

VON ARDENNE



HIISS & VVISS INLINE PLATFORM

## HIISS & VVISS INLINE PLATFORM

HIGH FLEXIBILITY FOR VARIOUS REQUIREMENTS

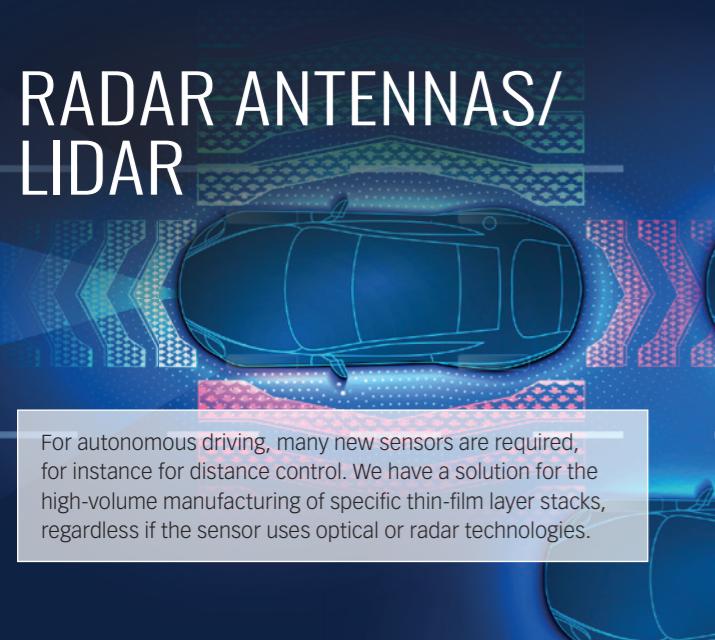
# Applications

## ADVANCED PACKAGING/ FLEXIBLE PCBs



Recent developments in packaging have shown a demand for smaller structures. The coating platforms shown here are perfectly suited for meeting this demand. The systems we have already installed are proof of that with their low cost of ownership and high productivity.

## RADAR ANTENNAS/ LIDAR



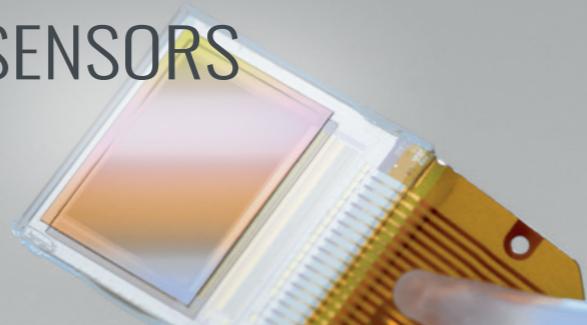
For autonomous driving, many new sensors are required, for instance for distance control. We have a solution for the high-volume manufacturing of specific thin-film layer stacks, regardless if the sensor uses optical or radar technologies.

## PASSIVATION



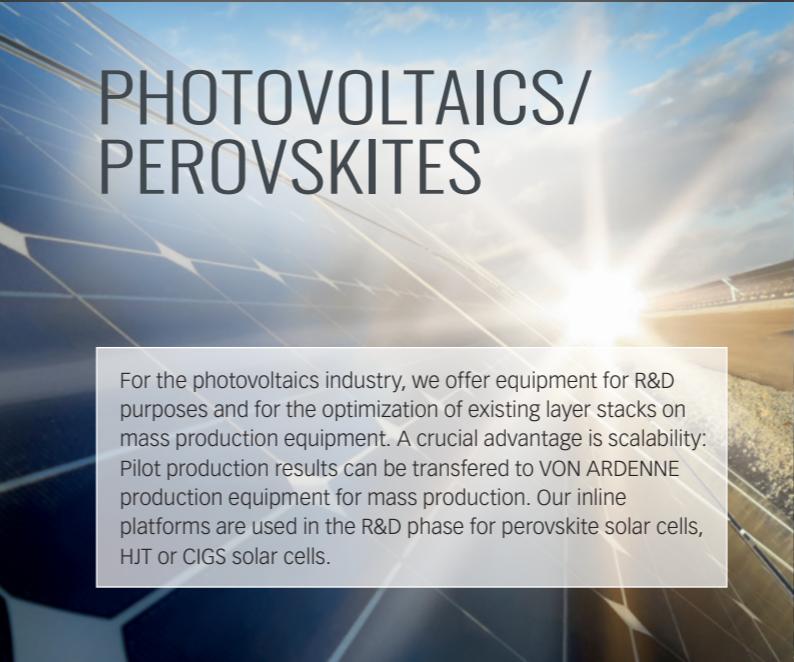
Most thin-film applications require a final passivation and protection layer. This is often combined with no (or low) damage requirements. But there are also opportunities for the electrical contacting of underlaying structures and the fulfilling of the high standards for long-time stability, for instance with health or automotive applications.

