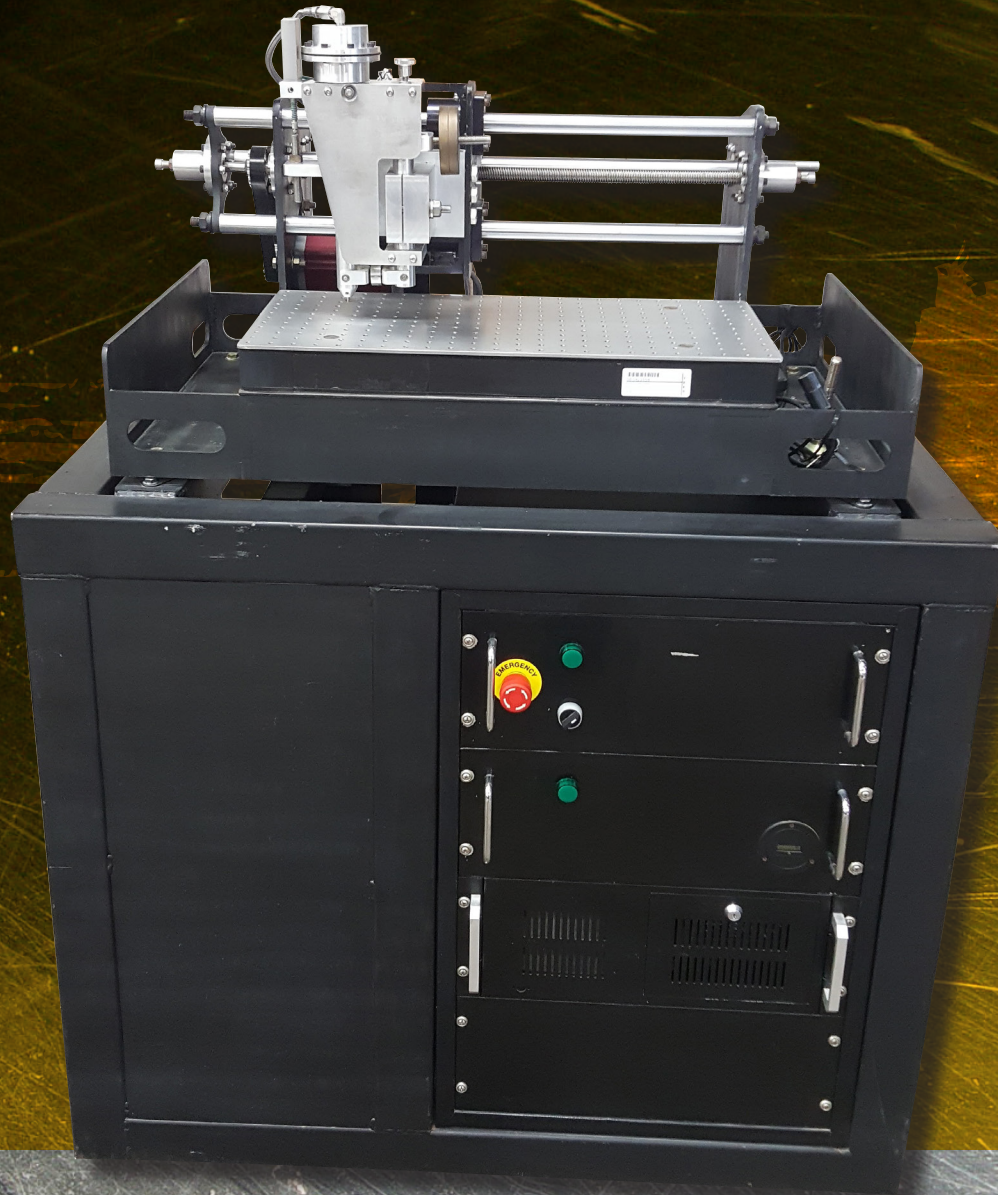


REFURBISHED SCRATCH MACHINE PROGRAM



SCRATCH

ADVANCED SURFACE TESTING SYSTEM



SURFACE MACHINE SYSTEMS' REFURBISHED SCRATCH MACHINE PROGRAM

Each Scratch Machine is purchased by SMS from a previous customer, and then goes through a rigorous evaluation and rebuild process. The equipment electronics, mechanics, and electrical components are disassembled, individually inspected, and replaced as necessary. Each refurbished machine is guaranteed by us for a year after delivery. All of our machines more than exceed the capacities required to run ASTM and ISO standard scratch tests.

