A New Salt Measuring Strip Equivalent to ISO 8502-9

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U.S. Navy Surface Salt Testing

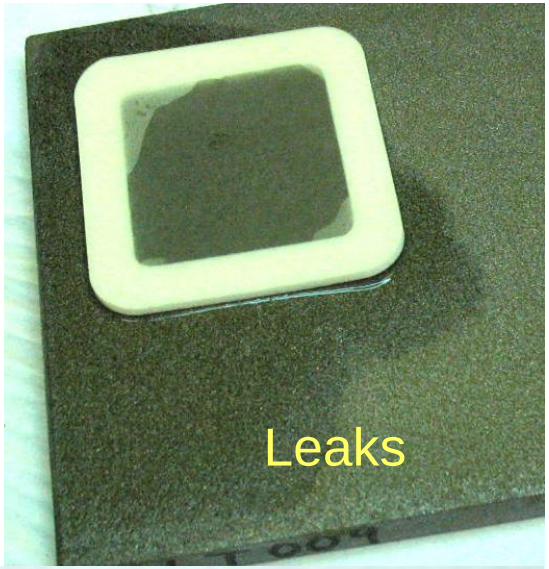
- Corrosion control costs US$2.4B/yr

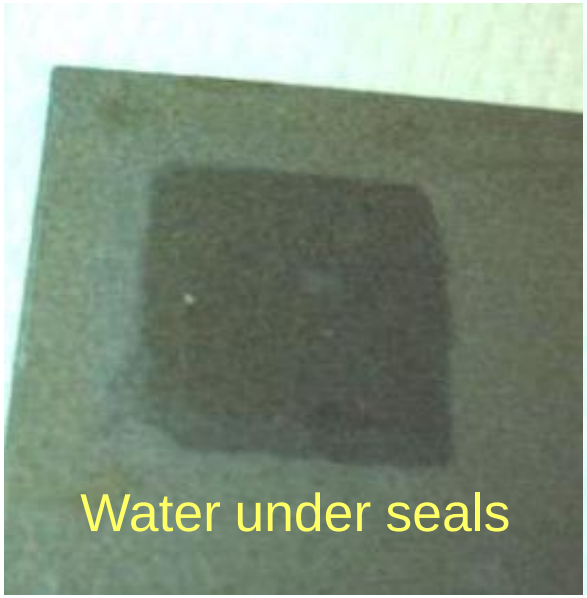
- Potential 20 year coatings
  - High solids epoxies
  - Rigorous QA/QC

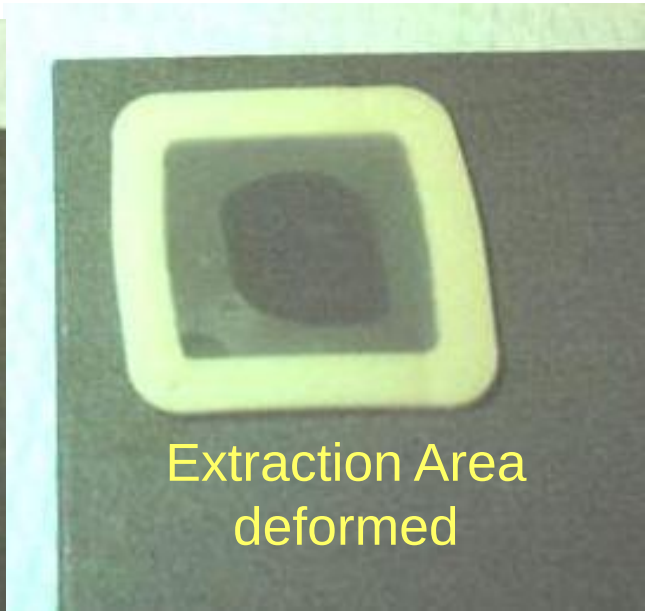
- Surface salt testing before painting
  - All critical surfaces: tanks, underwater hull, landing areas
  - 5 readings per 100 m^2
  - Non-immersed areas < 50 mg/m^2
  - Immersed areas < 30 mg/m^2
- 100,000 salt tests/yr

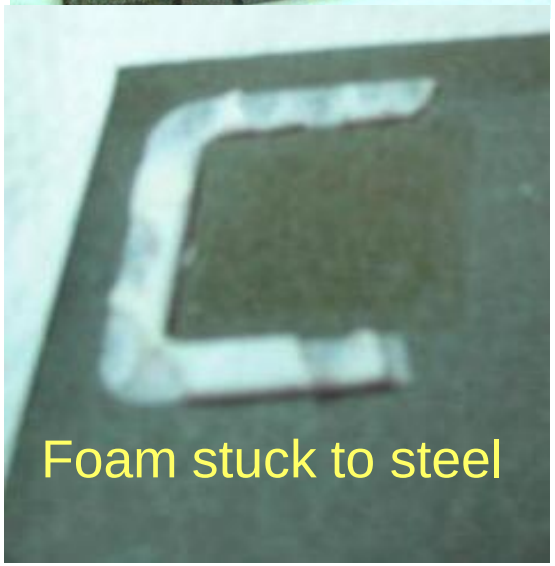
ISO 8502-9 Test

- Slow: 15 minute / test
- Not accurate
- Frequent failures









Salt Test Wish List

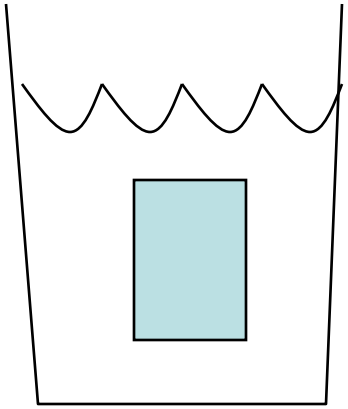
Analytical	• 10% at 50 mg/m^2 • Detection limit below 20 mg/m^2 • Insensitive to operator technique • No cross contamination
Field Utility	• Fast - don’t delay coating application • Reliable • Compact, rugged, safe • Test flat or curved surfaces • No residue • Auditable result

Field Conductivity Analyzer

- Blood Glucose Meter
  - High stakes analysis
  - Low operator training
- Disposable strip
  - Holds sample
  - Integrated sensor electrodes
  - No contamination
- Compact field reader

