VON ARDENNE provides tailored web coating solutions for today’s most ambitious thin-film applications on polymer films, flexible glass and metal strip. These solutions comprise coating equipment, key technology components and application technology.

Our customers benefit from our extensive process know-how and our experience, which we have gained for more than 15 years in roll-to-roll coating, 40 years in magnetron sputtering and 55 years in electron beam technology. Moreover, we support our customers in qualifying their products and processes step by step. For that, we offer unique facilities, such as our in-house sample coating equipment and technology support for various substrate types and sizes. Together with our customers, we develop their ideas, from the first laboratory tests to the manufacturing of the most competitive large-scale production equipment.

VON ARDENNE has developed a roll-to-roll vacuum coating system optimized for the processing of flexible glass: the FOSA LabX 330 Glass. It is available for demonstrations, sampling and joint product developments in Dresden to help flexible glass move from the laboratory to the mass market.

With more than 26 web coating systems for large-scale industrial production in the field and 55 years of process experience, VON ARDENNE has secured an enormous intellectual property portfolio in application technology.

This knowledge capital ranges from complete layer stacks for the window film business to specific process know-how in the variety of all thin-film materials, and is the basis for customer driven optimizations.

**OUR STRENGTHS IN WEB COATING**

**IN-HOUSE TECHNOLOGY & APPLICATION CENTER**
Product & process verification and optimization; sample coatings of customer applications

**CLOSE PARTNERSHIP**
with Fraunhofer FEP, European Society of Thin Films and AIMCAL

**EXPERTISE AND SIMULATION SUPPORT**
for qualified concept development and evaluation

**WORLDWIDE ROLLOUTS**
of mid-size and large-scale equipment

**PRODUCTION SUPPORT**
at customer’s site after SOP for efficient ramp-up

**TAILORED SERVICE & SUPPORT**
around the world, up to 24/7

**UPGRADE OF EXISTING EQUIPMENT**
with new components and application technologies
VON ARDENNE provides five machine platforms as a basis for customization according to the required solution defined by the process, the annual throughput, the facility surroundings and the budget. Each FOSA uses our process and technology components, such as rotatable magnetrons and our proven winding system, which is suited for the forward and backward coating of sensitive thin substrates.

The FOSA MX and FOSA CX are ideal tools for mass production, e.g. of displays and window films. The FOSA MX 300/600 is designed for small-scale production and process and product qualification – at a small scale, but with our original key components.

In addition to our standard products, we offer customized web coating systems according to the requirements of our customers.

CUSTOMIZED WEB COATING SYSTEM

- Customized equipment according to the product and business case requirements of the customer
- Verified and tested at in-house technology and application center
- Especially designed winding system (e.g. no front touch, double-sided coating, exotic substrates)
- Various process components (planar or rotatable magnetrons, thermal evaporation, electron beam systems, PECVD, etc.)
- Full support by VON ARDENNE: from verification & initial engineering to pilot tool, 1st production tool, world wide roll out and world wide service

FOBA

- Uses VON ARDENNE E-beam evaporation technology and all types of pre-treatment and sputter sources
- High-speed coating up to 1000 m/min

VON ARDENNE has developed the FOSA LabX 330 Glass, a roll-to-roll vacuum coating system optimized for the processing of flexible glass. The system was put into operation in 2016 and is available for demonstrations, sampling and joint product developments. Please contact us if you are interested in taking this opportunity.

The FOBA is a coating system for the roll-to-roll coating of flexible materials. It uses our proven electron beam evaporation technology to deposit functional layers at high rates on polymer film or thin metal foil, for instance for holographic applications, battery applications and next-generation packaging.

The FOSA MX is a web coating system with a modular design. It is ideal for high-volume production and can be configured with up to three coating drums.

Furthermore, it offers an advanced maintenance concept. The FOSA MX is engineered for minimized downtime for complex layer stacks, such as AR and window films.

The FOSA CX is a compact production tool 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.

The FOSA MX 300/600 is a web coating system based on a modular, expandable and highly customizable platform for a wide range of substrates and applications. It is especially designed for all process and product qualification steps from the laboratory to production.

