



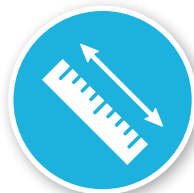
# METHIONINE PRODUCTION



## Chemical Industry

“By replacing the electromagnetic flowmeters that are prone to error, we were able to significantly reduce our maintenance and servicing costs. As we previously had at least two unplanned plant shutdowns a year due to defective flowmeters, the ROI for Flexim’s FLUXUS® F721 clamp-on ultrasonic systems was less than one year.”

*Muthusamy Naganathan,  
Senior E&I Engineer,  
Evonik Methionine SEA Pte Ltd,  
Singapore.*



## Measuring Task

### Flow measurement of a very corrosive chemical in the production process for methionine

Evonik’s methionine plants in Singapore are the largest production complex for DL-methionine in the world.

Methionine is a sulfurous amino acid that is manufactured from the primary materials acrolein, methyl mercaptan and hydrogen cyanide. Amino acids are the building blocks of all proteins and are therefore vital nutrients for humans and animals. Some of them, including methionine, cannot be made by the body, and must therefore be supplied in food. Fowl in particular require a lot of methionine in their food. As a rule, the methionine occurring naturally in the raw feedstuff (e.g. cereals, soya grain) is not sufficient to meet the animals’ requirements. Industrially manufactured DL-methionine closes this supply gap.

In 2014, Evonik opened the production complex for MetAMINO®, the essential amino acid DL-methionine used in sustainable animal feed. In 2019, to better serve the high demand and customers in Asia, Evonik opened its second complex for DL-methionine right next to the existing plant. With an annual capacity of 150,000 metric tons in each plant, it brings the company’s global methionine production to approximately 730,000 metric tons.

Evonik manufactures MetAMINO® in a chemical process called the carbonate process. The company produces all the important intermediates in an integrated production process at the same site. The media used in the process partly place the highest demands on the system and measurement technology. A highly corrosive chemical with a temperature of 400 °F is fed through pipes made of particularly resistant special material.

The electromagnetic flow meter installed in the pipeline did not achieve a satisfactory service life. Despite its electrodes being made of special material and having a PTFE lining, it usually failed within one to two years. Replacing the defective unit is extremely laborious and requires a shutdown of the plant. Therefore, the plant engineers were looking for a superior solution.



### Solution

FLUXUS® proves to be the superior measuring solution for this type of application. Non-invasive clamp-on ultrasonic technology has long been the method of choice when the medium flowing in the pipe itself is reason enough

to avoid opening the pipe if possible. Particularly in the chemical industry with its often aggressive and toxic media, the advantages of non-invasive measurement technology are appreciated. Flow measurement from the outside of the pipe means measuring from the safe side – without any wear caused by the medium, without any risk of leakage, without any pressure loss and without any impairment of the plant availability. Any modifications to the existing piping would be very expensive at Evonik Singapore because of the special materials required. These are all good reasons to switch to non-invasive acoustic measurement technology.

Nevertheless, Evonik was initially sceptical: Would ultrasonic flow measurement be able to provide the required high measurement accuracy? What about measurement drift?

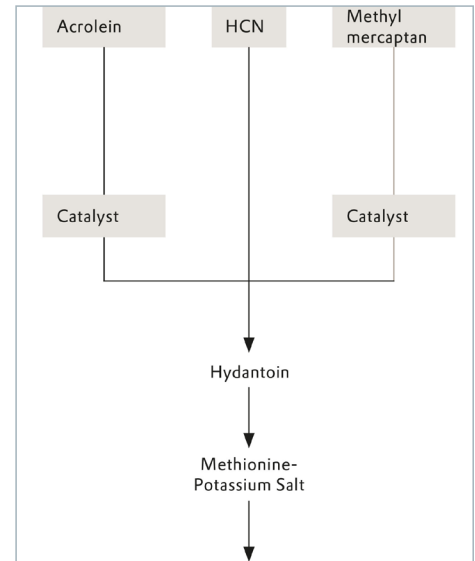
FLEXIM Singapore's team was able to convince the plant engineers: Every measurement system is pre-calibrated in-house, so no on-site zeroing is required. Matched transducers, integrated temperature compensation (according to ANSI/ASME MFC-5.1-2011 regulations) and digital signal processing guarantee the highest zero point and flow measurement stability. Because the measuring system does not come into contact with the corrosive medium, it suffers no wear and therefore shows no drift. Additional security is provided by FLEXIM's Advanced Meter Verification (AMV): During the initial installation, the status of the measurement is comprehensively logged. Regular – usually annual – comparisons with the reference data allow a reliable evaluation of the measuring installation. The simple and convenient on-site validation requires no interruption of the measurement and does not affect normal operation. AMV is intuitive to use and can be carried out by the user or by the FLEXIM service.

Evonik therefore decided to equip its methionine process with four FLUXUS® F721 clamp-on ultrasonic systems from FLEXIM. Due to the high demands on accuracy and absolute reliability, all flow measuring points were designed with two channels. Since the installation of the clamp-on ultrasonic systems, plant shutdowns due to defective flowmeters are now a thing of the past.



Evonik's second DL-methionine plant (Me6) in Singapore

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Evonik manufactures DL-methionine in a chemical process called the carbonate process. The company produces all the important intermediates, such as acrolein, methyl mercaptan, and hydrocyanic acid, in an integrated production process at the same site.



The stationary FLUXUS® F721 ultrasonic systems are used as the measuring transmitters.

## Measuring Points and Instrumentation

|                          |                                                                                                                                                                                                                                                                        |
|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Pipelines</b>         | 6" and 10", special material                                                                                                                                                                                                                                           |
| <b>Media</b>             | highly corrosive chemical                                                                                                                                                                                                                                              |
| <b>Temperature</b>       | up to 400 °F                                                                                                                                                                                                                                                           |
| <b>Measuring Devices</b> | 4 stationary FLUXUS® F721 ultrasonic flowmeters (dual channel versions)<br>4 pairs of clamp-on ultrasonic transducers type CDP2E52 (for 6" pipeline),<br>4 pairs clamp-on ultrasonic transducers type CDM2E52 (for 10" pipeline) installed in Variofix C mounting rail |

## Advantages

- Easiest retrofit solution to replace the defective inline flowmeters without process interruption
- Huge cost-saving as no process downtime and no modification is required on the special pipe material
- Increase of plant efficiency and safety, thanks to the reliable flow measurement without direct contact with the corrosive medium

## Customer

### Evonik Methionine SEA Pte Ltd, Jurong Island, Singapore

Evonik is one of the world leaders in specialty chemicals. The company is active in more than 100 countries around the world. About 34,000 employees generated together sales of €18.5 billion and an operating profit (adjusted EBITDA) of €2.49 billion in 2022.

Evonik has been a committed partner to Singapore since 1969, when they set up their first office. Activities here have since evolved from only sales activities to include production and research. Today, Singapore is the regional headquarters and Innovation hub for the region.

In Singapore, Evonik's manufacturing assets include the world's largest production complex for essential amino acid DL-methionine within Evonik's network and an oil additives production site on Jurong Island. It also includes two manufacturing facilities in Tuas, with one producing Epoxy Curing Agent, Ink & Hotmelt Resin and Polyurethane Catalyst Blends, and another catalyst recovery centre.



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AR-202318-Evonik-US

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