SCRATCH STANDARDS

SMS Scratch Machines meet or exceed ASTM D7027-05 and ISO 19252 Scratch testing standards, and can also replicate other industry standards including Ford 5 Finger, Erichsen cross-hatch, pencil-hardness, and constant-load tests.

SMS Scratch Machines run to higher loads (150 N), higher velocities (400 mm/s), and are more consistent (as little as 0.25 N variance) than other instruments. The profile-calibrated rising-load test is the state-of-the-art in scratch property analysis and competitive performance analysis. No other method provides repeatable, quantifiable scratch data, and only the SMS Scratch Machine implements this test in the load ranges required by the ASTM and ISO standards.

SMS Scratch Machines supports a variety of replaceable styli (from 1mm to 10mm ball in various materials, as well as mar-styli, abrasive styli, and cutting/sharp styli to support a variety of research and test standards). They are also designed to work with our Automatic Scratch Visualization Software.

SMS Scratch Machines ship with everything you need to get started with ASTM and ISO standard tests, including the machine, the controller PC and data capture card, styli, clamps, and operating software.

SCRATCH TESTING

Scratch tests with the Scratch 5 Machine feature reliable data acquisition, repeatable results, and the security of an industrial standard. Capabilities include rising-load tests to meet ASTM and ISO standards using a variety of styli geometry, and constant-load tests to replicate Ford 5-Finger, Erichsen, and pencil-hardness (ASTM D3363) tests.

The Scratch 5 Machine performs consistent and repeatable tests. Older testing methods lack quantitative, auditable testing data, and cannot reliably reproduce tests between material formulations, or even on the same material with different samples. Only the the Scratch 5 Machine gives you the confidence that you are working with good science and known physical testing parameters.

INSTRUMENTED DESIGN

Every major axis of an SMS Scratch Machine is instrumented, and gathers data at up to 1000 points per second, with 0.25% accuracy per data channel. Data is precisely correlated in time, and can be correlated to captured visual information for each test. The machine captures data on normal Load (vertical load), tangential load (opposing the direction of traversal) and distance. Precise, high-performance data capture is a key element of reliable, quantifiable testing and systems comparison during research and validation. No other instrument is capable of producing the high quality, reliable data that the Scratch Machine is capable of producing, test after test.

EASE OF USE

Each Scratch Machine ships with everything you need to meet ASTM and ISO scratch tests. Installation and basic training takes a few hours. After setup, no additional tools are needed to begin scratch testing. Our intuitive and integrated operating software makes performing and analyzing tests easier than ever. Tests can be run in seconds, and data can be reviewed and saved in industry-standard formats, including Microsoft Excel. Many customers are produce research-quality testing information on the same day as installation.

STANDARDS COMPLIANT

SMS Scratch Machines are the only scratch systems patent-licensed instruments that meet ASTM D7027-05 and ISO 19252:2008 standards for polymeric coatings and plastics scratch testing. They can also be leveraged to meet a variety of other ASTM, ISO, and industry standards. Scratch machines developed by the Polymer Technology Center's SCRATCH

Consortium were instrumental in the design and acceptance of these industry standards, and an SMS Scratch Machine is the latest commercial iteration of that work.

ANALYTICAL SOFTWARE

SMS's SVA software automatically performs visual analysis of scratch and mar samples for flat, piano-black, and textured surfaces across a range of colors. Developed in conjunction with the Texas A&M University PTC SCRATCH consortium, this software reliably and consistently identifies the critical load at which scratch phenomena occurs. It integrates seamlessly with the data files produced by the Scratch Machine, giving you "heads up" inspection of visible phenomena and data in real-time. The software works with samples produced by an SMS Scratch Machine, as well as Ford 5-Finger, and Erichsen equipment. The same software is compatible with both the SMS SVA Kit and the SMS Blackbox Mar Visualization Instrument.

