure while preserving a consistent aggregate class; refine the metal scratch through the manufacturer’s transitional system; grout pinholes if required; apply densifier at TDS rate; complete resin sequence; apply approved stain protector/guard; burnish only as the chemical system directs. Inspect edge/field appearance every night before reopening.

JOB 3 — 22,000 ft² WAREHOUSE / FULL AGGREGATE

Assessment: hard/low-abrasion surface, previous treatment, significant floor variation. Mockup demonstrates that perfectly uniform aggregate would require excessive cutting in low areas; client approves a “uniform overall character” standard.

Sequence: remove treatment; flatten/expose with high-production planetary equipment; continuously record tool wear and square feet/hour; refine through metal and transitional phases; grout; densify; polish; protect; final gloss/appearance testing per specification. Chalk lines and zone maps keep multiple machines synchronized.

JOB 4 — 800 ft² COMMERCIAL KITCHEN / HEAVY-DUTY RESINOUS FLOOR

Assessment: grease contamination, old coatings, hot-water cleaning and floor drains. Instead of defaulting to conventional 100% solids epoxy, evaluate cementitious urethane or another industrial system based on thermal shock, chemistry and sanitation needs.

Sequence: decontaminate; remove all unsound coating; mechanically prepare to the specified profile; repair concrete and detail drains/coves; perform moisture testing required by the system; install primer/body/broadcast/topcoat or cementitious urethane assembly at specified thickness; preserve designed movement joints; allow cure before service.

JOB 5 — 1,800 ft² NEW HOME / CREAM POLISH

Assessment: new slab with curing treatment and client demand for minimal aggregate. Create a mockup before full production because cream is the least forgiving exposure class.

Sequence: use the least aggressive approved opening tool that removes treatment without cutting through the paste-rich surface; clean; densify if the specified system calls for it; refine with manufacturer-compatible polishing tools; protect; final burnish only as required. The goal is preservation, not “one light 100-grit pass” by rote.

JOB 6 — 12,000 ft² OFFICE / QUARTERLY RESTORATION

Assessment: dull traffic lanes, scuffs and worn protection; base polished surface is intact. Begin with cleaning chemistry and the least aggressive maintenance pad that restores appearance. Escalate only if scratches extend below the maintenance system.

Sequence: deep scrub; diamond-impregnated maintenance pads as needed; spot repair guard/protector according to system; burnish; record gloss/appearance; adjust maintenance frequency at entry zones. Recurring service protects the owner’s floor and stabilizes contractor revenue.

28

QUALITY CONTROL

Finish Verification: Scratch, Gloss, DOI & Appearance

A professional finish is verified with the measurement that matches the requirement. Do not call Ra, gloss or "mirror" the same thing.

FIELD NOTE	In this chapter: scratch inspection • gloss units • image clarity/DOI • surface roughness

