

Ford Paint Control

Reprint 137

Ford Controls Paint Viscosity by Robert A. Norcross, Jr., President Norcross Corp., Newton, MA

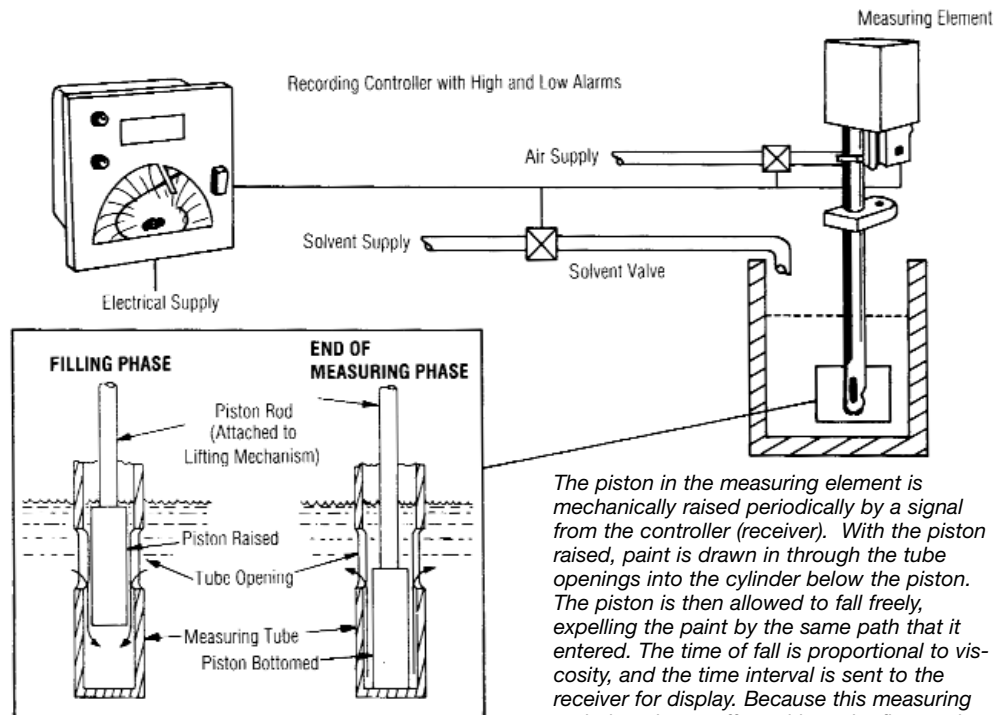
By Robert A. Norcross, Jr., President of Norcross Corp., Newton, MA
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Precise control of the viscosity of paint to decorate Ford automotive grilles has improved appearance and durability while keeping paint costs down and production rates up.

Chrome-plated grilles for the Crown Victoria, Thunderbird, LTD and Grand Marquis are coated at Ford's Plastics Paint and Vinyl Div. plant in Saline MI in automatic dipping machines manufactured by Deco Tools Canada, Ltd. Each machine is equipped with a Norcross viscometer, which keeps paint at the specified viscosity automatically by adding small volumes of solvent as needed.

It's a big improvement over the old manual method, according to A.M. McIntire of the plant's manufacturing engineering group. "Just a few years ago we had to watch for the paint to thicken, take a viscosity reading with a Zahn cup and add what we thought was the right amount of solvent. It was subject to error and rather time consuming, to say nothing of the appearance and performance problems that resulted when the paint film build was insufficient or too thick. Suspected defective parts then had to be inspected and removed from in-process or end-item inventories, which required additional time and labor."

The viscometer consists of a measuring element, which is immersed in the stainless steel paint reservoir of the dipping machine, and a recording controller (receiver) mounted on the machine. In addition to controlling the operating frequency of the measuring



The piston in the measuring element is mechanically raised periodically by a signal from the controller (receiver). With the piston raised, paint is drawn in through the tube openings into the cylinder below the piston. The piston is then allowed to fall freely, expelling the paint by the same path that it entered. The time of fall is proportional to viscosity, and the time interval is sent to the receiver for display. Because this measuring technique is not affected by paint flow, turbulence or level fluctuations, measurements can be made directly in the machine reservoir, thus eliminating the need for side streams, sampling chambers and recirculating lines.

element, the receiver displays the viscosity set point, provides a visual indication of high and low set-point deviations and cycles the solvent solenoid valve to correct viscosity deviations. It also provides a 24-hour record of the paint viscosity, which the engineering department keeps for future reference so that repeat runs can be made at any time at identical viscosities. The electrical components for the measuring elements and controller are encased in explosion-proof housings.

