



When oil and gas measurement matters

As part of the Emerson Process Management group of companies and its \$24 billion parent company, Emerson, Daniel Measurement and Control (Daniel) is a leading brand in providing fiscal flow and energy measurement products, systems and services to the oil and gas industry and serves its customers from over 600 locations in more than 85 countries. As a business it has been operating for more than 80 years and has built its respected name as the oil and gas custody transfer and fiscal flow measurement expert. Customers around the world trust and depend on Daniel's expertise, equipment, services and solutions to reduce their oil and gas measurement uncertainty and deliver fair and accurate billing.

The company's portfolio of products and services includes flow meters, control valves, analysers, metering systems, and life-cycle services. Typical markets served by Daniel

include production and transportation of gas and crude oil, refining, marketing and distribution of petroleum, and transportation of refined product. Daniel's customers range from multinational and national oil companies to Engineering, Procurement and Construction companies (EPCs), as well as independent producers.

Daniel provides full metering solutions from consultation to design and engineering, project management, fabrication, installation and start-up. Products range from the most electronically advanced ultrasonic meters with remote diagnostics (Figure 1), to differential pressure fittings and mechanical instruments such as turbine meters, pressure relief valves and venturi tubes. These solutions and products are supported by life-cycle services that include consultation, audits, inspections and re-calibrations, system upgrades and refurbishment, maintenance and repair, and training services.



Figure 1: With built-in device diagnostics, the Daniel SeniorSonic Gas Ultrasonic Flow Meter allows operators access to real-time process conditions and meter health to address maintenance alarms before they lead to failure.

Daniel prides itself on its dedication to innovation. In fact, bringing technology and engineering together to create innovative solutions is deeply rooted in the company's heritage. The company started in the 1930s when its founder Paul Daniel invented and patented Daniel Senior Orifice Fitting, a creation whose fundamental design remains the standard in the gas pipeline industry today. This device allows for the changing of orifice plates without interrupting the flow or utilising costly bypass pipes.

Daniel's technologies and expertise have resulted in many one-of-a-kind solutions. Not surprisingly Daniel can point to many industry firsts, including the first ocean-going ball prover used to calibrate meters measuring the loading and offloading of crude oil, the first to invent and use a microprocessor in oil and gas custody transfer, the first to build a commercial small volume meter prover (Figure 2), the first to build the largest (48") ball prover in the world, the first to use HART communication output for custody transfer ultrasonic meters, the first to manufacture the world's largest (48") orifice fitting, and the only company in the world able to manufacture 2500 # ANSI class dual-chamber orifice fittings in large sizes and exotic materials (Figure 3), among other things.



Figure 2: A flow prover is installed in a custody transfer system to provide the most accurate measurement possible. It is used to calibrate the metering system's flow meters before, during and after a transfer.

Today, the company continues to be a powerful force of innovation in the oil and gas industry and manages a portfolio of over 200 unique US and foreign patents. "Becoming an inventor or having a patent at Daniel is not a privilege of only engineering staff. We have an evaluation process that encourages contributions from all employees regardless of their functional responsibility." Kevin Chin, director of business development at Daniel, explains to *European Oil and Gas Magazine*. "Daniel recognises and rewards those employees who have ideas to improve operations or help distinguish our products and solutions from our competitive offerings."


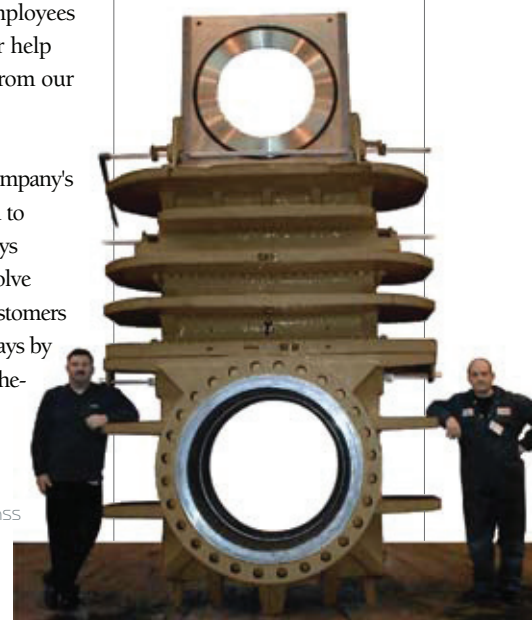
Kevin adds that Daniel employees and technology advancement are two of the company's key success factors: "Both are fundamental to how we serve customer needs globally," says Kevin. "Daniel is known for its ability to solve complex customer challenges and help customers grow their businesses in surprising new ways by creating new-to-the-business and new-to-the-world solutions." 

