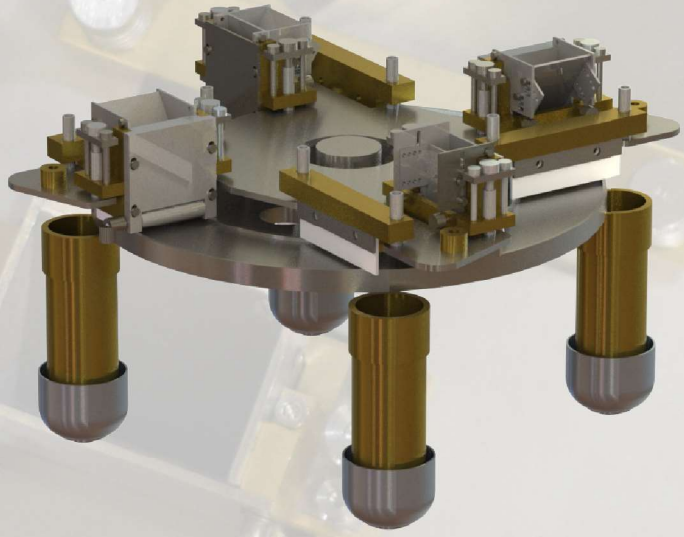
SpreadStation

from

Mercury
Scientific
Inc

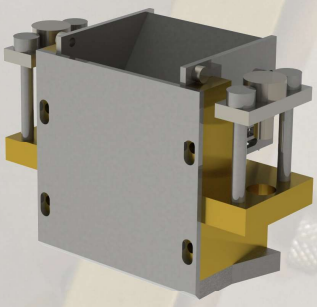
The SpreadStation Powder Analyzer measures the spreadability of powders by actually spreading powders in a layer and then analyzing the properties of the layer.



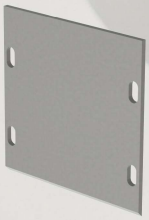
SpreadStation with solid build plate and four spreaders and scrapers

Powder is loaded into a spreading device that includes a feeder and a spreading surface. The spreading device rests on the build surface and has an adjustable gap at the bottom to control the powder layer thickness. The build surface is rotated to create linear motion between the spreading device and the build surface. This linear motion spreads the powder in a layer on the build surface. Images of the created layer are captured and the thickness of the layer is measured using a laser or capacitive distance sensor. The layer is then removed from the build surface by a scraping blade and is weighed.

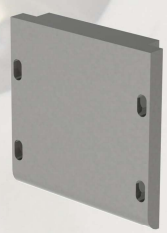
The SpreadStation can be equipped with up to four spreaders and the build surface can be a solid surface or a powder bed. Spreading speed is programmable from 1 to 300 mm/s. Spreading layer thickness can be set from 20 micrometers to 2 millimeters. The build area can be purged and heated to 250C. Samples are loaded into the spreader through a trap door using a bottom emptying sample cup.



Each spreader can be equipped with various powder feeders and spreaders to study different printer parameters. Custom spreaders can also be fabricated to match specific printers.

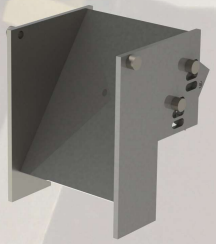


Flat Spreader
rigid or flexible

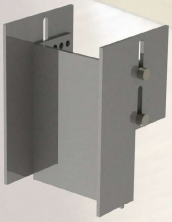


Round Spreader

Rotating Roller
adjustable rate & direction



Angled Feeder
adjustable angle and feeding gap



Straight Feeder
adjustable width and feeding gap

Pressure Feeder
adjustable pressure, width and feeding gap

Layers created by the SpreadStation are analyzed using three measurement systems:

Weighting System
The mass of powder in the spread layer is measured using a load cell.