## SENSORS



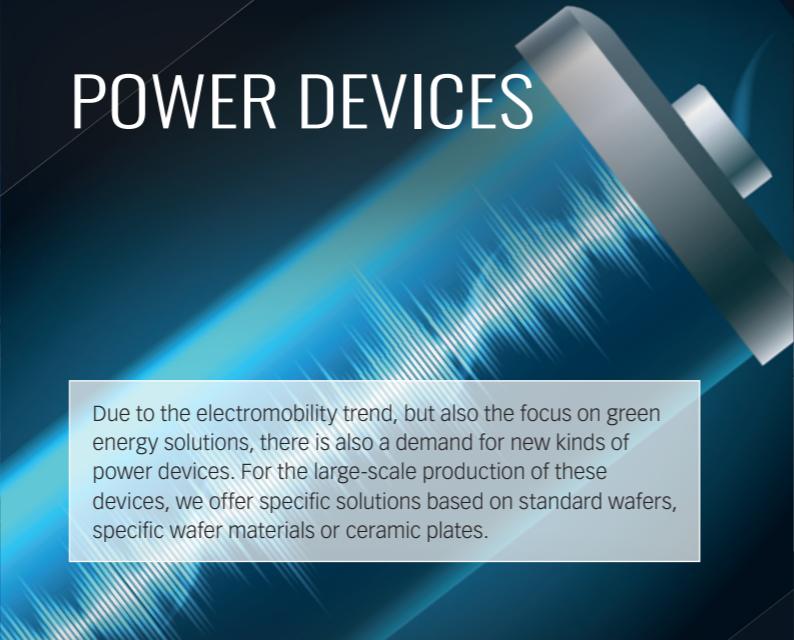
For sensor applications, conductive and active layers as well as highly encapsulating barrier layers can be deposited with our coating systems. By using masks in the deposition step, a raw structuring would also be an option. Application examples are sensor probes for position (GMR), distance, pressure, temperature, resistance etc.

## PHOTOVOLTAICS/ PEROVSKITES



For the photovoltaics industry, we offer equipment for R&D purposes and for the optimization of existing layer stacks on mass production equipment. A crucial advantage is scalability. Pilot production results can be transferred to VON ARDENNE production equipment for mass production. Our inline platforms are used in the R&D phase for perovskite solar cells, HJT or CIGS solar cells.

## POWER DEVICES



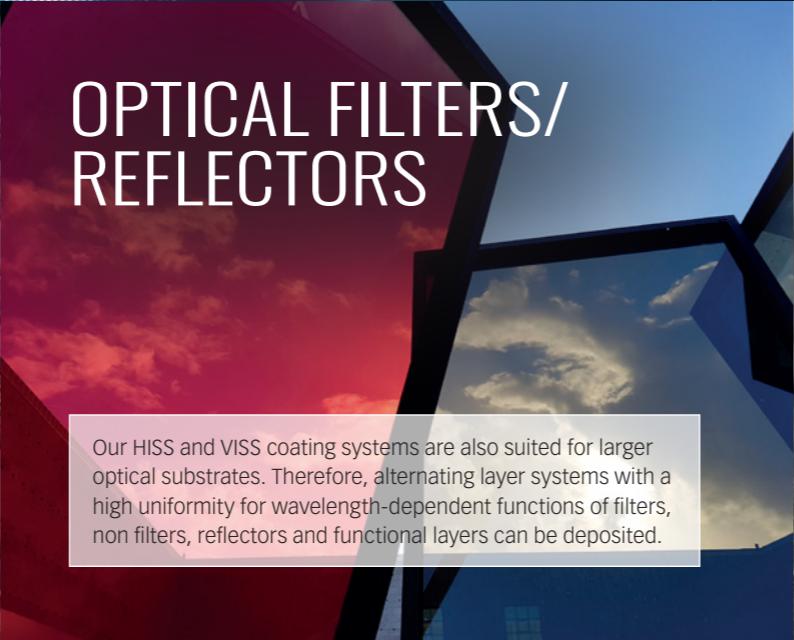
Due to the electromobility trend, but also the focus on green energy solutions, there is also a demand for new kinds of power devices. For the large-scale production of these devices, we offer specific solutions based on standard wafers, specific wafer materials or ceramic plates.

