The importance of ration control for automotive coatings

To improve the quality of end-product automobiles and reduce assembly costs, it is important to consider ratio control for coatings- especially when dealing with plastic components. AW-Lake has experience of engineering flow meters for coating and paint measurements in the automotive sector

Besides body sheet metal, automotive plastics represent the largest sector of painted components on today's saloons, SUVs and HGVss. But these dissimilar substrates require vastly different paint measurement and application processes.

SHEET METAL: COATINGS AND PAINT MEASUREMENT

Automotive sheet metal coating systems typically comprise multiple, one-component coatings that impart the superior corrosion protection expected from modern vehicles. Car bodies are "dipped" in an e-coat tank containing an electrostatically charged liquid that, when dried, serves as the first layer of corrosion protection.

FLOW MEASUREMENT FOR PAINT AND COATINGS

Bodies are then conveyed to the paint booths where primer, base coat, and the clear top coat are applied. Some automotive companies utilise powder primer applications in place of liquid primer application. Each method serves a vital role in preparing the surface for the base coat. When dry, it also serves as a barrier to harmful UV exposure that degrades adhesion to the e-coat. Today, most base coats are direct-charge water-borne, followed by two layers of clear coat.

Afterwards, the paint is cross-linked (cured) in a high-temperature oven that would melt and/or deform most automotive plastics.

MEASUREMENTS FOR PLASTIC COMPONENTS

Plastic components are subsequently painted differently. Paint companies exploit a chemical reaction to promote molecular cross-linking so that coated parts can bake at roughly half the temperatures used for sheet metal. This chemical reaction is achieved by mixing a catalyst that reacts with the resin component. Holding the ratio of resin to catalyst to close tolerances during paint measurement is essential for optimum performance. Too little catalyst and the paint will not cure properly. Too much, and finished parts will be less resistant to stone chips and more prone to cracking. Both defects lead to costly warranty repairs.

The "pot life" is another important consideration. Once the two components are mixed, the chemical reaction begins, and the coating must be applied in a relatively short window as the viscosity steadily increases. At some point, the paint is unusable and can even solidify in paint lines and application equipment. None of these situations is desirable, so the industry requires on-demand 2K mixing solutions that deliver precise ratio and flow control for plastic coatings.

AUTOMOTIVE COATINGS AND PAINT MEASUREMENT

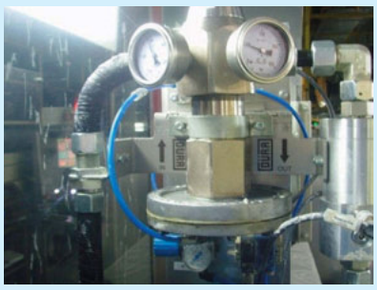
To overcome these application challenges while fulfilling the requirement of precisely-ratioed on-demand 2K coatings, equipment companies have devised multiple strategies. Some use gear pumps mounted in robot arms or on panels that feed the robot mounted applicators. The robots drive servo motors that turn the gear pumps at the exact RPM required to deliver the desired ratio which is an "open loop" process as there is no flow verification. When verification is required, an AW-Lake JVM-15CG or JVS-15SLGFS flow meter can be incorporated in the paint measurement and delivery system. With accurate flow feedback, the robot flow control system knows that ratios are within tolerances. Further, this data can be archived so that if down the line there is a warranty issue, the manufacturer has data that at least the application was within specifications leading to better defect analysis.

For smaller Tier-1 plastic component supplies, the gear pump solution is too costly. For these and companies that require human painters, other solutions are preferred. These systems utilise AW-Lake JVM-CG flow meters and various flow controlling regulators to meter the correct proportions of resin and catalyst to optimum tolerances. If the flow rates or ratios go out of tolerance, the "smart" 2K equipment will fault and notify the operator to the issue.

AW-Lake www.aw-lake.com

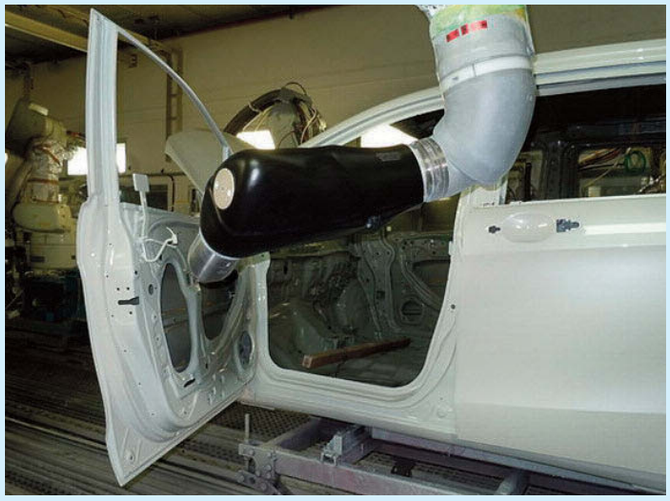
ACCURATE DISPENSING OF HIGH VISCOSITY PVC SEALANTS IN AUTOMOTIVE PRODUCTION LINES

An automobile production line needed to ensure precise measurement and dosing of sealants during paint finishing operations. After auto production, sealant is applied to welding spots, tank wax to the chassis and PVC to the frame hub for better corrosion resistance.



Due to high viscosity of PVC sealant and frequent changes of manipulator actions during spraying, operators used inching actions most of the time. Flow meters used in the paint finishing operations must have excellent repeatability and corrosion resistance to provide the necessary feedback to ensure accurate operations.

A Helical Gear Positive Displacement Meter from AW Lake provides high-resolution, 3,500 pulses/L, and a 0.1 per cent repeatability that ensures compliance with customer metering requirements even



under inching and micro flow conditions. A tungsten carbide alloy bearing and rotor surface hardening treatment improves flow meter corrosion resistance, extending its product service life.

As the measurement range ratio reaches as high as 1:100, the system works in a low range segment in high- viscosity conditions to greatly reduce flow meter pressure loss. With operation pressure reaching to 400bar, the system adapted to a higher back pressure during start/stop. Viscosity range could reach 1,000,000cst, making it suitable for applications such as silica gel.