MeiVac INC.

602 Sputter Deposition System

Deposition Products & Processes

"Collaboration with the Customer is essential to arriving at optimum solutions."

The 602 Series Systems

"Collaboration with the Customer is essential to arriving at optimum solutions."

Understanding this principle has guided MeiVac through more than thirty years of providing deposition products and processes.

Searching for solutions with our customers is central to attaining the predictable results necessary to meet the most stringent processing requirements.

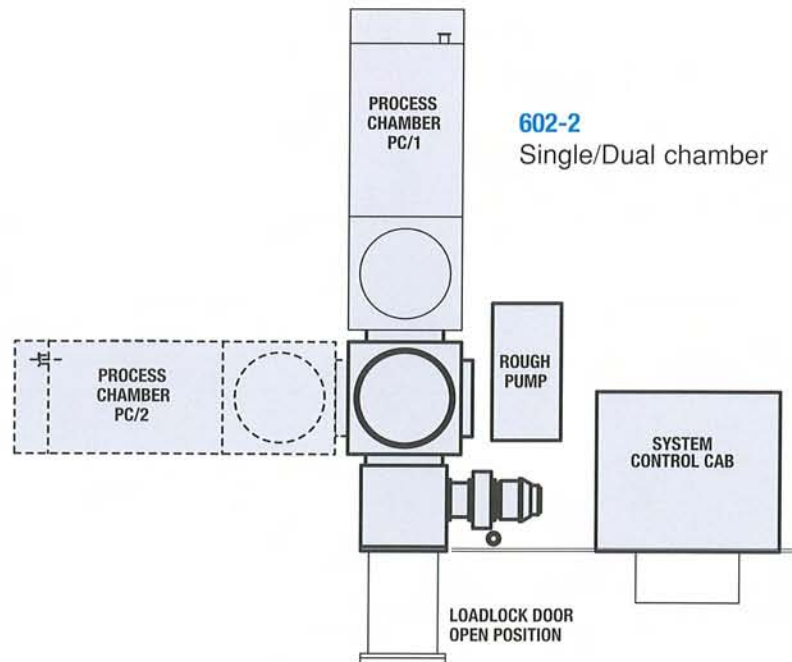
The MeiVac 602 series was developed as a high reliability, high uptime, expandable system platform. The first in this series was the MeiVac 602G, a single process chamber system for the deposition of thin alumina gap layers.

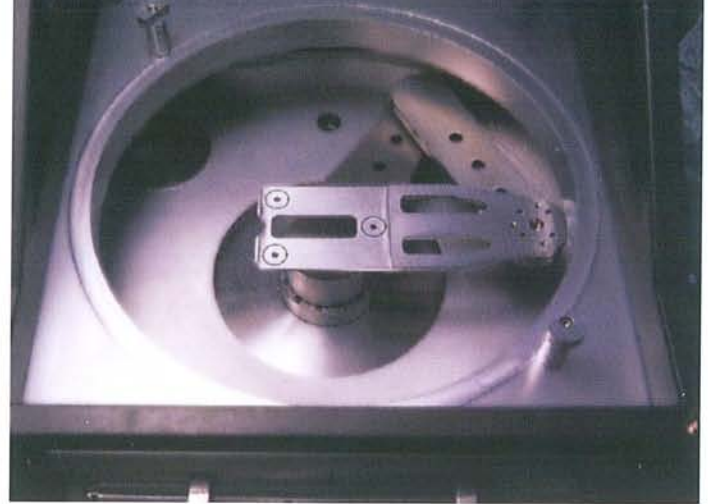
Responding to the need for higher productivity of increasingly sophisticated thin film manufacturing processes, MeiVac recently introduced the MeiVac 602 two and three chamber cluster tools, the next deposition system in the series. This system was developed especially for applications where it is essential to provide chamber isolation, maintain vacuum between process steps, or for higher throughput when running a single process.

Consistent with the modular architecture of the MeiVac 602 family, the multi-chamber cluster tools share a large number of sub-systems. For example, all systems utilize the same robot, as well as loadlock and transfer chambers. For many applications, they incorporate the same process chamber. All this results in a newly introduced system that contains many major modules that have already been proven in production in MeiVac 602 single chamber systems.

Such a multi-chamber approach allows the MeiVac 602 to address the increasingly complex needs of MeiVac's core alumina Thin Film Head market, as well as other advanced thin film applications.