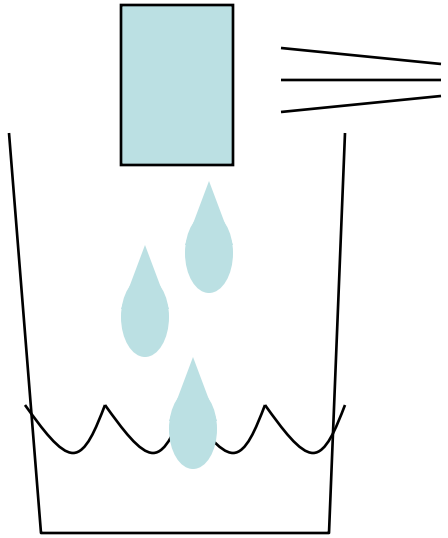
Batch vs. Flow Extraction

- Batch Extraction
  - Bath
  - ISO 8502-9 Patch



< 85% salt extracted
3.0 mL H2O

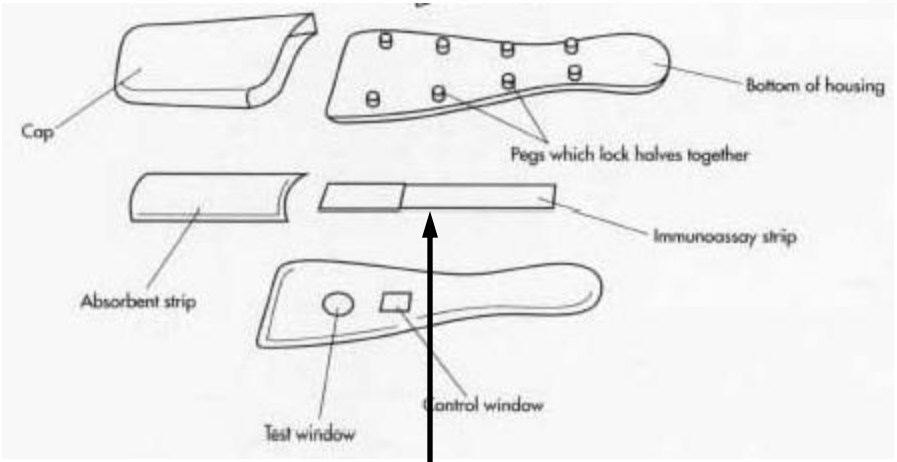
- Flow Extraction
  - Shower
  - Water jetting



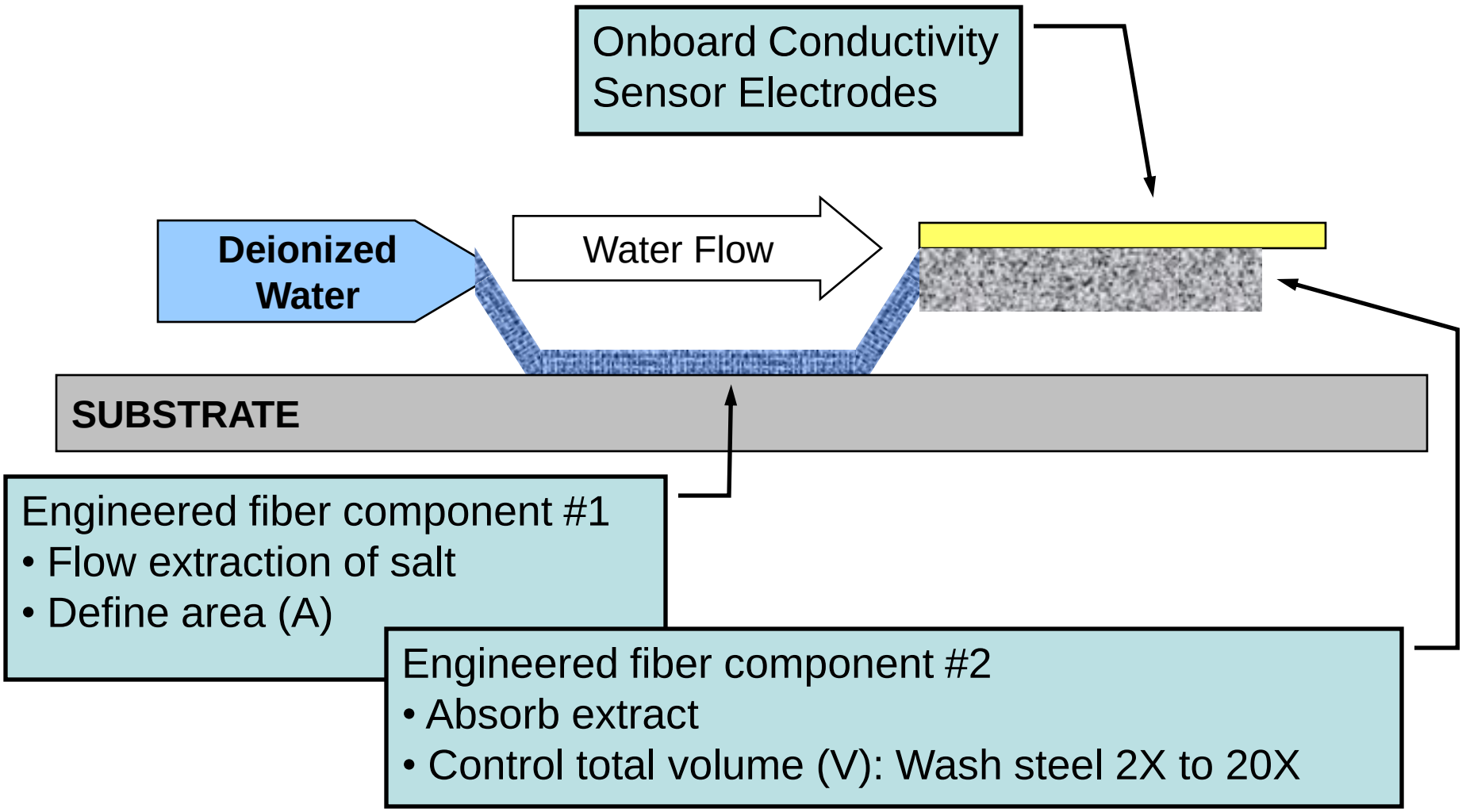
> 99% salt extracted
0.6 mL H2O

Precision fluid management

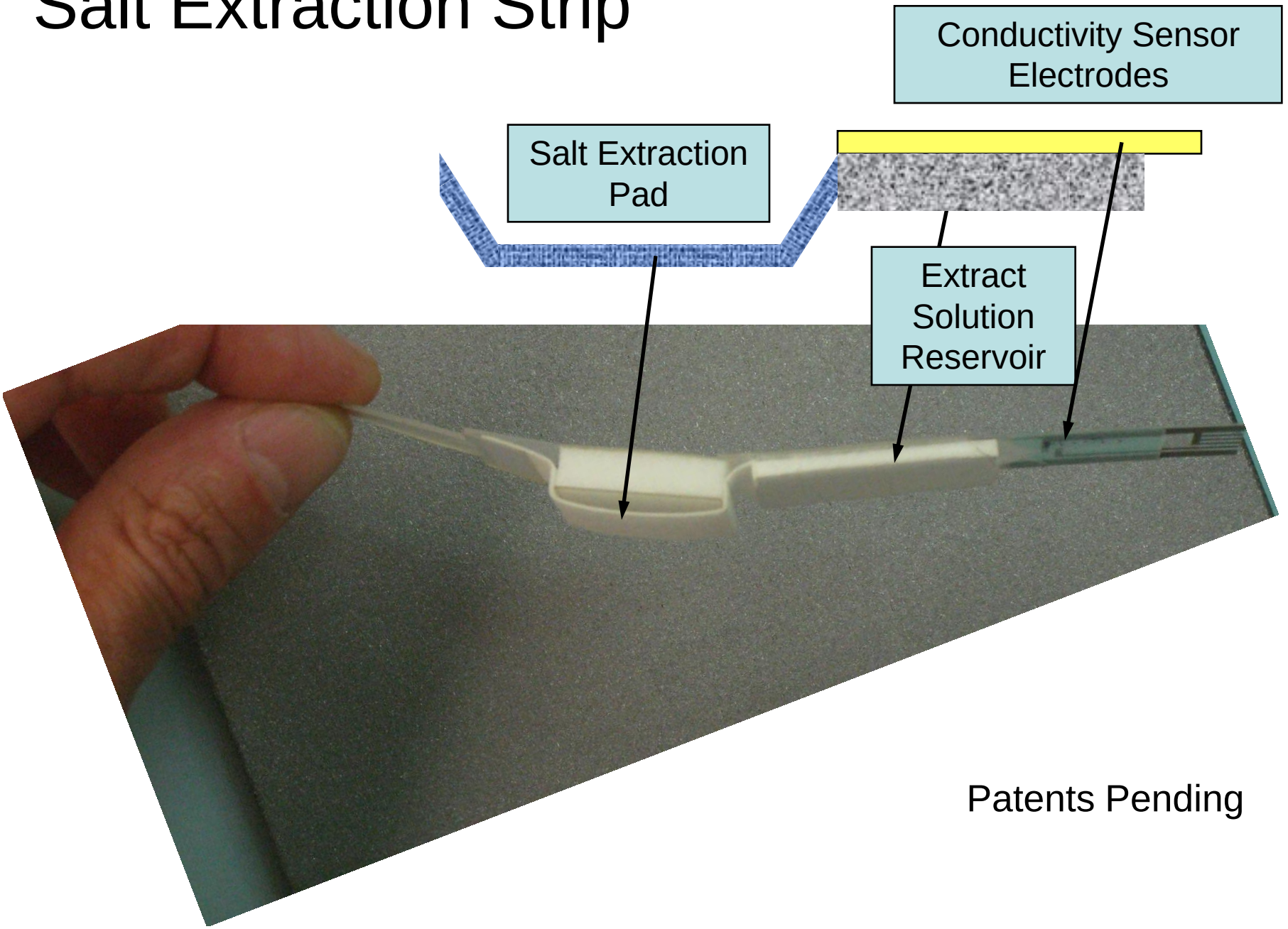
- Pregnancy Test Strip
  - Robust
  - Reliable
- Engineered fiber membranes
  - Fluid contained
  - Flow metered
  - Volume controlled



