HHV ADVANCED Technologies

THIN FILM DEPOSITION SYSTEMS

THE COMPANY

The HHV Group is India's premier vacuum technology group with over 60 years of expertise in the design and manufacturing of high vacuum equipment for research and industrial applications. HHV's products are integral to multiple sectors including Automotive, Aerospace and Defence.

The HHV Group has multiple manufacturing facilities located in Bengaluru with pan India marketing and service operations. The Group is certified with ISO 9001:2015, ISO 14001: 2015 and ISO 45001: 2018 certified.

HHV Advanced Technologies (HHVAT) is ranked amongst the global leaders in thin film technology equipment and coatings. It has a wide international market presence with branches in the United Kingdom and distributors worldwide. HHVAT is particularly strong in executing large, highly sophisticated customized thin film coating equipment for a range of applications, Additionally it has inhouse expertise and experience in thin film design and coating from UV to far IR spectrum and has years of experience in fabricating high precision optics for the space, defence and industrial sectors.

History

1965

Hind High Vacuum founded as a small-scale industry in Bangalore, India

1967

Developed India's first indigenous 12" lab model vacuum coating unit in association with the Indian Institute of Science

1991

Established the thin films division and began producing optical filters

2002

Built and supplied the largest vertical coating system for 2.2m diameter telescope mirror coatings at an elevation of 14800 ft. above sea level at Hanley, Ladakh

2005

Developed a robot- controlled sputter coating system for conductive and transparent coating on aircraft canopy and windshield with process technology

2007

Established the 6.5 acre plant in Dabaspet, Bangalore, India which includes international contract manufacturing operations for Edwards' range of thin film deposition equipment and diffusion pumps

2008

Installed the horton spheres coupled with hyersonic wind tunnel at Trivandrum, India: The spheres are 16.13 m in diameter (equivalent to the height of a five storeyed building), with a vacuum system having a pumping speed of 1,20,000 m^3/hr

2009

HHV's international activity commences with the export of thin film deposition equipment: Acquired the Edwards thin films lineage and established HHV Ltd. in United Kingdom

2010

Developed a complete turnkey line for the production of amorphous silicon solar panels with a capacity of 10MW per annum

2017

Established the thin films and optics facility to fabricate high precision optical components in the visible and infrared spectrum

2017

Designed and manufactured the TF1400 thin film deposition system with a 1400mm chamber for mass production

2018

Launched India's first commercial ALD reactor

2018

Received National R&D award for successful commercialization of Indigenous technology in 2018 from the President of India

ADVANCED
Technologies

2023

HHV Advanced Technologies commences operations

2023

Installed and commissioned a mirror coating plant for 2.5-meter telescope at Mount Abu Observatory

2024

Established two new facilities: 40,000 sq. ft. for diffusion pump manufacturing and 40,000 sq. ft for high precision optics and optomechanical assemblies

Research & Development

HHVAT has an R&D team that works on machine design, hardware and process recipes. The team of scientists and engineers continually advance the company's technology base by upgrading its products and processes through extensive research and testing.

The R&D group collaborates with various academic and research institutes across the country to upscale and commercialize technologies developed out of research labs.

Our R&D facility is recognized by the Department of Scientific and Industrial Research (DSIR), Govt. of India.

Awards & Recognition

HHV received a National Award for successful commercialization of Indigenous technology in 2018 from the President of India

HHV has received the 'Star performer' Award from EEPC for 5 years in a row

HHV was awarded the 'Technovation Award 2011' from the Indian Semiconductor Association (ISA) for the indigenous development of an amorphous silicon production line

HHV received a certificate of recognition from the DIO for indegenous work on laser coatings for defence applications

HHV Advanced Technologies has been awarded The CII Awards for Excellence in Women in STEM 2025

Manufacturing Capabilities

HHVAT is a leading supplier with capability to provide standard platforms and customized system for various applications.

It is constantly upgrading its manufacturing capabilities to keep in line with the evolving demands of the market.

This includes all aspects of the manufacturing process:

Engineering design
Process automation
Precision machining and fabrication
Electropolishing
TIG welding
Vacuum brazing
Global supply chain
Electro-mechanical assembly
Comprehensive product testing

Our Thin Films and Optics division is a leading manufacturer of high precision optical components and thin film coatings. It is equipped with ISO 7, ISO 8 clean rooms and class 100 laminar flow stations.

