



WATER FLOW MEASUREMENTS FOR ENERGY MONITORING



Petrochemical Industry

“Thanks to the non-intrusive and dual channel flow measurement of the FLUXUS® F721 we were able to reduce our efforts on the project execution and the overall installation cost. It was very easy to install the flowmeters without any modification of the pipelines. Furthermore, the AMV allows us to verify the installed flowmeters with minimum efforts to ensure the measurement performance and reliability.”



Ivan Goh, Plant General Manager,
Toagosei Singapore Pte. Ltd.



Measuring Task

Flow measurement of cooling water, chilled water and brine (methanol-water-mixture) at the distillation columns' heat exchanger

Toagosei Singapore Pte Ltd. produces acrylic ester and acrylic polymer with a production capacity of 90,000 tons/year. It sells its products within the Singapore market and exports to Asian, European and US customers. It is part of the Singapore MMA and Acrylic Group (SMAG), a petrochemical complex, located on the island of Jurong, operates several plants that produce methylmethacrylate monomer (MMA), polymers (PMMA), and acrylic acid and its derivatives.

Toagosei has ambitious targets to reduce its greenhouse gas emissions by 50% by 2030 and to zero by 2050. In addition, the Singapore government is continuously tightening its regulations regarding the monitoring of industrial consumption and efforts to increase energy efficiency. Therefore, the operators of Toagosei Singapore's plant were looking for ways to continuously monitor the energy efficiency of the heat exchangers on their distillation columns. Flow measurements on the water circuits are needed for this task.

Given the central importance of the plant for the integrated site and the

limited personnel resources of Toagosei, retrofitting of the measurement technology should cause as little effort as possible and should not disturb production. It was very fortunate that a sales engineer from Flexim's local office in Singapore had only recently introduced himself on-site. He got a call asking if he could offer an appropriate solution for this project with his measurement technology.

Will Teoh, Technical & Project Support Engineer at Flexim Singapore, likes these kinds of calls: "Yes, of course."

Solution

Clamp-on ultrasonic technology has always been the best choice when it comes to easily setting up flow measuring points on existing piping systems. Since Toagosei had no experience with the non-intrusive measuring technique, doubts were raised as to whether the measurement would also work under challenging conditions, for example on the small pipes in which 5 °F cold methanol-water mixture flows and ice forms on the surface. In the event of any doubt or uncertainty, Flexim's sales and service engineers know that the answer is to carry out a test measurement.

One of the advantages of non-intrusive measurement technology is that it can be tested for suitability on-site without any disruption to normal plant operation. The test measurement with the portable FLUXUS® F601 proved to be convincing.

Toagosei therefore decided to equip the cooling water circuits on the heat exchangers with Flexim clamp-on ultrasonic flowmeters. Toagosei's process engineers and Flexim's measuring experts worked together to find the best solution in terms of investment costs and installation effort. The fact that Flexim's product portfolio also includes transmitters with two measuring channels proved to be particularly advantageous. The choice finally fell on the FLUXUS® F721.

In order to fit a total of 12 flow measuring points, Toagosei decided to purchase seven devices, five of which are dual-channel versions. This not only meant an economical solution in terms of acquisition costs, but also reduced the effort required for cabling. The installation and commissioning was carried out by experienced service technicians from Flexim Singapore.

The acoustic measurement technology provides relevant diagnostic values that can be transmitted, visualized and evaluated with Advanced Meter Verification, allowing the quality of the measurement to be assessed with certainty. This also means a welcome reduction in organisational effort for Toagosei, as Flexim ensures traceable verification of its measuring points in accordance with ISO9001 requirements.



Toagosei's acrylic ester plant in Singapore



Aerial views of the expansion of the Singapore Petrochemical Complex, known as the Complex II.



Measuring point with the clamp-on ultrasonic transducers, installed in a Variofix C mounting rail. In the background two FLUXUS® F721 transmitters.



The customer is obviously satisfied with the work of the Flexim Singapore service team.

Measuring Points and Instrumentation

Pipelines	¾" to 8", carbon steel and stainless steel
Media	Cooling water, chilled water and brine (methanol-water-mixture)
Temperature	5 °F to 95 °F
Measuring Devices	7 stationary FLUXUS® F721 ultrasonic flowmeters (dual channel versions) 7 pairs of clamp-on ultrasonic transducers type CDQ1N52, 5 pairs of clamp-on ultrasonic transducers type CDM2N52 installed in Variofix C mounting rail for a total of 12 measuring points

Advantages

- Big project cost savings on installation and engineering man hours, as installation did not require any pipe modification
- Cost-effective solution with dual-channel transmitters, savings on cabling costs
- Excellent collaboration between plant engineers and Flexim's local sales and support team

Customer

Toagosei Singapore Pte Ltd., Jurong Island, Singapore

Since its establishment in 1944, Toagosei has achieved continued growth in line with the development of the chemical industry in Japan. In 1960, Toagosei was the first company in Japan to commercialize acrylic esters (acrylates). The Toagosei Group is expanding its technology and product fields by displaying unique strengths in five business fields: Commodity Chemicals, Polymer & Oligomer, Adhesive Material, Performance Chemicals, and Plastics.

Toagosei's Singapore acrylic ester plant was constructed within the framework of the expansion of the Singapore Petrochemical Complex, located on the Island of Jurong. It started operation in 1999.



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