New Concept for Salt Testing

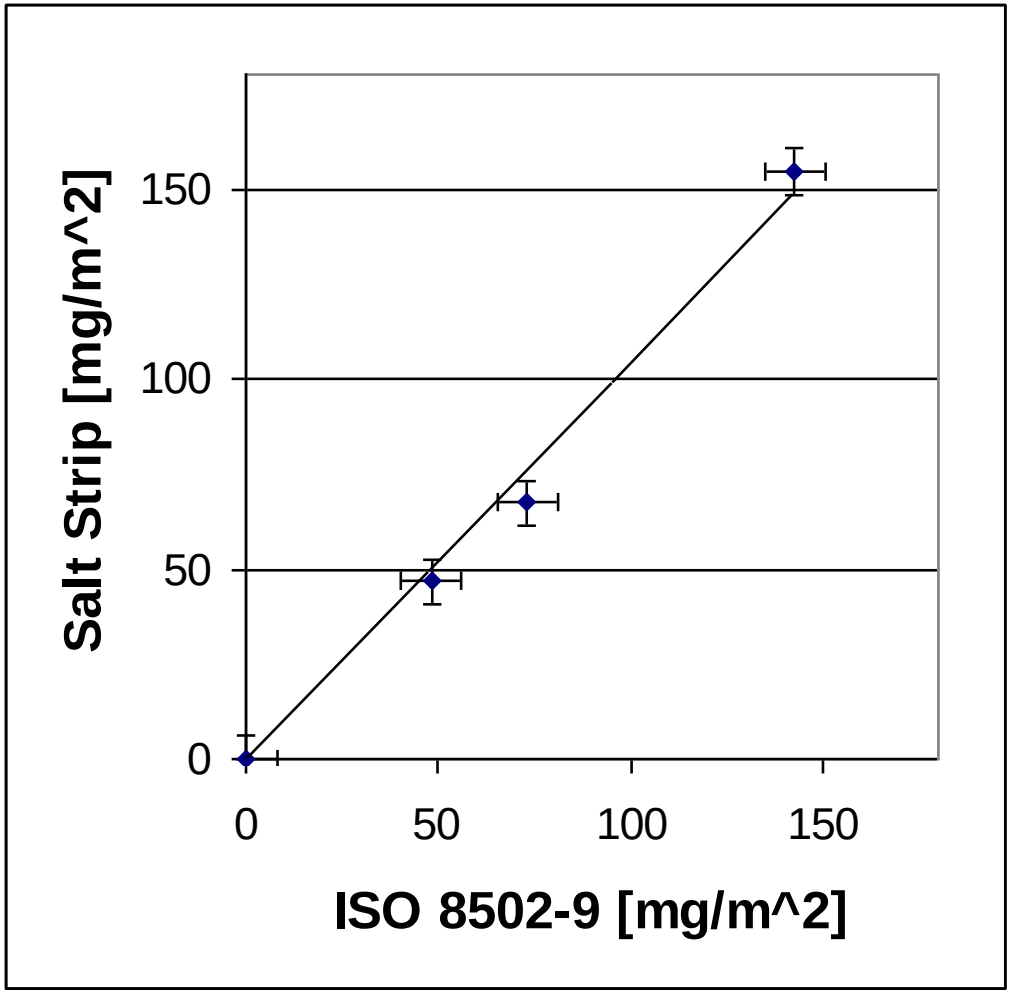


Salt Extraction Strip



Patents Pending

Salt Strip Performance on Steel

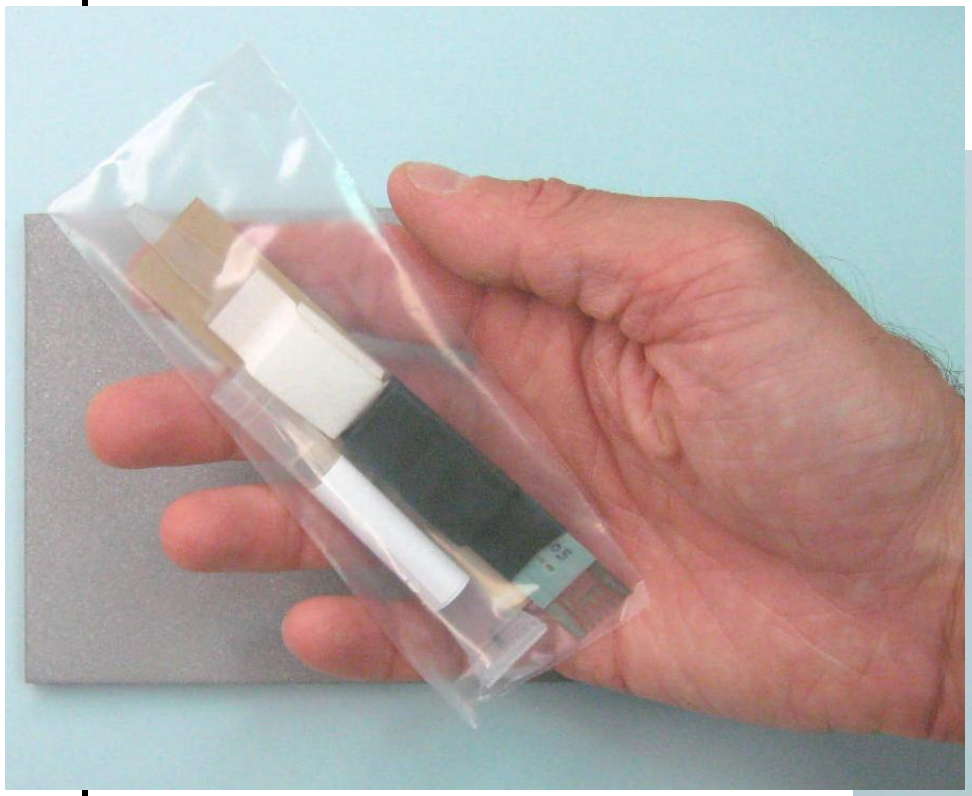


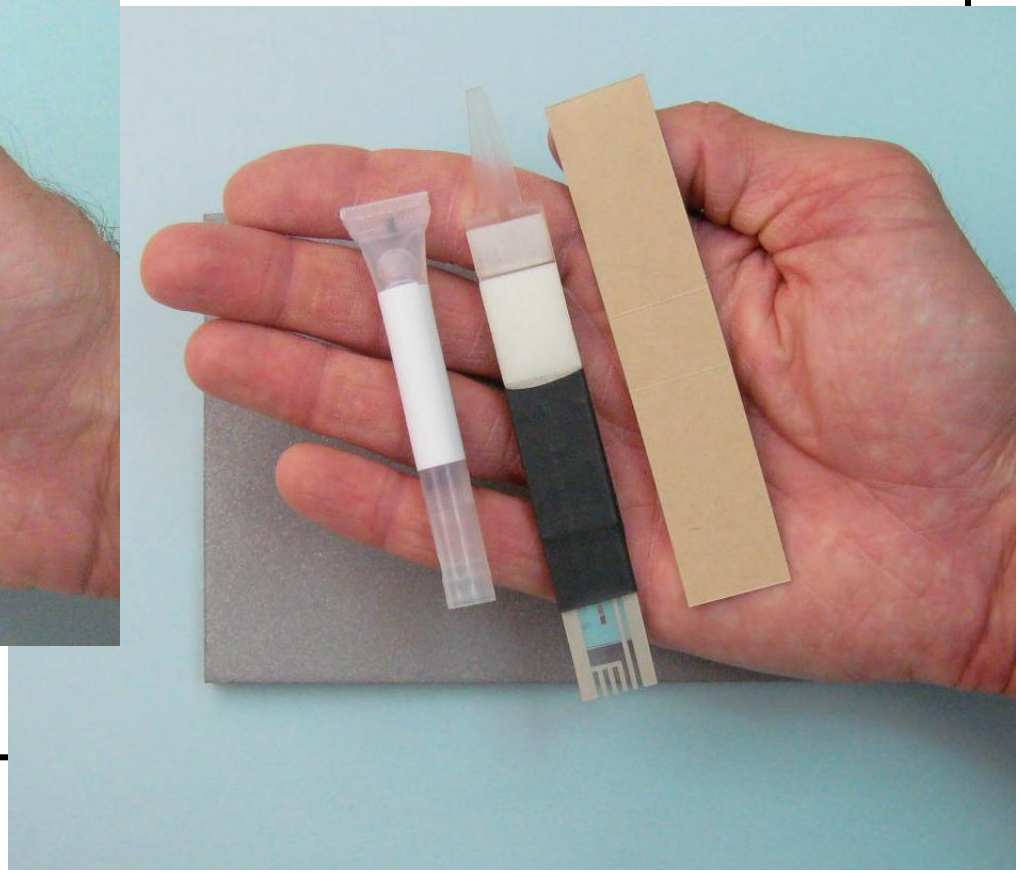
Design Performance

- at 50 mg/m^2, 7%
- at 20 mg/m^2, 13%

Strip Work Flow

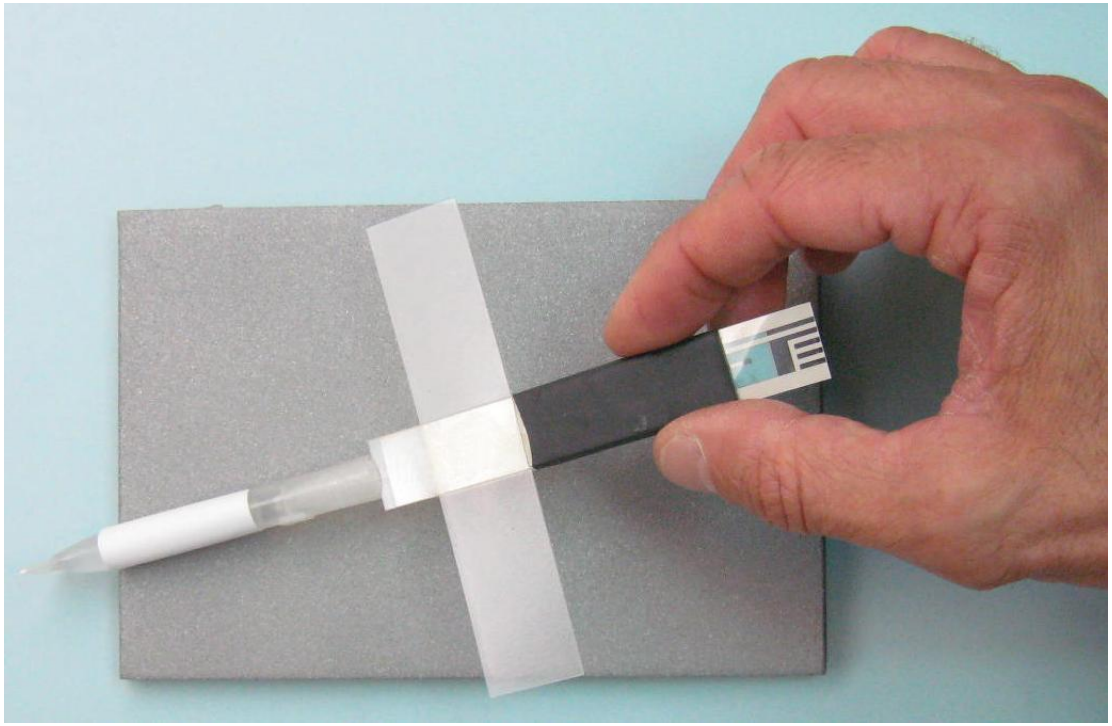
1. Unwrap Package	0:05