This division manufactures dichroic coated optics, laser filters, narrow band interference filters, hybrid micro circuits, periscope prisms, thin film heaters and infrared optics for a variety of applications in industrial, space and defence technologies.

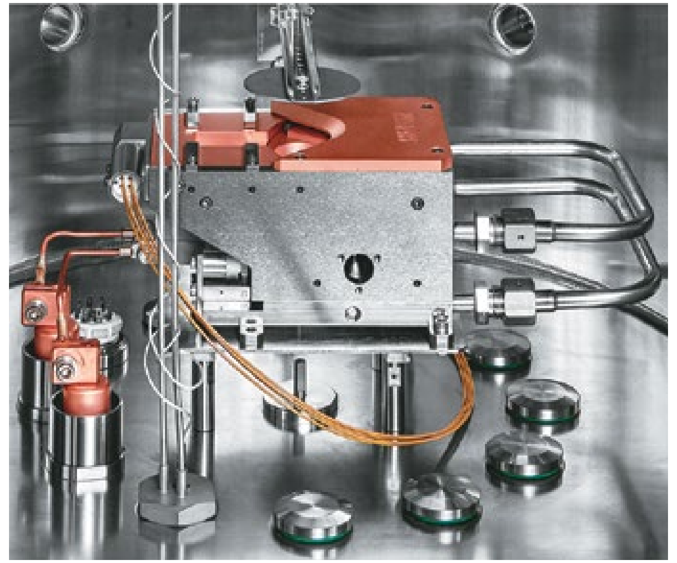
The precision Optics Fabrication Lab is equipped with state of the art technology for single point diamond turning (SPDT) along with slitting, trepanning, curve generation, grinding, polishing, centering and edging for high precision spherical and aspherical optics for the visible and infrared light ranges. This is the country's largest flat optics fabrication facility in the private sector.

PROCESS TECHNOLOGY

ELECTRON BEAM EVAPORATION

A stream of high energy electrons heats up the source to generate vapours which condense onto the substrate to form a thin film.

HHVAT provides electron beam guns from a single to large capacity-multi pocket sources enabling complex multi-layer depositions requiring higher film thicknesses.



MAGNETRON SPUTTERING

Magnetron sputtering employs plasma to generate ions which bombard the surface of a 'target' which then sputters the thin film material on to a substrate.

We offer a range of circular, linear and cylindrical magnetron sputter sources, engineered to meet R&D and production requirements.

PECVD

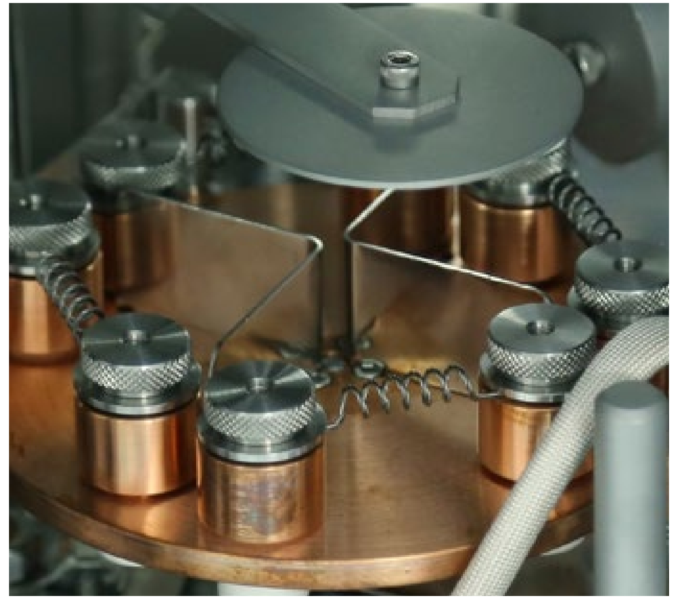
Plasma enhanced chemical vapor deposition (PECVD) processes induce a chemical reaction between powered electrodes which results in a thin film being deposited on a substrate.

We offer PECVD systems in various configurations such as single chamber, load-lock coupled and multi-chamber cluster tool to suit customer needs.

THERMAL EVAPORATION

Thermal evaporation involves heating a material inside a high vacuum chamber until it boils or sublimes, and then condenses on a substrate to form a thin film.

