

Wire Manufacturing

Reprint 150

Viscosity Controls Ensure Quality in Wire Manufacture

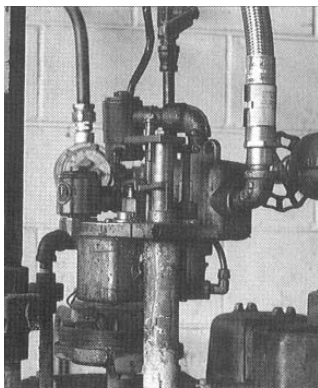
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The Horning Wire Corporation of Lake Zurich, IL, manufactures magnet, appliance, bare and tinned wire and has for the past 27 years used Norcross viscosity controls.

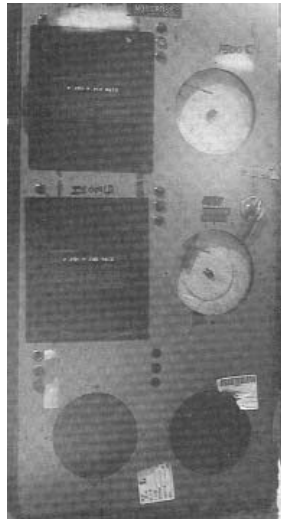
According to Plant Supervisor Ted Caudill, "The initial and continued use of viscosity controls was instrumental in making Horning more competitive and viable in a time when many wire coaters were forced to close their doors. The early controlling of wire enamel viscosity was one of the keys in Horning Wire's success."

Controlling diameter size of magnet wire is very important to quality control. The Norcross equipment controls the viscosity of enamels for magnet wire, ensuring wire runs of consistent size. Viscosity control components for each coating line include the measuring element, controller, and solvent valve. According to Caudill, "The continued control over the magnet wire size is why we can compete in the 90's."

The M8B viscosity measuring element consists of a falling piston within a close fitting bushing. The time of fall of the piston is related to the viscosity of the surrounding fluid. As the piston is raised by an air cylinder, fluid is drawn into the bushing space below the



Closeup of one of the original measuring elements installed in 1968.



Original control cabinet showing two of the original recording controllers and two new upgraded digital MP90 controllers.

Horning Wire operation requires holding viscosity to within ± 0.1 second time of fall. This is equivalent to 0.06 Zahn cup seconds.

Location of the viscosity measuring element inside the enamel recirculation supply tank ensures that a representative enamel sample is drawn into the bushing each cycle. The system's simple design allows for reliability and low maintenance.

The measuring element is cycled by an MP90A microprocessor controller that monitors the piston time of fall and displays it in designated viscosity units. The controller simultaneously compares the viscosity readings with a set point. When the viscosity exceeds the set point by a predetermined amount, the controller activates a solenoid valve to permit additional solvent to enter the enamel supply tank. After a sufficient time to allow for thorough mixing, the controller may

rising piston. The piston is then allowed to fall by gravity, expelling enamel from the bushing. Gravity is the constant force, and the time required to expel the fluid through an orifice (rate of shear) produces a measure of viscosity that correlates with centipoise and cup seconds. The

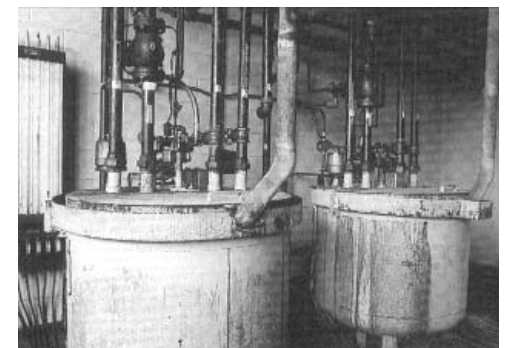


View of winding stations.

signal for further solvent addition if the set point viscosity has not been reached. The controller gives a visual display when adding solvent.

Two 100-gallon and two 200-gallon enamel supply tanks have their own Norcross M8B measuring elements. The M8B's are connected to individual MP90A controllers.

Horning Wire has over the past 2 years upgraded the MP90A controllers. The new controllers provide proportional control as well as analog output which can be utilized for future data collection. The operators' reaction to this new technology is that it provides good visibility control. These controllers are capable of interconnecting with a PC through the RS485 port or analog signal. For additional information contact Norcross Corporation.



General view of wiring coating tanks.