

Translation from

December
Issue 12, 2005
121st Year

9

OIL GAS

EUROPEAN MAGAZINE
INTERNATIONAL EDITION OF
ERDÖL ERDGAS KOHLE

Exploration and extraction · Processing · Petrochemicals · Coal liquefaction



Crude oil transport

Single-source responsibility: KROHNE Flowmetering stations for custody transfer

By J. STOPP, J. VOLTZ and W. LOTHER*

KROHNE Oil & Gas and Deutsche Transalpine Oelleitung GmbH (TAL) have successfully commissioned several metering skids for custody transfer. TAL, one of the largest pipeline operators in Europe, transports crude oil to the value of 13 - 14 billion Euros per year and accounts for it using KROHNE custody transfer metering technology. The five-beam ALTOSONIC V ultrasonic flowmeters supplied by KROHNE Oil & Gas and installed in 8 measuring sections are sized 12" to 20" and are therefore designed for a flow capacity of 2,500 m³/h to 7,100 m³/h. The viscosity of the products varies from 0.7 to 120 cSt. The custody-transfer metering streams have an accuracy of less than +/- 0.2% of flow.

About TAL

The Transalpine Pipeline (TAL) Group, founded in 1965 by companies from the international petroleum industry, is a European Joint-Venture of cross-nationally operating companies located in Germany, Austria and Italy. The operating companies jointly manage the TAL system, comprising three independently operated pipelines, port facilities in Trieste and two tank farms in Trieste and Ingolstadt. The crude oil delivered in tankers is stored in the Trieste tank farm before being transported via the pipeline system to refineries in Austria and in South and Southwest Germany. Each year about 35 million tonnes of crude oil flow through the 753 km long pipeline. Without it around 8000 tank cars would need to make the trip over the Alps every day. TAL employs a workforce of 230 at various sites. In Europe, TAL is one of the most important pipeline systems for supplying

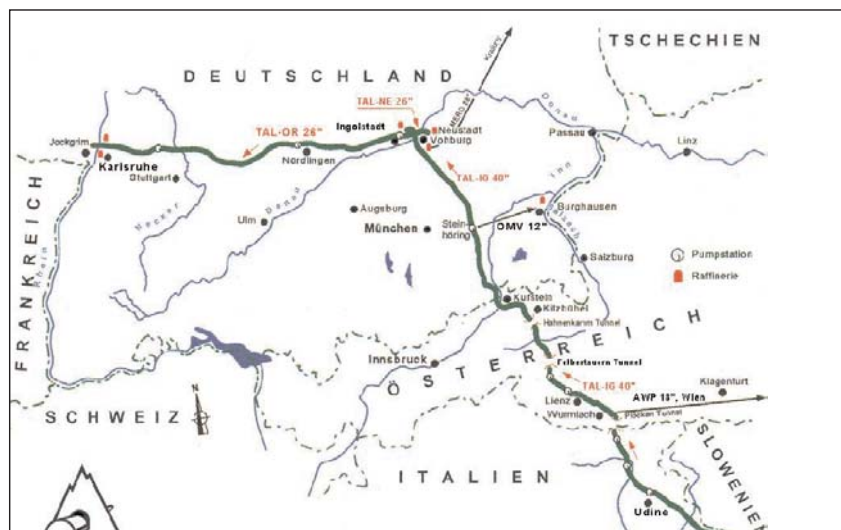
Austria and Germany with crude oil. The TAL pipeline system covers about 75% of Austria's crude oil requirements, 20% that of the Czech Republic, 100% of Bavaria's demand and about 50% of that of Baden-Württemberg. The TAL pipeline thus makes a vital contribution to the energy supply to these regions.

The project

Various crude oils are transported via the transalpine oil pipeline from the Adriatic port of Trieste to a tank farm in Ingolstadt. The crude oil is pumped through three tunnels in the Alps and brought to a height of more than 1500 m before it reaches its destination. The TAL pipeline also supplies refineries in the vicinity of Vienna with crude oil (using the AWP pipeline) and the Burghausen refinery near Munich. The Ingolstadt tank farm is responsible for supplying the refineries in Ingolstadt itself and in Karlsruhe and Neustadt. A further branch line goes to the Czech Republic via the Mero Pipeline. All

billing points and branch lines are subject to the regulations on custody transfer and, accordingly, have to be approved by the Weights and Measures Departments of the respective country.