We have been developing deposition systems with various types of crucibles and multi-turret/multi-deposition sources customized to user needs.



EFFUSION CELLS

Effusion cells are specialized thermal evaporation sources offering precise temperature control for the deposition of sensitive materials.

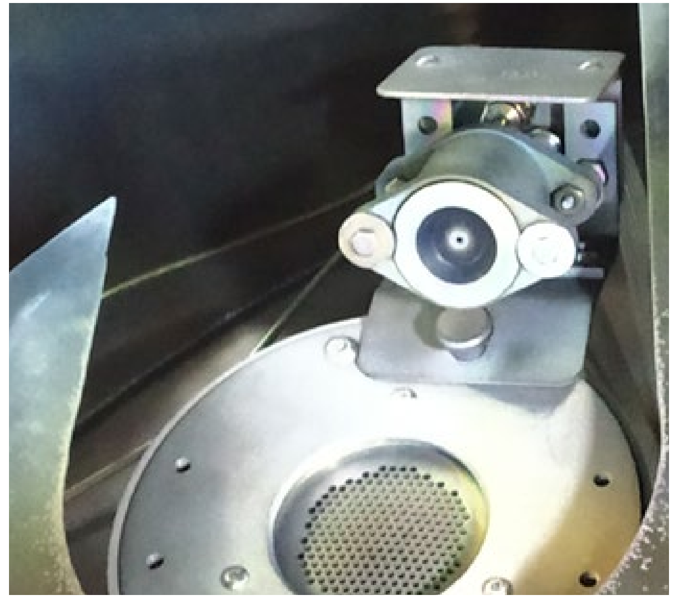
We have been developing deposition systems for organic materials for use in OLED displays, solar cells, and flexible electronic devices.

We develop specialised evaporation systems for continuous wire feed and fast cycle production.

ION BEAM SPUTTERING

Ion beam sources convert a process gas into an output ion beam that is parallel or divergent to the target. Parallel beams are used to sputter material with high-energy ions, and divergent beams are used on large-area work holders with lower energy ions during the deposition process.

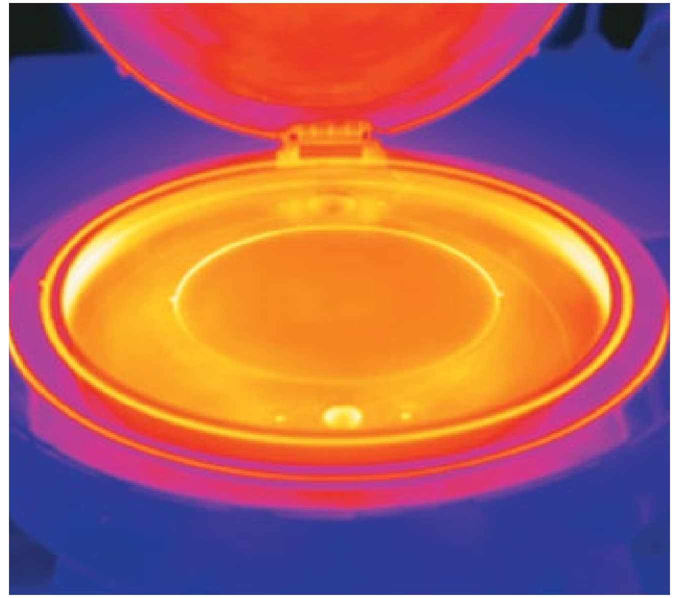
We apply ion beam technology for research and production systems.



ATOMIC LAYER DEPOSITION

Atomic layer deposition (ALD) is a thin-film deposition technique based on the sequential use of precursors and gives 100 percent conformal coverage and excellent thickness uniformity with pinhole free coatings.

We offer highly cost effective thermal ALD tools with built-in process recipes and a user-friendly software interface.

