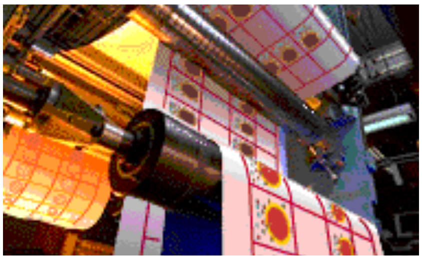


End products benefit through coating viscosity control.

In-process coating quality can be managed effectively via a new in-line viscosity control method.

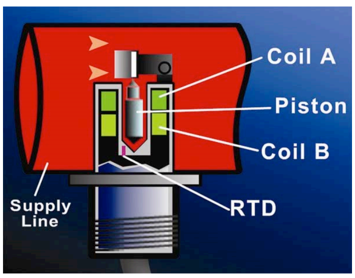
Even though raw coating materials are perfect when they enter a converter's plant, they usually don't stay that way for long and deteriorate during use.
Tipically, the failure mechanism is simple. As a thin layer of coating material is deposited on a roller drum for coating, it is exposed to air often at elevated temperatures. This is ideal for evaporation to occur.
Then the coating is squeezed against other rollers and ultimately against the targeted material itself, which further concentrates the solids in the material on the rollers. High-solids material is then recirculated in the applicator pan and day tank.
To control the coating process and consistently achieve the targeted coatweight, the residual recirculated coating material high in solids must be refreshed.
Viscosity control allows this refreshment to be managed effectively.
Unfortunately, proper viscosity control requires compensation for temperature effects. This is due to the significant impact that temperature has on viscosity and the fact that temperature changes are common in many coating operations. Because full control of plant temperatures is frequently not feasible, **temperature-compensated viscosity (TCV) provides an effective way to adjust for variations in process temperatures**.

Options for measuring viscosity

Each coating has a characteristic temperature-viscosity curve. If the running temperature and viscosity of the coating are known, TCV allows the converter to easily tell whether solids are high, low or just right. TCV also indicates what corrections are needed.
For this reason, many converters are choosing a method that directly incorporates TCV. Of the various methods for measuring coatings, the cup method is the traditional way to monitor viscosity. The drawbacks of the cup method are poor consistency and repeatability. A far better measurement is the coating's absolute viscosity, measured in centipoise, which can be controlled with excellent accuracy and repeatability. For many paper coatings, a rough comparison between cup seconds and centipoise can be made.

New driven-piston viscometer

A proprietary, driven-piston viscometer is a new method for measuring in-process coating viscosity. It combines accuracy and repeatability with reportedly little to no maintenance required.



Cambridge Viscosity's VISCOpro 2100 is designed to stand up to the challenges within the process industry. With a sensor that is designed to protect itself from outside elements, the VISCOpro 2100 is highly insensitive to the outside environment. Its continuous piston motion means that the VP2100 is self-cleaning and can run for years without recalibration.

Many Sensor Options for Unique Requirements

Every Cambridge Viscosity viscometer uses one proprietary sensor technology. Sensors have only one moving part, a piston, driven electromagnetically through fluid in a small measurement chamber. A deflector, positioned over the piston, moves fluid into the measurement chamber, while two coils move the piston back and forth at a constant force. Proprietary circuitry analyzes its two-way travel time to measure absolute viscosity.
This translates into a highly effective viscometer. Further, because all wetted parts are stainless steel and the piston is in constant motion, the sampling area is continually scrubbed clean.