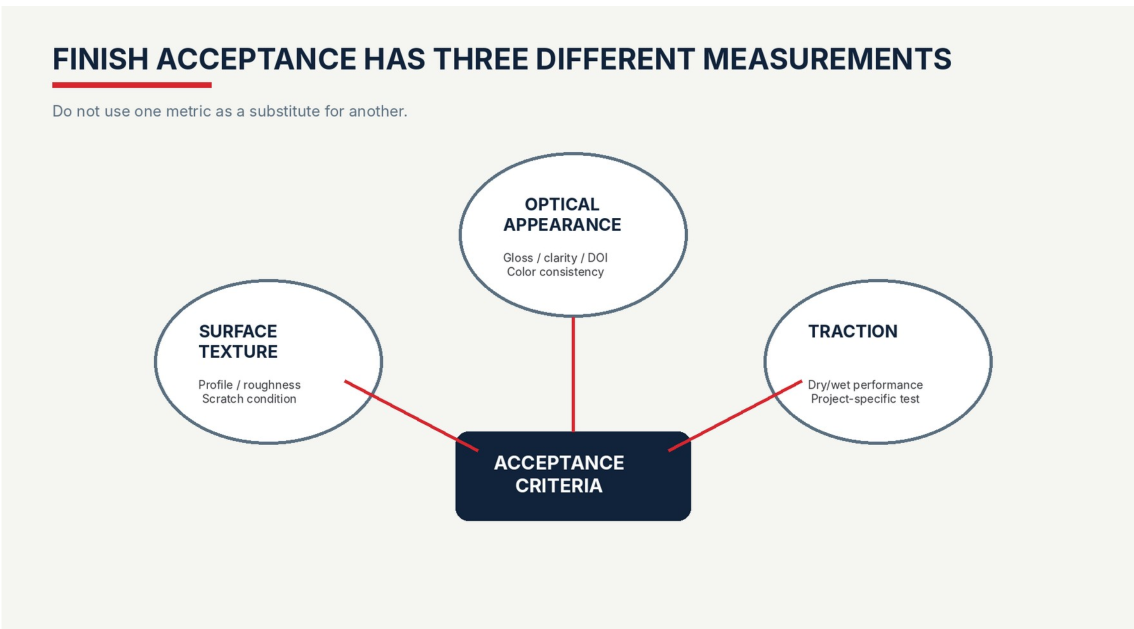

Figure 7. Surface texture, optical appearance and traction are different acceptance categories.

28.1 Scratch condition

Raking light is the fastest field tool for scratch quality. Inspect from multiple directions because a scratch can disappear when viewed parallel to light and reappear at another angle. Use the approved mockup as the visual standard for edge match, aggregate exposure and repair visibility.

28.2 Gloss and clarity

Gloss meters report specular reflectance in gloss units (GU) using defined geometry. Image clarity / distinctness-of-image (DOI) describes how sharply reflected objects appear. A floor can have high gloss with poor clarity if waviness, micro-scratches or haze scatter the reflection.

When quantitative optical acceptance is required, use the project specification and a defined acceptance method. The current CPC appearance chart separates DOI/image clarity, optional gloss and haze rather than using grit number or Ra as a substitute for finished appearance.

CPC LEVEL	AVERAGE DOI	OPTIONAL AVERAGE GLOSS	AVERAGE HAZE
1 - Exposed/Flat	0-9	<10	<12
2 - Exposed/Satin	10-39	5-25	<12
3 - Polished	40-69	>35	<12
4 - Highly Polished	>70	>50	<12

CPC compliance protocol: use ASTM D5767-18(2023) for DOI/image clarity and ASTM D4039-09(2023) for haze, with calibrated instruments. CPC calls for at least three test locations up to 1,000 ft2 and one additional test for each additional 1,000 ft2 or fraction. Measure before post-polish surface treatments; the current CPC chart also calls for measurements within 72 hours of polish completion and before other trades access the floor. ASTM D523-25 is the active ASTM method for specular gloss when that metric is specified.

28.3 Surface roughness

Profilometers measure texture metrics such as Ra, Rz and other parameters. These can be useful for engineered processes, but a specific Ra does not automatically equal “satin,” “high gloss” or “mirror.” Use roughness only when the project or internal process control specifically calls for it.

CRITICAL Remove the original “400 grit = Ra 60-80, 3000 = Ra 6-12, burnish = Ra 2-6 = mirror” table. It presents a non-universal relationship as an engineering standard.

29

SAFETY

Silica, Slurry & Compliance

Silica control and slurry disposal must be written around current regulatory requirements and the specific task—not around one vacuum filter label or one respirator rule.

FIELD NOTE	In this chapter: OSHA Table 1 • written exposure plan • respirators • slurry containment

29.1 Respirable crystalline silica

Grinding concrete can generate respirable crystalline silica. In the United States, construction work is governed by OSHA 29 CFR 1926.1153. Employers may fully and properly implement the engineering/work-practice controls and respiratory protection specified in Table 1 for listed tasks; otherwise the alternative exposure-control provisions apply. Under those provisions, the PEL is 50 micrograms per cubic meter as an 8-hour TWA, with an action level of 25 micrograms per cubic meter.

The silica program must include a written exposure control plan, required competent-person oversight, training and compliant housekeeping. OSHA restricts dry sweeping/dry brushing where it could contribute to silica exposure unless methods that minimize dust are not feasible, and restricts compressed-air cleaning unless the dust cloud is effectively captured or no alternative is feasible.

TABLE 1 TASK	REQUIRED CONTROL SUMMARY	RESPIRATOR
Handheld grinder - dry, non-mortar	Shroud + dust collector; follow manufacturer. Collector: >=25 cfm/in. wheel, >=99% filter efficiency, plus cyclonic pre-separator or filter-cleaning mechanism.	Outdoors: none. Indoors/enclosed: none <=4 hr; APF 10 >4 hr.
Walk-behind floor grinder	Integrated water delivery OR manufacturer-recommended dust collection; operate/maintain per manufacturer instructions.	None under Table 1 when controls are fully implemented.
Outside Table 1 / controls incomplete	Follow 29 CFR 1926.1153(d) alternative exposure-assessment and control requirements.	Select per exposure and OSHA respiratory-protection requirements.

