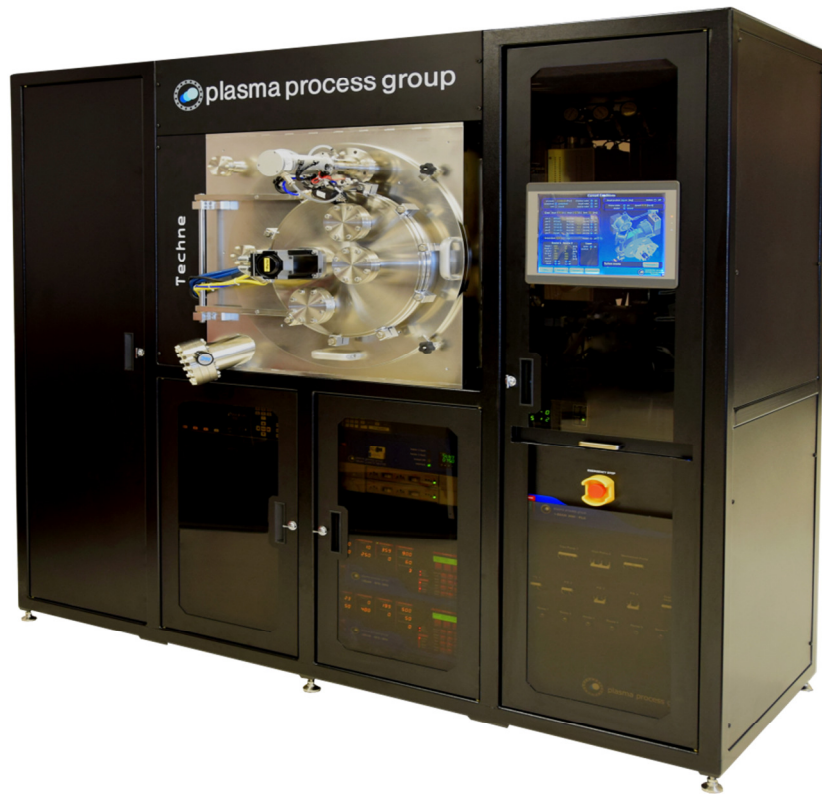




# plasma process group

## Techne - Ion Beam Process System



### Features

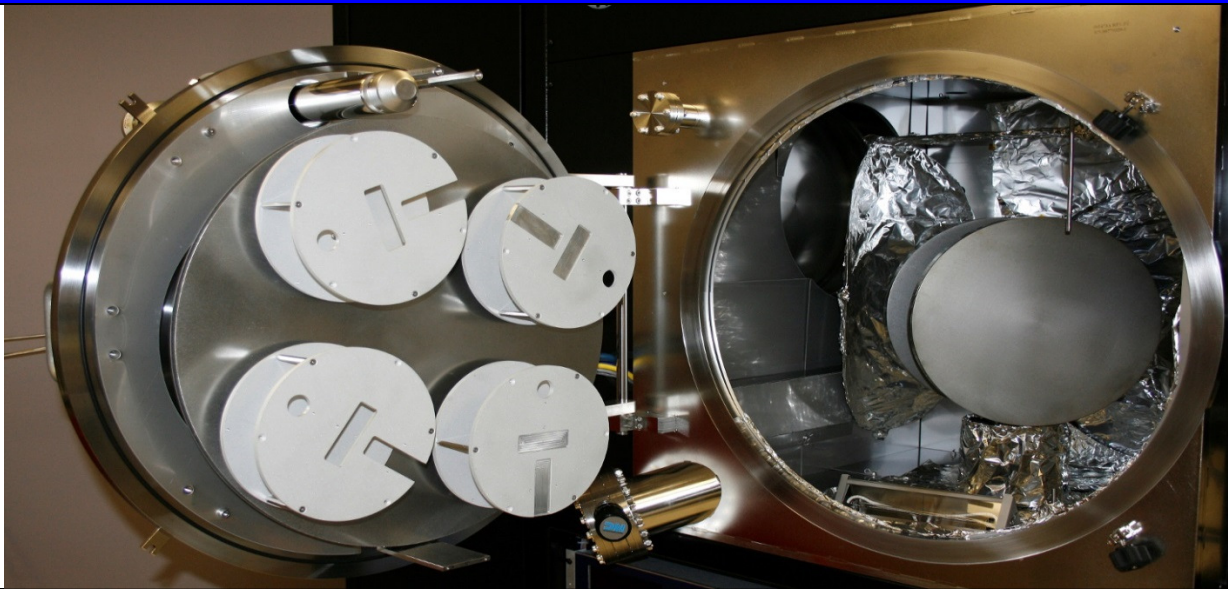
- Batch coating system with either two or three target materials.
- Planetary or single part substrate motion.
- Deposition geometry optimized for rate, uniformity and minimized contamination.
- Automated control with accurate layer termination.
- Small chamber volume for rapid pump down and maximum production throughput.
- Designed for easy access to promote quick substrate loading and maintenance on system components.
- Real time data display and data logging for post process analysis.

