

ADHESIVE COATING EQUIPMENT

Many adhesives, as used in the graphic arts converting industry, require specialized, dedicated application equipment.

When one considers the range of adhesive types and chemistries that are available, it is no wonder that a variety of application equipment is deployed.



Among these adhesives types are:

Heat activated adhesives are a class of formulated thermoplastic materials. They are applied in liquid form, dried to evaporate a solvent, leaving solids bonded to a substrate. The dried adhesive/coating film is able to be heat activated and bondable to another substrate. Graphic arts products in this category are EVA laminating adhesives, blister and fold-over card adhesives, IML (in-mold-label) adhesives and foil stamping adhesives. Offshoots of these product types may also be based on 100% solid UV & EB energy curing formulations.

Reactive adhesives are usually two part systems, although blocked one part systems are found. Epoxy chemistry resin systems typify these types of adhesives. Food packaging and other laminated technical products rely on polyurethane chemistry, solvent or solvent-free. Dispersions may also be used based on polyurethanes, acrylics or natural raw materials.

Energy curing adhesives are formulated materials that react to UV or EB energy to cure almost instantly changing from liquid to solid. These 100% solid products once cured (cross-linked) form bonds that exhibit high physical and chemical resistant properties. Both UV & EB laminating adhesives are being commercialized.

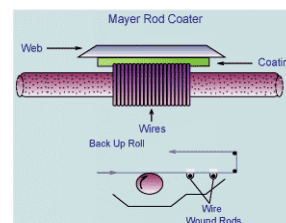
Temporary adhesives are a category based on PSA's, (pressure sensitive adhesives) elastomer formulations, designed to easily stick and sometimes be easily removed. Post-it-notes and some PSA tapes are product applications. Other PSA's can be very permanent in adhesiveness. Hot melt PSA technology is also used for tapes and labels.

Cold seal adhesives are adhesives that stick only to themselves creating a light pressure bond. Many are formulations of natural rubber latex blended with vinyl acetate and ethylene copolymers. Aqueous formulations are commonly used on candy bar wrappers, and envelopes.

Laminating adhesives can be based on aqueous, solvent, 1 & 2 part reactive, and UV & EB chemistry. Applications are found in flexible packaging, retort packaging, decorative papers, textiles, etc.

Let's review some of the types of application equipment being used to apply adhesives.

Mayer rod (Wire wound rod) coater:



This coating method involves the use of a steel rod that is wrapped with a wire. The space created between the tightly wrapped wire determines the amount of adhesive that is metered on a substrate in application. In the process, adhesive in excess is applied to a substrate by an applicator roll running in machine direction or reverse. The role of the Mayer rod is to then scrape off the excess adhesive leaving a metered amount in place. The amount of adhesive finally applied is dependent on the diameter of the wire wound around the steel rod. Larger diameter wire equals more coat weight. Mayer rod equipment is low in cost,

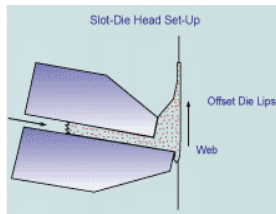
easy to use and capable of applying a broad range of post-metered coat weights.

Curtain coater:

Curtain coating is functionally very similar to slot die coating except the head slot is located several centimeters above a moving substrate web. The method is based on using a waterfall or curtain of adhesive to pre-meter adhesive to a substrate. Viscosity control is required in order to control coat weight from a consistent curtain. High application speeds in excess of 1000 meters per minute can be achieved.



Slot die coater:



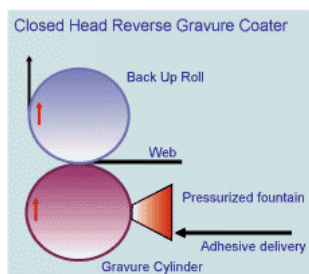
A slot die functions by pumping adhesive into a chamber, from which it is delivered through a narrow exit slot located directly above an impression cylinder backed substrate. High line speeds at high coat weights are achievable using lower viscosity adhesives. Pattern coating is also a capability.

Extrusion slot die coater:

This coating method has been adopted from the screw extrusion process used to extrude molten plastic onto substrates, or to form plastic film or sheet. It can handle very high viscosity adhesives and allows pattern application. Slot die adhesive deposition pre-meters adhesive exactly, controlling coat weight. What is extruded is what is deposited without excess waste.

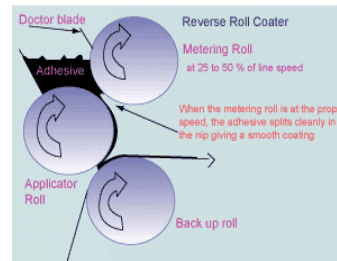
Gravure coaters:

Gravure coating technology varies to include direct gravure, offset gravure and reverse gravure. Gravure as a coating method functions by adhesive being pumped into a fountain or chamber, which is in contact with an engraved cylinder. The action fills engraved cells with adhesive after



which an impression cylinder backing the substrate brings the substrate into contact so that adhesive is transferred. Coat weight is pre-metered precisely by the volume and shape of the etched engraved cells. High line speeds are possible but coat weights are light and limited by low viscosity requirements. Pattern coating is easily accomplished and application can be extremely smooth.

Reverse roll coater:



This method of coating involves the use of multiple rolls to pick up, meter and then apply adhesive to a substrate.

Three roll designs work by using the middle roll to pick up an exact thickness of adhesive from a metering roll to which adhesive has been transferred. The gap between the middle and metering rolls determines the thickness of the adhesive on the middle roll. Adhesive may be supplied from a fountain or from the nip formed by two rolls. Coat weight can be controlled by an increase or decrease in applicator roller speed, as compared to the substrate web speed. Smoothness can be controlled by changes made in metering roll speed. This technology is the basis for commonly used blanket coaters.

Blanket Coaters:

These popular coaters have proliferated in litho printing as a means of applying aqueous, UV/EB coatings, and certain adhesives in-line. Using flexo and gravure techniques, 2 & 3 roll designs transfer coating to a blanket, trapping coating over wet or dry printing. Coating is supplied from a fountain or a chambered dr. blade system.

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Photos courtesy Rohm & Haas