AW-LAKE
PROCESS FLOW MEASUREMENT

APPLICATION SPOTLIGHT
Plastics Recycling into High Quality Fuels & Chemicals

Plastics Recycling into High Quality Fuels & Chemicals

APPLICATION:

QCI-PCF (Plastics to Chemicals & Fuels) has developed proprietary IP and processes that allow them to convert waste plastics into fuels, carbon black, and high-end, ASTM qualified industrial chemicals using traditional finishing processes. Their focus on turning pollution into profitable byproducts recently resulted in QCI-PCF receiving over $60M in private equity bond financing to build out their plant located in Livonia, MI. This phase of the project will be completed by December 2021, creating 150 full-time jobs. Similar facilities are planned for regional waste collection centers throughout the world as their process becomes mainstream.

PRODUCT SUPPLIED:

- **TRICOR TCM-65K-EX Coriolis Meters**
- **SignalFire Modbus to Ethernet-TCP Communications Gateway**
- **TRG-11.250 and TRG-11.750 Turbine Meters**
- **MAG-PB low temp sensor, and the MG-450 high temp sensor with CAPM-15/AMP external amplifier**
- **FAC-R digital to analog converter**

CHALLENGE:

AW-Lake has partnered with QCI almost from their founding in 2009 when QCI engineers reached out to AW-Lake to recommend flow instrumentation for two important and different functions. The first was to monitor water temperatures in a heat transfer application that is vital to condensing hot hydrocarbon rich gases back into liquid fuels, diesel and gasoline. This critical step must be closely monitored to keep the conversion process at optimum performance. The challenge was finding a flow meter/sensor that would work at up to 450°F maximum temperatures.

The second challenge that QCI faced was their need to accurately meter their fuels (diesel and gasoline) from outside storage tanks to their customer's tanker trucks. For this need, they needed a highly accurate flow monitoring system that would be interfaced to their plant network for custody transfer/billing to their customers. Further, the fuel transfer required a high transfer rate, C1D1 Ex Certification, and necessitated by their outdoor location, a meter that would work in Michigan's sometimes harsh weather.

Plastics Recycling into High Quality Fuels & Chemicals

SOLUTION:

Working within the parameters of QCI's cooling system requirements, AW-Lake proposed using Turbine meters to measure water flow in the two distinct areas of the cooling system. For the "cold" side, a TRG-11.25 turbine meter best matched the required flow range. Combined with our MAG-PM sensor and FAC-R Digital to Analog converter to feed flow information into a PLC analog input channel. The FAC-R's Bluetooth capabilities and the AW-Lake Flow Monitoring app running on a cell phone, allowed for easy scaling setup of the 4-20mA output with flow parameters previously established in PLC logic. Similarly, the TRG-11.75 Turbine was specified for the hot side of the condenser heat exchanger, but with the MG-450 Inductive, High Temp, Pickup. As the name implies, this sensor can work with fluid temperatures up to 450F by using an inductive pickup and AW-Lake's remote CAPM-15/AMP external amplifier. The digital frequency output signal from the amplifier was then converted to 4-20mA analog signal that was again interfaced to the PLC.

Monitoring the custody transfer of diesel and gasoline to waiting tanker trucks required a whole different set of solutions for the challenges outlined above. AW-Lake's TRICOR TCM-65K-EX Coriolis meters fit these requirements to a "T". They were sized to easily accommodate the pumping systems maximum flow rate of 200 GPM and carried cCSAus Certification for the required C1D1 EX outdoor environment. To interface the two meters to the PLC a SignalFire Gateway was used to convert communications from the two meter Modbus network to the Ethernet-TCP communications protocol used by the PLC network. QCI's PLC logic and reporting software supplied by others allowed QCI to easily monitor custody transfer of fuels to waiting tankers. The meter mounted display/controllers display a "Batch Total" for quick comparison to truck mounted meters. Once verified, the Batch Total is processed, and the customer is automatically billed for onboarded fuel. The Batch Total then remotely reset by the PLC for the next fuel transfer.

RESULTS:

With the implementation of the two very different, but essential, flow and metering solutions, QCI realized precise process control of their heat exchange system and automated custody transfer billing of fuels to their customers. As this was their first "Beta" plastics to fuel conversion system, not all aspects of how to control this process were defined upfront. But through process monitoring of critical systems, QCI was able to quickly gain invaluable insight on how to control their plastics to fuels process. For a relatively new start up company, these process insights shaved years of R&D costs resulting in multi-million ROI savings. Due to these tremendous achievements, AW-Lake's contributions will be incorporated into all future systems to be built, but of primary importance, the world now has this proven method to environmentally and profitably rid the world of waste plastics!

AW-LAKE
PROCESS FLOW MEASUREMENT