OPTIONAL STYLI (INDENTER) GEOMETRIES

SMS produces a wide variety of styli, including custom styli for various tests. Standards styli include:

- 1mm, 2mm, 4mm, 5mm, 7mm, and 10mm ball tips in stainless steel;
- 1mm, 2mm, 5mm ball tips in carbide;
- 6mm and 12mm tilting barrel tips;
- 10x10mm and 5x5mm square tips;



ATTACHMENTS & EXTERNAL OPTIONS

Hot Plate

This temperature-controlled hot plate sits on the work surface of the machine, and can hold samples to specified temperatures in situ, up to 250 °C. The hot plate can be mounted to one side of the work surface, and the adjustable head position of the Scratch Machine allows an operator to conduct tests directly over the hot plate attachment, without moving or transferring the sample.

Pneumatic Film Chuck

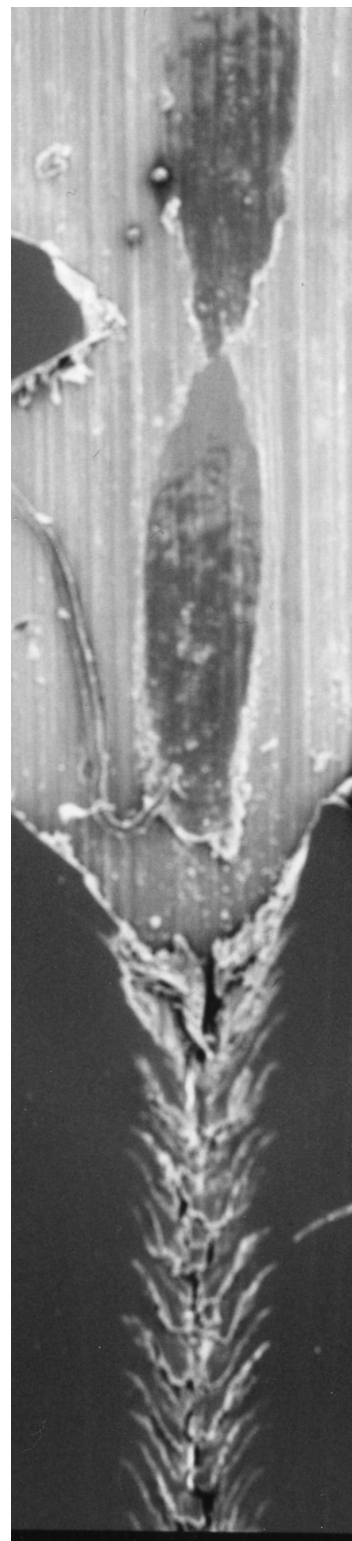
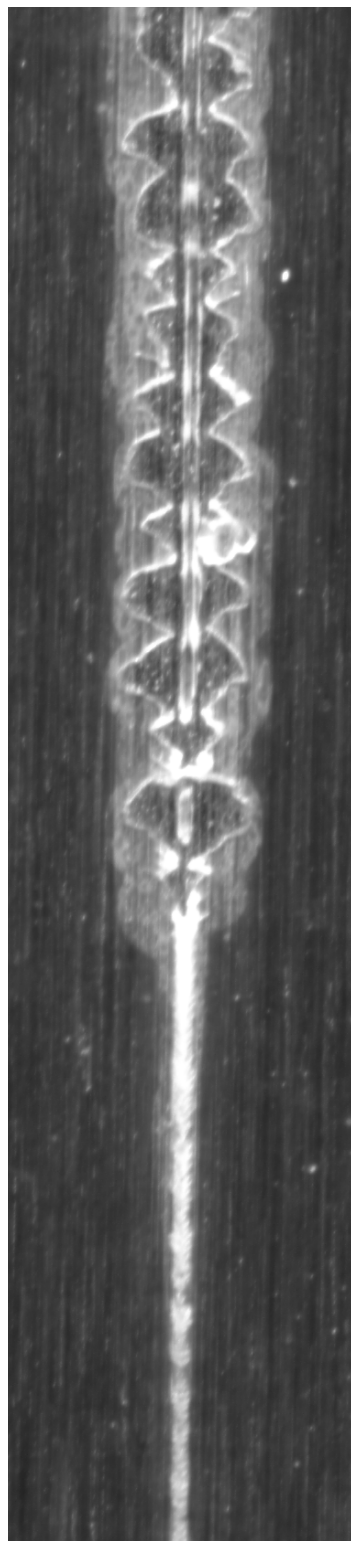
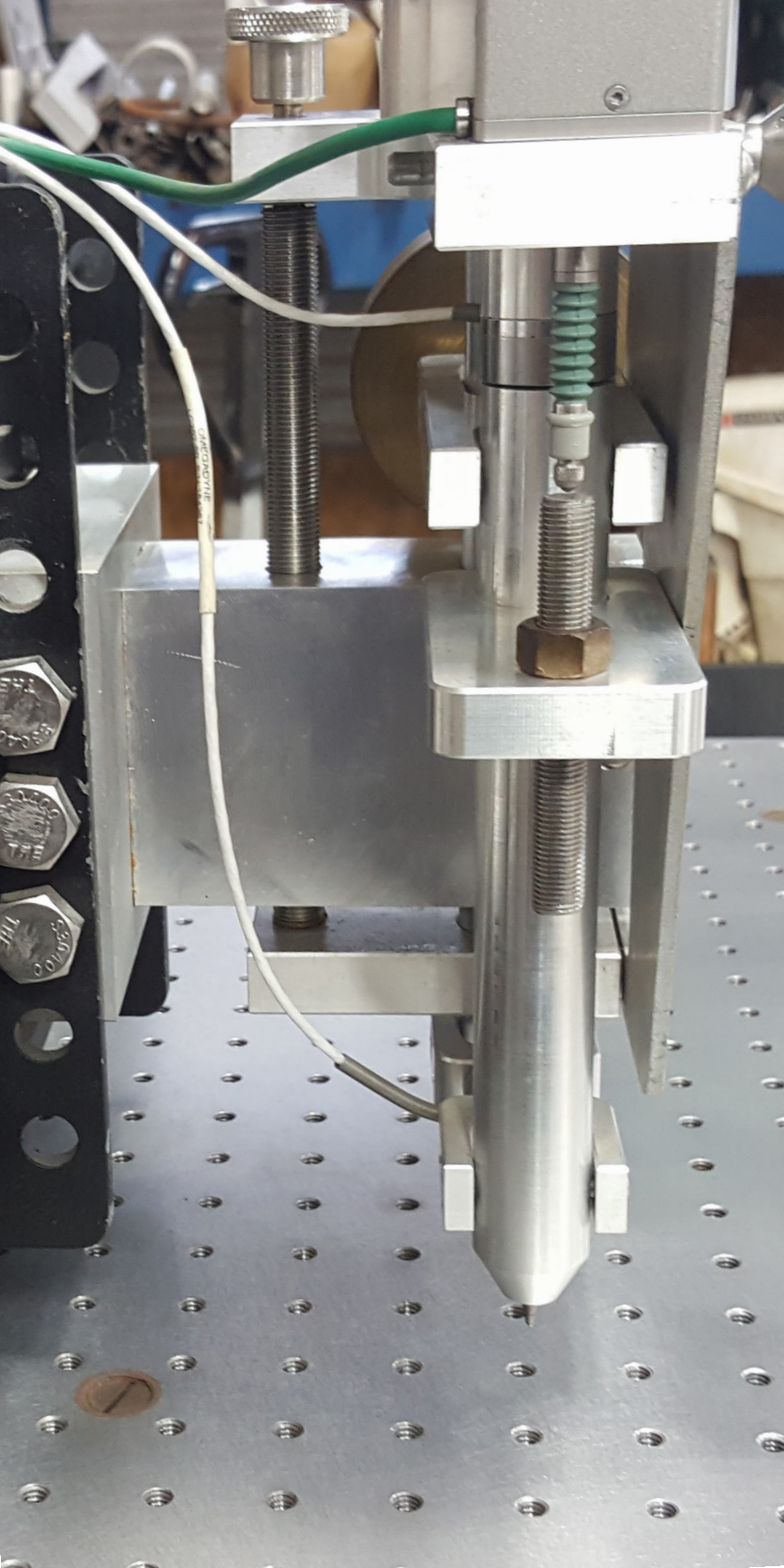
A pneumatic-vacuum film chuck, this attachment allows an operator to hold thin films and other flexible samples to a variety of sacrificial backings during test. It can also be used with standard, flat, bulk samples for simple and quick testing.

TAMU “Black Box” Mar Visualization Instrument

The Black Box is the key analytical instrument in the assessment of Mar damage. Developed by the Texas A&M PTC SCRATCH laboratory, this device is critical in analyzing mar tests performed by the Scratch Machine.