The KROHNE ALTOSONIC V measures both volumetric and mass flow. The ultrasonic flowmeter not only convinces with its high accuracy and reliability, but unlike all other technologies for flow measurement, it works independently of the flow profile, density and viscosity of the product. There is only minimal pressure loss over the entire measuring range. So it is quite understandable how the ALTOSONIC V easily exceeds the recently published API guidelines for ultrasonic flowmeters (see box). These advantages offered by ultrasonic technology convinced TAL to equip the custody-transfer metering points along the pipeline with KROHNE ALTOSONIC V. Of particular import was a consistently high accuracy independent of fluctuating viscosities and densities,



Course of the transalpine pipeline

Johann Stopp, Electrical / Instruments and Jörg Völtz Quality /Quality Management, Deutsche Transalpine Oelleitung GmbH (TAL), Munich and Wilfried Lothar, Sales Support Manager, KROHNE Oil & Gas, Breda, Netherlands

Topic: API Guideline for Ultrasonic Flowmeters

In the spring of 2005 the American Petroleum Institute, API, published the long awaited standard "Measurement of Liquid Hydrocarbons by Ultrasonic Flow Meters Using Transit Time Technology". The API guideline covers the dynamic measurement of liquid hydrocarbons. It was written above all with reference to custody transfer, but also discusses other applications such as allocation measurement, comparative measurement and leakage detection. The API guideline defines the application criteria for ultrasonic flowmeters (UFMs) and discusses the liquids to be measured and their properties. In addition, the installation, operation and maintenance of ultrasonic flowmeters for measuring liquid hydrocarbons are also highlighted.

The publication of this guideline represents an important step towards the acceptance of ultrasonic flowmeters as the standard solution for custody transfer applications with liquid hydrocarbons.

The popularity of five-beam ultrasonic flowmeters can be traced back to KROHNE's introduction of the ALTOSONIC V, the first ultrasonic flowmeter for liquids in custody transfer service, in the late 1990s. In the meantime, hundreds of ALTOSONIC V flowmeters are in service in offshore platforms, refineries, loading and offloading stations and pipelines. The five-beam ALTOSONIC V features an inbuilt Reynolds correction. This allows the ALTOSONIC V to cover a wide viscosity range that is unrivalled in the market for custody transfer flowmeters.

The API guideline provides an independent reference for both buyers and sellers of high-quality multi-beam ultrasonic flowmeters. Such ultrasonic flowmeters combine accurate and reliable measurement with low maintenance and operating costs. They have no moving parts and are not subject to wear. Pressure drop is negligible, as there are no internals to cause flow obstruction.



A member of the Bavarian Weights & Measures seals the ALTOSONIC V in Neustadt

SPSE's calibration rig KROHNE demonstrated the high degree of accuracy of the ALTOSONIC V with four products, each different in density and viscosity. It was able to meet the accuracy and repeatability as specified by OIML R 117 and endorsed by API in all 6 points.

since TAL transports up to 40 different kinds of crude oil with viscosities ranging from 0.7 to 120 centistokes.

The Neustadt outlet was the first to use KROHNE's ALTOSONIC V five-beam ultrasonic flowmeter. The installed meter had a nominal diameter of 12" and was designed for a flow rate of 2,500 m³/h. Five-beam ultrasonic flowmeters can be subject to special German TRBF 301-specifications (= Technical Regulations for Flammable Liquids). These refer to hydraulic safety requirements. In the TAL project, TRBF 301 was mandatory.

During the site acceptance test to TAL in Neustadt the KROHNE Oil & Gas system was inspected for the final time and was given the official seal of the Bavarian State Office of Weights and Measures. The National German Institute of Metrology PTB certified the specific custody transfer application data of the ALTOSONIC V in the PTB approval. TAL subsequently tested the metering skid over a period of six months, before deciding to carry out the entire project with KROHNE. On the basis of the measurements from the Neustadt station TAL decided to equip all metering skids with ALTOSONIC V ultrasonic flowmeters in sizes up to 20".