TYPICAL TOOL LAYOUTS





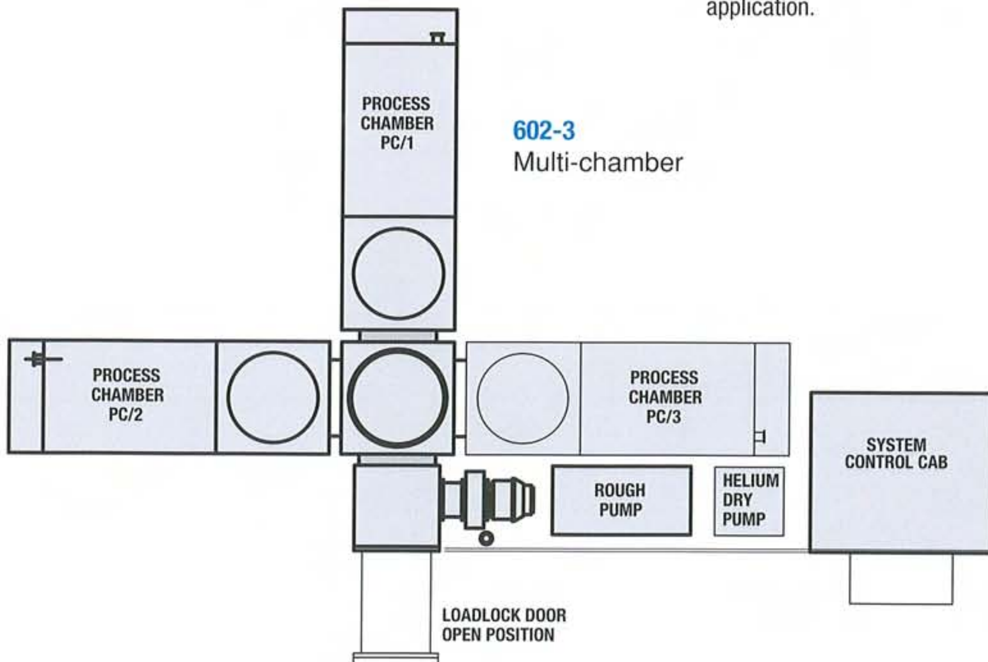
MeiVac 602 series systems are automated, loadlocked, single substrate deposition tools optimized for dielectric, magnetic and conductive layers used in Thin Film Magnetic Heads. The systems deposit in the static, sputter-down mode with a variety of RF or DC sources. The modular design and MESC compatibility allow for efficient operation in both R&D and production environments, with single or multiple process module configurations.

The transfer module consists of a loadlock chamber with an elevator for loading and unloading substrates, a transfer chamber with a robotic arm for transferring the substrates to and from the different process/loadlock chambers, and related vacuum measurement and control facilities. The transfer chamber can be provided with vacuum isolation from the loadlock chamber.

Today's magnetic recording heads require the deposition of ever thinner alumina layers. The MeiVac 602G deposition system provides superior film properties for ultra-thin gap layers.

The 602G can be used for deposition of alumina or alternative gap material by various conventional and reactive sputtering techniques.

The 602B deposition system extends the processing accuracy and speed for increasingly thin basecoats, while providing the improved defect controls that can only be found in loadlocked systems. It incorporates two process chambers for deposition of alumina layers that are typically <10 microns thick. Its process modules are identical to the ones used in the field proven MeiVac 602G with a larger RF power source allowing 30% higher deposition rates. The system delivers the high reliability essential in a production environment, while depositing alumina layers with uniformities in the 1-2% range, at throughputs that, depending on thickness, exceed those of MeiVac's HEDA 2460 and 2480, the long-standing products of choice for this application.



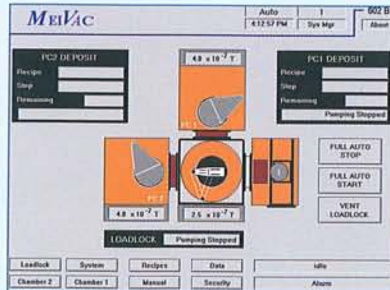
602-3
Multi-chamber

Control System

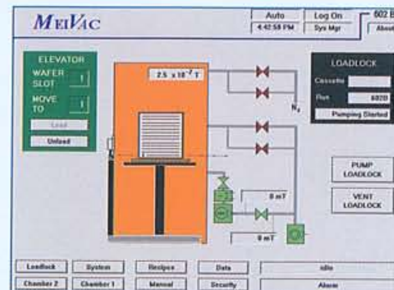
Control and monitoring of the 602 series systems are accomplished through a computer-based system working with a Programmable Logic Controller. An advanced point-and-click Graphical User Interface provides easy access and control of the software and hardware. Multi-level password protection allows different operational access levels while maintaining ease of functional control.

