CASE STUDY

V-Cone Flow Meter Solves Nuclear Lab Underwater Measurement Problem

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Introduction

A research facility located in the Netherlands, NRG Laboratory, produces nuclear medical isotopes. They conduct tests on materials for nuclear power plants. NRG's capabilities and functions include boron neutron capture therapy (BNCT), services irradiation of fuel and materials post, medical irradiation examinations, and medical isotope production.

Application

NRG uses flow metering to measure the nuclear laboratory's basin cooling system. The medium for this type of nuclear reactor is demiwater.

Problem

NRG Lab faced a problem when the old vortex flow meter was wearing out and they found that model was no longer in production. The Lab plant managers needed a new flow metering solution with specific capabilities, including, electronics with a long life, low maintenance costs and a technology that performs well underwater and can withstand the effects of nuclear radiation.

Solution

NRG Lab worked with their McCrometer reps, A-B-T based also in the Netherlands, to research flow meter technology that would meet their stringent requirements for long life and low maintenance under harsh nuclear testing conditions. Additionally, there was the issue of minimal space available in a retro-fit situation.

A-B-T suggested McCrometer's V-Cone™ flow meter.

A-B-T made the recommendation based on the V-Cone's ability to provide reliable accuracy in less than ideal piping conditions and low-maintenance design with a no moving parts design.

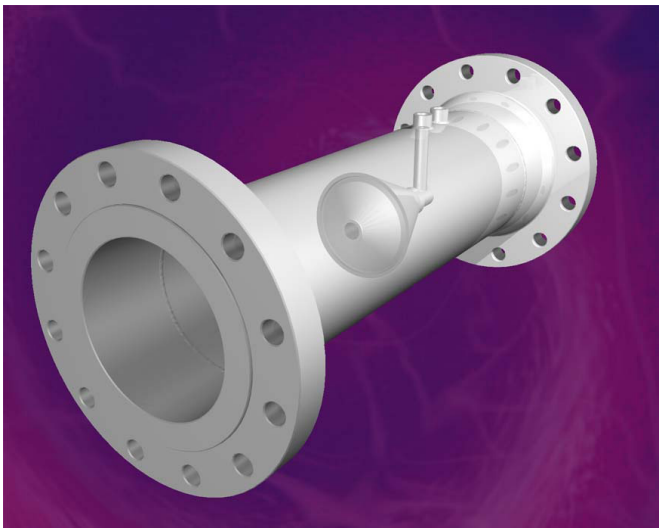

Figure 1. V-Cone Flow Meter

The V-Cone is an advanced differential pressure-type flowmeter with built-in flow conditioning for accuracy to +0.5% of the flow rate with +0.1 repeatability. It is ideal for tight-fit and retrofit installations because it

requires a minimal 0-3 pipe diameters upstream and 0-1 diameters downstream.

V-Cone Solves Nuclear Lab FM Problem

The V-Cone is designed specifically for hard to fit, limited space installations—most often in existing facilities.

The plant engineers determined that the V-Cone flow meter's capabilities would provide the best solution to NRG Lab's ongoing harsh nuclear testing conditions and intense wearing problems for additional reasons:

- Flow meter is completely submerged in water
- Electronics must have a long-life under the harsh high-radiation conditions
- Pressure difference transmitter must be mounted outside the reactor basin

The final application used the V-Cone flow meter with pressure difference transmitter with 4 – 20 mA output signal, a 5-way manifold and tubing.

Results

The V-Cone flow meter was installed at the NRG Lab in June of 2005.

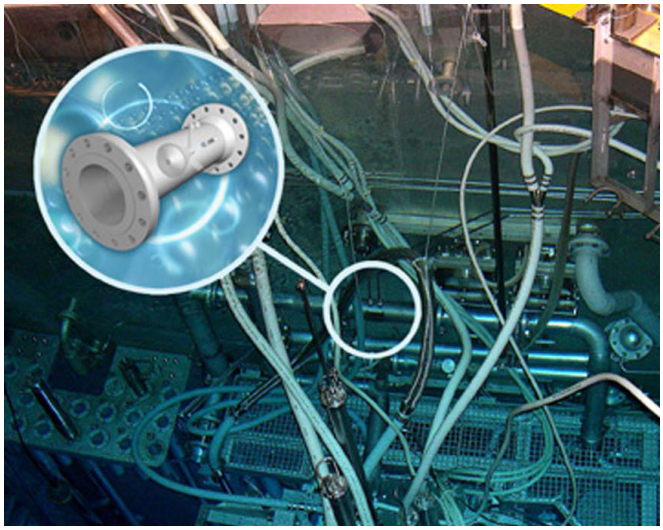

Figure 2. V-Cone Installed Near Reactor

The installation was completely trouble-free. A key benefit is the safety factor; there are no electronics near the reactor vessel.

Since the installation, the only maintenance that's been required was purely educational and consisted of how to monitor the V-Cone. Additionally, the V-Cone performance is higher than that of the original vortex flow meter.

NRG is particularly pleased with the operational advantages of no maintenance required for the V-Cone. The second big bonus is the safety factor. Prior to the V-Cone installation, every two years NRG had to change the cable from the old vortex flowmeter. This activity required time and energy and nuclear waste. The operations savings alone from eliminating this maintenance activity is significant. The NRG Lab is considering replacing two additional vortex flow meters with the V-Cone technology.

About McCrometer

McCrometer's advanced liquid, steam and gas flow measurement solutions solve complex challenges in Agriculture, Municipal/Industrial Water & Wastewater, Oil & Gas, Process Control & Plant, Electric Power Generation, and Institutional Facilities. The company's products and systems are found in thousands of installations worldwide. Its products and systems meet many of the world's most demanding industrial, safety and quality standards.

About A-B-T

Since its founding in January 1994, A-B-T has specialized in flow. Due to this specialization, and many years of application experience in virtually every industry, the best possible advice is provided.

Focusing on the customer's needs, A-B-T recommends a specific flowmeter to fit each application. Accuracy and repeatability, purchasing, installation and operating costs, maintenance aspects, among others are all taken into consideration. The total cost of ownership forms an important basis for a proposal.

About NRG

The Nuclear Research and consultancy Group (NRG) was established in 1998 through the merger of ECN's and KEMA's business activities in the nuclear fields. In a later stage, TNO-CSD (national person dosimetry center) was taken-over by the Group. The successive

mergers have created a Center of Excellence for the nuclear technology, integrating all relevant disciplines. As the Dutch centre of excellence, NRG develops knowledge, products and processes for safe applications of nuclear technology on behalf of energy, environment and health. Safety and quality are our main priorities.

Figure 2 Notes:

The photograph in Figure 2 illustrates the under water application. The V-Cone Flow Meter is placed near the reactor itself. You can see the blue light that is a result of the Tsjerenkov effect. The V-Cone is visible in the middle of the photo. The pressure tapings lead to the basin border. The differential pressure transmitter is placed outside the basin.

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24510-71 Rev. 1.1 | 04NOV2022