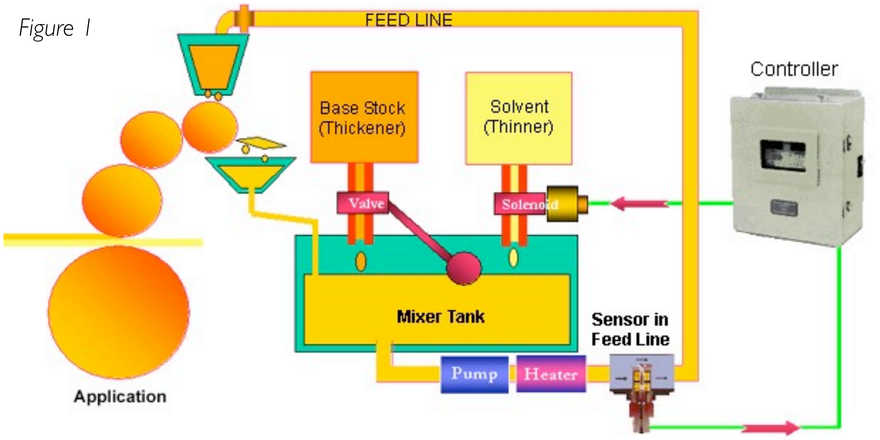
A typical coating operation can be used to describe how the driven-piston viscometer works (Fig. 1).

In the day tank, new coating material is blended with fluid recirculated from the coating pan and make-up fluid (solvent or water). The new material may have the perfect level of solids, while the recirculated material is high in solids (and often in bubbles), and the make-up fluid probably has no solids.

Because of these differences, the viscosity measurements differ. The system accepts materials with radically different characteristics and blends them into a homogeneous material with the characteristics required for the particular coating. New coating material is added to the day tank along with make-up fluid (solvent or water) and finally, recirculated fluid from the coater is allowed to flow into the tank. This very often reintroduces solids and bubbles to the mixture.

The spot where mixed material is pumped out and into the applicator pan on the coater is an ideal place to install the in-line viscometer. Through this control of the make-up fluid input into the tank, the targeted coating characteristics for the batch are met.

Figure 1



The viscometer sensor has one moving part and no seals, with all wetted parts made of stainless steel.

Designed to be fully wetted at all times, the unit is also self-cleaning. In addition to sensing viscosity, it measures the fluid temperature. Its accuracy and low maintenance make it extremely suitable for coating viscosity control.

Two coils are imbedded in the sensor surrounding a fluid test chamber. The test chamber typically houses 1 to 2 ml of process fluid, and a freestanding piston. The coils drive the piston through the fluid electromagnetically.

At any given time, one coil provides the force to move the piston, while the other coil measures how long it takes the piston to travel.

The travel time is a direct measurement of viscosity. As the piston is driven toward the chamber's closed base, it pushes the material at the base of the chamber. The material flows around the piston and out into the main fluid flow. When the piston's direction is reversed, new material is sucked in around the piston. This flushing action cleans the sensor with every stroke, even as the measurement is being taken. At the same time, the temperature is tracked. Electronics drive the sensor. Along with tracking temperature and viscosity, the electronics calculate and track TCV.

The unit also includes an integrated controller, six alarm settings, a 1,000-point datalogger, and full RS232 communications.

Gauging ROI

Every operation is different, but many converters find that evaporation losses in coating operations can total roughly a gallon of fluid per 100,000 sq ft of material coated. **Controlling the viscosity with the driven-piston viscometer** allows the loss to be made up automatically with inexpensive solvent, rather than being replaced with more expensive base coating.

Returns can be impressive. Users report paybacks from material savings of two to 12 times in the first year, depending on their operating characteristics. In addition, it is not unusual for converters to report coating consistencies in the range of 0.1 lb of coating per roll of finished product. Improved coating consistency, quality and cost savings can all be achieved with the driven-piston, inline coating viscosity control.

SRA Instruments S.p.A
20063 Cernusco S/N (MI)
Tel +39 02 9214 3258
www.srainstruments.com
info@srainstruments.com

SRA Instruments SAS
69280 Marcy l'Etoile Lyon
Tel +33 04 7844 2947
www.srainstruments.com
info@sra-instruments.com

Agilent Premier Solutions Partner