- Point-and-click actuated intuitive icon-driven GUI for ease of operation and high functional visibility.
- Complete recipe management and wafer load map, which assigns a recipe to a wafer.
- Data logging capabilities for storing process parameter values, with auto data logging and self-cleanup features.
- Five levels of automation and control from fully automated to fully manual.
- Interlock control (both hardware & software) configured appropriately to the chosen operational mode.

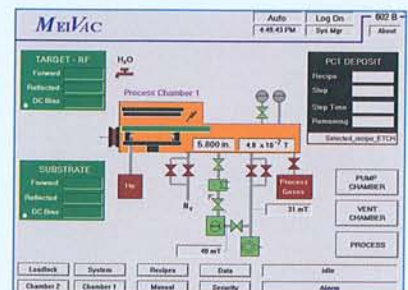
Navigation Button and Graphical Icon Access



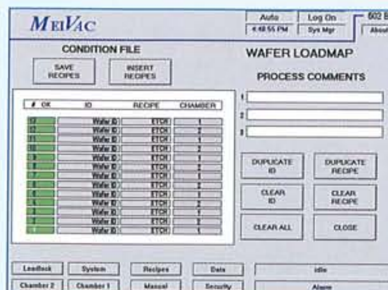
SYSTEM SCREEN



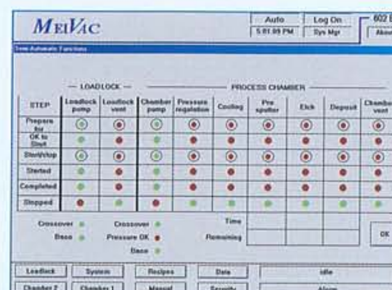
LOADLOCK SCREEN



PROCESS CHAMBER SCREEN



WAFER LOADMAP SCREEN

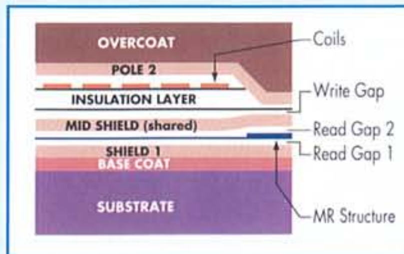


SEMI-AUTOMATIC SCREEN

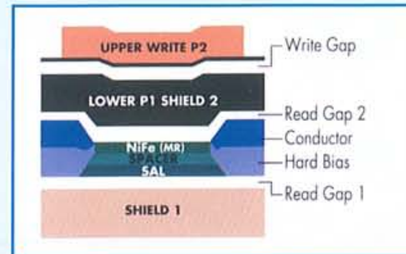
RECIPE EDIT SCREEN

THIN FILM MAGNETIC HEADS

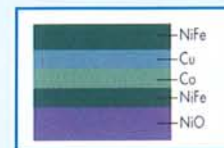
HARD-BIASED MAGNETORESISTIVE (MR) HEAD



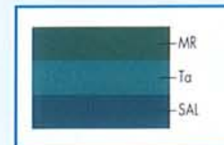
CROSS-SECTIONAL VIEW



AIR BEARING SURFACE VIEW



SPIN-VALVE HEAD



AMR HEAD

The Hard Disk Drive Industry has a history of unprecedented technological growth with data storage capacities increasing exponentially. The introduction of spin valve and perpendicular recording technology is driving areal densities at a CAGR of 60% while prices continue to drop. The main limitations on the size of the smallest bit that can be reliably written and read are head design. These developments in thin film head technologies call for increasingly sophisticated thin film manufacturing processes. The ability to accurately reproduce precise layers is key to continued progress.

Gap Application

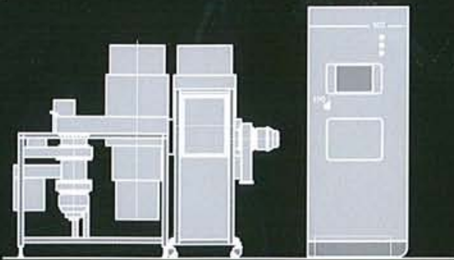
Insulating gap layers are used to physically and electrically separate various conducting layers in a thin film head. The read element of the head is separated from the bottom and top shields by insulating gap layers (half gaps). In merged heads, the top shield also serves as the bottom pole of the inductive write element. The active part of the inductive element is a multi-turn, multilayer copper coil separated from the bottom and top poles by a gap layer.