Figure 3: Daniel is the only company in the world able to manufacture 2500 # ANSI class dual-chamber orifice fittings in large sizes and exotic materials.





Experience, breadth of products, comprehensive life-cycle services, together with certified international fabrication facilities and an understanding of local governmental regulations give Daniel another core strength; the ability to provide single-source metering solutions to mega projects and the capability to manufacture these solutions to meet multiple international standards including AGA, API, CE, ATEX, ISO, DIN, OIML and NACE (Figure 4). Daniel has the largest installed base of large metering systems. This market intimacy endows Daniel with credibility and a distinct competitive advantage.



Figure 4: This photo illustrates the magnitude of a full-scale pipeline system. When such a metering system is handling between \$5 million and \$10 million worth of natural gas a day, flow measurement accuracy and repeatability become paramount.

Some of the recent projects Daniel was awarded include a multi-year framework agreement with Statoil. In one of the projects covered by this agreement, Daniel will provide a range of Daniel integrated fiscal metering systems and support services for Statoil's new Valemon gas and condensate platform. Located in the North Sea at the Norwegian Continental Shelf, the Valemon development will include ultrasonic metering systems with fully automated controls for the condensate, gas, and HP and LP flare gas. The unmanned platform, which is controlled from the neighbouring Kvitbjørn platform, will begin production in 2014.

In another project, Cairn India Limited, a private energy company now part of the Vedanta Resources PLC Group from London, chose

Daniel to solve the challenge of designing, constructing and commissioning a metering system that can accurately measure the heavy, waxy oil transported to multiple refineries throughout India (Figure 5). This is part of the Mangala Development Pipeline project in India, which consists of the world's longest continuously heated and insulated pipeline and will have access to 75 per cent of India's refining capacity. This pipeline spans 680 km and provides oil to multiple refineries throughout India, including Reliance refinery, currently the largest refinery in the world.



Figure 5: Cairn India Limited chose to install Daniel's fully engineered, integrated and pre-packaged custody transfer metering skids with ultrasonic accounting flow meters at each terminal along the Mangala pipeline.

Reflecting on the success of the company, Kevin is optimistic of an exciting future. "Even though there have been a number of ups and downs in the oil and gas market as a result of the sluggish global economy, Daniel's long term strategy is to leverage a market slowdown as an opportunity." Kevin explains: "With the emerging oil and gas exploration and development in the Asian market, Daniel is seeing significant growth in demand from this world area. Customers in this market can count on Daniel to provide fiscal flow measurement solutions for their needs."

Daniel is well positioned to respond to those needs. Its Asia Pacific manufacturing and engineering test facilities, such as Singapore's facility, is certified to three international standards, including ISO:9001:2008 Quality Standard, OHSAS 18001 Occupational Health and Safety, and ISO14001 Environmental Management Systems certifications (Figure 6).




Figure 6: One of the 76 metering skids built for Reliance refinery in Jamnagar, India, the world's largest refinery. The metering systems were manufactured in Daniel's Singapore facility to monitor oil and gas valued at \$27 billion.

With Daniel's commitment to serve Asia from Asia, it has not only relocated service, sales, engineering and supply resources close to the customer to increase response speed, but also involved Asian customers into product development to help increase customer satisfaction. Most recently, Emerson Process Management has opened an Engineering and Development Center within the recently expanded Asia Flow Technology Center operated in Nanjing, China. The new Engineering and Development Center brings Emerson's total investment in the center in Nanjing to more than \$35 million and strengthens the company's

overall presence in China and Asia Pacific.

Daniel is also enhancing its support for European customers by renovating its Stirling facility in Scotland. Enhancements include a new state-of-the-art training facility, a design development and control panel facility, a service area and an UKAS calibration laboratory for its fiscal metering products. Daniel will also be investing in local resources, which includes hiring local service engineers to improve the range of its Daniel fiscal measurement services available to the European market.

Looking forward and with the increased importation of natural gas as a main source of clean energy in Europe, Daniel is involving Europe's customers into the development of measurement methods and capabilities for traceable LNG flow measurements with reduced uncertainties. The company is currently working on an LNG R&D project with VSL, the National Metrology Institute of the Netherlands and Justervesenet, the Norwegian Metrology Service, where Daniel is supplying a cryogenic liquid ultrasonic flow meter for field tests in Norway. 

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