Respiratory protection for construction is addressed by 29 CFR 1926.103, which applies the requirements of 29 CFR 1910.134. When a tight-fitting respirator is required, fit testing is required before initial use, whenever a different facepiece is used, and at least annually thereafter. Facial hair or stubble that crosses the sealing surface is not permitted because it interferes with the face seal.

CRITICAL	Do not state that every grinder operator always needs a P100 half-mask or that “H13/H14 is mandatory” under OSHA. Use the current rule and task-specific control requirements.

29.2 Slurry containment

Wet grinding slurry and process water contain cementitious solids and can be highly alkaline. Treat them as controlled construction wastewater: contain and collect them, and keep uncontrolled discharge out of storm drains and waters. EPA construction-stormwater requirements prohibit concrete-washout wastewater discharges unless managed by appropriate controls; state, local and site requirements may be more specific.

A good job file records approximate volume, containment method, settling/processing method, disposal destination and any required approvals. Do not assume settled, clear or pH-adjusted water is automatically legal to discharge. Sanitary-sewer/POTW discharge is governed by pretreatment requirements and local limits and may require approval from the applicable control authority.

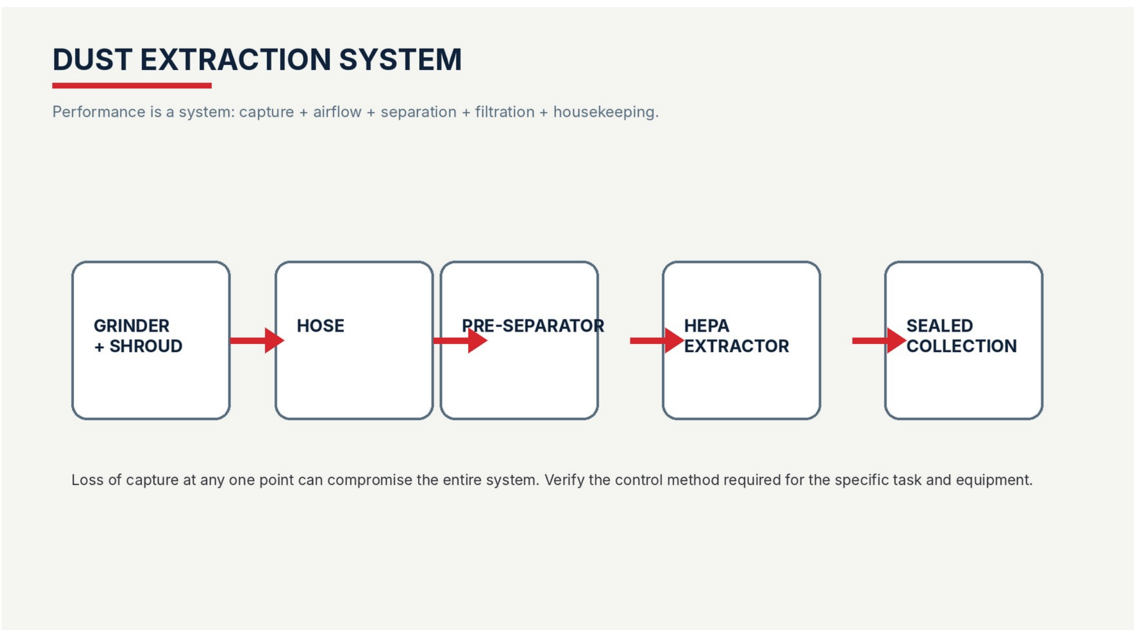

Figure 8. Dry work requires a complete capture-and-filtration system; wet work replaces airborne dust with a slurry-management obligation.

30

DIAGNOSIS

Troubleshooting & Remediation

The best troubleshooting question is not "what grit fixes this?" It is "what changed, what evidence do I see, and what is the earliest step capable of correcting it?"