## DISPLAY & OLED



VON ARDENNE provides different systems for small-scale and mass production focusing on the deposition of the active layer with our proprietary organic evaporation sources. Furthermore, we can provide systems for metallization in combination with a mask structuring process. Beyond that, our systems can be used to create barrier layers, anti-reflex as well as easy-to-clean functionality.

## OPTICAL FILTERS/ REFLECTORS



Our HISS and VISS coating systems are also suited for larger optical substrates. Therefore, alternating layer systems with a high uniformity for wavelength-dependent functions of filters, non filters, reflectors and functional layers can be deposited.

## EMERGING TECHNOLOGIES



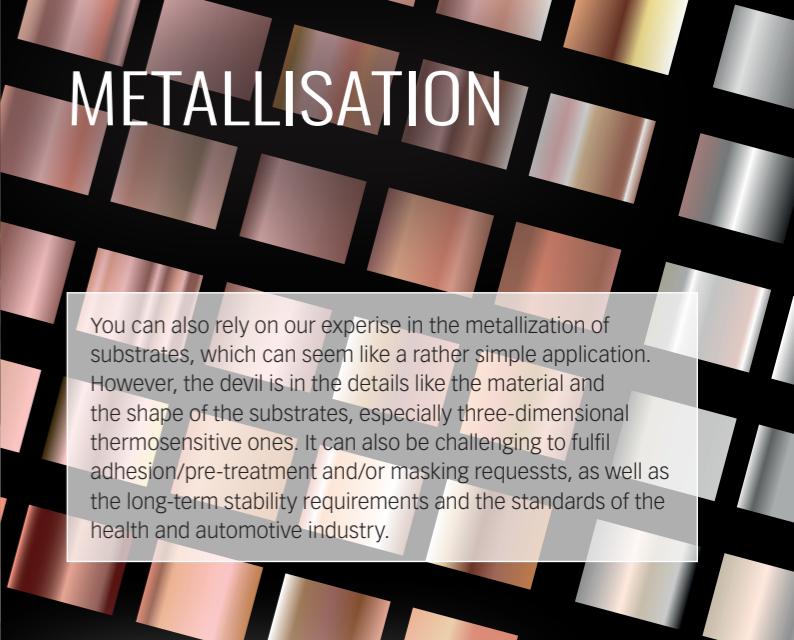
You can also use our modular inline systems for the manufacturing of future technologies such as fuel cells, thin-film batteries and electrothermal generators.

## ARCHITECTURAL GLASS



For the architectural glass industry, we offer equipment for R&D purposes and for the optimization of existing layer stacks on mass production equipment. Using our modular process systems at the R&D stage facilitates the transfer to larger VON ARDENNE production equipment for high-volume production.

## METALLISATION



You can also rely on our expertise in the metallization of substrates, which can seem like a rather simple application. However, the devil is in the details like the material and the shape of the substrates, especially three-dimensional thermosensitive ones. It can also be challenging to fulfil adhesion/pre-treatment and/or masking requests, as well as the long-term stability requirements and the standards of the health and automotive industry.

## RESEARCH & DEVELOPMENT



We also provide systems for all basic research tasks that require sophisticated vacuum coating equipment. Our ability to provide the most suitable setup is based on our long-term experience as a supplier for research facilities in Germany and abroad.

# Key Features

Based on the experience of more than 45 years in magnetron sputtering and over 60 years in evaporation, we have incorporated a broad scope of features into VON ARDENNE modular process systems. Our modular process systems use all the important vacuum thin-film technologies.

Beyond that, they can also apply various pre- and post-treatment methods. On top of that, there are many options for monitoring, handling and control. You can see all the key features of our systems in more detail in this brochure.