In order to obtain the local custody transfer approval for the 12" meters installed,

TAL, KROHNE and the Bavarian State Office of Weights and Measures developed and implemented their own concept for testing at high flow. As a first step, the official test was performed up to a maximum flow rate of 4,000 m³/h at SPSE in France. SPSE is an independent operator of calibration rigs certified by the French "Service des Instruments de Mesure". It received COFRAC accreditation in 1998 which is renewed at regular intervals. The accreditation is recognized for example by the PTB, NMI and other international certification bodies. On

To demonstrate the stability of the ultrasonic flowmeters even at high flow rates, the meters were tested in a second calibration step using a specially designed master bench. This bench was installed in one of the TAL transfer stations. Basically, it consisted of 3 x 12 inch ultrasonic flow meters arranged in parallel runs and with a maximum flow rate of 2,500 m³/h. Each meter had previously been calibrated on the SPSE test rig. This arrangement was able to verify the linearity of the 20 inch ultrasonic flow meters up to the maximum flow rate of 7,500 m³/h required in subsequent operation.



Test installation at SPSE

The result

Following successful commissioning of the metering system, the German Transalpine Oil Pipeline (TAL) attested its great satisfaction to KROHNE Oil & Gas. Moreover, TAL confirmed that the KROHNE Oil & Gas system had low maintenance costs and negligible pressure loss. Since their commissioning, none of the flow meters has exhibited any shift in the K-factor, although the above-mentioned pilot plant has already been in operation for 3 years. On the whole TAL concludes that "all these factors have helped to reduce operating and maintenance costs and enhance the reliability of our custody transfer."

About KROHNE Oil & Gas

KROHNE Oil & Gas offers the oil and gas industry turnkey solutions from a single source. The portfolio of the Dordrecht-based company comprises design, engineering, consultancy, design, documentation, project management, construction and commissioning of custody transfer metering skids as well as testing, handover and supervising installation on site, after-sales service and training. However, KROHNE Oil & Gas is not just in the business of supplying metering stations - so-called metering skids - it also offers a sophisticated leak detection and localization system, loading and offload-

ing systems and tank farm management. The turnkey solution for TAL not only comprised the five-beam ALTOSONIC V ultrasonic flowmeter for custody transfer as the key element of the metering skid, but also included pressure, temperature and density meters as well as the entire cabling package. In addition, KROHNE Oil & Gas also supplied the control and monitoring system complete with hardware and software.

Graham Wilson, Managing Director, comments: "We not only take responsibility and provide support for the complete facility, but also for the most critical elements, the flowmeters. Our experience and expertise, combined with our ability to supply all technologies, mean that our sales staff are in the position to quote the best solution to meet the customer's needs in each and every case. This is how we create a lasting relationship built on trust. Repeat orders for our turnkey solutions are our best recommendation."

Apart from the ALTOSONIC V flowmeters, KROHNE Oil & Gas also commonly supplies inlet and outlet sections, piping and valves for metering skids. AltoSuite offers the customer a flow monitoring system that has been programmed, developed and manufactured by KROHNE. The system is used for visualization of process data and for monitoring instrumentation readings during operation. It produces

Jörg Völtz, head of quality and quality management at TAL, is extremely satisfied with the KROHNE meters:

"TAL's expertise in oil transport, handling and loading, combined with KROHNE's track record in flow measurement technology, deliver significant savings for us every year - simply because we have achieved the maximum possible accuracy with the ALTOSONIC V."

Stephan Neuburger, managing director of the KROHNE Group, stresses above all the spirit of trust that characterizes the working relationship with TAL.

"After such a significant project involving the supply of several ALTOSONIC Vs to TAL we are proud of the fact that in every phase of the project our relationship has been both professional and based on real partnership."

batch loading certifications for custody transfer and provides reporting and diagnostic functions for validation purposes. A secure operation with maximum data integrity is guaranteed along with an easy to use human machine interface.

After clocking up 30 years of experience in the industry, KROHNE Oil & Gas now has a presence in all significant oil and gas markets: from Russia to the Far East, from Houston to Dubai. KROHNE Oil & Gas B.V., with its team of industry experts, is now the fastest growing company in the KROHNE stable. Thanks to its in-house capabilities, team of industry experts and cutting edge technology for level and flow measurement, KROHNE has managed to achieve outstanding successes and has won a series of major contracts in the oil and gas sector.



An ALTOSONIC V being prepared for a customer in Algeria

KROHNE Oil & Gas

Kerkeplaat 18
3313 LC Dordrecht
Tel.: 0031-78-63.06.535
Fax: 0031-78-63.06.404
koginfo@krohne-oilandgas.com

WWW. KROHNE-OilandGas.com

