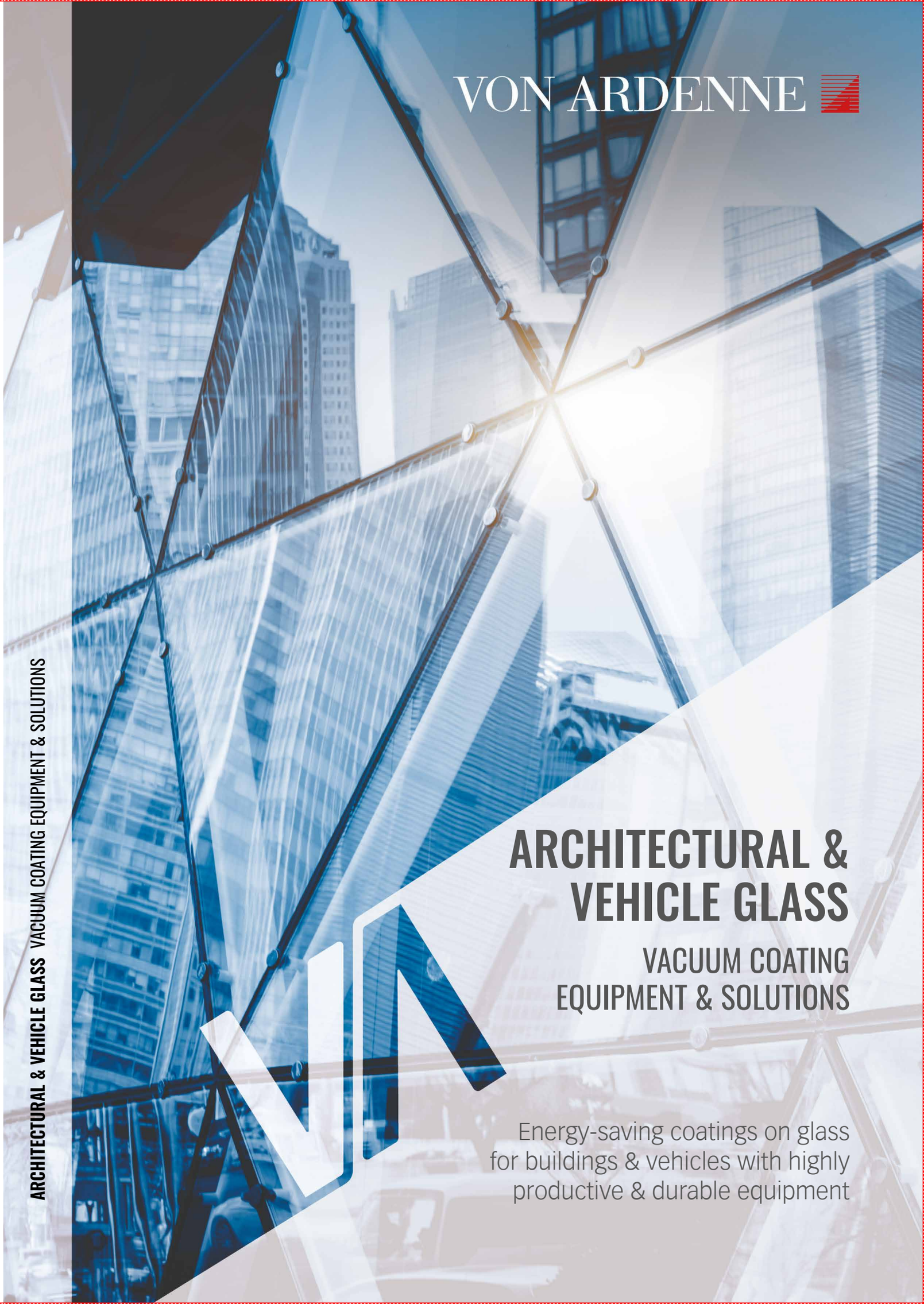


VON ARDENNE

ARCHITECTURAL & VEHICLE GLASS

VACUUM COATING EQUIPMENT & SOLUTIONS

Energy-saving coatings on glass for buildings & vehicles with highly productive & durable equipment

ARCHITECTURAL & VEHICLE GLASS VACUUM COATING EQUIPMENT & SOLUTIONS

ENERGY-SAVING COATINGS ON GLASS

FOR BUILDINGS & VEHICLES

Buildings and vehicles account for a high proportion of our society's energy consumption. However, glass offers a great potential for improving their energy balance – through functional coating.