## PRE-/POST-TREATMENT



- Heating
- Cooling
- Degassing
- Plasma etching pre-treatment
- Easy-to-clean post coating
- Substrate surface activation by glow discharge

- Single substrate or carrier band
- Magazin on atmosphere, inert gas or vacuum
- Carrier return system on atmosphere or inert gas
- Masking on top and bottom of substrate
- Automatic loading and unloading by industrial robots

- Cleanroom compatible
- Sputtering with planar magnetrons
- Sputtering with rotatable magnetrons
- Sputtering with facing target
- Thermal evaporation
- E-beam evaporation
- Plasma-enhanced chemical vapor deposition (PECVD)
- Co-sputtering and co-evaporation
- Other process technologies on request
- Flash lamp annealing

- VA PROCOS 2 for reactive magnetron sputtering
- Process emission monitor (PEM)
- Deposition rate monitoring & control
- Temperature logger (e.g. with pyrometer)
- Measurement of optical layer properties (transmission, reflectivity)

- Measurement of electrical properties (e.g. by means of eddy current measurement)
- Manual, semiautomatic or fully automated
- SECS / GEM interface
- User management
- Comprehensive process data logging
- VA Trend and VA ProcessDB Data Base
- VA INDIGO software support tools

## SUBSTRATE HANDLING



## COATING PROCESSES



## PROCESS CONTROL AND MONITORING



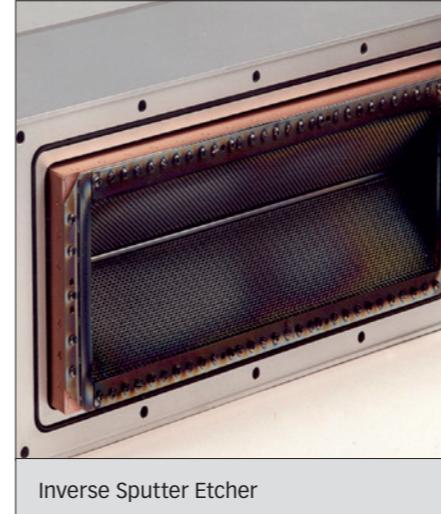
## CONTROL



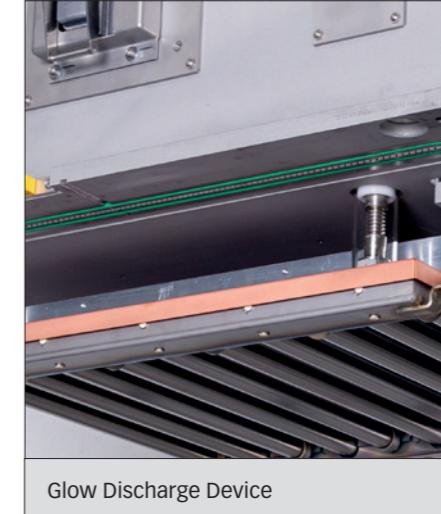
# Key Components

The success of our modular process systems is based on their highly flexible and broad configuration range, our technological experience and know-how. Another basis for the success of these systems are our proprietary key components that we manufacture in-house.

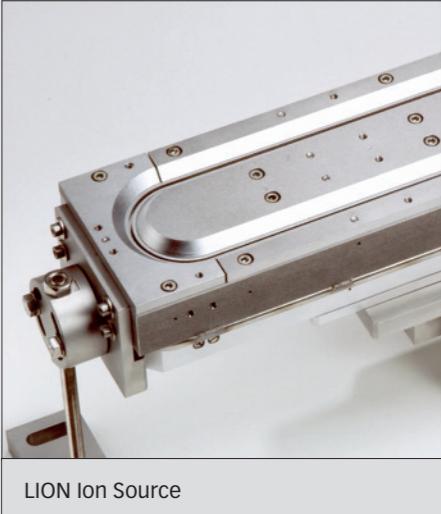
Depending on the required tool configuration, a VON ARDENNE system may include one or more of the listed components. Due to their modular design, the systems can also be upgraded or retrofitted with these components after the initial system installation.