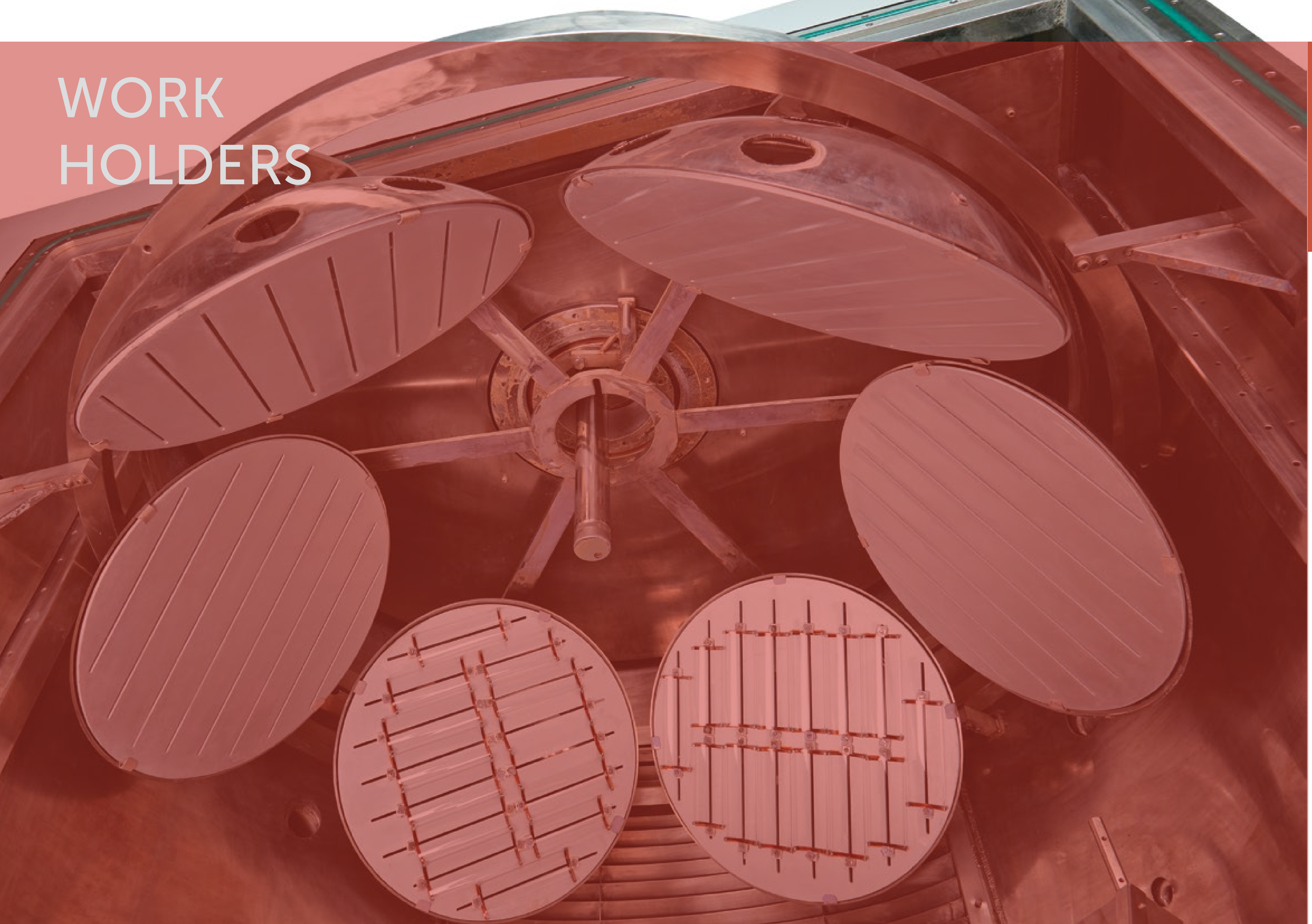


REACTIVE ION ETCHING

Reactive ion etching process uses chemically reactive plasma to remove material deposited on a substrate. It combines both physical and chemical activity of the reacting species to ensure high etch anisotropy as well as greater material selectivity.

We offer low cost of ownership RIE systems with pre-programmed process recipes on select models.

WORK HOLDERS



We manufacture a range of work holders which are designed to suit a variety of PVD and PECVD processes.

The work holders have many standard functionalities such as rotation, heating, and electrical biasing(RF/DC) to improve adhesion, uniformity and to control film density.

We also offer custom solution for substrate holders based on the sample size, geometry, throughput requirement and temperature range.

ROTATION

We provide various options such as rotary, planar planetary, Knudsen planetary, glancing angle deposition (GLAD), and substrate flip mechanism. Substrate rotation can also be supplemented by source masking to ensure uniform depositions.

