Metal Beverage, Food and Aerosol Can Coat Developments

Drink a can of your favorite beverage, spray a little touch up paint to your outdoor furniture, or open a can of food for yourself or your pet. Chances are a metal container was in your hand 50% or better of the time.

Metal cans have been a popular choice to contain both liquids and solids for over a couple hundred years. [The tin canning process was allegedly invented by Frenchman Philippe de Girard and the idea passed to British merchant Peter Durand who was used as an agent to patent Girard's idea in 1810.] (Ref. 1) There are other alternatives, some new, some old, but cans are still one of the favorites for many reasons including shelf life of product and well known and developed production methods.

Over the last several decades the cost to produce metal cans and containers whether a two piece beverage can, a three piece food can or other has risen. As with many other manufacture procedures the cost of energy, labor, and raw materials for the most part steadily rise. However another cost has slowly but steadily risen, that of decoration. Decoration keeps getting more and more advanced and specialized to promote and lend sustainability to metal can use and end product (can content) sales. Labeling, advertisement, branding can be nearly as expensive as the product contained!

So let's discuss decoration. One example would be a beverage can. How do we go about decorating this can? In simple layman's terms, the can is prepped for coating, graphics are added, then an Over Varnish is applied to protect the graphics and provide mobility to the can as it is being processed. There is also a thermal cure or UV cured bottom coat applied to the can to assist conveyance and to protect the aluminum to some degree. An internal coating is then applied to the can and lid for sanitary and other needs.

The topic we will next discuss is the Over varnish. We will explore how applying the Over Varnish in a more efficient manner can be beneficial for Can makers. First, there will be a percentage savings due to less coating weight variation. The can will also dry faster due to less weight variation, saving energy and most importantly will increase throughput!

So how will we control the amount of coating applied?

There have been a few varieties of viscometers used to accomplish this but few have been proven to work easily with low maintenance and repeatability other than the AMETEK Brookfield model AST. AMETEK Brookfield is worldwide renowned for lab viscometers, rheology lab instruments and process viscometers. The AST is a set point viscosity and is one of the simplest type viscometers available. The below figure 1 system will continually monitor and correct the viscosity by adding water. The viscosity set point is 45 cup seconds (#4 Ford).

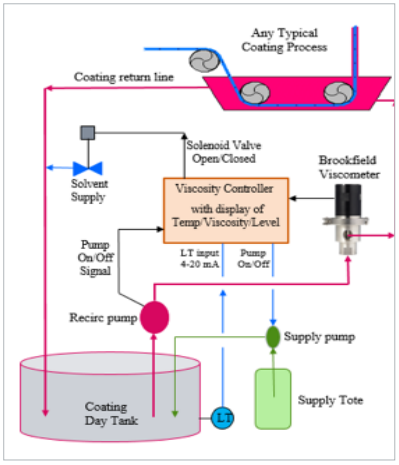

Figure 1: Typical Viscosity Automatic Control System

This AST system has a proven track record at major beverage can producing companies worldwide and is the choice viscosity control system bar none. The reasons are:

Key Advantages:

- No moving parts
- Limited Cleaning needed, Easy Open Design (See figure 2)
- No calibrations needed
- Can be used with water based or solvent (NEMA 7 / ATEX)
- Small size and weight
- Low capitol cost
- Easy to install
- Easy operator use
- Viscosity index value of varnish coating can maintained Automatically
- Monitors process temperature
- AMETEK Brookfield support

Figure 2
AMETEK Brookfield Model FAST-101

The main reason for viscosity change is evaporation of water out of the varnish solution. (Semi open supply tanks and roller pans)

The Solution: - AMETEK Brookfield FAST-101 Viscosity Control -

1. Viscosity is monitored and water is dosed in a controlled fashion to keep the viscosity consistent to a set point.
2. The process temperature is monitored by the AST system to allow newly added varnish to be supplied at a similar temperature.

Applied to a typical single Stolle decorator (figure 3), for ONE Over Varnish line, typical R.O.I is as follows:

- An average OVER VARNISH single process uses 50 gallons of varnish/day for 5 million cans.
- Controlled Viscosity = 10% saved
- % saved = $100/day.
- Viscometer (1) System = $8,000 + $1,000 ancillary items & installation = $9,000.
- $9,000/$100 = 90 days; ROI is about 3 months.

Figure 3
Rutherford Decorator and Basecoater

Case in Point:

A major can maker in Minnesota has recently purchased AMETEK Brookfield AST viscometers for their three Over Varnish lines. They have been using this same AST series auto-viscometer with great success for over 4 years now, at other plants. “Over Varnish” is one of the processes where production costs can be lowered significantly. A natural progression is to apply this success to all plants.

Because of this consistent success, varnish supply companies have gotten deeply involved with AMETEK Brookfield and the AST viscometers to aid varnish to preform to its highest potential. Can plants depend on the AST viscometer to increase line speeds due to this optimum varnish control? The can coating varnish suppliers have been very impressed by AMETEK Brookfield’s solution. They have stated that they have been working with AMETEK Brookfield with the AST system and see the benefit of very stable viscosity control, ability to calibrate on line to an actual viscosity cup reading and ease of operation.

As installed, the AST viscometer systems immediately had consistent set point control maintaining 49 cup seconds (#4 Ford). Figure 4 shows the typical viscosity set point control improvement. Please see figure 5 showing the basic viscosity set point control system components. The system shown in figure 5, helps reduce excessive use of raw materials and increases line throughput. The system is paid for with varnish control alone, in a short 3 month ROI period. This system has been at many plants for over 10 years with little to no cleaning or maintenance. That is how simple, accurate, and dependable the AST viscometers function and why they are becoming ever more the popular choice by major can producing companies, bar none.

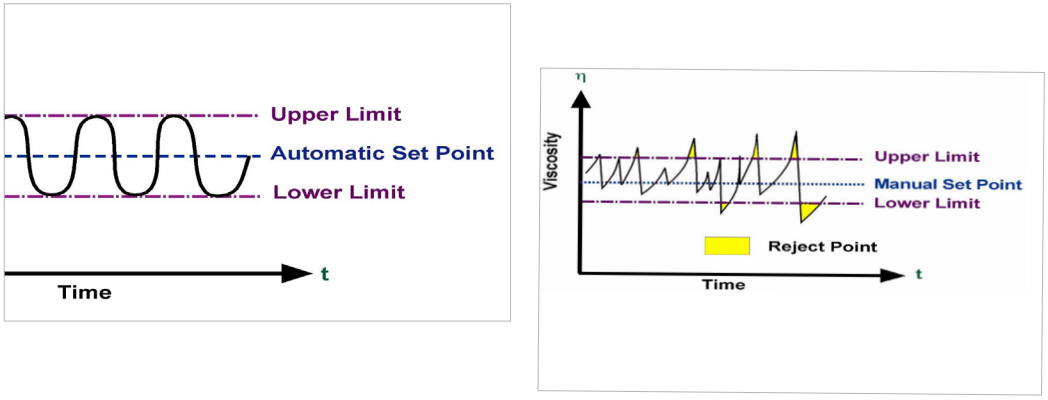

Figure 4
Basic viscosity control scheme

Figure 5: AMETEK Brookfield FAST-101 and AST-330 Controller

References:

(1) Geoghegan, Tom (2013-04-21). “BBC News - The story of how the tin can nearly wasn’t.” Bbc.co.uk. Retrieved 2013-06-04.

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