THE COMPANY
Hind High Vacuum (HHV) is India’s premier thin film and vacuum technology company. With over 55 years of expertise in the design and manufacture of high vacuum equipment for research and industrial applications, HHV’s products are integral to multiple sectors that include Aerospace, Automotive and Defense.

HHV is a global developer and manufacturer of laboratory and industrial-scale vacuum coating systems for optical, decorative and functional coatings, astronomical telescope mirror coaters, thin film coatings, optics and special purpose vacuum equipment for complex metallurgical applications.

HHV has multiple manufacturing centres located in and around Bengaluru, India. HHV is a leading exporter for coating equipment with branches in the United Kingdom and distributors worldwide. HHV is an ISO 9001:2015, ISO 14001:2015 and OSHAS 18001:2007 certified company.
History

1965
Started Hind High Vacuum 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

1990
Commenced the development and production of thin film coatings for optical filters.

1994
Developed India’s first completely automated box coater the BC-600 for the development of night vision devices

2001
Manufactured a multi-chamber in-line load-lock PECVD system for the production of amorphous Silicon solar modules with dual substrate transport mechanism

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

International activity commences with the Export of thin film equipment, acquired the Edwards thin films lineage and established HHV Ltd in the United Kingdom.

Installed a large sputter coater for 3.7m diameter telescope mirror coating.

Compact cluster PECVD tool for R&D.

Launched India's first commercial ALD reactor and the TF-1400 - a 1400mm chamber, automatic coater for mass manufacturing.

Awarded the National R&D award and began the ATS 500 production line.
HHV 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.

HHV has an annual internship program that receives applicants from India's leading institutions. Selected candidates go through a 6 week internship consisting of two weeks of class room lessons and 4 weeks of project work.

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 system.
Manufacturing Capabilities

HHV constantly upgrades 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
- Electro-polishing
- TIG Welding
- Vacuum brazing
- Global supply chain
- Electro-mechanical assembly
- Comprehensive product testing

HHV’s facility is equipped with ISO 7, ISO 8 clean rooms and class 100 laminar flow stations for the production of Thin Film Metallized Circuits.

HHV’s precision Optics Fabrication Lab (OFL) is equipped with state-of-the-art technology for 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.

At HHV, we strive to help our customers achieve their targeted goals of quality and efficient cycle times in a cost-effective manner. Our goal is to forge quality relationships with our customers by delivering the highest value and best service.
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.

HHV 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.

HHV offers a range of circular and linear magnetron sputter sources, engineered to meet R&D and production requirements.

PECVD

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

HHV offers PECVD systems in various configurations such as single, load-lock and multi-chamber cluster tools 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.

HHV has been developing deposition systems with various types of crucibles, customized to customer needs.

EFFUSION CELLS

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

HHV has been developing deposition systems of organic materials for use in OLED displays, solar cells, and flexible electronic devices.

These sources are used for applications such as the evaporation of organic materials for OLED displays, solar cells, and flexible electronic devices.

HHV has been developing deposition systems with wide range of crucible options for use in R&D and small series 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 used on large-area work holders with lower energy ions during the deposition process. HHV applies ion beam technology for large scale 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.

HHV offers highly cost effective thermal ALD tools with built-in process recipes and a user-friendly software interface.
WORK HOLDERS
HHV manufactures 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 control film density.

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

**ROTATION**

HHV provides 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.

**HEATING**

Substrate heating solutions can be provided for a wide range of temperature 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.

**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 LOCKS**

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.

**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.

**ROBOTICS**

Specialized high vacuum compatible multi-axis robot with external teaching facility to map contours and uniformly coat complex components.
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 process accessories for SEM and TEM sample preparation and research applications
- Complete process automation with a colour, high resolution, touch screen user interface
- Range of work holders
- 660 mm x 520 mm system footprint
- In-situ process monitoring
- Turbo pump option
Our popular Auto series platform offers compact, economical and rugged solutions suitable for multiple process applications. You can choose from a wide range of modular process accessories for numerous research applications.

**AUTO 306 SERIES**

**FEATURES:**

- Variety of chamber options
- Supports multiple deposition processes
- Range of work holders and heaters
- In-situ process monitoring and control options
- PLC controller for automated vacuum cycle
- No pneumatics, all electronic components
- CE standards
- 630mm x 880 mm system footprint
- Modular construction
ATS 500

The ATS 500 is our latest series of mid sized coaters for production and large wafer R&D applications. The ATS 500 is clean room compatible and offers high throughput efficiency, load locks and a source to substrate distance of 500mm for lift off applications.

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 Color, Touch Screen PLC with integrated process recipe-driven process and vacuum control
- 1460mm x 1670 mm system footprint
- Custom designed for your process needs
TF SERIES

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

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
HHV’s glove box series are designed for organic electronics research and production applications. The systems are available with single or dual chambers, manual or auto process controls and a range of sources and sample stages.

FEATURES:

- 500mm or 60mm chambers with front and rear chambers
- Temperature controlled sources for organics
- Thermal sources for metals
- Rotary work holders with heating and cooling options
- Single or multiple chambers in the same glove box enclosure
- PLC and PC control options
- Sputter options
- Custom designed for your process needs
Our fully-automated stand alone thermal atomic layer deposition (ALD) system can deposit pin-hole 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
- Comes with built-in recipes for Al2O3 and ZnO
- Complete process automation with LabVIEW interface
- 893 mm x 1377 mm system footprint
- Dry pump option
- Custom designed for your process needs
SAARA SERIES

HHV's SAARA platform is made of superior performance single block aluminum chamber to deposit electronic and optical coatings of the highest quality. The SAARA platform 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
- Substrate plate to accommodate up to 8” wafers
- Dual frequency (RF & LF) power supply for film stress control
- Substrate biasing options of DC, Pulsed DC or RF
- Built-in process recipes
- In-situ cleaning
- Substrate heating up to 800°C
The CT series combines multiple PVD and CVD process capabilities in the same run to fabricate multilayer stacks and device architectures. Each module can be configured individually to meet your 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
SPECIAL PURPOSE
THIN FILM DEPOSITION SYSTEMS
HHV offers custom designed special-purpose thin film deposition systems for pilot scale research, large area coatings and high throughput industrial applications.

**SPECIAL PURPOSE THIN FILM DEPOSITION SYSTEMS**

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

Telescopic mirror coaters for deposition of Aluminium and protected Silver coatings on mirrors of up to 3.7m in diameter for astronomical applications.
Robotic magnetron sputtering coating system for conductive and transparent coating on aircraft canopy and windshields for LCA stealth technology

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