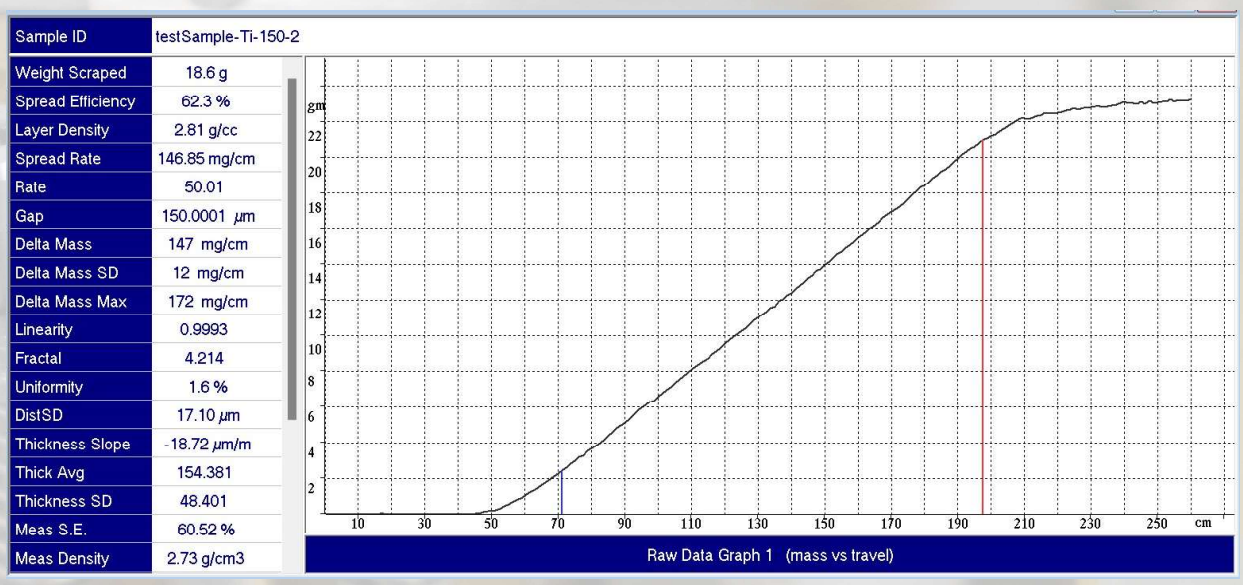
Measurement
Spreading Efficiency
Layer Density
Layer Uniformity

Laser Distance System
The thickness of the spread layer is measured using a laser or capacitance sensor.

Measurement
Layer Thickness
Layer Uniformity

Imaging System
Images of the spread layer are taken using digital cameras and LED lighting.

Measurement
Build area coverage
Channeling detection
Wave detection

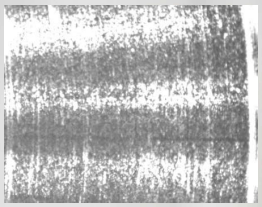


PC software screen shot

Spreadability versus level height
50 mm/s spreader speed

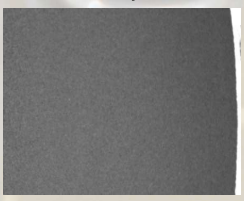
Level Height	Spreading Efficiency	Layer Density	Spread Rate	Layer Thickness
50 µm	48.0%	3.84 g/cm^3	66 mg/cm	61 µm
100 µm	48.2%	3.86 g/cm^3	134 mg/cm	112 µm
150 µm	49.3%	3.95 g/cm^3	206 mg/cm	158 µm
200 µm	52.9%	4.24 g/cm^3	297 mg/cm	202 µm