Coated glass reduces the energy consumption of buildings and vehicles and enables efficient thermal and solar control. It also offers modern aesthetics, daylight and transparency.

We provide our customers with coating systems and technologies that enable them to manufacture these products. And we ensure that productivity and quality remain very high over a long period of time.

The world's leading manufacturers of architectural and automotive glass work with VON ARDENNE equipment and process solutions. They can adapt our modular glass coating systems to their needs. And the equipment allows for necessary changes during the course of its long service life.

To guarantee the reliability and durability of the systems and components, our customers can rely on comprehensive and conscientious service. And with a portfolio of digital products, we support our customers on the road to the smart factory.

Highest productivity

at high quality with sustainable equipment

Best technological performance

through experience, expertise & service

Software-based support

for processes and operation of the systems

DIELECTRIC PROTECTION

REFLECTANCE

DIELECTRIC/INTEFERENCE

SINGLE LOW-E
DOUBLE LOW-E
TRIPLE LOW-E
for residential heat insulation

for reduced radiation of incoming sunlight
SOLAR CONTROL

DIELECTRIC/INTEFERENCE

SEED

INFRARED REFLECTION

BUFFER

DIELECTRIC/INTEFERENCE

WINDOWS & FACADES

Reliable coating of architectural glass meeting the highest demands for efficiency & aesthetics

As a manufacturer or coater of architectural glass, you have to master production processes at the edge of what is technically possible. And it is important that the ratio between costs, quality and delivery time is right.

With our glass coating equipment, we offer you stability for the production of a high-quality product portfolio of architectural glass for all global markets.

We offer comprehensive system solutions from a single source. This ranges from the equipment, magnetrons and optical measurement technology to software and service.

No matter if it's solar control, single, double or triple Low-E coatings: With our equipment, you will achieve the desired visible transmittance and infrared reflectance, as well as the best optical performance.

- **Homogeneous color effect of the glazing**
  due to high process stability
- **Low product costs**
  due to highest productivity & availability
- **System solution from a single source**
  from equipment to magnetrons & measuring technology to software & service

GC330H, GC280H & GC254H
Glass Coating Systems

WINDSHIELD & SUNROOF

Reliable coating of automotive glass meeting the highest standards of efficiency & aesthetics

As a manufacturer or coater of automotive glass, you must master production processes at the edge of what is technically possible. It is important that the balance between cost, quality, and delivery time is right. Moreover, you should achieve these goals with limited resources over the entire service life of a plant. You expect your systems to support you in continuously adapting the process.

With our long-lasting glass coating systems, we offer you stability for the production of a high-quality product portfolio. For flat glass, the GC254H glass coating system is a suitable platform.

We also offer leading system solutions for coating films that are laminated with automotive glazing, as well as for window films.

- **Homogeneous color effect of vehicle glazing**
  due to high process stability
- **Outstanding product properties**
  even for the most demanding layer systems due to advanced process control concepts
- **System solution from a single source including expert support**
  for the coating process & the entire coating line

FOSA CX
Roll-to-Roll Vacuum Web Coating System

GC330H, GC280H & GC254H
Glass Coating Systems

SMART GLASS

Reliable coating of switchable glass at highest uniformity

As a manufacturer or coater of switchable glass, you need coating equipment that is adapted to your process. This also applies to processes with heated substrates. Here, it comes down to the best technical solution to ensure a consistent process with low energy requirements.