FIELD NOTE	In this chapter: scratch matrix • tooling failure • chemical residue • coating defects

SYMPTOM	LIKELY CAUSES	DIAGNOSTIC / CORRECTION
Ghost scratches at high polish	Earlier scratch not fully replaced; debris; edge mismatch	Raking-light trace to earliest visible scratch; return to the least aggressive step that can remove it.
Tool not cutting / polished segment face	Bond too hard for actual abrasiveness, low load, wrong speed, loaded segment	Condition or change bond per manufacturer; verify head load and test cut.
Segments disappearing rapidly	Bond too soft for abrasive slab, excessive load, unsuitable wet/dry use	Try harder bond / revised setup; track wear per ft^2.
White densifier residue	Excess product, dirty surface, dried chemistry	Follow product remediation; do not automatically regrind/re-densify without identifying chemistry.
Uneven gloss	Incomplete scratch refinement, contamination, slab variation, uneven protection	Separate mechanical vs chemical cause; compare mockup and zone history.
Coating fisheyes	Silicone/oil/water contamination	Stop and isolate source; repair according to coating manufacturer.
Coating delamination	Moisture, contamination, weak concrete, insufficient profile, mix/cure error	Failure analysis before recoat; remove to sound substrate and correct root cause.

30.1 Seven-step decision tree

- Stop production before the defect spreads.
- Define the exact pattern: location, direction, color, sheen, depth.
- Ask what changed from the area that worked.
- Inspect tooling and machine condition.
- Inspect the floor under raking light and with cleanliness/wetting tests as relevant.

- Change one variable at a time in a small test area.
- Document the successful correction before restarting full production.

FIELD NOTE	A photo of the tool face plus a low-angle photo of the scratch pattern often tells more than a phone description saying “the floor is not polishing.”

31

MAINTENANCE

Maintenance, Restoration & Recurring Service

A polished or coated floor is a maintained asset. The contractor who installs the system should own the maintenance instructions—and can often own the recurring service.

FIELD NOTE	In this chapter: daily cleaning • diamond maintenance pads • guard renewal • recurring revenue

FREQUENCY	POLISHED CONCRETE	RESINOUS COATING
Daily / routine	Dust mop or auto-scrub with manufacturer-approved neutral cleaner; remove grit	Sweep/scrub with compatible cleaner; remove oils and abrasive debris.
Periodic	Diamond-impregnated maintenance pads or burnish as protection system allows	Deep scrub; inspect traction, topcoat wear and joints.
Restoration	Progressive maintenance pads, spot protector/guard renewal, localized repolish	Abrade/recoat within system rules; repair gouges and worn traffic lanes.
Annual review	Gloss/appearance map, joint condition, stain protection and traffic plan	Film thickness/wear, UV exposure, chemical damage, slip resistance and recoat planning.

ZION METHOD	Sell a maintenance plan at handoff. The owner gets a floor that stays consistent; the contractor gets predictable recurring work and early visibility into problems before they become replacements.

PART VII

BUSINESS SYSTEMS

Price the risk, document the floor and build a repeatable operation.

32

BUSINESS

Estimating, Job Costing & Pricing

Square-foot pricing is useful only after you know what one square foot costs you on this floor.

FIELD NOTE	In this chapter: direct labor • tool consumption • equipment cost • overhead and margin

COST COMPONENT	INCLUDE
Direct labor	Crew hours, supervisor time, travel, setup, cleanup and overtime.
Diamond tooling	Actual expected consumption by slab behavior and finish—not an average from an easy job.
Chemicals / coatings	TDS coverage, film thickness, waste, primer, repairs, flakes/aggregate, solvents/cleaners.
Equipment	Depreciation or rental, maintenance reserve, generator, vacuum, mobilization.
Disposal / containment	Slurry, coating debris, dust bags, hazardous/special waste if applicable.
Overhead	Insurance, vehicle, phone, software, warehouse, sales, admin.
Risk allowance	Unknown coating thickness, contamination, access restrictions, schedule compression.
Profit	Return for owning the business and carrying risk—not whatever remains.

BASIC PRICE MODEL

Price = direct job cost ÷ (1 – target gross margin)

Example: $10,000 direct/allocated job cost at a 30% target gross margin → $14,286 selling price. Confirm your accounting definitions before using margin formulas.

32.1 Use production assumptions you can defend

Production rates must be tied to machine, step, crew, access and slab behavior. Track square feet per labor-hour and square feet per machine-hour for each major step. The job history becomes more valuable than generic national pricing.

Market price ranges can be included as dated local context, but they should be labeled illustrative. Never let a competitor's low square-foot number replace job costing.

