

APPLICATION NOTE Food & Beverage

Flow and alcohol concentration measurement in raki production

- Flow monitoring for control and automation of distillery processes
- Inline quality monitoring using Coriolis mass flowmeter with integrated alcohol concentration measurement
- Fully compliant with legal requirements for ethanol measurement

1. Background

A premium producer of alcoholic beverages operates a distillery for high-quality raki in Turkey. Raki is a traditional Turkish spirit distilled from fresh grapes or raisin. According to the Turkish Food Codex, raki must be made by distilling twice. In the second distillation, the distillate, called suma, must pass through a pot still made of copper. During pot still distillation, aniseed is added to the distillate, which gives the raki its distinctive aroma. The final distillate, which must not exceed an alcohol content of 94.5% ABV, is then mixed with demineralised water and diluted down to its desired drinking strength of 40 to 50% ABV. After at least 30 days of maturation, the final raki product is ready for bottling.

2. Measurement requirements

The different distillation processes from must production and fermentation to alcohol distillation and dilution to maturation and bottling must be carefully controlled to ensure consistent production of a high-quality product. To ensure this, flow measurement of the different products - from fermented must feed to the different ethanol distillates to the finished raki - is of particular importance. A high degree of accuracy and repeatability of measurement is essential for the targeted control and automation of the production processes.

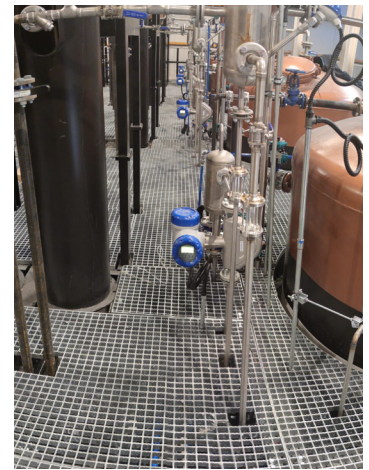
In the past, the customer used paddlewheel meters for flow measurement. These meters worked unreliably and inaccurately. The raki producer therefore decided to retrofit the instrumentation and replace it with more accurate flowmeters with long-term stability. As alcohol production is subject to legal requirements of the Turkish authorities, the measuring instruments had to be supplied calibrated in accordance with ISO/IEC 17025.

3. KROHNE solution

The raki producer was impressed by KROHNE's many years of experience in the spirits industry. They decided to use more than 40 units of the OPTIMASS 6400, a Coriolis mass flowmeter that has been successfully used for years in many distilleries to measure flow and alcohol concentration.

The flowmeter with V-shaped twin bent measuring tube made of stainless steel (S) is designed for applications with very high demands on accuracy and repeat-ability of measurement. It was installed with different nominal diameters from S10 (with DN15 flange) up to S80 (with DN80 flange). The KROHNE flowmeter measures the volume flow at various locations in the distillery. The flow rates range from 50 l to 25 m³ per hour, covering the following process flows:

- The fermented, slightly solid must stream to the distillation columns
- The different distillates from the distillation columns and pot stills
- The suma for dilution with demineralised water
- The final raki product



Measurement of flow and alcohol concentration in raki production

The measuring instruments have been 5-point calibrated according to ISO/IEC 17025 and therefore comply with the legal requirements. The readings are transferred to the control room via Modbus RS485. In addition to mass and volume flow measurement, the Coriolis meter also has integrated temperature and density measurement. Via the density measurement, the meter can calculate the alcohol content by volume (ABV). This enables the customer to obtain a reliable and accurate inline alcohol concentration measurement of the suma and the final raki product.

4. Customer benefits

With the help of the OPTIMASS 6400, the raki producer is able to control its distillation processes with a higher degree of automation than before and in accordance with the legal requirements. The significantly higher measurement accuracy and the excellent repeatability of the readings allow the individual processes to be run reliably and much more in line with the ideal characteristic curve and the best product quality, yield and revenue in mind.

The KROHNE devices measure several parameters in one device, which not only saves the customer money, but also makes process control easier. The integrated alcohol concentration measurement provides additional benefit. It enables inline determination of the alcohol content per volume via density measurement and thus offers the operator a continuous indication of the performance of the multi-stage distillation and the desired target strength of the final raki product.

Unlike the paddlewheel meter used previously, the KROHNE Coriolis meter has no moving parts that can easily wear. Its stainless-steel twin bent measuring tube can be drained and is easy to clean. There is also no clogging or blocking of the flow tube, e.g. when measuring fermented must for distillation, which can contain some solids.

5. Product used

OPTIMASS 6400

- Coriolis mass flowmeter for advanced distillery applications and fiscal metering, e.g. in the production of Raki, Whisk(ely) and other spirits



Contact

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Do you require technical advice for your application?
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