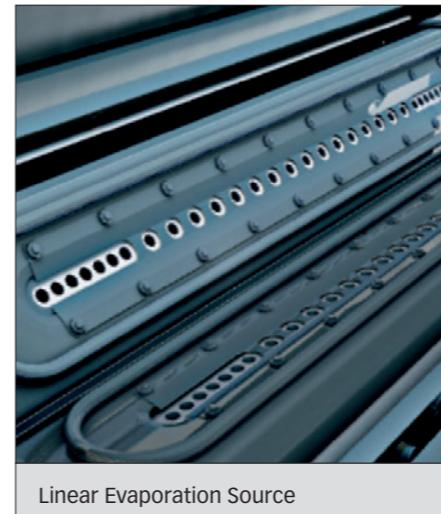
Inverse Sputter Etcher



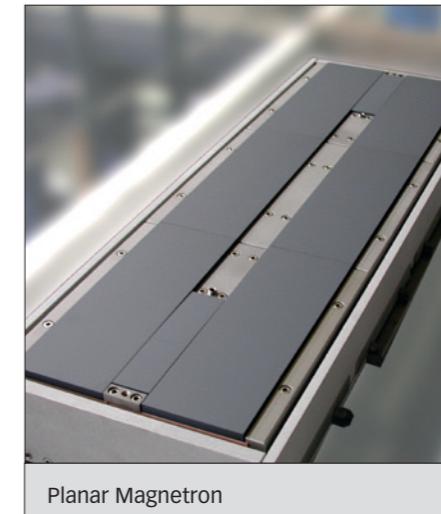
Glow Discharge Device



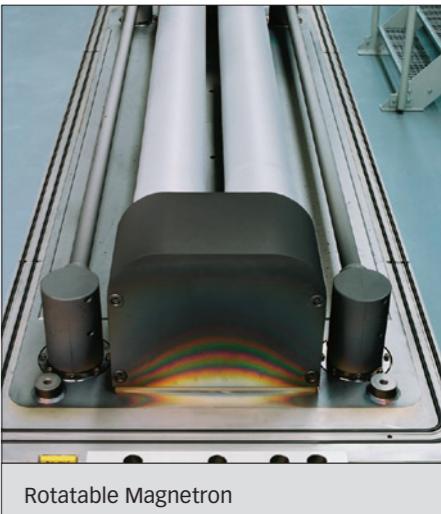
LION Ion Source



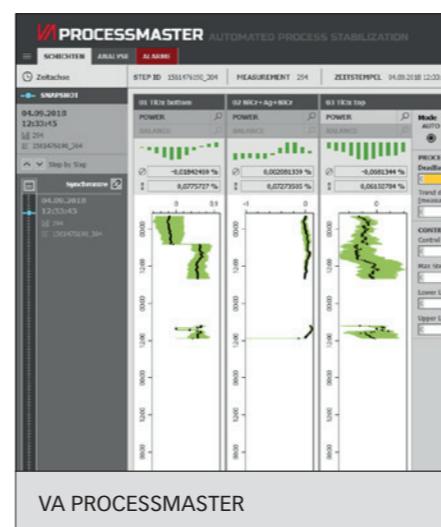
Linear Evaporation Source



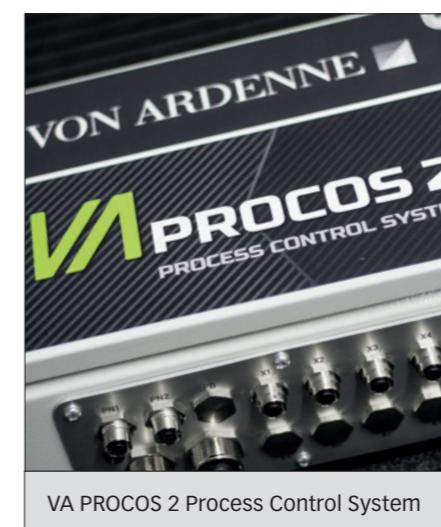
Planar Magnetron



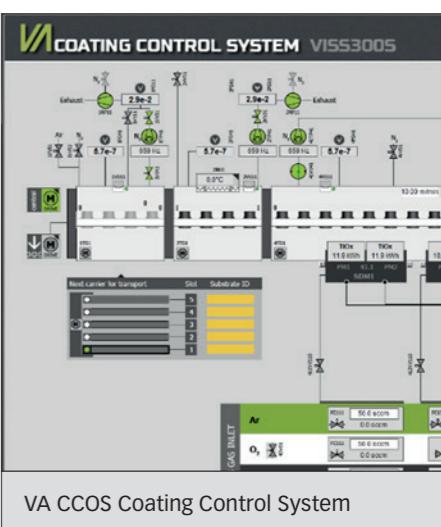
Rotatable Magnetron



VA PROCESSMASTER



VA PROCOS 2 Process Control System



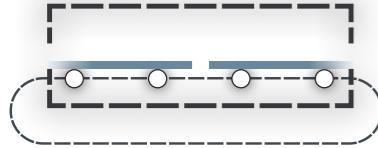
VA CCOS Coating Control System

# Inline Systems **H****I****S****S** [horizontal] & **V****I****S****S** [vertical]

## Modular Platforms

For the processing of larger substrates at a higher productivity, or high volumes of smaller parts, we provide several inline coating systems. The systems shown here have a coating width between 200 and 600 millimeters.

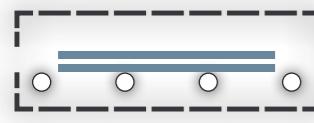
**Carrier Return System**



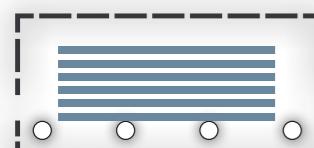
**Manual Loading**



**2-Fold Magazine**



**Magazin with Stacker**



**Loading/Unloading Station**  
[operated under air or inert gas]

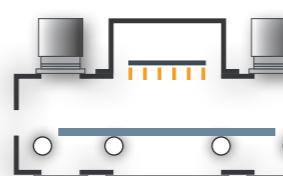
The loading station enables the easy (manual) loading of substrates into the carrier. From there, the carrier will be transferred into the vacuum system. The position is monitored by measuring equipment.

In case of a single-end version, the loading station is also the unloading station. A version with a magazine for a longer autonomous operation is also available.

In high-volume coating systems, the station is part of the carrier return system.