### Applications

- Ion beam sputter deposition
  - Ion beam assisted deposition
- Optical coating deposition
  - Antireflection coatings
  - Band pass filters
  - Broadband reflectors
  - Edge filters
- Surface pretreatment
  - Substrate etching / cleaning
  - Ion milling

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*Whether you're in research or production, Plasma Process Group is committed to providing the best support possible. Help is just a phone call away (or email if you prefer). Our people have many years of experience with ion beam sources, systems, and applications, and we're happy to share that with you. Give us a call.*



### Description

The Techne Ion Beam Process System is a thin film deposition tool that produces very high quality coatings. The ion beam, sputter target and substrate fixture geometry have been optimized for high deposition rate and best uniformity. The ultra high vacuum environment enables the production of coatings with minimal defects and impurities.

Reactive ion beam sputtering is achieved with the addition of a gas such as Oxygen. The Techne can easily produce many different oxides such as  $\text{SiO}_2$ ,  $\text{Ta}_2\text{O}_5$ ,  $\text{Nb}_2\text{O}_5$ ,  $\text{TiO}_2$  and  $\text{Al}_2\text{O}_3$ . A wide selection of other materials such as metals and metal alloys can also be deposited. Typical deposition rates vary from 2 to 5 Å/s depending upon the process.

The deposition process begins with our optimized 16 cm radio frequency (RF) ion beam source controlled by our IBEAM 703 power supply. The deposition source is equipped with industry standard 3 focal point grids and produces a 16 cm diameter ion beam. This grid assembly promotes even target erosion and a stable deposition plume. The deposition source is typically operated on Argon; however, it can be operated with many other gases.

The targets are mounted to our two-target manipulator that is designed to promote target life and deposition stability. Target life is 2X longer than other IBAD systems. Water-cooled stainless steel baking plates 14 inches in diameter support the target material and can be changed in minutes.

The Techne system can be equipped with an

assist source for ion beam assisted deposition (IBAD) applications. Our 12 cm RF ion beam source is equipped with a grid assembly that produces an 8 cm beam diameter. The assist source will promote uniformity, material packing density and reduce compressive stresses in the deposited coating. The assist source can be operated on Argon, Oxygen and other gases specific to the process.

We offer a combination planetary / single substrate fixture for mounting components to be coated. The planetary fixture holds 6 planets that are 7 inches in diameter (or 4 planets 8 inches in diameter). Uniformity of the coating is controlled with masking to  $\pm 0.5\%$ . The planetary fixture can be removed in a few minutes for the high-speed single substrate holder to be installed. Specific mounting tooling can be fabricated to meet your needs.

High quality thin films require accurate layer control. The Techne utilizes a dedicated programmable logic controller (PLC) timer in conjunction with our IBEAM 703 power supply. Layer termination is controlled to within 100 ms providing unprecedented accuracy. Termination signals from a quartz crystal monitor (QCM) or other user devices can also be implemented to halt the coating process.

The small vacuum chamber volume on the Techne promotes a quick turn around for the batch coating environment. Precious manufacturing time is saved with the reduction of pump down times. Utilizing a sizable mechanical and cryo pump combination, the system routinely achieves a pressure in the  $10^{-6}$  Torr range in less than 30 minutes from atmospheric pressure.

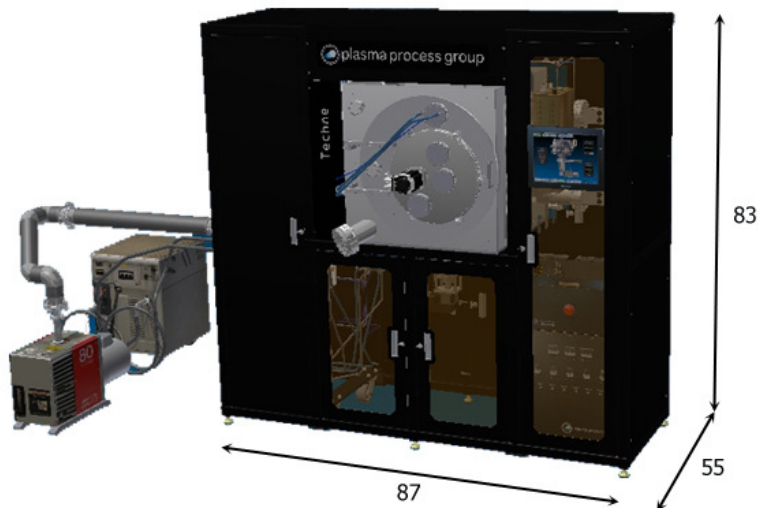
*High quality ion beam coatings without the fuss.*