SVA Kit

The SVA Kit is the basic analytical toolkit for performing visual analysis of test samples from the Scratch Machine, and from other devices. The SVA Kit includes a flatbed scanner, color calibration cards, and the software necessary to automatic scratch analysis. The software performs an objective analysis of the samples, without having to rely on extensive operator and technician training. It eliminates variables in the assessment phase of testing by normalizing for lighting conditions, viewer angle, and sample color.



MINIMUM SPECIFICATIONS

PERFORMANCE CAPACITIES

FEATURE	RANGE	ACCURACY & CAPACITY
Velocity	1 - 400mm/s	0.25mm/s
Normal Load	+/-225N, +/-750N	0.5N, 3N; 1000 sps
Tangential Load	+/-225N, +/-750N	0.5N, 3N; 1000 sps
Lateral Displacement	300mm	0.25mm
Depth	+/-2.5mm	12.5µm

WORKING ENVELOPE

ORIENTATION	RANGE	NOTE
Lateral	300mm	200mm working space
Vertical	50mm	
Work Surface	150mm x 300mm	¼-20 mounting holes on 1" grid
Lateral Displacement	300mm	0.25mm
Depth	+/-2.5mm	12.5µm

OUTPUT

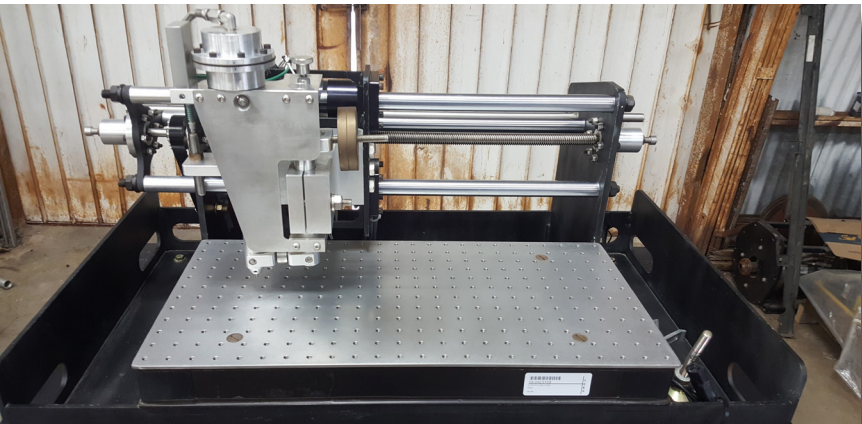
- CSV format, all analog sensors + scratch coefficient of friction

STYLI CHUCK

- ASTM/ISO standard for 0.095" shank

OPTIONS

- Integrated work stand



STANDARDS & TEST CAPABILITIES

STANDARD OR TEST	NOTES
ASTM D7027-05	Meets and exceeds
ISO 19252:2008	Meets and exceeds both formats
ISO 19252:2013	Meets and exceeds both formats
Ford 5 Finger	Multiple constant-load
Erichsen Crosshatch	Manual turntable accessory available
ASTM D3363	Replication by constant-load analysis
Toyota TSL3618G 4.9 & Others	Per ASTM
Scratch Coefficient of Friction	Per ASTM and ISO
Reciprocation	Up to 1Hz
Puncture	Thin film non-conductive puncture detection
Indentation	Up to 200N @1mm/s
Automotive Mar Analysis	