Apart from manual loading, the combination with automation is also possible. For operator safety, the station comes with a housing.

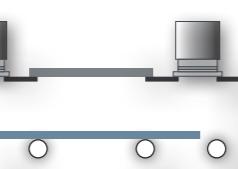
**LION® Linear Ion Source**



**Planar Magnetron**



**Load Lock**



**Plasma Glow Discharge**



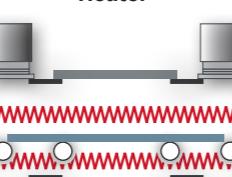
**Rotatable Magnetron**



**Load Lock with Stacker**



**Heater**



**Linear Evaporator**



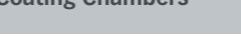
**Load Lock Chamber**



**Pre-/Post-Treatment Chamber**



**Coating Chambers**



The entry load lock chamber enables the loading of the substrate carrier without venting the process chambers of the system.

Alternatively, a combined fore-vacuum/high-vacuum load lock can be used.

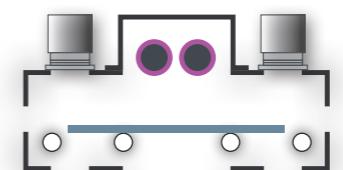
An exit load lock is similar to the entry load lock and will be used for a real inline setup of the coating system.

In high-volume coating systems, the station is part of the carrier return system.

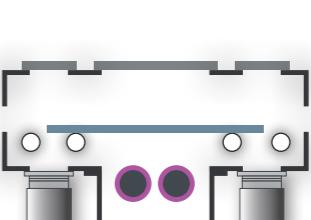
Apart from manual loading, the combination with automation is also possible. For operator safety, the station comes with a housing.

Depending on the requirements of the process and substrate handling, different deposition configurations are available.

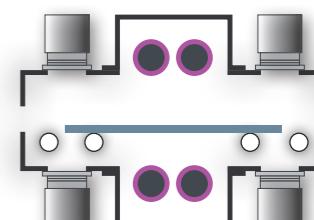
**DEPOSITION DOWN**



**DEPOSITION UP**



**DOUBLE-SIDED DEPOSITION**

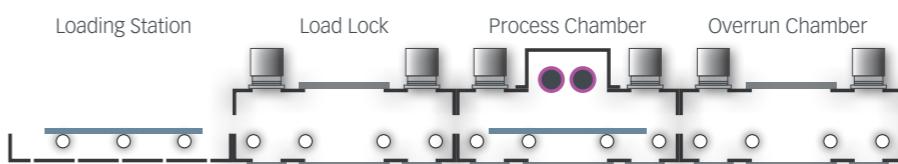


Sputtering and evaporating can be done with process stations above and below the substrates in a horizontal inline system.