We offer coating systems tailored to your needs, with which you can apply transparent conductive oxide (TCO) coatings. An example of such coatings is indium tin oxide (ITO), which enables dynamic switching of an applied electrical voltage.

- **Market-leading experience**
  with equipment for coating heated glass substrates
- **Expertise for transparent conductive oxides**
  especially ITO
- **Flexible equipment platform for vertical coating**
  with & without carrier

GC120V
Vertical Coating System

BUILDING-INTEGRATED PHOTOVOLTAICS

Turning buildings into generators with functional layers for integrated solar cells

With integrated photovoltaics, the building envelope performs two functions: Protecting the building and generating electricity. However, the creative freedom for architects should not be lost in the process. For this reason, the requirements for the cell and the front glass of the solar module are extremely high.

We offer vacuum coating systems that enable you to meet these requirements. Our systems ensure your production process, both for cell production and for glass coating. With extremely precise layer distribution of our deposition processes, even the highest demands on aesthetics can be met. In addition, you can also produce chromatic layers according to your specifications. The optical result is reproducible at any time with our equipment.

- **Aesthetic surfaces**
  due to extremely high layer thickness homogeneity
- **Lower material costs**
  due to high target utilization
- **High reproducibility**
  of the different layers

XEANOVA
Inline Coating System

GC330H, GC280H & GC254H
Glass Coating Systems

GC330H, GC280H, GC254H

HIGHLY PRODUCTIVE MULTI-TALENTS

for industrial glass coating

With the GC330H, GC280H and the GC254H, we offer you coating systems for the production of high-quality architectural and automotive glass for all markets in the world. More than 70 of these systems are currently in operation with our customers worldwide.

VON ARDENNE GC330H, GC280H and GC254H have a modular design. They can be flexibly configured to meet all your requirements with process components from a single source.

These inline systems are suitable for all common glass formats, including 100-inch, jumbo and super jumbo.

In addition, we offer market-leading Industry 4.0 solutions for data analysis, process control and operational optimization with the VA INDIGO software product family.

Fast adaptation to new requirements & layer stacks

through flexible configuration at any time

Easy to maintain & short downtimes

due to easily accessible maintenance concept

Stable product quality

and fast reproducibility during product changes

APPLICATIONS

Building-Integrated PV

Windshield & Sunroof

Windows & Facades

TECHNICAL DATA

Subject to change without notice due to technical improvement.

Substrate

Material: flat glass

Thickness: 2 mm to 19 mm

Coating area

GC330H: up to 3300 mm x 7800 mm (Super Jumbo)

GC280H: 2800 mm x 5000 mm

GC254H: 2540 mm x 3810 mm

Cycle time

GC330H / GC280H / GC254H: < 20 s

Base pressure in sputter chamber

$\leq 5 \times 10^{-6}$ mbar

utilities and supply

Utility requirements: between 0,5 and 5 MVA, depending on application and throughput
Mainconnections: 400 VAC, 50 Hz oder 480 VAC, 60 Hz

GC120V

PROVEN VERTICAL COATING SYSTEM

with high productivity

With the GC120V, we offer you a reliable system for the deposition of thin metal and oxide layer systems on flat glass or substrates made of other materials.

The substrates are guided vertically through the system in a carrier. After coating, the carrier is transported back to the start by a return system. This saves you time and manpower.

VON ARDENNE is a leader in developing and manufacturing of large-area coating lines. Therefore, we were able to incorporate our extensive knowledge and experience with PVD technologies into this platform. The reliability of the system has been proven and confirmed in the display industry.

High productivity

due to scalability, modular design & short cycle times

Small footprint

due to vertical chamber orientation

Low defect rates

due to vertical orientation

APPLICATIONS

Automotive Displays

Displays for Consumer Electronics

Thin-Film Photovoltaics

Smart Glass

TECHNICAL DATA

Subject to change without notice due to technical improvement.

