Vacuum Web Coater, P600MR Series

P600MR Machines is our contribution into the production of flat panel displays and flexible circuitry. The unique multi-drum design of this machine makes it different from the machines for similar application from other manufacturers. Web is coated on three process drums in three isolated compartments to ensure different process environments in each compartment and to increase productivity.

Vacuum web coater P600MR.2 at operation in Asia

Vacuum web coater P600MR provides one-side magnetron deposition of SiO₂+ITO layers in the production of touch screen and LCD films. The system may be also used for antireflection layers and copper layers deposition.

P600MR is equipped with a winding device, magnetron sputtering devices, carriages of winding and sputtering systems, instrumentation for monitoring coating parameters. A place is foreseen for installation of the heating/chilling system (cooling to subzero temperatures) for the process drums (optional).

The vacuum chamber of the machine is a rectangular stainless steel tank, where the inside surfaces are polished. The chamber is divided into 6 compartments: unwinding compartment with the glow discharge device, rewinding compartment, intermediate and 3 deposition compartments. The interleaf shafts are arranged in the substrate unwinding and rewinding compartments.

The reversal winding device provides constant winding speed and tension, which is controlled through AC motors with electromagnetic clutches. On the central process drum, constant speed is maintained with the AC motor with frequency control.

The winding device includes: web unwinding and rewinding shafts, interleaf unwinding and rewinding shafts, idle rollers, 3 water-cooled process drums, tension sensors and rollers. Cooled shields are provided on the process drums.
The winding device with the drive travels off the chamber on one carrier while the magnetrons travel on the opposite side carrier.

Depending on the process required, various combinations of magnetrons are possible. Sputtering target materials are metal or ceramic. Power to the magnetrons is provided by Huettinger power supplies 30 kW each and Advanced Energy DC power supplies 20 kW each. The sputtering process is monitored with multi-channel emission plasma spectrometer.

The machine control system is based on Siemens PLC. It provides fully automatic monitoring and control of the entire technological process. Coating parameters are monitored after each deposition zone, that ensures accurate maintenance of the process parameters of each deposited layer. In particular, coating optical characteristics after each deposition zone and sheet resistance of ITO layers are monitored.

Main Advantages of the Multi-drum Coaters

- Decrease of mutual influence of gas media of different deposition zones due to pressure in the intermediate compartment 5–10 times lower than in the deposition zones;
- Monitoring of the coating characteristics after each deposition zone to provide high-precision control of the coating parameters;
- Web tension control between the deposition drums, that ensures compensation of the film size variation during deposition;
- Decrease of contamination risk of the magnetron targets and coated web due to the vertical arrangement of the sputtering targets;
- Significantly better heat removal from the film to the processor drums on account of their smaller radii;
- Optimal arrangement of the high-vacuum pumps and gas feeding system, that provides uniform gas flows in the deposition zones;
- Simple and convenient maintenance due to optimal machine configuration.

Technical Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Substrate material (thickness, micron)</td>
<td>PET, PC, PI (50–400)</td>
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<tr>
<td>Substrate width, mm</td>
<td>up to 670</td>
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<td>Winding speed, m/min</td>
<td>0.5–5.0</td>
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<tr>
<td>Nominal sheet resistance (ITO layer), Ohm/sq</td>
<td>40–400</td>
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<tr>
<td>Maximum roll diameter with interleaf, mm</td>
<td>500</td>
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<td>Machine overall dimensions, m</td>
<td>14.5 x 10.0 x 3.7</td>
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