The simultaneous coating of both substrate sides is also possible and common.

## CONFIGURATION EXAMPLES

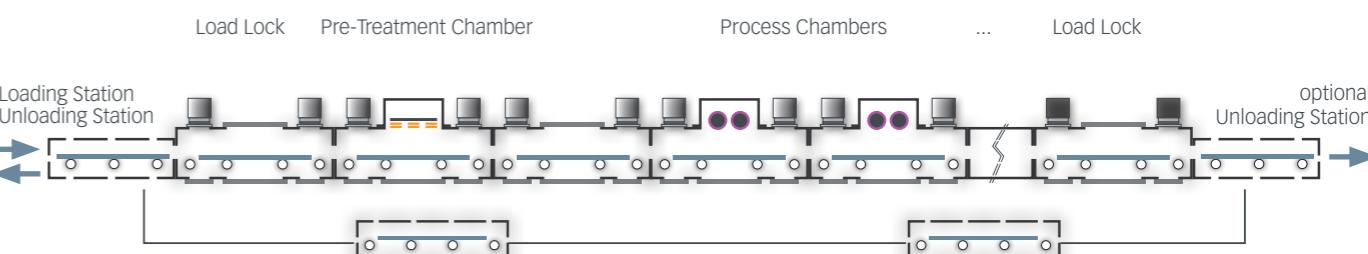
**VISS/HIIS LabX** Single-end platform with load chamber for one carrier



**VISS/HIIS PilotX** Single-end platform with double carrier load chamber and 2 process chambers



**VISS/HIIS VolumeX** Real inline platform with carrier return system



# HISs Horizontal Coating System

Flexible, Scalable Inline System for Medium Productivity & Double-Sided Coating



The **HISs** is a modular vacuum coating system for the horizontal processing of substrates. It is the perfect choice if you are looking for highly flexible production equipment with a small or medium throughput equipped with proven technology.

Thanks to its modular design, the **HISs** can be configured according to your needs. We offer various basic configurations of the system such as the single-ended version for a smaller production scale.

The system offers a **high process flexibility** as the process chamber can be configured with planar or rotatable magnetrons for sputter-up, -down or **double-sided coating**. Ion pre-treatment, heating and cooling units are available upon request. All auxiliary chambers, like entry/exit, buffer or transport chamber, can be upgraded like that.

## TECHNICAL DATA

Subject to change without notice due to technical improvement.

### SUBSTRATE

Material	glass, polymers, metals
Coating width	200 mm to 600 mm
Coating Length	up to 1000 mm

### DEPOSITION SYSTEM

Deposition type	DC, pulsed DC, AC, RF
Magnetron type	planar, rotatable
Plasma source	glow discharge device, sputter etcher or LION® ion source
Others	linear evaporation source
Sputter arrangement	sputter-up, sputter-down, double-sided
Substrate temperature range	RT/ 250 °C
Substrate potential	floating
Number of independent process gases	5 (e.g. Ar, Ar/O <sub>2</sub> , N <sub>2</sub> , O <sub>2</sub> , H <sub>2</sub> )

The **flexible and dynamic design** of the system with standardized subcomponents enables custom-made configurations. That means that the system can be adapted to new processes or requirements. Therefore, you will be able to act very dynamically and adapt to the evolution of your product.

### TRANSPORT

Type of transport	inline, carrier or glass transport, optional: carrier return system, stacker
Loading	optional: automatic loading & unloading by robot

### SYSTEM CONTROL & SOFTWARE

Hardware	industry PC/ SPS module
User interface	Windows 10 with WinCC
MES link	e.g. SECS/ GEM

### DIMENSIONS AND WEIGHT

Depending on version (200/600) and configuration

### OPTIONAL

Pre-treatment, process technology, VA PROCO 2 process control system, optical in-situ measurement, easy-to-clean module (ETC), more on request



# VISS Vertical Coating System

Flexible, Scalable Inline System for Medium Productivity



The vertical inline sputter system **VISS** is an appropriate, modular solution for vertical deposition processes when scaling up from laboratory use to production. The tool is available either as a single-ended inline system or for continuous processing and is uniquely suited for scaling up to substrate width up to 600 mm.