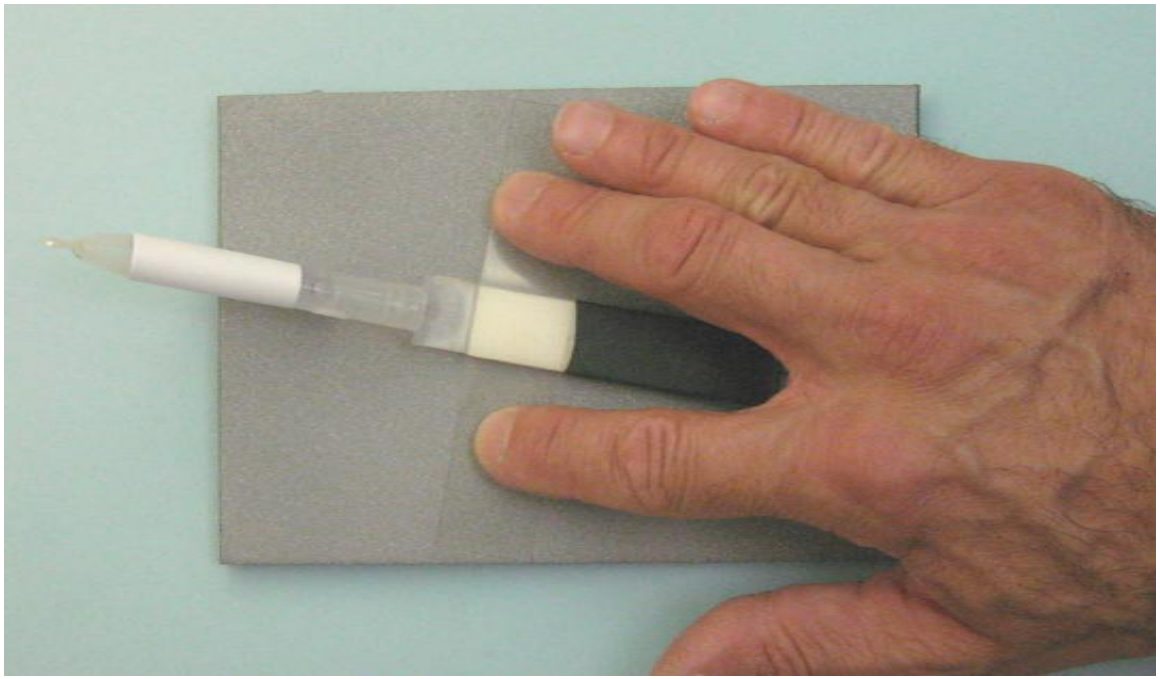
Strip Work Flow

2. Assemble Strip	0:13

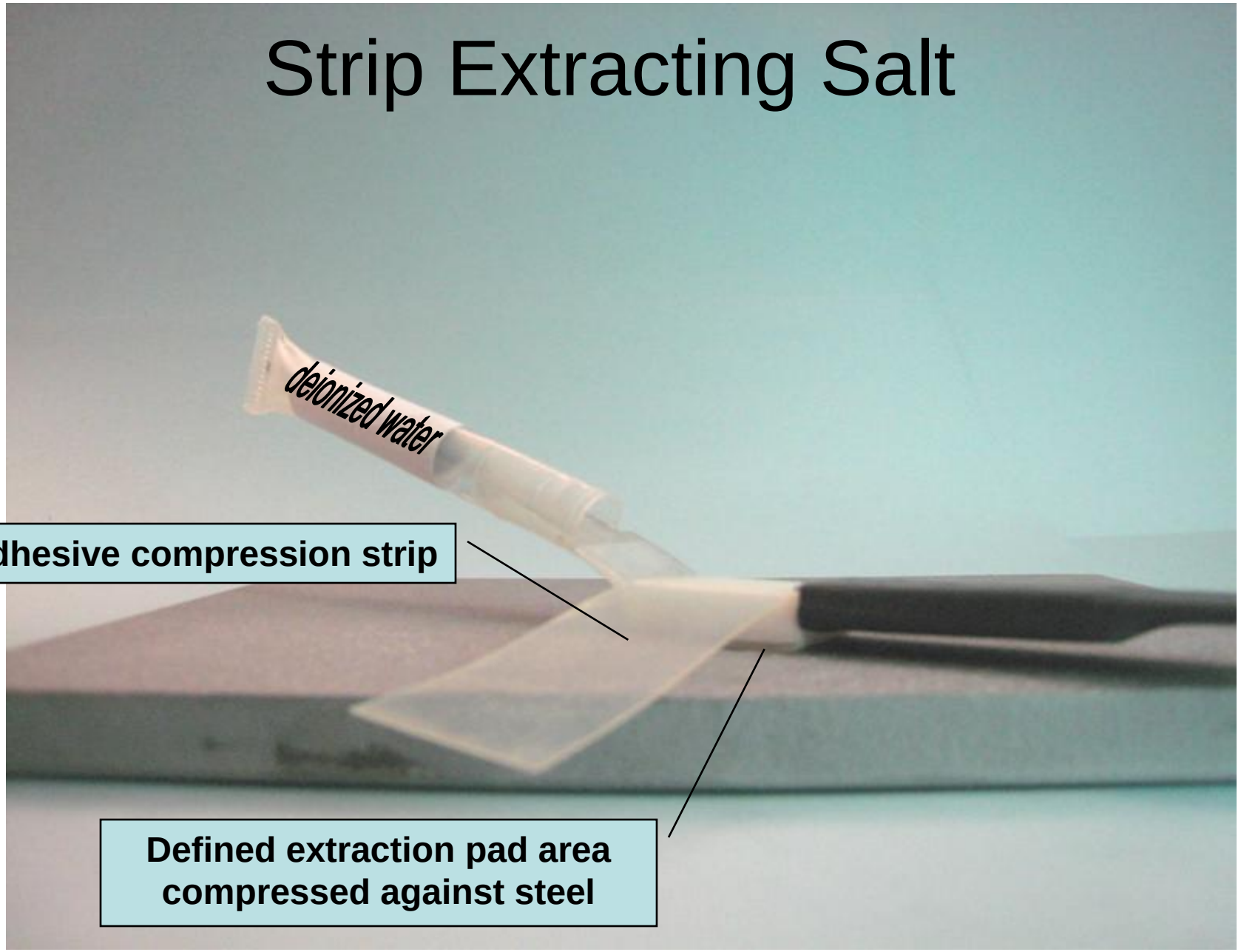


Strip Work Flow

3. Tack onto surface	0:15

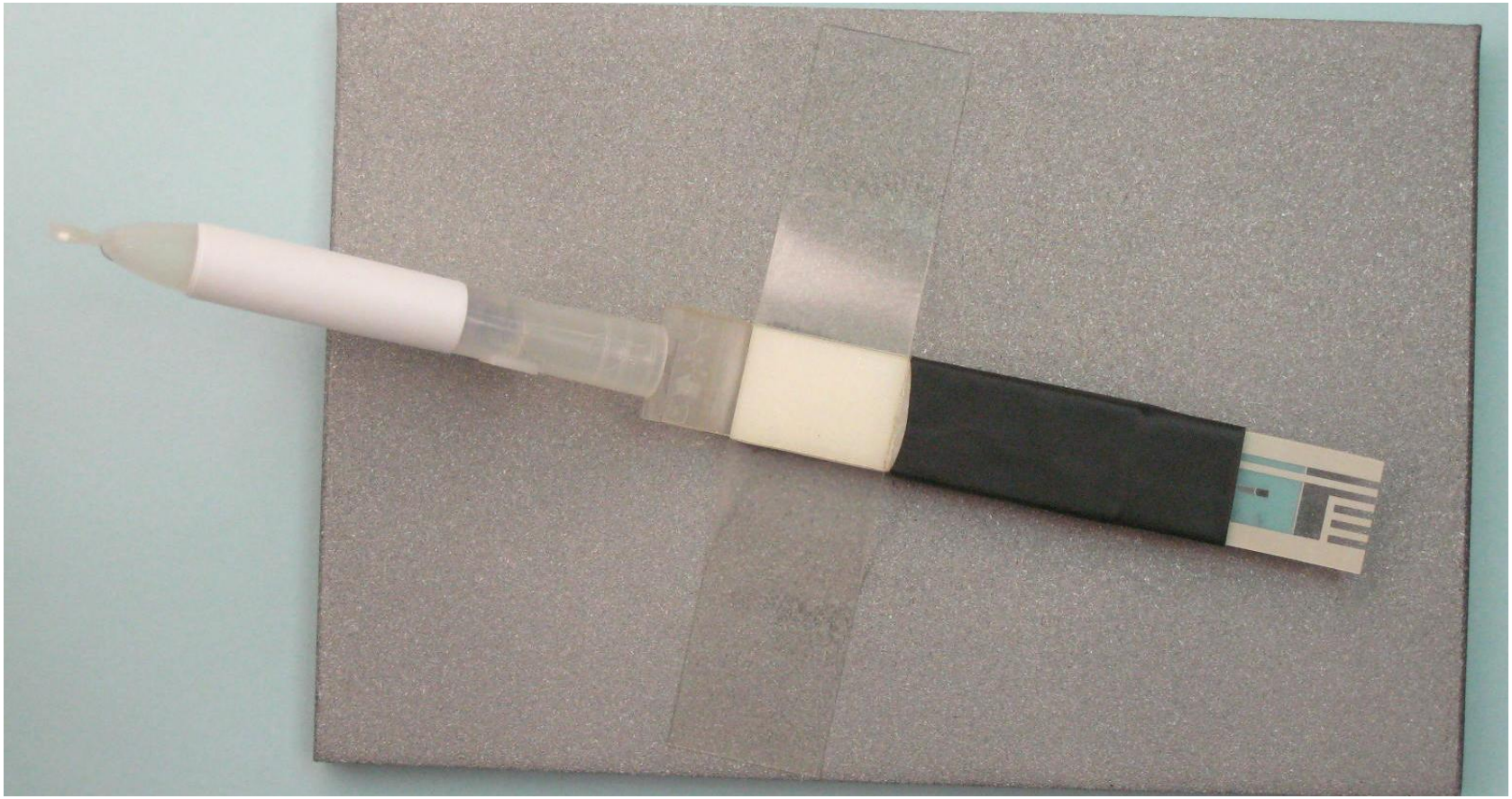


Strip Extracting Salt



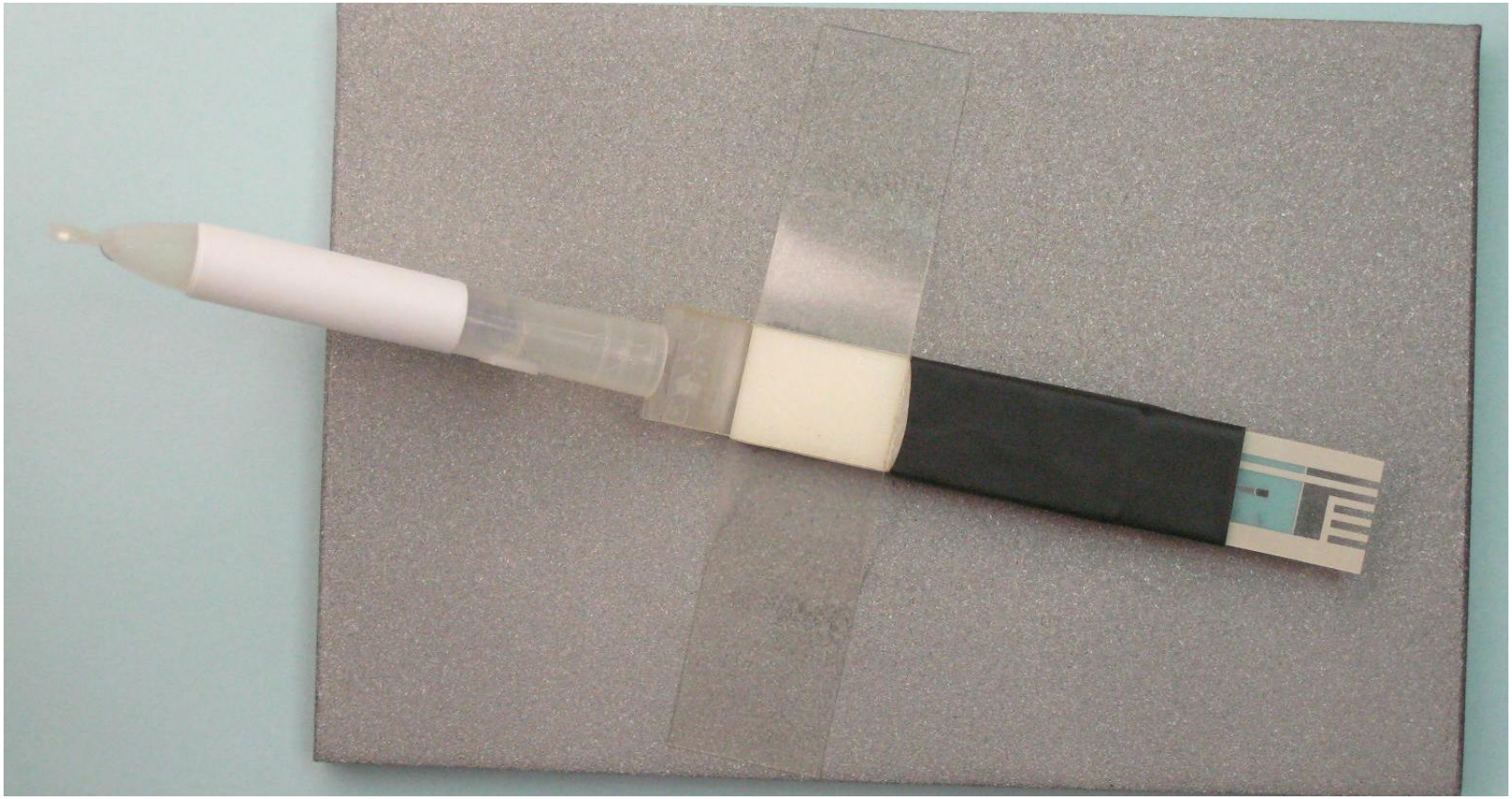
Strip Work Flow

4. Extract Salt into Reservoir	1:15



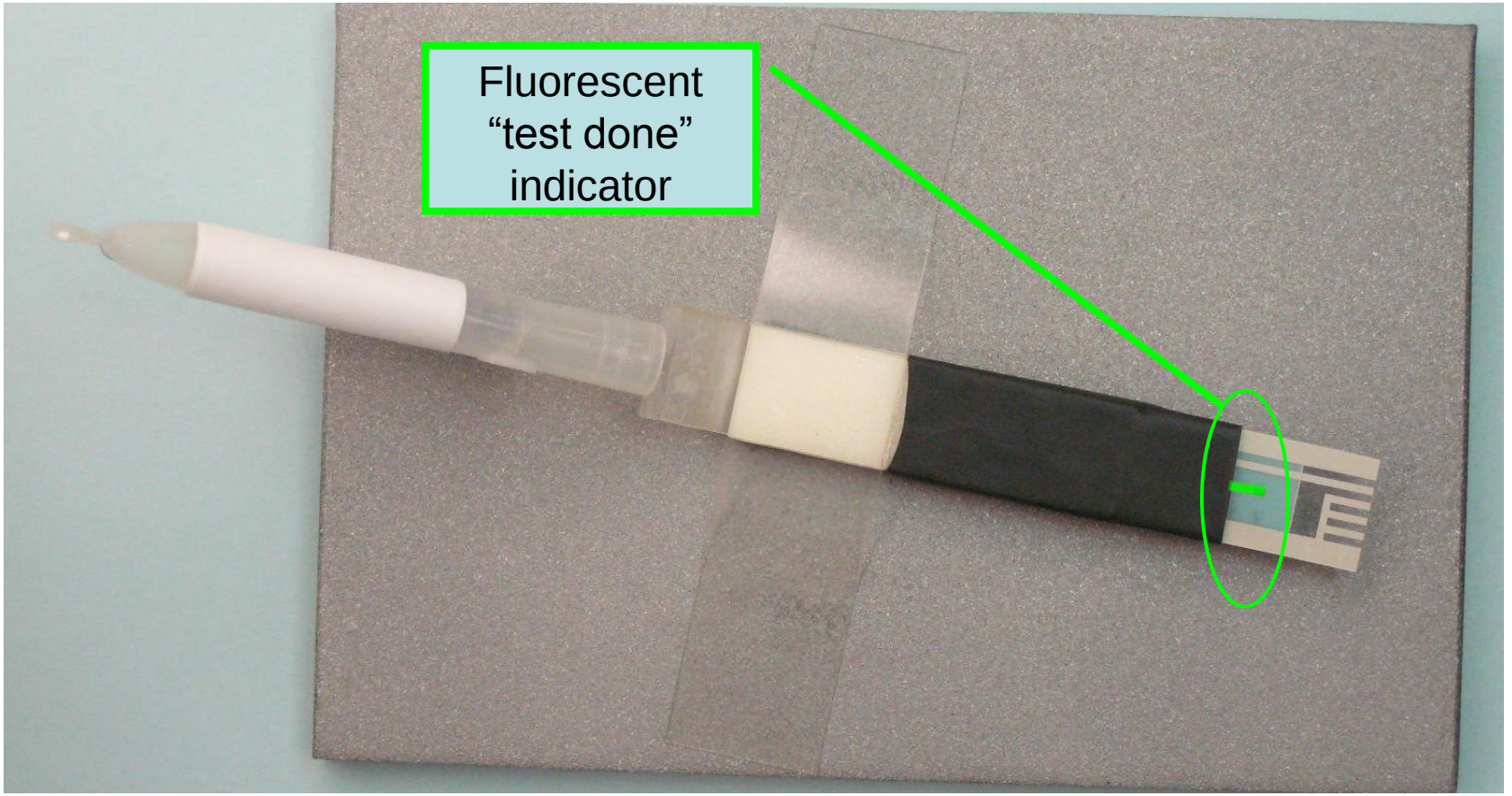
Strip Work Flow