Images of layers

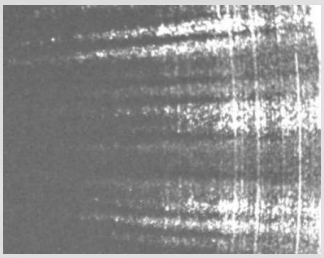

50 µm


100 µm


150 µm

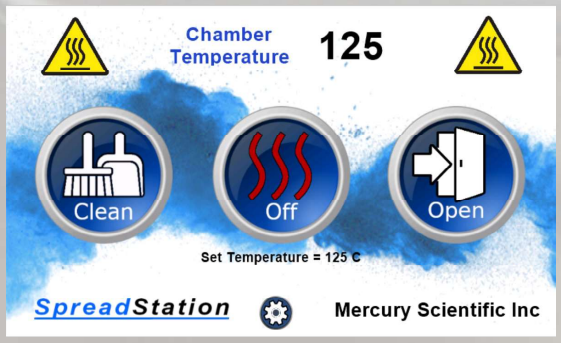

200 µm


Good Spreading Powder

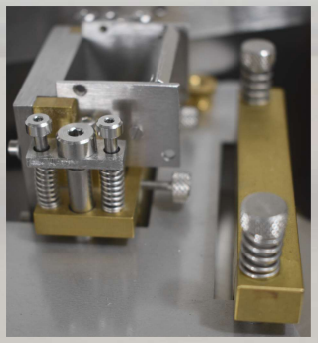

Poor Spreading Powder

Sample	Spreading Efficiency	Layer Density	Spread Rate	Layer Thickness
Good Spreading	38.3%	3.29 g/cm^3	174 mg/cm	118 µm
Poor Spreading	21.5%	1.85 g/cm^3	97 mg/cm	72 µm

Counter-rotating roller

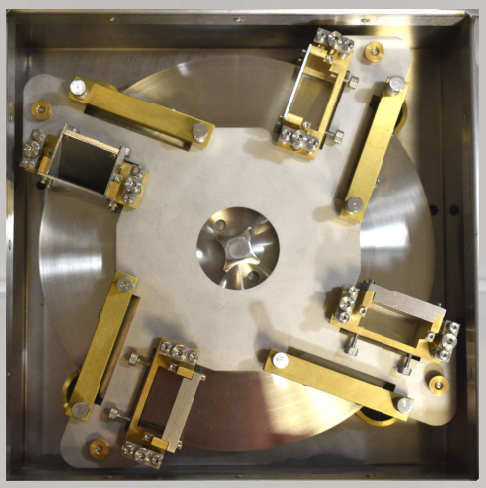


SpreadStation TouchScreen Display

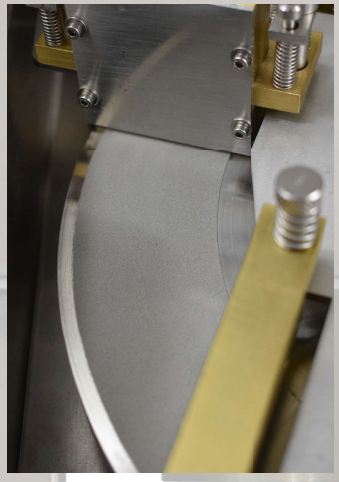


Spreader & Scraper

Polymer spread with a counter-rotating roller



Solid build plate with 4 spreaders



Stainless Steel spread with a flat spreader

Specifications

Layer thickness: 20 to 2000 µm
Spreading rate: 10 to 300 mm/s
Build surface: solid or powder bed
Temperature: ambient to 250C (optional)
Purging: Optional
Cameras: 4 maximum
Thickness Sensor: Laser or Capacitance

Voltage: 100-240V,
Current: Control 3 Amps, Temp Option 6 Amps
Software: Windows 11
Ports: 1 USB control, 1 USB per Camera
Dimensions: 17"W x 13"L x 17"H (43 x 33 x 43 cm)
Weight: 50 lbs (23 kg)

Mercury Scientific Inc. manufacturers instruments that test powder properties in Newtown CT USA. Products include the Revolution Powder Analyzer for dynamic flow measurements and the Evolutuon Powder Tester and Volution Shear tester for static flow (Unconfined Yield Strength) measurements.