BIASING

Substrate holders can be provided with various biasing options such as DC, pulsed DC, and at alternating frequencies such as MF, RF and mixed RF and LF frequencies.

GLAD

The GLAD workholder can be provided with rotation, tilt (± 90°), and linear z movement with inbuilt subtrate heating facilitates for structured three dimensional deposition.

TRANSFER

Linear transfers are available with manual or motorized actuation. A telescopic arm transports sample holders and samples between chambers or from the load lock chamber to main chamber.

LINEAR Z-SHIFT

Linear Z-shift motion provides the option to change source to sample distance up to 150 mm. This feature is useful for determining the optimum deposition conditions and to facilitate substrate transfer between chambers.

LOAD LOCK

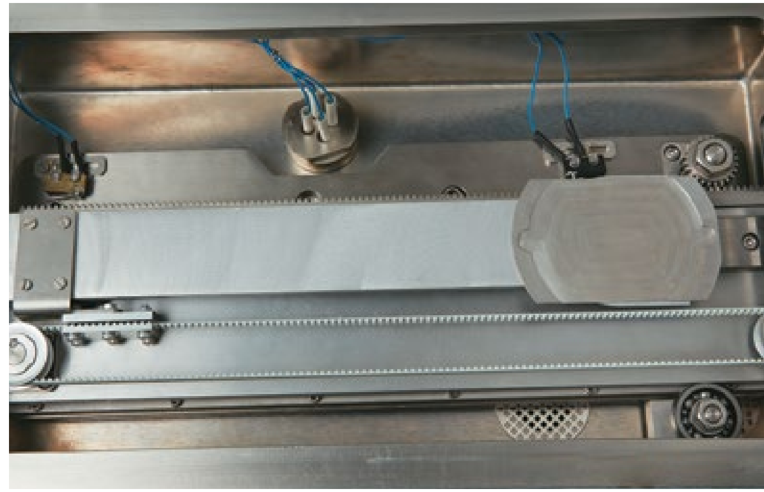
Load Locks allow samples to be transferred into the process chamber without venting the chamber enabling the user to reduce cycle times and potential sample contamination.

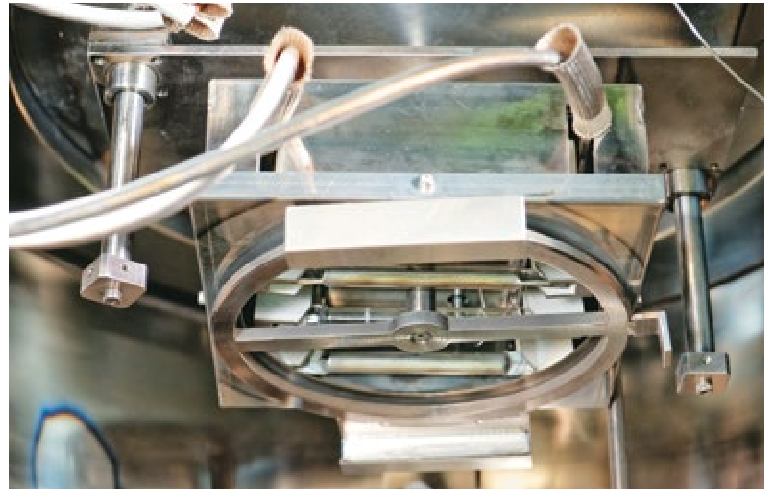
ROBOTICS

Specialized high vacuum compatible multi-axis robot with external teaching facility to map contours and uniformly coat complex components.

