

Cover Story

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# Shut-off valve as a discharging valve when extracting glycerin from the waste products compound

*Shut-off valves are used in several fields of application, especially as a discharging system under a vacuum. This ensures a continuous processing. The German company Emil Kammerer GmbH has several decades of experience in developing customized slide gate valves for absolutely tight shut-off solutions. Ms Seher Sevim explains how Kammerer created a reliable shut-off system in a difficult manageable field of application.*

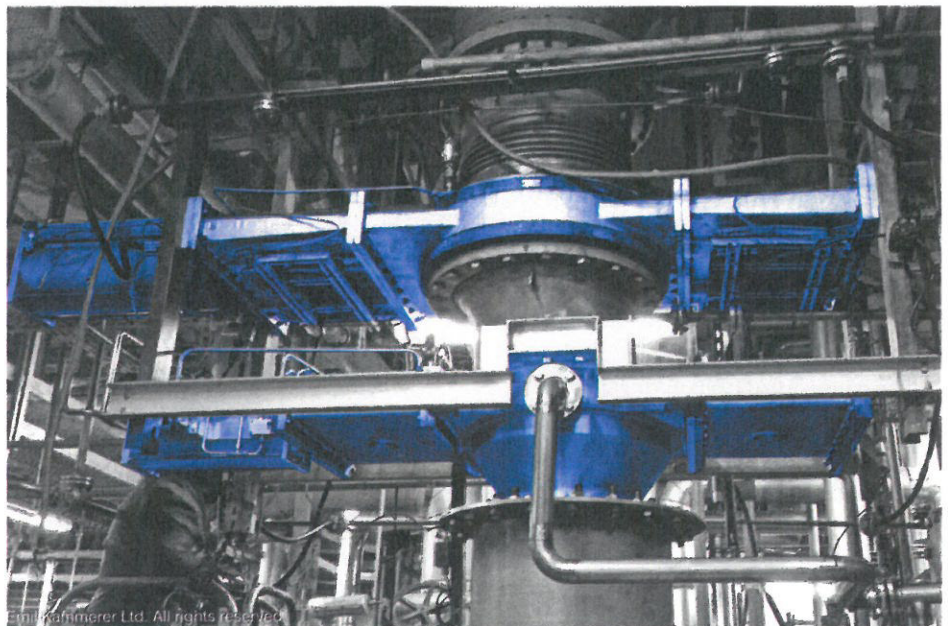
By Seher Sevim, Emil Kammerer GmbH

## Brief profile of Emil Kammerer GmbH

For more than sixty years, Kammerer's slide gate valves have been providing reliable shut-off solutions, both nationally and internationally. Emil Kammerer's current product range is the result of decades of experience, in-depth technical understanding, and an openness towards innovative developments as well as cooperation with customers.

To meet customer needs, innovative developments for numerous shut-off solutions are implemented continuously. By means of a close exchange between different departments it is possible to take an in-depth look at the existing possibilities and select the best possible solution for the respective customer facility. This process is completed with a fast implementation of the developed idea. On request, Kammerer can also include expert service personnel and a correspondingly well-equipped stock of spare parts in an offer.

The product range of Emil Kammerer primarily covers valves with nominal diameters of DN 25 (1") up to DN 600 (24"). All of their shut-off valves are completely sealed outwardly. Rated operating pressures range from  $10^{-4}$  up to 25 bar, and the operating temperature range is from  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) up to  $+300^{\circ}\text{C}$  ( $572^{\circ}\text{F}$ ). Usually, various types of stainless steel and the material silumin are used for the housings. The sealing materials are selected according to the technical and chemical requirements.