The system uses the same key components as our web coating systems for industrial production, however at a smaller scale. Thus, our customers can test their applications under laboratory conditions and save time when they scale their products up to mass production.

The FOBA uses our proven electron beam evaporation technology to deposit functional layers at high rates on polymer film or thin metal strip, e.g. for holographic applications.
VON ARDENNE KEY COMPONENTS
FOR VACUUM WEB COATING

OUR KEY COMPETENCIES FOR WEB COATING COMPONENTS

1. PRE-TREATMENT OF THE SUBSTRATE
   - Glow-discharge device
   - IR heater
   - Ion source

2. POST-TREATMENT
   - Flash lamp annealing
   - Web marker

3. INLINE MEASUREMENT SYSTEM
   - Transmittance, reflectance in VIS and NIR
   - Eddy current resistance measurement
   - Quality inspection system (e.g., wrinkle control, particle scanner)
   - Data retrieval and analysis system

4. DEPOSITION COMPONENTS
   - Magnetrons, optimized for web coating (e.g., DAS)
   - Electron beam guns for web coating
   - Process control systems
   - New deposition sources (e.g., ICP source)

5. MACHINE OPERATION INTERFACE
   - Connection to manufacturing execution and quality inspection system
   - Data storage and analysis tools
   - Fully integrated system

6. MACHINE OPERATION INTERFACE
   - New deposition sources (e.g., ICP source)
   - Process control systems
   - Magnetrons, optimized for web coating (e.g., DAS)
   - Data retrieval and analysis system

MAGNETRON TECHNOLOGY

Thanks to many years of experience gained from designing and installing advanced sputtering equipment, we can offer a complete portfolio of components for specific tasks:

- SPUTTERING MODES
  - DC, DC-pulsed, DC with DAS, AC-MF, bipolar processes

- MAGNETRON TYPES
  - Single, dual or triple planar or rotatable
  - Planar (150 gauss to 800 gauss), rotatable (500 gauss to 1000 gauss)

- GAS INLET SYSTEM
  - Binary system, fast reaction time, fully system integrated gas delivery solution, enables reactive gas sputtering application using the VON ARDENNE process control system (VAprocos2).

E-BEAM TECHNOLOGY

With more than 60 years of experience and over 400 electron beam systems installed worldwide, VON ARDENNE provides the most advanced and powerful electron beam systems.

- HIGH-POWER ELECTRON BEAM GUNS
VON ARDENNE develops and manufactures electron beam systems which are used for melting, refining, evaporation or heat treatment. The first electron beam gun was developed in 1959 at the Mannfred von Ardenne Research Institute.

- PROCESS CONTROL SYSTEM
VON ARDENNE PROCESS CONTROL SYSTEM

Since 1980, VON ARDENNE has been in a leading position in reactive sputtering processes. Furthermore, we have provided and optimized our process control system VAprocos for many years. Today, VAprocos2 controls the reactive magnetron sputtering of compound layers (such as ITO, TiOx, TiAlOx, AlN, SiO2, Si3N4, ZnO, ZrO2 or Ta2O5) by reliably fixing the working points in the crucial transition region.

- DAS DUAL ANODE SPUTTERING TECHNOLOGY
The heat load is a major limiting factor in mass production due to thermal sensitivity of polymer substrates. The energy impact, and thus the substrate temperature, is strongly determined by the plasma mode (AC or DC). Plasma quenching and re-ignition by each AC voltage alternation causes heat and decreases the deposition rate compared to the DC mode. Unfortunately, in reactive sputtering the DC mode leads to a coated anode: the disappearing anode problem. It makes the process unstable and not reliable for mass production.

- BENEFITS OF DAS:
  - Up to 50 % less DC energy impact and stable AC reactive process
  - Less heat impact on sensitive polymer substrates
  - Reactive sputtering without disappearing anode problem
  - 100 % duty cycle of DC sputtering used (compared to DC bipolar)
  - Available for planar and rotatable magnetrons used in the FOSA platform
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.

WHO WE ARE & WHAT WE DO

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COMPONENTS
www.vonardenne.biz