Substrates
Material: flat glass
Thickness: 0.5 mm to 4 mm
(others on request)
Pretreatment: linear ion source
or plasma glow discharge

Coating area
Up to 1280 mm x 1650 mm

Cycle time
30 s

Transport type
Inline, carrier-based
Orientation of the substrate: -7 °/ 0°/+7° vertical, LEL, SEL
Speed: ≤ 3.5 m/min

Loading & unloading
Optional automation by robot

System control
Siemens SPS and WinCC

XEANOVA

HIGHLY PRODUCTIVE & HIGHLY PROFITABLE

double-sided coating on large areas

If you are looking for a highly productive and flexible production system combined with proven technology and design, the XEANOVA is the perfect choice.

The inline coating system is based on our patented coating technology for large substrate areas. The large system width allows the simultaneous processing of many substrates. Therefore, it is particularly suitable for applications with high productivity at very low costs. With the XEANOVA, you can coat silicon wafers or other small substrates. It is also suitable for very thin substrates.

Thanks to its modular design, the XEANOVA can be equipped with rotatable magnetrons for the sputter deposition of high performance TCO layers or various other materials such as metals and metal oxides. It can also be adapted for other deposition technologies. Substrates can also be pre-treated in the system by cleaning or etching, either under vacuum or before entering the vacuum.

Exceptionally productive

due to large width

Easily adaptable to new processes & requirements

due to flexible & modular design

High uptime

due to quick and easy maintenance

APPLICATIONS

Metallic Bipolar Plates

IBC Solar Cells

Building-Integrated PV

TOPCon Solar Cells

Heterojunction Solar Cells

Perovskite Tandem Solar Cells

HIGHLY PRODUCTIVE ROLL-TO-ROLL COATING

with compact equipment

The FOSA CX is a compact production system for the roll-to-roll deposition of thin functional layers on polymer films. It is ideal for high-volume production and is optimized for single drum applications.

Furthermore, it benefits from a freely configurable compartment structure and can be maintained easily from two sides. The FOSA CX is engineered for long production campaigns with minimal operator intervention.

VON ARDENNE is a leading supplier of large-area coating systems that have been proven in the industry. Therefore, we were able to incorporate extensive technological knowledge and experience in handling film substrates into this platform.

Saves floor space

due to compact single-chamber design

Selection of cooling drums available

depending on the application

Low downtime

due to quick & easy maintenance

FOSA CX

APPLICATIONS

Lithium-Ion Batteries

Windshield & Sunroof

SPUTTER COMPONENTS

COMPONENTS FOR SPUTTER PROCESSES

from individual components to complete magnetrons

If you are using thin-film coating for your production, two questions are crucial: How high is the productivity and how good is the quality of the product? In the end, they determine the achievable revenue and the success of your company.

Our coating components can help you answer both questions with "very good".

Increase the availability of your equipment: Use industry-proven components with long uptime, high reliability and maximum utilization of coating materials.

And improve your product quality by using coating sources that give you excellent coating properties. We can help you find exactly the right components for your application.

- **Industry-leading layer uniformity & target utilization**
  in rotatable and planar magnetrons
- **Highest reliability & experience**
  from thousands of installations worldwide
- **Comprehensive technology solutions**
  from individual components to complete magnetrons

BOOST YOUR YIELD

when sputtering with planar targets

HIGH-UTILIZATION PLANAR CATHODE

- **Long uptimes**
  due to highest possible target utilization
- **Best coating uniformity**
  in the market
- **Low target costs compared to cylindrical cathodes**
  through easier manufacturing method

BOOST YOUR YIELD IN SPUTTERING

through longer target lifetime

ROTATABLE MAGNETRONS

- **Longer production time**
  due to extended target lifetime
- **High process stability**
  due to low redeposition zone
- **Best coating results**
  in terms of rate & layer uniformity

