Instrumenting refrigerant filling

In automotive assembly line

Siemens Coriolis MASSFLO® Series flow meters enable improved accuracy and repeatability in charging air conditioning (A/C) systems on automotive assembly lines.

When a car rolls off the assembly line, many kinds of fluids must be added to the freshly assembled car; refrigerant for the air conditioning system, fluid for the brakes, antifreeze for the engine, motor oil, gear oil etc. To permit the car to function properly, control manufacturing costs, and satisfy the customer from the point of sale, it is important to dispense all these fluids accurately. An automobile manufacturer in Scandinavia follows this concept, dispensing fill fluids accurately. To accomplish this, a decision was made to research and improve all the filling processes that did not function as accurately as the automobile manufacturer desired. Siemens was chosen to provide instrumentation for the filling systems used to charge up the refrigerant in the cars' air conditioning systems.

Application Guide - Coriolis Flow

process INSTRUMENTATION

SIEMENS

Challenge
The existing measurement system used on the filling equipment was not as accurate over time as the manufacturer would have liked. This allowed the possibility of an improperly charged A/C system when the car was delivered to its owner. (see http://www.rapidcharge.fr/anglais/entreprise/entreprise.htm)The inaccuracy of the measurement could allow the concentration of methylated alcohol to be inaccurately measured during the filling process. If the concentration was too low, it could cause premature freezing in the system, and damage to the A/C system. If the concentration was too high, spillage could result in possible damage to the cars' finish, resulting in a costly re-coating procedure and time delay. A high concentration of this flammable chemical could also push the area classifications for the filling section into an Ex or Class 1 Division 1 zone, causing the production line to stop as a result of the possible fire hazard. According to the manufacturer's ISO program, all quantities of fluids filled into the car parts have to be certified for every car. The only way to have these measurements certified is to be able to prove traceability by using a highly repeatable and accurate flow meter This is why Siemens was called.

Solution
The automobile manufacturer had already installed two Siemens Coriolis Massflo flowmeters that were being used to monitor the filling and concentration of engine antifreeze. These had proven to work very successfully. The assembly line manager, whose responsibility it is to keep all the fluid filling stations running smoothly, needed a solution to the accuracy and repeatability issues on the A/C charge line. The manufacturer saw a possible solution in the Siemens Massflo meters, based on past successes on the antifreeze line.

The experiences gained on the antifreeze line resulted in the purchase of four, Massflo meters for use in charging air conditioning systems. The manufacturer was very satisfied with the new flow measurement results. The performance, in fact, was so good that they did not require a second source for this manufacturing component, as is standard procedure for all components of production equipment. As a result, Siemens Massflo meters are currently the only standard Coriolis flow measurement system on all new equipment for the filling of new car refrigerant for this manufacturer.

Benefit
Cost Saving – The automobile manufacturer considered many profitable aspects they when selected and applied Siemens Massflo meters.

Since the distance from the bulk storage facility to the filling stations is several hundred meters, leak detection for the tanks and the systems in the facility is very important. It would be a simple matter to rationalize the totalizers on the bulk delivery systems with the totalizers at the point of use systems, to confirm a seal-tight system.

Although the purchase price of a Siemens Massflo meter is higher compared to a paddle wheel and turbine meters, the increase in price could easily be justified when considering the cost of ownership and the additional value realized. For the customer, the long-term costs are key. Less costly **flow** meters are expensive to maintain and re-calibrate. In addition to the costs of incorrect filling and the resulting rework, the Siemens sensors are considerably more price effective.

Improved process reliability – The auto manufacturer can now rely on constant filling accuracy and process repeatability, ensuring improved assembly line "up-time", reduced preventive maintenance cycles, and higher though-put.

Improved quality of finished product - By ensuring the accuracy of the filling line, the customer can help ensure the quality of the car being delivered to the customer and save considerable time and money on rework and warranty claims.

*Other Siemens FC Massflo **flow** meters applications the customer is considering:*

Fuel Measurement:
The manufacturer is considering the use of Coriolis meters for measuring the quantity of gasoline **pumped** into each car before shipping the car to the retail dealer. Fuel level requirements differ from car to car, depending on the travel distance after production. If cars are **filled** with only the exact quantity of gasoline necessary for the transportation phase, a good bit of profit would be saved.

Gear Oil Measurement:
The manufacturer is also looking into the filling of the transmission cases that are manufactured earlier in the production line and then mounted into the chassis already full.

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