<b>Specifications</b>		
<b>Item and Part Number</b>	<b>Base Model - Ion Beam Process System</b>	
Deposition source	36001A	16 cm radio frequency (RF) ion beam source mounted to ISO 320 style flange. Source uses a 3 focal point grid assembly for maximum target utilization. Maximum beam conditions are 1500 V and 600 mA.
Assist source	36002A	12 cm radio frequency (RF) ion beam source mounted to ISO 320 style flange. Source uses an 8 cm grid pattern for maximum etch coverage and minimized overspray. Maximum beam conditions are 1500 V and 250 mA.
Source neutralizer	36001A	RF neutralizer (RFN) mounted to a 6" CF flange with matching network for each source.
Source power supply	36001A	IBEAM 703 power supply package with cables and matching network for each source. The IBEAM 703 has all required power supplies in one 19" rack mount x 4U height chassis. These include beam, accelerator, RF power and RFN power supplies.
Substrate fixture	38001A	Combination planetary and high speed fixture mounted to an ISO 400 style flange. Quick and straight forward conversion to either configuration with minimal downtime. Rotation accomplished using single shaft and Ferro fluidic feedthrough.
Planetary fixture	38001A	Four planets, each 8" diameter for a total coating area of 1300 cm <sup>2</sup> . Rotation speed of 0.3 revolutions per second (rps). Gearing is selected such that the substrate position will not be repeated for ~150 seconds at 0.3 rps. Easy to remove and install planets for preloading. Actual substrate mounting hardware tailored to end user requirements.
High speed fixture	38001A	For single substrates up to 30 cm diameter. Rotation speed of 1000 revolutions per minute (rpm).
Fixture position	38001A	Parker style brushless servo motor with controller.
Target assembly	37005A	Two target – 2 axis of motion. Water cooled mount with two industry standard 14" diameter stainless steel backing plates. Target material up to 0.5" thick is selected by the end user.
Target cleaning	39004A	Shutter to pre-clean target prior to deposition.
Target position	37005A	Parker style brushless servo motor with controller.
Process chamber	31001A	Electro polished stainless steel, 500 liter internal volume. Walls are externally water cooled with built in water channels. Two access doors (28" and 24.5" diameter).
High vacuum valve	34003A	ISO 400 style flange pneumatic with position sensor and debris protection.
High vacuum pump	34003A	Cryo Torr 400 cryogenic high vacuum pump. 17000 l/sec pumping for water vapor, 6000 l/sec Air. ISO 400 style flange.
Chamber valves	33001A	KF and ISO style flange connections, stainless steel rigid and flex tubing with KF25 pneumatic vent valve and KF40 pneumatic roughing valve.
Mechanical pump	33001A	Edwards E2M80 two stage 96 m <sup>3</sup> /h, 60 Hz, 208/460VAC
System controller	35004A	A human machine interface (HMI touch screen) with programmable logic controllers (PLC) is used to control pumping, cooling, gas flow, target position, fixture operation, and ion beam source operation. The operator can program process templates and execute programmed recipes. Other features include alarm with message display for troubleshooting and data logging for process monitoring. All system components interlocked for safety.
Gauge control	35004A	Granville Phillips 307 gauge control with 1 ion gauge and 2 convectron gauges.
Gas flow control	35004A	Base unit has 6 Alicat Scientific mass flow controllers (50 sccm maximum).
Layer control	35004A	Base unit has timer and pressure monitor control. Other endpoint detection options include quartz crystal monitor and user input.
Uniformity control	39003A	Static shadow mask for uniformity improvement.
Frame	32001A	Rigid steel with matt black finish and panels. Built in 19" instrumentation rack.
Cooling manifold	35001A	Three separate channels for water cooling of the ion beam sources, target and chamber. Gems flow sensors are used to indicate flow.
Power distribution box	32001A	Electrical panel for facility power interface. Outputs for mechanical and cryo pump. Additional receptacles for 208 VAC x 20 A x 1 Ø and 120 VAC x 20 A with circuit breaker and interlock protection. Size 19" rack mount x 9U height.
<b>Utilities</b>		
Power	208 VAC, 60 Hz, 3 phase, 60 amp service with EPO for safety.	
Water cooling	Minimum of 7 l/min (2.0 gpm) supply, 6.0 gpm with cryo compressor.	
Argon	99.995% ultra-high purity, 20 to 30 psi, stainless steel supply lines from bottle.	
Oxygen	99.995% ultra-high purity, 20 to 30 psi, stainless steel supply lines from bottle.	
Nitrogen (dry)	99% purity, 20 to 30 psi, stainless steel supply lines from bottle, for vent and cryo.	
Air	Compressed, oil and water free, 80 to 100 psi.	
Exhaust	Oil mist capture exhaust plenum for mechanical pump.	



## Layout

Size (inches):



Doors open:



### Additional features

- Easy access to all system components (front and back door access).
- Event and error messaging with email notification.
- Data logging with remote backup.
- Remote monitoring (VNC).
- Able to deposit 200+ layer designs.
- Easy access doors for maintenance.
- Chamber liners that are easily removed.

### More Options

- Quartz heaters for system bake out.
- Rotary sensor for 6 quartz crystals.
- Turbo pump for high vacuum.
- Different target configurations.
- Different planetary options.



### The Techne Ion Beam Deposition System

*A coating machine that delivers.*



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