RESTORATION INTEL · ROUND-2 FIELD READINESS MATRIX (1,920 TRIALS)

Contents & Document Robotics Readiness Matrix: 2026-2027 Guide

Canonical Edition: https://restorationintel.com/contents-restoration-robotics-readiness-matrix-by-item-and-environment/

Direct Answer: Across 1,920 MuJoCo trials (8 item classes x 4 restoration environments x 4 end-effectors), robotics readiness depends on **rigid carrier trays (`G4 Under-Scoop`: 84.8% vs `G1 Pinch`: 38.3%)** and **low-temp elastomers (`VMQ`: 53.3% vs** NBR**: 25.0% at -20 C)**. Poly totes (`C1`), ultrasonic mesh baskets (`C2`), and poly-bagged ledgers (`C4`) hit **100% transfer across all 4 zones**.

8 x 4 Readiness Matrix & Deploy-Now Index (DNI)

Contents Class	Dry	Soot	Wet	-20 C	DNI / Tier
Poly Ledger	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	**93.8 (Tier 1)**
Brittle Book	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	**90.6 (Tier 1)**
Wet Folios	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	**90.6 (Tier 1)**
PCB Basket	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	**86.0 (Tier 1)**
Soft Bundle	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	**86.0 (Tier 1)**
Poly Tote	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	**82.8 (Tier 1)**
Bankers Box	100% (G4 Under-Scoop)	100% (G4 Under-Scoop)	13% (G4 Under-Scoop)	100% (G4 Under-Scoop)	**53.4 (Tier 3)**
Ceramic Vase	100% (G2 NBR Cup)	27% (G2 NBR Cup)	93% (G3 VMQ Bellows)	0% (G4 Under-Scoop)	**32.2 (Tier 4)**

Procurement & Standard Operating Procedure Checklist (2026-2027)

[ ] **1. Mandate Under-Scoop Forks (G4, p = 6.34e-52):** Zero side-pinch pressure eliminates oily IICRC S700 soot slip (mu ~ 0.08) and wet cellulose shear (1.5 N fiber threshold on soaked folios).

[ ] **2. Swap NBR Cups for -50 C VMQ Silicone (p = 5.46e-06):** At -20 C NEDCC 3.12 blast-freezer intake, NBR hardens near its glass transition (25.0% intact) while VMQ silicone doubles cryo yield (53.3%) and seals poly-bagged ledgers (C4).

[ ] **3. Stage Fragile Paper & China Before Automation (p = 1.56e-86):** Technicians slide Coroplast trays beneath wet folios (C7: 0% bare -> 100% racked) and place loose glassware (C5, DNI = 32.2) into stainless mesh baskets (C2, DNI = 86.0).

[ ] **4. Route Saturated Cardboard Boxes (C3) to Hybrid Re-Pack:** At 88%+ RH waterlogging, corrugated folds collapse to 13.3% even under flat forks; wrap or decant into C1 HDPE totes.

Conservation & Audit Guarantee: Every automated transfer logs tare-verified gravimetric mass (F = mg) against SHA-256 container IDs (970 intact, 570 dropped, 275 crushed, 105 soot-smeared across 1,920 trials; 0 scale mismatch).