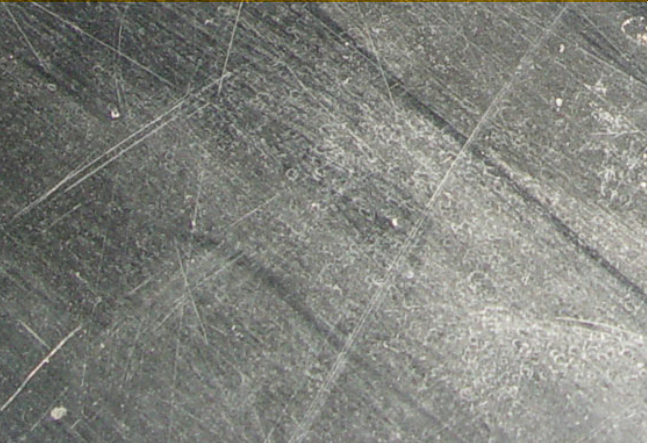
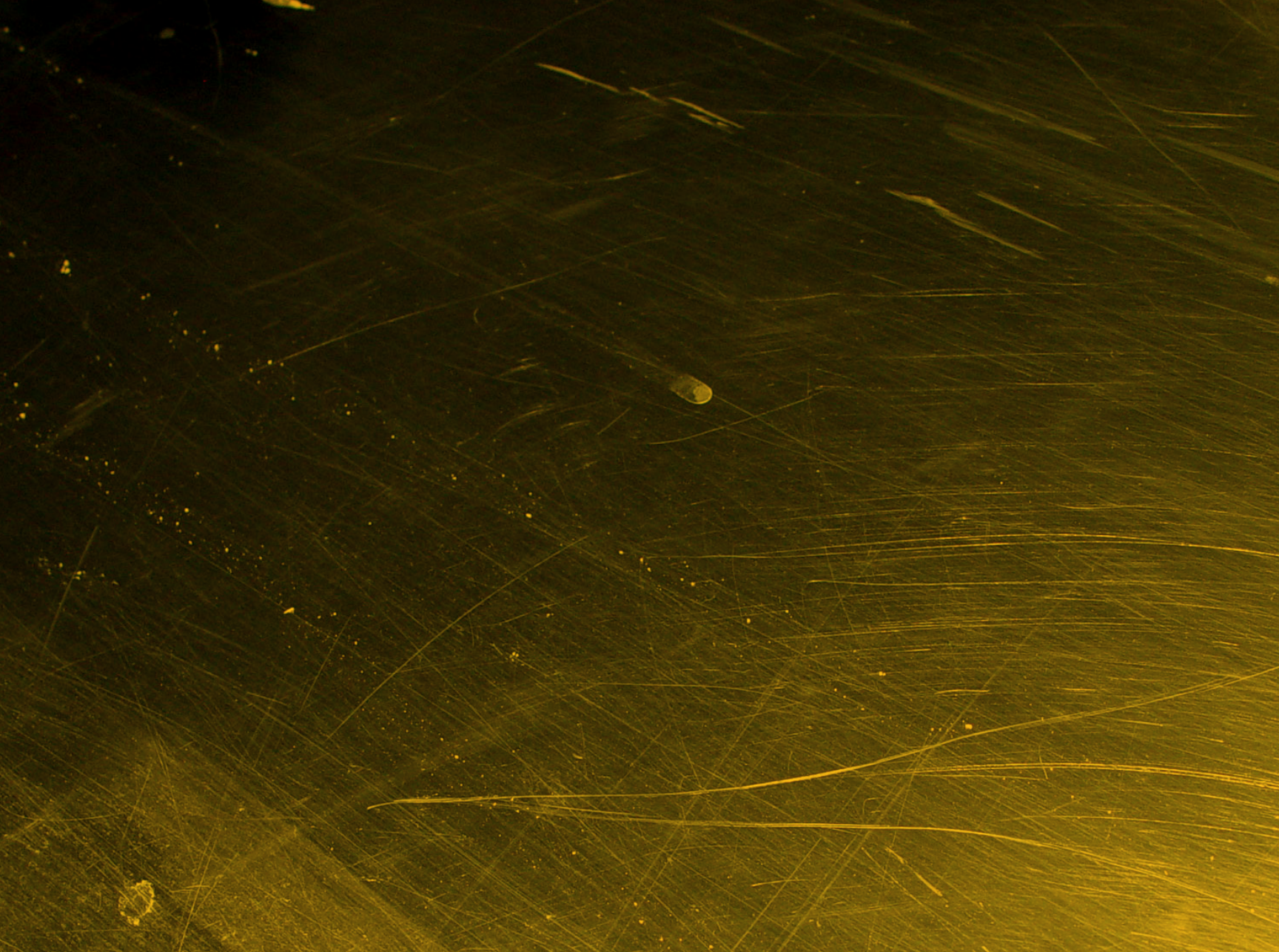


CONTACT INFORMATION:

(888) 512-5633
+1 (713) 234-0026 (International)

Noah Smith, COO
Surface Machine Systems, LLC
1320 Arrow Point Dr, Suite 501 #TW55
Cedar Park, TX 78613

inquiries@surfacemachines.com



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