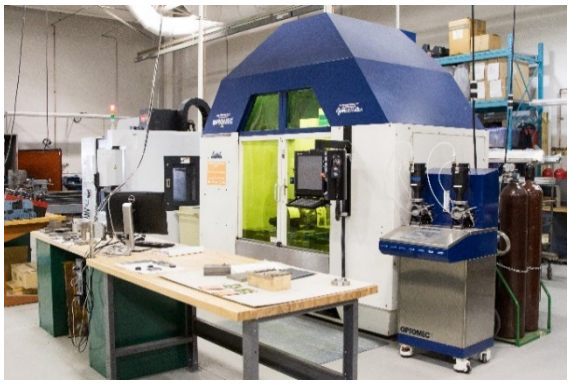
Rochester Institute of Technology Remanufacturing Process Development Facility



Optomec Laser Deposition System

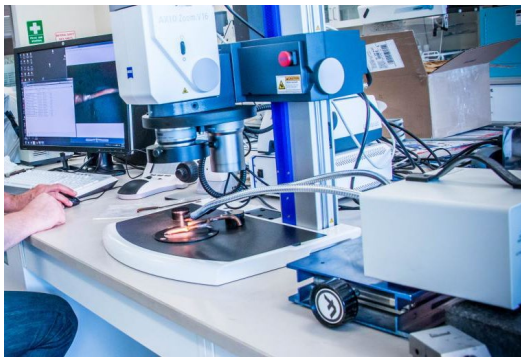
The remanufacturing process development facility currently supports development of the following types of processes: condition assessment for reuse consideration, restoration and repair of metal, plastic, and electronic components, and reman process verification. We anticipate adding the capability to support automated disassembly and reassembly, and process integration at a future date.

This facility will predominantly support the REMADE Remanufacturing and Reuse node. However the capabilities can also support the Design node (to guide design for reman/reuse and more broadly disassembly), and the Systems Analysis node (e.g. characterization of energy intensity of reman/reuse processes).

Cold Spray System

In terms of restoration and repair, the facility supports a variety of processes for repairing damage to metal parts, including thermal spray, cold spray, and laser-based powder fusion capability. These processes span a range of cost levels and functional capabilities for the repair. In terms of condition assessment and inspection, the facility supports dimensional measurement, failure analysis or failure finding technologies applicable to a variety of materials, including circuit board and electronic components. For verification of repair processes and remanufactured products the capabilities include thermal and vibration testing capabilities, environmental chambers, and dynamometers for power generation and transmission components.

Highly Accelerated Life Tester (HALT)



Material and Failure Analysis Lab

RIT Remanufacturing Process Development Facility Equipment List

Restoration/Repair Process Development:

- Optomec, Laser Engineered Net Shaping (LENS), combined additive and subtractive capability
- Low Pressure Cold Spray, Rusonic K205/407R
- Twin Wire Arc Spray, Spray Tech Engineering, AMG 25
- Twin Wire Arc Spray, Thermach AT-400
- Thermal Flame Spray, Alamo Supply, PG-550
- Electronics Rework System, Metcal APR-1200-SRS

Condition Assessment and Inspection

- Laser Scanner Arm, Romer RS2
- Smart Scope, OGP Flash 302
- Discovery CMM, Cordax D-28
- Complete Metallurgical Analysis Lab
- Real Time X-Ray, Glenbrook, Jewel Box 70-T
- C-Sam, Matec
- Optical Inspection, Metcal VPI-1000

Process Verification

- Instron Fatigue Tester, model 8801
- Highly Accelerated Life Test Chamber, Allegan, OVS-3
- Small Electrodynamic Shaker System, Labworks, LW 139.141-75
- Thermal Shock Chamber, Espec TSE-11-A
- Environmental Chamber, Assoc Environmental Systems, HD-208 (8ft3 temp/humidity)
- Large Walk-in Environmental Chamber, Cincinnati Sub Zero, WM-560-MP2H
- Transmission Dynamometer (300 HP)
- Engine Dynamometer (350HP), Mustang MD-350
- Reciprocating and Rotating Wear Testers (custom design)