SPEC CHECK	The original pricing tables should be relabeled as illustrative market examples, not timeless U.S. pricing. Update them periodically for DFW or whichever market ZION is targeting.

33

SALES

Site Visits, Scope, Sales & Contracts

Technical sales works when the contractor can show the customer what is actually happening on the floor and translate it into risk, options and price.

FIELD NOTE	In this chapter: site-visit close • scope language • change orders • warranty expectations

33.1 The site-visit advantage

A competitor who quotes from a phone photo is selling a square-foot number. The site-visit contractor can show moisture risk, burnished zones, joint movement, contamination, flatness and exposure variability. That expertise justifies a professional scope and premium price.

The strongest sales language is specific to the floor in front of you: “This darker area is oil contamination. Before I promise adhesion, I need to remove it and confirm the concrete wets uniformly. Here is how that changes the process.” Education makes the price logical.

33.2 Scope essentials

☐ Exact system and finish description, including aggregate exposure and optical target.

☐ Included and excluded repairs; joint treatment by type.

☐ Existing coating/contamination assumptions.

☐ Moisture test responsibility and system limits.

☐ Mockup/sample acceptance procedure.

☐ Access, power, water, temperature and schedule assumptions.

☐ Protection and cure before traffic.

☐ Change-order method for concealed conditions.

☐ Maintenance requirements and warranty exclusions written in plain language.

FIELD NOTE	Do not promise that repaired cracks will disappear, that aggregate will be perfectly uniform, or that a coating will overcome moisture beyond its tested limits. Clear expectations close better jobs and reduce callbacks.

34

BUSINESS SYSTEMS

Building a Repeatable Flooring Business

The scalable company is not the one with the most grinders. It is the one that turns field decisions into data, standards, training and repeatable customer outcomes.

FIELD NOTE	In this chapter: job data • crew systems • maintenance revenue • education platform

34.1 Build the operating system

- Standard site-assessment form with photos and floor map.
- Test-cut record tied to machine/tooling SKU and production.
- Crew QA sign-offs at each process gate.
- Job costing by step, not only total job.
- Maintenance-plan offer at every handoff.
- Before/during/after content captured systematically.
- Post-job review: what surprised us, what changed cost, what becomes a new standard.

34.2 Turn field knowledge into a moat

Every job can improve ZION's education and tooling recommendation system. Store the substrate observations, tool setup, production rate, wear, chemical coverage and failure/correction data. Over time, that turns contractor experience into a technical knowledge base competitors cannot copy from a product catalog.

The long-term position is larger than equipment sales: a technology and education company that understands concrete and surface preparation deeply enough to recommend the process, machine, tooling, chemistry and business system around the job.

ZION METHOD	Use this book as the public knowledge layer. Use job data, tooling maps, training videos and software tools as the living layer. The book establishes authority; the platform keeps the authority current.

APPENDICES

FIELD REFERENCE

The following pages are designed to be printed, laminated or copied into a digital job packet. Replace generic starting points with product- and machine-specific values as ZION validates its own equipment and chemistry.

APPENDIX A

Field Quick Cards

A1 — Bond selection decision

OBSERVED FLOOR / TOOL	TRY FIRST
Tool glazes; slab feels hard and produces little abrasive dust	Move toward a softer/open bond or manufacturer conditioning method.
Tool wears rapidly; slab is soft/abrasive and produces heavy fines	Move toward a harder bond and reassess load/segment count.
Cut is slow but tool face is open	Evaluate head load, active segment count, travel speed and geometry before changing grit.
Different zones behave differently	Zone the floor and change tooling where behavior changes. Do not force one bond across the entire slab.

A2 — Scratch replacement gate

☐ Previous scratch is no longer visible under raking light.

☐ Field and edge scratch character match.

☐ No debris scratches, swirl concentration or chatter pattern.

☐ Tool face is healthy; no glazing or missing segment.

☐ Floor is clean before changing tooling family or applying chemistry.

A3 — Coating prep gate

☐ Unsound concrete removed.

☐ Contamination addressed and wetting/cleanliness verified.

☐ Moisture data documented where required.

☐ Profile meets the coating-system requirement—not merely a chosen grit.

☐ Edges/corners match field intent.

☐ Dust removed; no loose aggregate.

☐ Temperature, humidity and dew-point conditions within TDS.

