PRODUCTION SYSTEMS

For Touch Panel and LCD Sputtering/PECVD/Wet Processing
Pilot and Production Systems
Process Solutions with over 20 Years of Know-how

Process Technology at a Glance for Touch Panel, LCD and Large Glass Substrates

SINGULUS TECHNOLOGIES, founded in a classic buy-out from the former LEYBOLD in 1995, is a corporation since 20 years with worldwide operations headquartered in Germany’s Rhein-Main region.

SINGULUS TECHNOLOGIES offers a high level of expertise in a combination with process-technological and scientific know-how coupled with unique solutions for machines and plant engineering. The application areas include vacuum technology, surface coating and thermal processing as well as the related chemical and physical processing steps.

Typical Processes

**Thin Film Deposition**
- Sputter deposition [DC, RF, MF, Bipolar, pulsed]
- Evaporation [thermal evaporation]
- CVD
- PECVD [ICP, μ-Wave]
- AACVD (aerosol assisted CVD)

**Surface Engineering**
- Embossing, imprint nano lithography
- Injection molding
- Functionalization
- Oxidation
- Plasma cleaning & etching
- Lacquering & bonding

**Thermal Processing**
- Rapid thermal processing
- Conditioning
- Annealing

**Wet Chemical**
- Cleaning/washing
- Etching/polishing
- Texturing
- Conditioning
- Chemical bath deposition
- Developing
One Glass Solution Technology

Modular inline PVD sputter systems provide solutions for dedicated coating processes on glass like the deposition of Nb, Si02 or ITO. The systems from SINGULUS TECHNOLOGIES are fully automated, innovative and modular coating tools for the industrial production of modern touch screen applications. The systems provide several customizable vacuum chambers for different processes. Scratch resistant coatings provide glass with durability and increased longevity. A high quality hard coating assures the best scratch resistance. Mobile display cover glass has to meet the requirements of crystal clear images, withstand every day application and allow smooth touch screen use.

Electromagnetic Shielding for Mobile Applications

Mobile applications demand also a very high functional density for electromagnetic shielding interference. Cover shields do not provide the shielding quality required for the next generation of products. SINGULUS TECHNOLOGIES offers modular vacuum sputtering system providing the best solution to produce high quality metal layers in a cost effective and economical way. Electromagnetic shielding is the practice of reducing the electromagnetic field by blocking the field with barriers made of conductive or magnetic materials. Shielding is typically applied to enclosures to isolate electrical devices from the outside world. A commonly used shielding method, especially with electronic goods housed in plastic enclosures, is to deposit the inside of the product with a copper or other suitable layers to provide the best device shielding solution from high frequencies.

PTM Sputtering Units

SINGULUS TECHNOLOGIES continued to emphasize on the new and further development of production equipment for new applications. Single substrates deposition machines are used for R & D and testing of new applications for display and touch screen devices with applications like ITO coatings, AR coatings, EMI shielding and coatings for so called one glass solution technology. The transfer from R & D to inline sputtering machines secures the use of layers systems of high conductivity and transparency and various other metal coatings at the same time.
PolyCoater Static Sputtering Systems

The static sputtering system “PolyCoater” was designed as system for pilot and production use. The cycle time per carrier is down to 6 s with up to 18 parts on one carrier. The system is equipped with two cathodes. Typical target materials are e.g. Al, Cu, Cr, Zr, Ag, Au, Stainless Steel and TCO. The “PolyCoater” offers a perfect layer uniformity and high deposition rates with highest coating quality and a high uptime.

The system can be used for different PVD processes, heating & cooling, hard coating of surfaces as well as decorative coatings and different functional coatings.

MODULUS Inline Sputtering Deposition Systems

As a modular inline sputter system this machine is ready for applications in display and consumer electronic applications. In the different process modules, plasma treatment, RF sputtering and DC sputtering can be implemented as well as intermediate cooling & heating of the substrates in dedicated modules. The SINGULUS TECHNOLOGIES inline sputter deposition system is designed for production with loading and unloading of the substrates at a single point, processing in a minimized footprint.

Inline Sputtering Systems with Vertical & Horizontal Substrate Transport

SINGULUS TECHNOLOGIES offers inline sputtering systems with vertical as well with horizontal substrate transport. These systems are featuring various applications, e.g. in photovoltaics, display, glass. Examples are transparent front or metallic back contact layers as well as multilayered precursors with a broad range of different materials. The transport carriers can be configured flexibly for different substrate formats and materials e.g. solar wafers, small glass substrates as well as large glass substrates. Different automation options for loading and unloading are available.
SINGULUS TECHNOLOGIES is one of the major wet process manufacturing equipment suppliers for professional wet processing systems. The VITRUM wet processing machine with a modular design is capable of glass washing as well as TCO etching, KCN etching or NH3 treatment respectively for substrate sizes up to 2,600 mm. The wet process tools offer high performance and high reliability, but also high customizability to accommodate specific chemical materials, production processes and sizes and thicknesses of substrates.

**Applications**

- Large & small substrates
- Resist stripping
- Cleaning, etching or deposition & polishing
- Surface etching applications
- Metal free cleaning, rinsing and drying

**SINGULAR XP PECVD System**

SINGULAR XP ICP-PECVD is a fully automated innovative and modular PECVD coating tool. The SINGULAR system provides an automation module and a coating module. The coating module consists of several customizable vacuum chambers.

The innovative SINGULAR tool is based on static inline production which combines the advantages of inline substrate transport and static processing. It allows the coating of complex layers, such as layer stacks of different materials e.g. AlOx/SiNy. The key feature of the tool is the ICP-PECVD technology.

The inductively coupled plasma (ICP) excitation allows ideal control of film properties for various materials such as SiNx, AlOx, SiOxNy at high deposition rates. The process variability, the small tool footprint in combination with an excellent total “Cost Of Ownership” makes the SINGULAR system ideally suitable for upgrades of existing production lines.

**Applications**

- Efficient use of process materials
- SiOx, SiNx, AlOx, TCO, aSi & µcSi (intrinsic & doped)
- AR-coating
- Hard coating
- Diffusion barriers
SINGULUS TECHNOLOGIES – Innovations for New Technologies

SINGULUS TECHNOLOGIES develops and assembles innovative machines and systems for efficient and resource-saving production processes, which are used worldwide in the solar, semiconductor, medical technology, consumer goods and data storage.

The company’s core competencies include various processes of coating technology, surface treatment and wet-chemical and thermal production processes.