SMARTWEB®
ROLL-TO-ROLL COATING SYSTEM
FOR STATE-OF-THE ART FLEXIBLE ELECTRONICS
Flexible Touch Panels (FTP)
These require high transmittance ITO coatings with virtually no absorption in the visible spectrum, high conductivity and uniformity, and large concentrations and long mean free path of charge carriers. SmartWeb delivers to this stringent requirement and is production proven in the manufacture of high-end touch panel devices used in mobile smartphones and tablet devices.

Employing physical vapor deposition (PVD) technology, SmartWeb deposits the critical ITO-based multi-layer film stack required in all common type of touch panels: analogue-resistant and projective Flexible Displays

The manufacturing challenge associated with the high volume production of flexible displays is centered around the thin film transistor (TFT) backplane, where thousands of thin film transistors are required to actively control the output of each pixel. The SmartWeb platform is ideally suited for the deposition of the source, gate and drain metallization layers employed in these devices.

Flexible Printed Circuit Boards (FPCB)
Current FPCB production requires greater adhesion strength delivered by SmartWeb’s optional pre-treatment tools. SmartWeb also meets the industry need for dust and particle free production for the small geometrical structures present in FPCBs.

Flexible Solar Cells
Roll-to-Roll (R2R) production of thin film solar cells (TFSi, CIGS) combines the advantages of using inexpensive, lightweight and flexible substrates with high throughput production. SmartWeb provides an intelligently controlled modular sputter coater designed for the deposition of both metallic back contacts and Transparent Conductive Oxide (TCO) based front contacts.
SMARTWEB BENEFITS

MODULAR DESIGN
The SmartWeb platform offers both volume production (SmartWeb XL) and R&D/pilot production (SmartWeb SL). While the SmartWeb XL production system incorporates up to 6 cathodes per coating drum, the smaller scale SmartWeb SL offers 3 cathodes per coating drum. With the modularity of both systems, a second coating drum may be added to scale up from development work to volume production.

CLEAN DEPOSITION CONDITIONS
• No moving parts above coating drum
• Stainless steel process module
• Oil free pumping system

LOWEST PARTICLE GENERATION
• Sputter-up orientation
• Side mounted winding module
• Decreased particles due to soft venting

SCRATCH-FREE, WRINKLE-FREE WEB TRANSPORTATION SYSTEM
• Minimal number of guide rollers
• Parallel aligned rollers eliminate axial movement of coating drum vs. guide rollers
• Closed loop drive control with tension measurement rollers

MINIMIZED DOWN TIME
• Easy loading and unloading of substrate rolls
• Load locks keep process chamber under vacuum during substrate roll exchange
• Rapid pump down
• Fast process startup
• Easy access to sources and shieldings for target exchange and cleaning
• Planar magnetrons with clamped targets for quick exchange and maintenance turnaround
• High utilization rotatable magnetrons enable longer target lifetimes
• Sealed target cooling water circuit eliminates water leakage during target change
• Fully interchangeable cathodes

EASE OF OPERATION
• Improved cycle time, easy substrate and consumable handling
• Sliding doors, pivoting rails and automatic winder releases for quick roll exchange
• Fast target exchange
• Process module with motor driven cover plates

MODULAR CONCEPT FOR MAXIMUM PROCESS FLEXIBILITY
• Fully interchangeable cathodes
• Enhanced cathode design provides higher line speed
• Chamber separation
  - Enables individual cathode gas supply control and pumping
  - >100:1 permits deposition without cross-talk
• Directly mounted TMPs with magnetic levitation reduce service frequency
• Cold traps on each chamber provide high pump capacity

APPLIED GLOBAL SERVICES
Applied Materials’ Applied Global Services division helps customers to lower costs, improve equipment and factory performance and maximize return on assets.

OFFERINGS
AGS offerings for our SmartWeb customers include:
• Applied ON Service for 24x7 technical support
• Post warranty service to prevent unscheduled costs
• Enhanced warranty service for additional service features
• Preventive maintenance programs
• Tool health check audits
• Assurance service or ‘block of hours’ for as needed corrective maintenance
• Process and product support for pre-defined time periods

Through world-class expertise, innovative technologies, and knowledge-based systems, Applied Global Services is committed to optimizing the efficiency and bottom line of our SmartWeb customers.
EXPAND PRODUCTION WITH SMARTWEB’S MULTI-PROCESS CAPABILITIES

SmartWeb’s innovative modular design enables efficient pre-treatment processes, deposition processes and inline layer quality measurement methods.

**SUBSTRATE DEGASSING & PRE-TREATMENT TOOLS**

TreatMag™ SmartWeb’s state-of-the-art magnetically enhanced glow discharge device cleans the substrate surface from adherent water molecules with ion energies up to 70 eV.

**Substrate Pre-Heating** SmartWeb is equipped with an efficient pre-heating device for substrate degassing. Efficient moisture removal is supported by high pumping capacity employing a cold trap.

**DEPOSITION TOOLS**

A complete suite of AC- and DC-powered sputter cathodes; both available for planar or rotatable magnetrons, allows the choice of the optimum cathode type for each layer material and application.

**Planar Magnetron** Applied’s planar magnetron uses clamped rectangular target plates for quick target exchange and fast maintenance turnaround. Sealed cooling water circuits eliminate water leakage during target exchange. Enhanced magnetic field arrangement within the cathode enables target utilization levels >40%.

**Rotatable Magnetron** For target utilization above 80%, Applied Materials’ rotatable magnetron enables the cylindrical target to rotate around a stationary set of permanent magnets. This uniform erosion of the target tube increases utilization and extends target lifetime.

**INLINE MEASURING INSTRUMENTS**

The SmartWeb can be equipped with state-of-the-art inline measuring equipment to monitor the following layer properties:

**Sheet Resistance** Measurement of the average value between isolated guide rollers, or an eddy current device can be used for non-contact local measurement.

**Optical Density, Transmission, Reflection, Color Values** Applied’s OPTOPLEX™ technology enables inline measurement of spectral transmission and spectral reflection in a wavelength range from 380nm to 1000nm including the calculation of color values.

**TopFilm Software** TopFilm is an off-line software package designed to calculate the spectral optical performance of a multi-layer stack. This tool can be used to develop new layer stacks on a theoretical basis, eliminating costly and time consuming experimentation. It can also be used for troubleshooting deviations in the inline optical measurements.

### TECHNICAL SPECIFICATIONS

#### VOLUME PRODUCTION SYSTEM

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<th>SmartWeb Model Number</th>
<th>XL 6-1400</th>
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<td>Depositing materials</td>
<td>Metals &amp; Alloys</td>
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<td>Maximum roll diameter (mm)</td>
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<td>Chamber separation</td>
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<td>Facility Requirements</td>
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Applied Materials, Inc. is the global leader in providing innovative equipment, services and software to enable the manufacture of advanced semiconductor, flat panel display and solar photovoltaic products. Applied’s WEB Coating Products is the leading supplier of advanced roll-to-roll vacuum coating systems that deposit thin films for flexible electronics, packaging, and advanced technology applications.

Our technologies help make innovations like smartphones, flat screen TVs and solar panels more affordable and accessible to consumers and businesses around the world. At Applied Materials, we turn today’s innovations into the industries of tomorrow.

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