APPENDIX B

Pre-Job Assessment Checklist

☐ Client / GC / address / contact information.

☐ Measured floor area by zone.

☐ Current use and required return-to-service time.

☐ Existing floor system / coating / curing compound identified.

☐ Hardness observations at 5+ representative locations.

☐ Controlled test cut completed and tooling setup recorded.

☐ Aggregate exposure / finish target approved with sample or reference.

☐ Cracks mapped: random active/dormant; joints classified by function.

☐ Spalls, holes, anchors, pop-outs and repair areas mapped.

☐ Oil / silicone / chemical contamination mapped.

☐ Moisture test requirement and results documented.

☐ Power: voltage / phase / amperage / cord and generator plan.

☐ Dust control / containment / adjacent-space protection plan.

☐ Wet work / slurry / disposal plan.

☐ Temperature, RH, dew-point and HVAC constraints.

☐ Access, loading, elevator, door width and equipment transport.

☐ Working hours / noise restrictions / cure traffic restrictions.

☐ Protection of walls, racks, drains, equipment and finished surfaces.

☐ Crew, tooling, spares, chemicals and PPE staged.

☐ Photos taken before mobilization and attached to job file.

APPENDIX C

Crew QA Sign-Off

PROCESS GATE	LEAD INITIAL / NOTES
Floor mapped and test cut approved	
Repairs/joints complete for current stage	
Coarse exposure / prep accepted	
Metal scratch fully refined	
Transitional scratch accepted	
Floor cleaned before densifier / primer	
Chemical application lot/coverage recorded	
Resin progression accepted under raking light	
Edges/corners match field	
Protection / topcoat complete and cure recorded	
Final appearance / gloss test complete if specified	
Owner maintenance handoff complete	

APPENDIX D

Coverage & Production Math

DENSIFIER / GUARD VOLUME

Gallons = floor area ÷ manufacturer coverage × number of coats × waste factor

Use the TDS coverage range for the actual substrate condition. Do not use a universal porosity/dilution table.

100% SOLIDS / VOLUME-SOLIDS COATING THEORY

Gallons = area × target DFT (mils) ÷ (1,604 × volume-solids fraction)

If target DFT is the TOTAL system thickness, do not multiply again by coat count. If using per-coat DFT, calculate each coat separately. Add realistic waste for mixing, roller/squeegee loss and broadcast system.

PRODUCTION RATE

ft^2/hour = completed area ÷ productive machine hours

Track separately by step. Mobilization, edges, cleanup and cure time belong in labor estimates even when machine production is high.

LABOR PRODUCTIVITY

labor-hours per 1,000 ft^2 = total crew labor-hours ÷ (area/1,000)

This metric exposes jobs that look fast by machine-hour but consume excessive crew time.

APPENDIX E

Preventive Maintenance

INTERVAL	GRINDER / TOOLING	EXTRACTION
Before each shift	Inspect tooling, plates, fasteners, shroud, cord, leaks, oil level where applicable	Check shroud hose, cuffs, seals, filters, bag/liner and separator.
After each shift	Clean machine without driving dust into bearings/electrics; record damage	Empty/dispose safely; inspect filter-cleaning system and hoses.
Scheduled by hours	Gear oil, belts, bearings, fasteners, electrical connections per manufacturer	Filter replacement, motor/brush/turbine service, seals per manufacturer.
Annual / major service	Professional inspection based on machine manual and usage	Full electrical and airflow system review; replace worn hoses/seals.

SPEC CHECK

Do not publish universal “gear oil every 200 hours” or “belt replacement at 500-800 hours” values for all machines. Build machine-specific maintenance cards from each manufacturer manual.

APPENDIX F

Glossary

Bond — Matrix holding diamond crystals; controls how quickly fresh diamond is exposed.

CSP — Concrete Surface Profile classification used to describe surface texture severity.

DFT — Dry film thickness.

DOI — Distinctness of image; optical clarity of a reflected image.

Densifier — Reactive treatment used to improve surface hardness/dust resistance in concrete.

Efflorescence — Visible salts deposited as moisture transports soluble compounds to the surface.

Glazing — Tool condition where bond/metal becomes polished and stops exposing effective diamond.

Guard — Protective treatment applied to polished concrete; may be penetrating, reactive or thin-film depending on product.

MVER — Moisture vapor emission rate.

PCD — Polycrystalline diamond; commonly used for removal of coatings/adhesives.