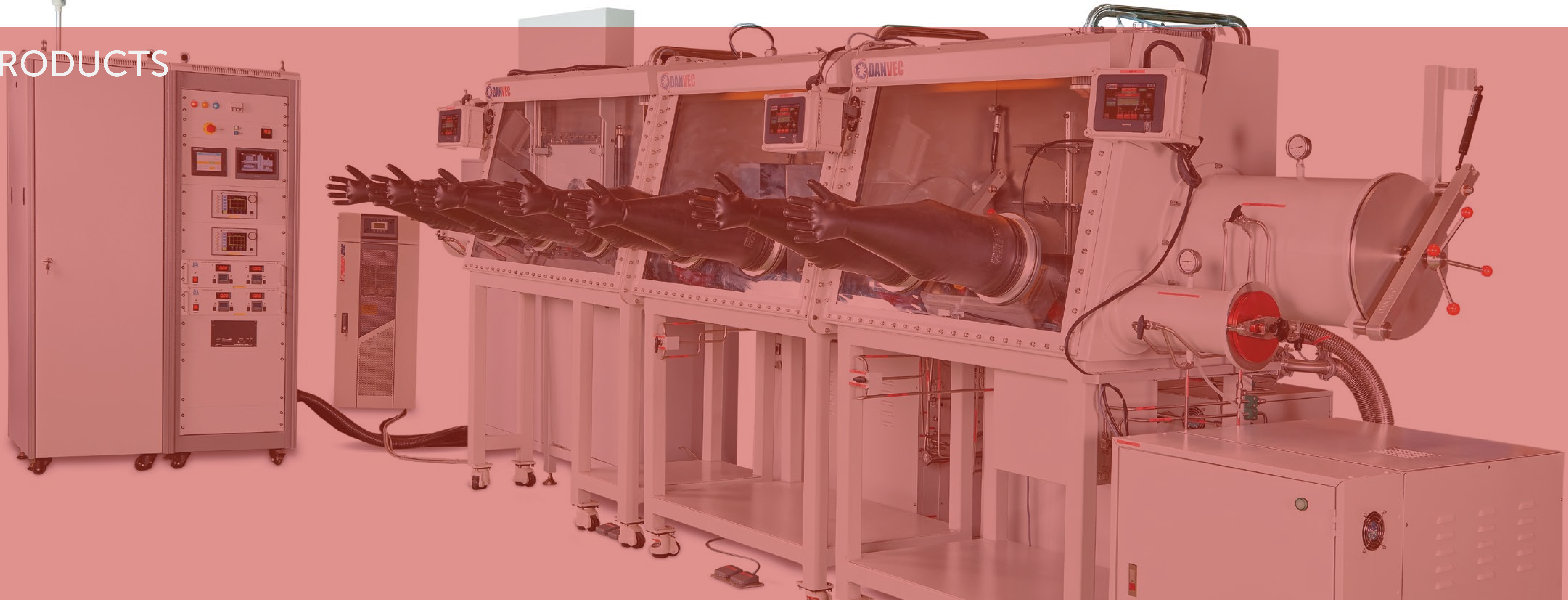
HEATING

Substrate heating solutions can be provided for a wide range of temperatures up to 800 degrees. A range of options such as Nichrome, enclosed tubular heaters, IR Lamps, Pyrolytic Graphite, and PBN can be used. Closed loop PID controllers and associated electronics ensure a highly stable temperature on the substrates throughout deposition.





PRODUCTS



BENCH TOP (BT) SERIES

Our BT coaters are perfect to deposit conductive coatings for sample preparation for electron microscopy imaging. A fully automated user-interface provides single touch deposition capability from a range of pre-programmable recipes.

FEATURES:

- Compact design for a minimized footprint
- Multiple accessory options for a number of surface preparation processes
- Complete process automation with a high resolution colour touch screen user interface
- Range of work holders
- 660 mm x 520 mm system footprint
- In-situ process monitoring option
- Turbo pump option

ALD 150

Our fully-automated stand alone thermal atomic layer deposition (ALD) system can deposit pin-hole free films with extreme surface conformality. The system can accommodate wafer sizes of up to 6 inches in diameter and a gas manifold for up to six precursor lines.

FEATURES:

- Fast pulse gas delivery valves with integrated purging
- Basic version with two precursor lines
- Extendable upto 6 precursor lines
- Comes with built-in recipes for Al_2O_3, ZnO and TiO_2
- Complete process automation with LabVIEW interface
- 893 mm x 1377 mm system footprint
- Dry pump option
- Custom designed for your process needs

SAARA SERIES

Our SAARA platform is made of superior performance single block aluminum chamber to process electronic and optical coatings of the highest quality. SAARA is the common platform between PECVD, RIE and plasma ALD tools and comes with a load-lock chamber, automated substrate transfer mechanism and a touch-screen PC with complete process automation.