4. Extract Salt into Reservoir	2:15



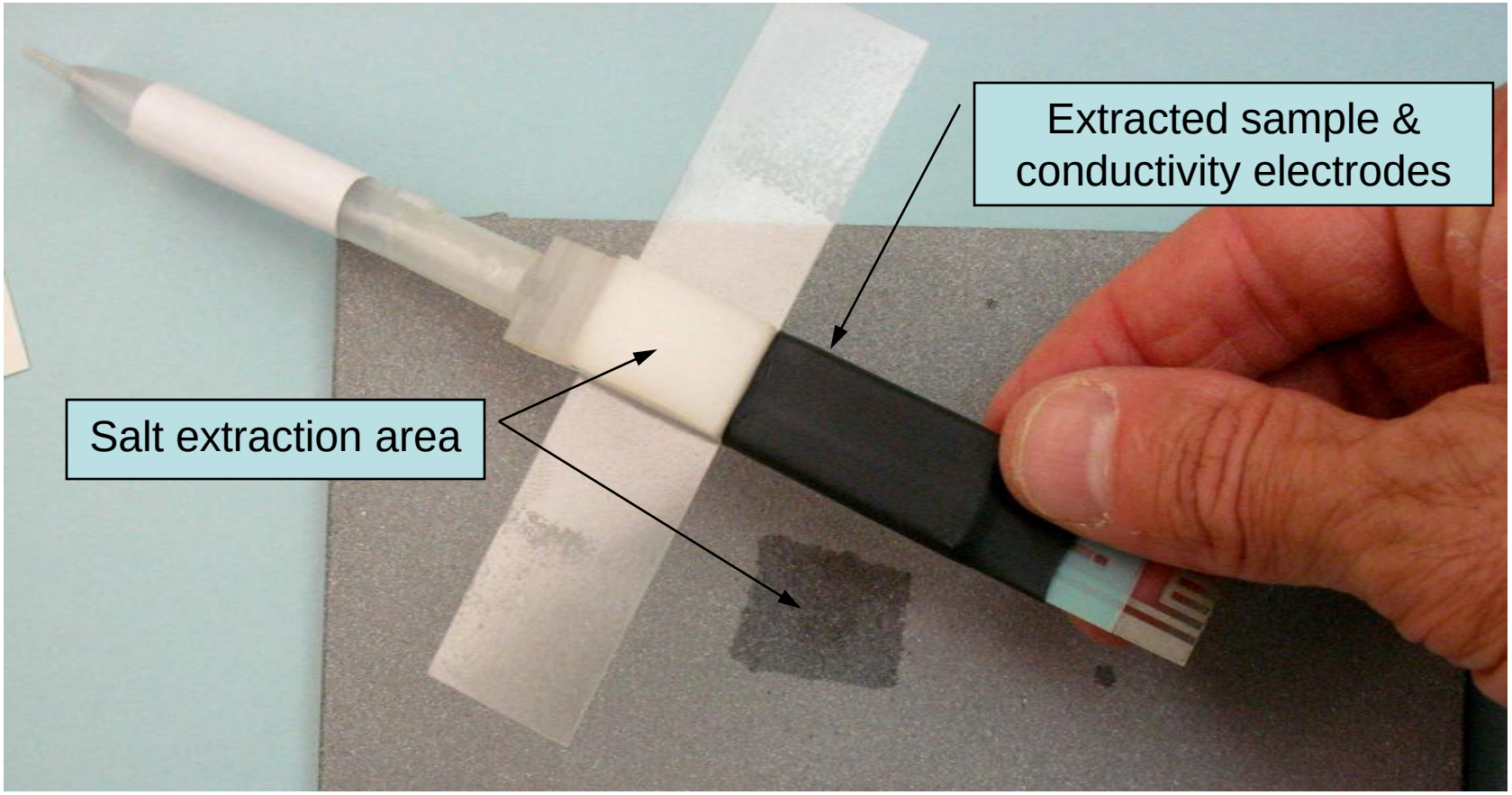
Strip Work Flow

4. Test Done	3:15



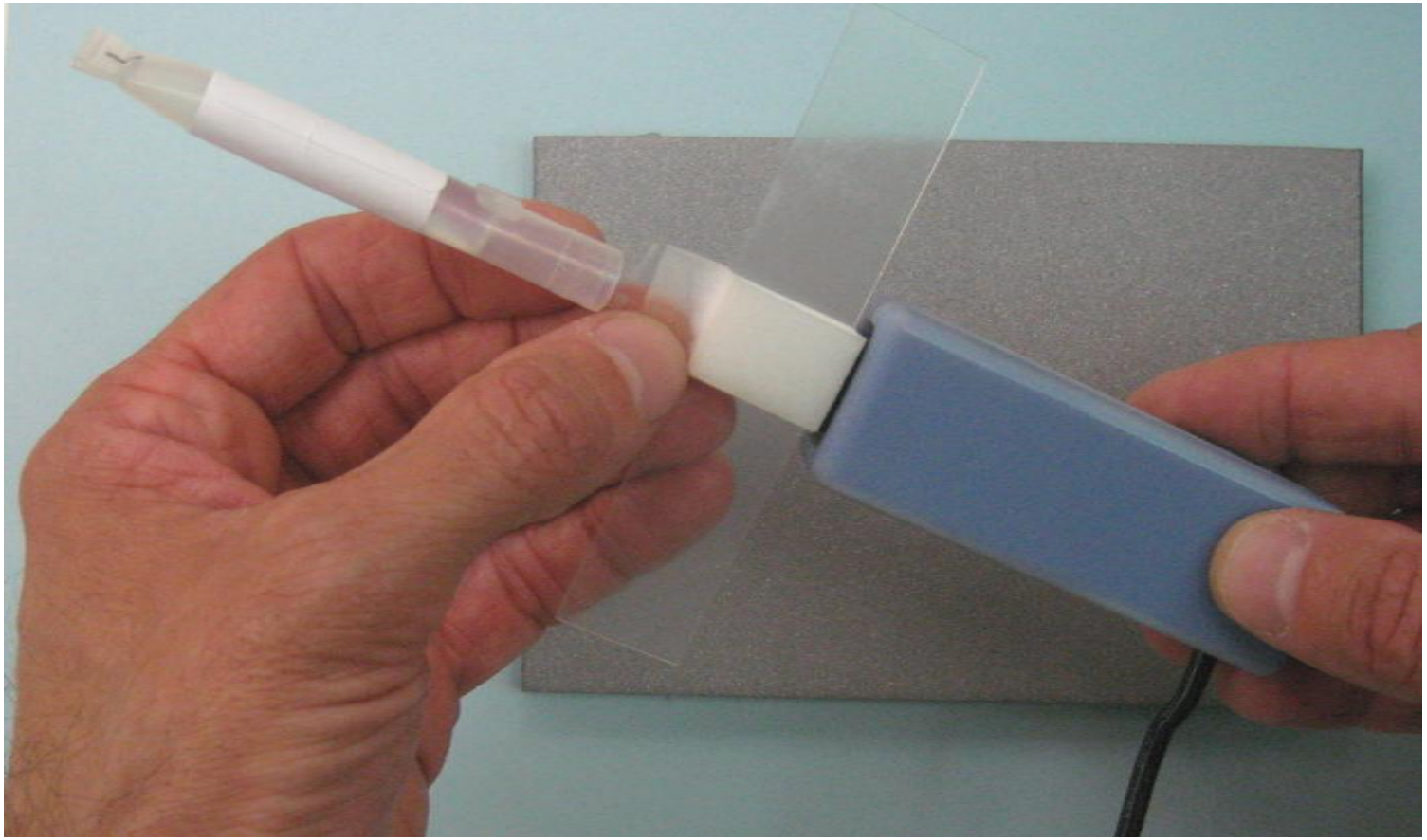
Strip Work Flow

5. Remove Strip from Steel	3:15



Strip Work Flow

6. Insert Strip into Reader	3:20

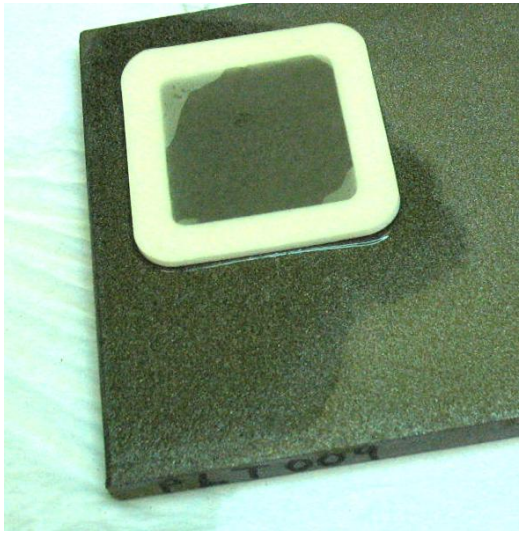


Strip Work Flow

7. Read & Save Result

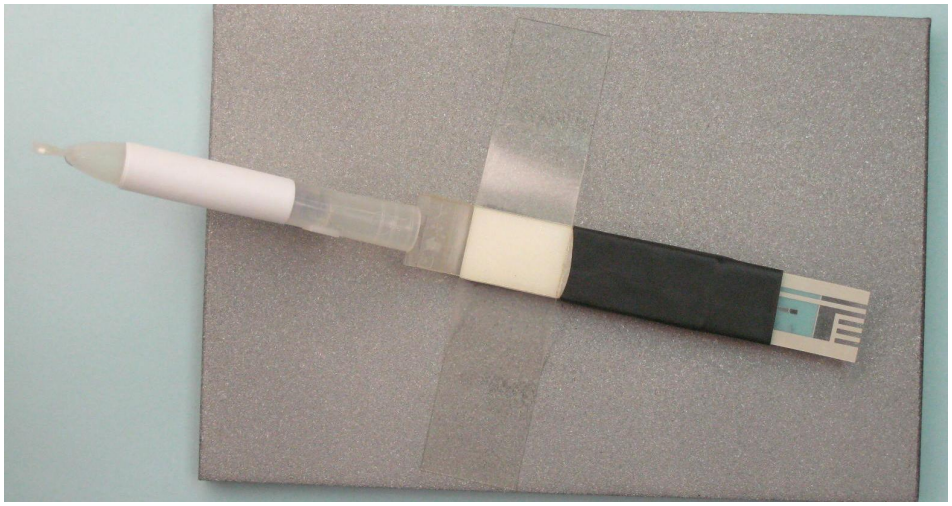