Prior to the start of a production run of a particular grille, the paint is prepared to Ford specifications in a mixing room, delivered to the dipping machine and

pumped into the reservoir. While the paint is mechanically agitated, its viscosity is checked again with a No. 1 Zahn cup. Solvent is added manually. If none is required, the viscometer is turned on to determine the viscosity as a function of the time required for a small piston in the measuring element to fall a fixed distance through the paint. The viscosity set point is then established by positioning the pointer on the receiver to wherever the unit is recording. Then the paint viscosity is monitored and controlled by the viscometer, which permits the machine operator to concentrate on processing the grilles.

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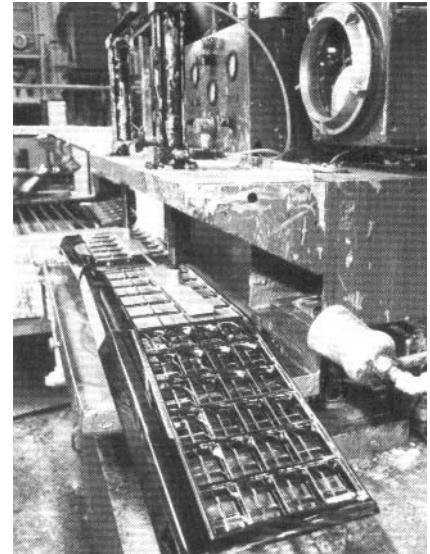
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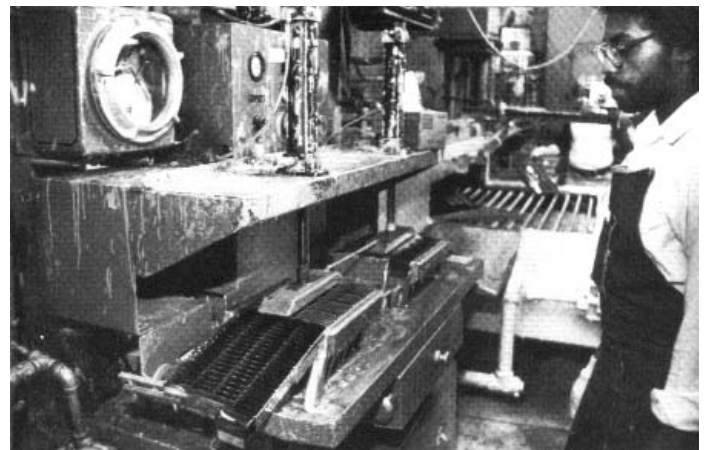
A typical dip cycle involves placing a grille in the parts nest and pressing the start button to raise the paint into the nest around the grille to a preset level. After the paint level has dropped, the operator off-loads the grille onto a conveyor and places another grille in the nest. When the viscosity exceeds the control point setting, the receiver signals the solvent solenoid valve to add solvent to the reservoir. The valve incorporates an adjustable port that is set to correct the viscosity rapidly without overshooting. During solvent addition, a control indicator on the receiver lights to show that a viscosity correction is being made. When the paint reservoir is topped off (which might be every four or five hours during a 24-hour run), the paint viscosity is adjusted manually to correspond to the initial control point setting.

The paint reservoirs are drained at least weekly and flushed with solvent to remove settled particles. The flushing also rinses the viscometer measuring elements, which can be easily removed for further cleaning of the wetted parts. These elements are designed to be self-cleaning by virtue of the reverse flushing action caused by the vertical motion of the piston during normal operation.

Of the benefits provided by the viscometer, perhaps the most significant is accuracy. According to McIntire, the paint viscosity is maintained within one cup-second throughout the day, which means that the grilles receive uniform coatings of the optimum thickness. "This is important," he explains, "because our goal is to produce grilles that will retain their attractive appearance and durability. The results achieved in Ford's Saline dip paint operation show consistent paint thickness and performance to test specifications, both vital to our quality objectives."



Grille halves rest in coating reservoirs and have the sides of the vertical and horizontal members coated when paint in the reservoirs rises to a specified height. The reservoirs then empty. Controller (receiver) at upper right maintains paint consistency for a quality deposit.



Viscosity controller (receiver) at upper left holds paint in the grille coating machine to within one cup-second of the specified viscosity to ensure consistent quality coating of grilles.