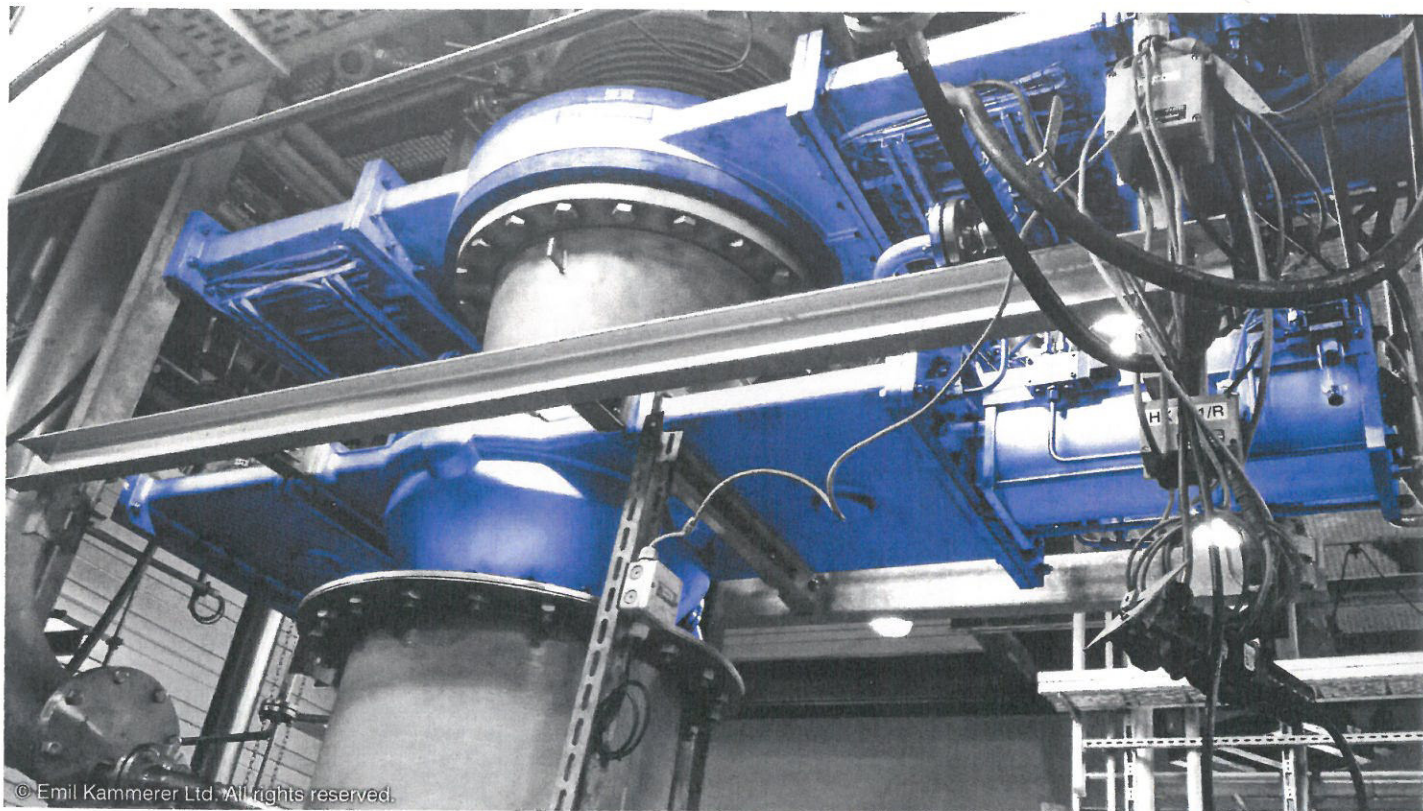
Shut-off solutions for requirements that go beyond the criteria mentioned above can be discussed with Kammerer in order to find the best possible solution.

## Brief profile of ecoMotion GmbH

ecoMotion GmbH is a subsidiary of SARIA-Bio-Industries AG & Co. KG, which in turn belongs to the family-run Rethmann Group. ecoMotion GmbH specializes in the production of biodiesel from animal fats and plant-derived oils, particularly rape seed oil. This production method cares for natural resources and reduces  $\text{CO}_2$  emissions. Esterification primarily takes place in the biodiesel plant, i.e. the glycerin contained in

the rape seed oil is replaced with methanol using a chemical reaction. Biodiesel, also called fatty acid methyl ester, and glycerin are ultimately produced, and the glycerin flows into various applications as a preliminary product. At the site in Sternberg, the raw glycerin with a purity of 80% is further processed in a special plant to produce pharmaceutical glycerin with a purity of at least 99.5%. Each year 15,000 tonnes of pharmaceutical glycerin is produced. An example of application in cooperation with ecoMotion GmbH, is that ecoMotion GmbH produces biodiesel primarily from rape seed oil as well as other plant oils, while also extracting glycerin from the waste products in order to reuse and resell it.





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## Basic knowledge on biodiesel manufacture with the by-product glycerin

Biodiesel is fundamentally produced from raw plant oils. Glycerin is a by-product that can be sold in a freshly extracted form, or prepared in various purity grades. It is a trivalent alcohol, also called 1,2,3-propanetriol. Today, glycerins are used in a very wide range of areas, for instance in the manufacture of plastics and dyes, pharmaceuticals, foodstuffs, and cosmetics. They mainly serve as a softener, or to preserve the material's own moisture. In Europe, rape seed oil is primarily chosen as the starting substance, while in the U.S. soy and palm oil are preferred as the starting substance.