- Strip reader adapter
  - Fits off-the-shelf meters
  - Replaces standard conductivity probe
  - Temperature compensated
- Calibrate with dry calibration strip
  - No calibration fluids

Cycle Time – 400 m^2 Tank



ISO 8502-9

- 15 minutes / test
- 20 tests in 4 hours



Salt Sensor Strip

- 4 minutes / test
- 20 tests in 12 minutes

- Labor savings
  - US$ 285 / tank (400 m^2)
  - US$ 30,000 / Navy CVN overhaul
- Paint cycle time = dry dock time

Salt Strip Field Utility

- Fast
- Accurate
  - Minimum training
  - Insensitive to technique
  - Re-wet strip to audit results
- Robust
  - Any substrate curvature or orientation
  - No leaks
  - 30 min. hold time after extraction until analysis
- Safe, Clean, Easy
  - Compact
  - No needles, bottles, solvents, calibration solutions
  - No residue on steel
- Cost Effective
  - Cost approx ISO 8502-9 Patch
  - 20X faster
  - Adapter for off-the-shelf conductivity meters

Interested in Testing?

- Production started
- U.S. Navy field testing underway
- Strips available for qualification testing
- Adapters for conductivity meters
  - Jenway Model 4150
  - Jenco Model 3150
- email: SaltStrip@nstcenter.com