The substrates are transported by a carrier system, which is tilted vertically by seven degrees. The substrates can be loaded without touching their front side.

## TECHNICAL DATA

Subject to change without notice due to technical improvement.

### SUBSTRATE

Material	glass, polymers, metals
Coating width	200 mm to 600 mm
Coating Length	typically 1000 mm to 2400 mm

### DEPOSITION SYSTEM

Deposition type	DC, pulsed DC, AC, RF
Magnetron type	planar, rotatable
Plasma source	glow discharge device, inverse sputter etcher (ISE) or LION® ion source
Others	linear evaporation source
Sputter arrangement	vertical
Substrate temperature range	RT/ 300 °C
Substrate potential	floating
Number of independent process gases	5 (e.g. Ar, Ar/O <sub>2</sub> , N <sub>2</sub> , O <sub>2</sub> , H <sub>2</sub> )

### TRANSPORT

Type of transport carrier-based, optional: carrier return system, stacker  
Loading optional: automatic loading and unloading by robot

### SYSTEM CONTROL & SOFTWARE

Hardware industry PC/ SPS module  
User interface Windows 10 with WICON control software  
e.g. SECS/ GEM  
MES link

### DIMENSIONS AND WEIGHT

Depending on version (400/600) and configuration

### OPTIONAL

Pre-treatment, process technology, VA PROCO 2 process control system, optical in-situ measurement, easy-to-clean module (ETC), more on request



# OUR STRENGTHS



## IN-HOUSE TECHNOLOGY & APPLICATION CENTER

- ... Sample coatings of customer applications
- ... Development of customized layer stacks
- ... Product & process verification and optimization
- ... Testing of new technologies and components



## GLOBAL PROJECT EXPERIENCE

VON ARDENNE equipment is used in over 50 countries.

We have established an installed base of hundreds of coating systems worldwide, ranging from small tools to equipment for large-area coating applications for several markets.



## PROFESSIONAL SIMULATION SUPPORT

We offer professional simulation technology to ensure best process quality with regards to plasma, heat and cooling. Furthermore, our simulation tools help demonstrate, develop and improve layer properties and define or optimize processes, details and the performance of our systems.



## COMPREHENSIVE SERVICE PORTFOLIO

- ... VON ARDENNE service hubs around the world
- ... On-site service
- ... Remote access by our technology department
- ... Regular technical and technological trainings
- ... Spare & wear part warehouse close to customers
- ... Lifecycle extension of wear parts



## CLOSE PARTNERSHIP

VON ARDENNE has a network of partners for even more profound R&D work and to identify future technologies. It consists of:

- ... Fraunhofer Institutes such as IPMS, FEP, IST and ISE
- ... Institutes of the Helmholtz Association (Jülich, Berlin)
- ... Universities (Kiel, Dresden, Sheffield)
- ... Companies such as FAP GmbH, scia Systems GmbH



## UPGRADES & RETROFITS

As soon as your business is growing, your VON ARDENNE equipment will grow accordingly - thanks to its modular design and the upgrades we provide. We will also supply you with the necessary technology upgrades if you decide to change your applications.

Furthermore, when your equipment is ageing, we will retrofit your systems with new components, no matter if they are VON ARDENNE or third-party machines.



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## WHO WE ARE & WHAT WE DO

VON ARDENNE develops and manufactures industrial equipment for vacuum coatings on materials such as glass, wafers, metal strip and polymer films. These coatings give the surfaces new functional properties and can be between one nanometer and a few micrometers thin, depending on the application.

Our customers use these materials to make high-quality products such as architectural glass, displays for smartphones and touchscreens, solar modules and heat protection window film for automotive glass.

We supply our customers with technologically sophisticated vacuum coating systems, extensive expertise and global service. The key components are developed and manufactured by VON ARDENNE itself.

Systems and components made by VON ARDENNE make a valuable contribution to protecting the environment. They are vital for manufacturing products which help to use less energy or to generate energy from renewable resources.



SALES  
CONTACTS



SERVICE  
CONTACTS

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