HIGH THROUGHPUT - MINIMAL HEAT EXPOSURE

for homogeneous layers

LINEAR EVAPORATOR

- **Inline processing of organic devices**
  at high throughput
- **Minimizes heat impact on evaporant & substrate**
  when processing sensitive materials
- **Superior homogeneity & stability**
  of the layers

END BLOCKS YOU CAN RELY ON

with long uptimes & low costs

X-SERIES END BLOCKS

- **Long uptime**
  through use of proven technical solutions
- **Low operating costs**
  due to low maintenance requirements & low-wear materials
- **Quick & safe maintenance procedures**
  due to plug & play cartridge design

ALWAYS UP TO DATE

with long uptimes & low costs

Y-SERIES END BLOCKS

- **Long uptime**
  through use of proven technical solutions
- **Low operating costs**
  due to low maintenance requirements & low-wear materials
- **Quick & safe maintenance procedures**
  due to plug & play cartridge design

SPUTTER COMPONENTS

SPUTTER COMPONENTS

BOOST YOUR YIELD

when sputtering with rotatable targets

MAGNET BARS

Long campaign duration
due to maximum target utilization

Best coating uniformity in the market
due to optimally designed magnetic field

Selectable magnetic field strength
for optimum coating properties

COATING AT HIGH DEPOSITION RATES

with long uptimes

DUAL ANODE SPUTTERING

Long uptime – even with insulating layers
due to cyclic cleaning of the anode

Flexible arrangement for your system
due to scalable design

Patented technical solution for innovative operation
and for differentiation from market participants

BOOST YOUR YIELD

in Reactive Sputtering

VA PROCOS 2

Reliable & industry-proven control
for reactive sputtering of all common layer systems

Easily configurable with external components
for all reactive sputtering applications

Continuous quality assurance
and parameter control

JOINT TESTING, SAMPLING & IMPROVEMENT

from simulation to pilot production

Sampling & Layer Development

At our Technology & Application Center (TAC), we work togehter with you on the next generation of your coating applications.

From the simulation of layer stacks and their functionality, to sample production on a laboratory and pilot scale, to the measurement and evaluation of coating and substrate properties: We are prepared to meet a wide range of requirements.

This gives you the opportunity to test the function of the coating for your product in advance on relevant sample sizes.

Gaining knowledge through simulation
of layer composition & properties

Risk reduction & quicker market maturity
through industrial trials

Individual access to a variety
of coating materials & services

Optimal equipment configuration
through testing in a scalable process

Technology & Application Center Dresden

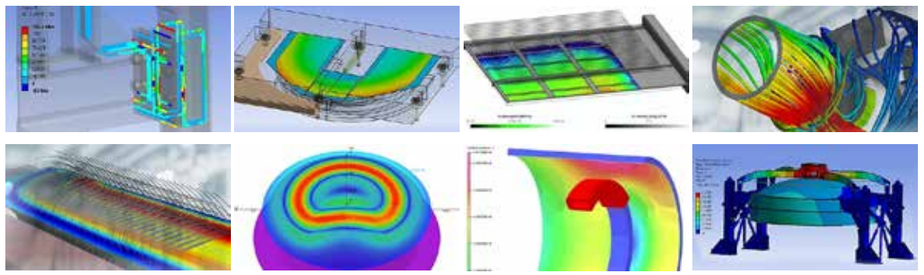
SIMULATION

helps you understand your process

You want to accelerate your product development? And you know that the answer is multi-physical simulation and modeling? You want accurate results. But which solution is right for you?

We can accelerate your product development and upgrade process by reducing engineering effort with state-of-the-art modeling and simulation. This allows you to design your custom vacuum solution or perform feasibility studies for upgrading a running system.

We have outstanding expertise in multiscale simulation and have leveraged it to ensure highly optimized system performance and best process quality.



TEST & SIMULATE

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

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.

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
- Institutes of the Helmholtz Association
- Universities
- Companies

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.

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

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.

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.

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Company | Career | Applications | Products | Service

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