Production of thin, precise gap layers with excellent dielectric properties and smooth surfaces are key for new generation spin valve and perpendicular recording heads. As areal densities skyrocket head size will continue to shrink, requiring gaps a few nanometers thick. This requires deposition techniques that keep substrate temperature low, while producing gap materials that possess high breakdown strength and thermal conductivity, as well as low defect density (pinholes) and electrical leakage. Step coverage also becomes a very critical issue for ultra-thin layers, since low values can lead to magnetic field leakage and drastic reductions in head performance. The 602 family offers improved edge coverage and stress control with RF bias while maintaining low substrate temperature with Helium Backside Cooling.

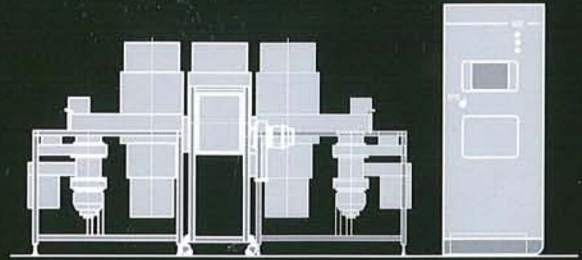
Basecoat Application

One of the first processes in head fabrication is to deposit a layer of alumina. These under layers of alumina (10-20 microns thick) provide a basecoat over which the rest of the head is constructed. Like gap layers, the thickness of basecoat layers is also decreasing with more stringent uniformity and defect density requirements.

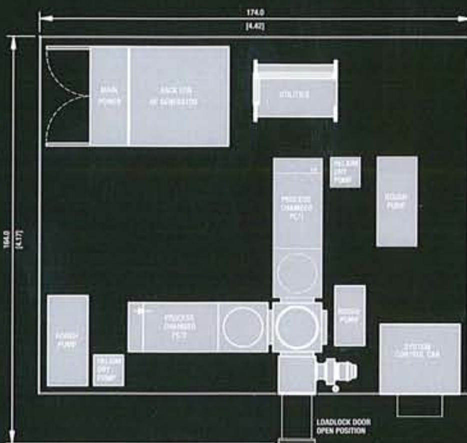
Systems Specifications



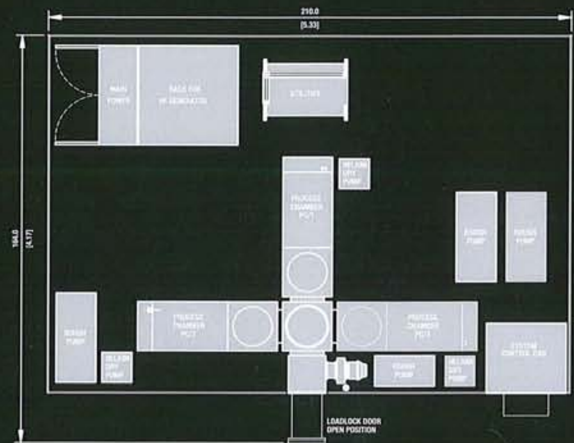
602-2 FRONT VIEW



602-3 FRONT VIEW



602-2 FOOTPRINT



602-3 FOOTPRINT

	MeiVac 602-2	MeiVac 602-3
Throughput	Typically 40 minutes of overhead for cassette loading, transfer, pumping, and venting per cassette plus deposition time (400A/minute)	Typically 40 minutes of overhead for cassette loading, transfer, pumping, and venting per cassette plus deposition time (650A/minute)
System Weight	Approximately 8000 lbs	Approximately 11000 lbs

602 TECHNICAL SPECIFICATIONS

Ultimate Pressure	
Process	3 x 10^{-7} Torr
Loadlock	3 x 10^{-6} Torr
Transfer	3 x 10^{-6} Torr (Shared pumping stack with loadlock)
Sputtering Sources	RF Diode RF Magnetron DC Magnetron

Wafer Capacity	Up to 25 wafers per cassette
Heating	Separate chamber can be provided for Substrate preheat
Target Sizes	14" Diameter, RF Diode 12" Diameter, Magnetron (RF or DC)
Uniformity	±2.0% Max/Min
Etching	Sputter etch in process chamber

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