FEATURES:

- Compact cabinet design offering minimized footprint
- Accommodates up to 8” wafers
- Dual frequency (RF & LF) power supply for film stress control
- Substrate biasing options of DC or RF
- Built-in process recipes
- In-situ cleaning
- Substrate heating up to 800°C
- 1080mm x 1900mm system footprint

RIE

HHVAT Reactive Ion Etching systems are used in micro and nanofabrication applications. RIE combines both physical sputtering, and chemical activity of the reacting species to ensure high etch anisotropy as well as greater material selectivity.

FEATURES:

- Low cost of ownership
- Accommodates up to 6” diameter wafers
- Optimized showerhead design for uniform gas distribution
- Adjustable source to shower head distance
- Helium cooled substrate holder
- 4 to 8 MFC controlled gas lines
- Fluorine and chlorine based chemistries offered
- Pre-programmed process recipes on select models
- 1080mm x 1900mm system footprint

AUTO SERIES

Our popular Auto series platform offers compact, economical and rugged solutions suitable for multiple process applications. Users can choose from a wide range of modular process accessories for numerous research applications.

FEATURES:

- Variety of chamber options
- Supports multiple deposition processes
- Range of work holders and heaters
- In-situ process monitoring and vacuum control option
- Compatible with new or existing glove box units
- PLC controller for automated vacuum cycle
- No pneumatics, all electronic components
- CE standards
- 630mm x 1500 mm system footprint
- Custom designed for your process needs

ION BEAM SPUTTERING (IBS)

Ion Beam Sputtering (IBS) is an advanced technique for depositing high-purity, dense, and uniform thin films. It uses a low-energy ion beam in a high-vacuum environment for precise material transfer onto substrates. The HHV Advanced Technologies IBS system is a fully automated, state-of-the-art platform enables deposition of high-performance multilayer dielectric coatings with excellent density and smoothness.Ideal for high-end applications in laser,and telecom industries.

FEATURES:

- Single or Dual Ion Beam (DIBS) configuration with RF/DC compatibility
- Flexible substrate holders for diverse product requirements
- Capability to deposit up to four materials in a single coating cycle
- Fully automated system with user-friendly touchscreen control
- High-vacuum processing in the 10^{-5} to 10^{-4} Torr range
- High-density, low-porosity film deposition
- Optional load lock and advanced optical thickness monitoring system (T%/R%-based)

CLUSTER TOOL (CT) SERIES

The CT series combines multiple PVD and CVD process capabilities in the same run to fabricate multilayer stacks and complex device architectures. Each module can be configured individually to meet the user's technological requirements, while also being extendable for future expansion.

FEATURES:

- Modular design with up to 5 process chambers
- Manual or automated substrate transfer
- Choice of system configurations
- Sample heating, cooling, bias, and cleaning options
- PC/PLC controlled recipes for single, batch, or automated processes
- Advanced data logging and process tracking
- Custom designed for your process needs

ATS 500

The ATS 500 is the latest model of mid sized coaters for production and large wafer R&D applications. The ATS 500 is clean room compatible and offers high throughput efficiency. A fully automated user-interface provides single touch deposition capability from a range of pre-programmable recipes.

FEATURES:

- Modular segmentation of system components
- 500 mm wide x 500 mm high, D-shaped chamber with hinged door
- Extended height versions are available for applications such as lift-off coatings
- Supports multiple deposition process
- Full colour touch screen PLC with integrated recipe-driven process and vacuum control
- 1460mm x 1670 mm system footprint
- Custom designed for your process needs

GBIC

The glove box integrated coaters (GBIC) is designed for easy integration of vacuum coaters with glove boxes from most major manufacturers. This allows for handling, transferring and coating samples under controlled atmospheres for end-to-end processing.

FEATURES:

- Ergonomic design for easy access from glove box
- Side-opening and vertically-opening front door options
- Convenient and interlocked service access via back side hinged door
- Wide range of process accessories
- In-situ mask change-over options
- Full integrated process control with recipe control software management
- Custom designed for your process requirements

TF SERIES

The TF series is our most versatile platform with large chamber options that can accommodate any deposition source. This is a highly customizable platform suitable for a wide range of laboratory and industry applications.

FEATURES:

- Wide range of chambers from Φ500 mm to 1400 mm
- Supports multiple deposition processes
- Available with load lock
- Compatible with new or existing glove box units
- Advance PC based software control
- Process data logging
- Optimized distribution-masks for high rates and uniformity
- Clean room compatibility
- Custom designed for your process needs
- 3300mm x 2094mm system footprint.