## Operational challenges in MONG discharging

During the acquisition of glycerin from biodiesel manufacture, a waste product is produced that primarily contains salt as well as a small amount of glycerin. The glycerin-free portion of the waste product is called MONG (matter organic non-glycerol). The discharging of MONG generally represents a very special challenge for shut-off solutions in two regards. Firstly, the shut-off valve must maintain the vacuum in the system in a completely

reliable way, i.e. create a perfect seal. Secondly, the slide gate valve must enable MONG to be discharged with as less residue left as possible – without itself being damaged by the properties of the product being discharged. The characteristics of MONG are thus crucial, as it is not always easily free-flowing but instead sometimes adheres. It can be highly abrasive and chemically aggressive as well and displays an aggregate state from moist and paste-like to solid. As the product is abrasive and fast-drying, this can lead to anything from slight blockages to completely damaging the shut-off equipment. The latter brings the risk of shutdown of the plant which means a complete cease in production. The consistency of MONG can fundamentally be influenced by its glycerin content. This, in turn, is fundamentally a cost-based decision on the part of the plant operator. After all, every amount of glycerin that is discharged in the waste product in order for it to flow easily cannot be reused or resold.

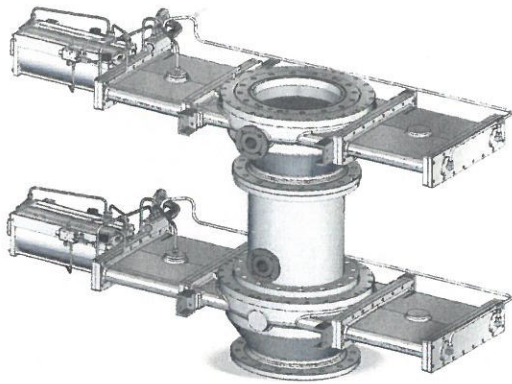
## Developed Kammerer solution: automated discharging valve

In 1988, Emil Kammerer GmbH designed a semi-valve that enabled MONG to be discharged in a relatively automated

manner. In the following twenty-six years the valve system was further developed in cooperation with the respective clients, so that the various customer-specific operating parameters could be taken into account without loss of quality or function. The discharging valve has thus become optimally adapted to the operating conditions of the respective plant so that customers can achieve the best possible results from a technical, chemical, and commercial point of view. The modifiable shut-off solution has proven itself to be very successful in various customer plants in Germany and abroad.

The Kammerer discharging valve is typically installed under a thin film evaporator or dryer that absolutely possesses a vacuum in the range of 3 to 10 mbar. Through evaporation and various distillation stages, the majority of the glycerin is extracted. A residue of MONG, combined with remaining glycerin, is deposited at the bottom. The valve directly underneath consists of two completely sealing Kammerer shut-off valves that are connected to each other via a valve container and locked against each other. The product reaches the upper slide gate valve and is saved up here. This upper slide gate valve is then opened





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so that the remaining products can pass through a valve container to the lower slide gate valve; the upper slide gate valve is closed. The space between both shut-off valves is placed under an atmosphere. Only then can the MONG be discharged. The waste or salt residues usually have a glycerin content of around 3 to 10%.

In practice, the slide gate valve models FK and FDK with integrated rinsing devices from Kammerer have proven themselves in this specialist area. The first one or two letters refer to the sealing system, while the last letter indicates the model of the shut-off valve. The K housing prevents possible depositing of the product and, as a result, the build-up of product due to its downward funnel-shaped, tapered construction. The F and FD sealing systems are particularly favoured for gas-tight shut-off requirements. There is an active pressing of the respective impermeable material here and, afterwards, also an active pushing back of the seal in the FD version. This mechanism ensures that the seals are as gentle as possible while also being completely reliable.

### A threefold result

The Kammerer discharging valves guarantee a reliable continuous discharge every 4–5 minutes. Additionally, the glycerin can be extracted in a significantly higher quantity for reuse as the waste product can be discharged in a drier form, thus containing less glycerin. Finally, a significant increase in the service life of up to twelve months has been achieved in all plants.

### About the Author



Seher Sevim joined Emil Kammerer GmbH three years ago. She has established and developed the strategic sales and marketing divisions focusing on international and national market development. Her tasks comprise particularly researching different process

technologies and writing technical articles. Sevim holds a degree in business administration from the University of Cologne and also teaches at an internationally-oriented business school. She lives and works in Bergisch Gladbach/Near Cologne.