

Pre-Finish Sanding Scratch Depth Standard Reference Samples Calibration and Maintenance

1.0 Maintenance Objective & Frequency

The objective of this procedure is to calibrate and maintain a set of pre-finish sanding scratch depth standard reference samples. These samples are used to visually and tactilely verify that the sanding process on production parts produces a consistent scratch depth profile, which is critical for proper coating adhesion and final finish quality. This PM ensures that the reference samples themselves remain accurate and representative of the target scratch depth for each grit sequence (e.g., 120, 150, 180, 220, 320 grit).

Frequency: Monthly or after every 500 production cycles (whichever comes first), and immediately if a coating adhesion failure or finish defect is traced back to sanding inconsistency.

2.0 Lockout/Tagout (LOTO) & Safety

- Electrical Isolation: Disconnect and lockout the main power supply to the sanding machine (e.g., wide belt sander, orbital sander) before accessing the sanding head or conveyor area.
- Pneumatic Isolation: Close the pneumatic supply valve to the sanding head tensioning system and bleed residual air pressure from the lines.
- Mandatory PPE: Safety glasses with side shields, cut-resistant gloves (ANSI A4 level or higher), hearing protection (if noise levels exceed 85 dBA), and dust mask (N95 minimum) to avoid inhalation of wood dust and abrasive particles.
- Lockout/Tagout Verification: Verify zero energy state by attempting to start the machine after lockout is applied. Confirm that the sanding belt or pad does not move and that all pneumatic cylinders are depressurized.

3.0 Required Tools, Parts & Lubricants

- Set of pre-finish sanding scratch depth standard reference samples (one per grit: 120, 150, 180, 220, 320) – each sample is a 4" x 6" x 0.75" piece of the same substrate material used in production (e.g., maple, oak, MDF).
- Digital surface profilometer (e.g., Mitutoyo SJ-210 or equivalent) with a 2 µm radius stylus and 0.8 mm cutoff length, calibrated within the last 12 months.
- Optical comparator or digital microscope (minimum 50x magnification) with measurement software for visual verification of scratch pattern.
- Set of new, unopened abrasive belts or discs matching the grit sequence (120, 150, 180, 220, 320) from the same manufacturer and lot as used in production.
- Isopropyl alcohol (99% pure) and lint-free wipes for cleaning samples and measurement surfaces.
- Calibrated feeler gauge set (0.001" to 0.030") for quick visual reference checks.
- Torque wrench (0-50 in-lb range) with a 1/4" hex bit for securing sample holders.
- Calibration log sheet or digital form in ServiceGrid for recording measurements.

4.0 Step-by-Step Maintenance Procedure

1. Perform Lockout/Tagout as per Section 2.0. Verify zero energy state before proceeding.
2. Remove the existing set of reference samples from their storage location (typically a dedicated rack near the sanding machine). Inspect each sample for physical damage, warping, or contamination (e.g., oil, resin buildup). Discard any sample that shows visible defects.
3. Clean each reference sample surface with isopropyl alcohol and a lint-free wipe. Allow to air dry for 2 minutes. Do not touch the cleaned surface with bare hands.
4. Using the digital surface profilometer, measure the average scratch depth (Ra and Rz) on each reference sample. Take five readings per sample at different locations (center and four quadrants). Record the average Ra and Rz values in the calibration log. The acceptable tolerance for each grit is $\pm 10\%$ of the target scratch depth specified by the coating manufacturer (e.g., for 120 grit, target Ra = 3.2 μm , acceptable range = 2.88–3.52 μm).
5. Visually inspect the scratch pattern on each sample using the optical comparator at 50x magnification. The scratches should be uniform, parallel (for belt sanding) or random (for orbital sanding), and free of chatter marks, gouges, or burnishing. Capture a reference image for the log.
6. If any sample fails the profilometer measurement or visual inspection, it must be reconditioned. Mount the sample in a dedicated fixture on the sanding machine. Install a new abrasive belt or disc of the corresponding grit. Set the sanding head pressure to the standard production value (e.g., 40 psi for a wide belt sander). Run the sample through the machine at the standard feed speed (e.g., 20 ft/min) for one pass. Do not apply additional pressure.
7. After reconditioning, repeat steps 4 and 5. If the sample still does not meet the target scratch depth within tolerance after three reconditioning attempts, discard the sample and fabricate a new one from the same substrate material. Document the discard and replacement in the log.
8. For samples that pass inspection, apply a thin, even coat of anti-static spray (if recommended by the abrasive manufacturer) to prevent dust attraction. Allow to dry for 5 minutes.
9. Store the reference samples in a clean, dry, temperature-controlled environment (18–24°C, 40–60% RH) in a dedicated rack that prevents contact between samples. Label each sample with the grit number, calibration date, and technician initials.
10. Update the ServiceGrid PM work order with all recorded measurements, any reconditioning actions taken, and the next calibration due date. Attach the reference images from the optical comparator.

5.0 Verification & Return to Service

1. Remove lockout/tagout and restore power and pneumatic supply to the sanding machine. Verify that all safety guards are in place and that the emergency stop functions correctly.
2. Run a test piece (scrap of the same substrate) through the sanding machine using the standard production settings for each grit in the sequence. After each grit, compare the scratch pattern on the test piece to the corresponding reference sample using visual and tactile inspection (fingertip drag test). The test piece should feel identical to the reference sample.
3. Measure the scratch depth on the test piece using the digital surface profilometer. The Ra and Rz values must fall within the acceptable tolerance range for each grit. If not, repeat the sanding process with a new abrasive belt and re-check.
4. Apply a standard coating (e.g., sealer or primer) to the test piece and allow it to cure per the coating manufacturer's instructions. Inspect for adhesion issues (e.g., peeling, blistering) and finish appearance. The coating should adhere uniformly without visible defects.
5. If all verification steps pass, sign off on the PM work order in ServiceGrid and return the machine to production. If any step fails, investigate the root cause (e.g., worn abrasive, incorrect pressure, feed speed variation) and correct before releasing the machine.

Regulatory Disclaimer: This document is a generic maintenance template provided for educational and informational purposes only. It does not constitute professional engineering or reliability advice. The end-user assumes all liability for validating all step sequences, torque specs, and LOTO protocols against specific machinery OEM manuals before deployment to a live production floor.