OPTICOAT SERIES

The Opticoat series of coaters are designed for full size Rx labs. These systems produce highly repeatable and high-quality anti-reflection coatings on lacquered CR 39 and polycarbonate lenses.

FEATURES:

- Repeatable and high-quality coatings
- Easy to use touch screen operation with recipe programming for automatic deposition
- Perfect for full sized Rx-labs
- Remote accessibility for software maintenance and up-gradation
- Easy access vacuum pumping station
- Segmented dome configuration for easy loading and unloading of lenses
- 1740mm x 1795mm system footprint

IDENTICOAT (ID) SERIES

Our identicoat series of coaters are designed for forensic laboratories. These systems utilise a Vacuum Metal Deposition (VMD) technique developed for the detection of finger marks on substrates such as plastic bags, sheeting, etc. that are difficult to handle using conventional techniques.

FEATURES:

- Rugged and proven design
- Easy access vacuum pumping station
- Adjustable source positioning
- Completely automated process cycle
- Easy loading sample hood
- Remote access for support and trouble shooting
- Fully interlocked for operator and machine safety

TWIN DOOR METALLIZER

We are a leading supplier of state-of-the-art, high throughput, twin door vacuum metallizing systems for the automotive industry across the globe. These systems are high production rate vacuum metallization systems designed to deposit coatings onto reflector components made of thermoplastics, thermo sets, and varnished base-coated metals.

FEATURES:

- High speed rotary, roots and diffusion pumps with cryo-cooler
- Glow discharge substrate pre-clean
- Thermal Evaporation Option:
  Cycle time of < 10 minutes, and Spool size of 960 mm diameter x 1570 mm height
- Sputtering Option:
  Cycle time of < 4 minutes, and Spool size of 710 mm diameter x 1370 mm height
- Plasma polymerization by mid frequency power supply for pre and post coat
- Rotary drive mechanism with ferro fluidic vacuum shaft
- Fully automated operation

DECORA PVD SERIES

The Decora PVD Series is engineered for high-volume, reliable production operations, offering exceptional performance for decorative and functional coatings. Utilizing magnetron sputtering and/or cathodic arc deposition, versatile and cost-effective vacuum deposition techniques, it delivers superior film properties, enhanced coating adhesion, and consistent quality.

FEATURES:

- Coating technologies: Cathodic arc, Magnetron sputtering, or a hybrid combination of the two for diverse coating applications
- Excellent color uniformity and reproducibility
- Flexible and fast loading / unloading system with 13 to 24 rack positions depending on size
- Fully automatic process control ensuring consistent coating quality with minimal operator intervention
- Process data logging and historical database through SCADA system
- Remote support and diagnostics for easy maintenance and trouble shooting
- Compact, space-saving footprint
- Can be tailored according to specific production requirements and throughput capacity

SPECIAL PURPOSE THIN FILM DEPOSITION SYSTEMS

We offer custom designed special-purpose thin film deposition systems for pilot scale research, large area coatings and high throughput industrial applications.

Ultra High Vacuum (UHV) system for depositing metals, metal oxides, and nitrides

Ion Vapor Deposition (IVD) system for plating air-craft components with a protective Aluminum layer

In-line magnetron sputtering system is a model platform for upscaling technologies and pilot scale production

Horizontal inline magnetron sputtering system designed for the deposition of chromium coatings on ABS pad rings, which are critical components in safety airbag modules

In-line multi chamber PECVD and magnetron systems for industrial scale production of large area coatings

Telescopic mirror coaters for deposition of Aluminium and protected Silver coatings for astronomical applications

HHV ADVANCED Technologies

INDIA
Site No. 31 - 34 & 37, KIADB Industrial Area,
Phase 1, Dabaspet, Nelamangala Taluk,
Bengaluru Rural District – 562111,Karnataka, India
Phone: +91-80-66703700, Fax: +91-80-66703800
Email: infotfed@hhvadvancedtech.com | Website: www.hhvadvancedtech.com

INTERNATIONAL
Unit 14, Lloyds Court, Manor Royal, Crawley,
West Sussex, RH10 9QX, United Kingdom.
Phone : +44 (0) 1293 611898 | Fax : +44 (0) 1293 512277
Email: info@hhvltd.com | Website: www.hhvltd.com