Planetary grinder — Machine with multiple satellite tool heads moving within a larger rotating/orbiting system.

Pot life — Time a mixed reactive material remains usable under defined conditions; not identical to field working time.

Ra — Arithmetic average roughness, a surface texture parameter; not a direct gloss measurement.

Raking light — Low-angle light used to reveal scratches, waves and finish inconsistencies.

RH — Relative humidity; in-situ RH testing evaluates moisture condition inside a concrete slab.

Swarf — Fines and liquid/dust generated at the grinding interface.

TDS — Technical Data Sheet published by product manufacturer.

VFD — Variable Frequency Drive used to control AC motor speed/torque and protect equipment.

APPENDIX G

Standards & Technical References

Live standards verification completed September 9, 2026 against official publisher and regulator sources. The edition numbers below were active/current or listed as current by their issuing organizations on that date. Regulatory applicability still depends on the task, product, project, contract, state plan and jurisdiction; verify current status before contractual reliance.

REFERENCE VERIFIED 2026-09-09	USE IN THIS GUIDE
OSHA 29 CFR 1926.1153 - Respirable Crystalline Silica in Construction	Silica PEL/action level, Table 1 controls, written exposure-control plan, competent person and housekeeping requirements.
OSHA 29 CFR 1926.103 / 1910.134 - Respiratory Protection	Construction respiratory program, respirator selection/use, fit testing and face-seal requirements.
2010 ADA Standards for Accessible Design, Section 302.1	Requires floor/ground surfaces to be stable, firm and slip resistant; no universal numerical COF is prescribed.
ASTM D4263-24	Standard Practice for Indicating Moisture in Concrete by the Plastic Sheet Method.
ASTM F1869-23	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
ASTM F2170-19a	Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
ASTM D523-25	Standard Test Method for Specular Gloss.
ASTM D5767-18(2023)	Standard Test Method for Instrumental Measurement of Distinctness-of-Image (DOI) Gloss of Coated Surfaces.
ASTM D4039-09(2023)	Standard Test Method for Reflection Haze of High-Gloss Surfaces.
ICRI 310.2R-2013	Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair; CSP benchmarks.
ACI SPEC-310.1-20	Specification for Polished Concrete Slab Finishes; testing, evaluation and acceptance provisions.
ACI/ASCC PRC-310-25	Decorative Concrete - Guide; current Joint ACI-ASCC Committee 310 guide, superseding ACI 310R-19.
ACI PRC-302.1-15	Guide to Concrete Floor and Slab Construction.
ACI PRC-302.2-22	Concrete Slabs that Receive Moisture-Sensitive Flooring Materials - Guide.
ASCC Concrete Polishing Council - current Aggregate Exposure & Appearance Charts	Current CPC framework: aggregate Classes A-C and Appearance Levels 1-4; DOI/haze measurement and acceptance guidance.
U.S. EPA NPDES Construction Stormwater + 40 CFR Part 403 Pretreatment/Local Limits	Construction wastewater controls; sanitary-sewer/POTW discharge is subject to pretreatment rules and local limits.
Manufacturer TDS/SDS and equipment manuals	Primary authority for mix ratio, spread rate, cure window, application limits, PPE/product hazards, machine ballast and maintenance.

APPENDIX H

Sample Polished Concrete Scope Outline

☐ Project area and exclusions.

☐ Existing condition assumptions and documented contaminants/coatings.

☐ Aggregate exposure class / approved mockup location.

☐ Mechanical tooling system and manufacturer family; exact grit progression field-adjustable based on scratch acceptance.

☐ Repairs and grout: included types, visible-repair expectation and excluded structural work.

☐ Densifier product and TDS application method.

☐ Polish endpoint and optical acceptance method if quantitative gloss/DOI is specified.

☐ Protection/guard product and burnish method.

☐ Edge/corner appearance standard.

☐ Joints preserved and treated by joint function.

☐ Moisture testing responsibility where coatings or moisture-sensitive products are included.

☐ Final cleaning and owner maintenance instructions.

☐ Change-order triggers: concealed coating, contamination, excessive floor variation, unstable concrete, active cracking, inaccessible power/water, schedule acceleration.

☐ Warranty: workmanship scope, substrate exclusions, maintenance obligations and chemical/abuse exclusions.

THE FLOOR TELLS YOU WHAT IT NEEDS.

The professional learns how to read it.

ZION

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