



By Trevor Forster
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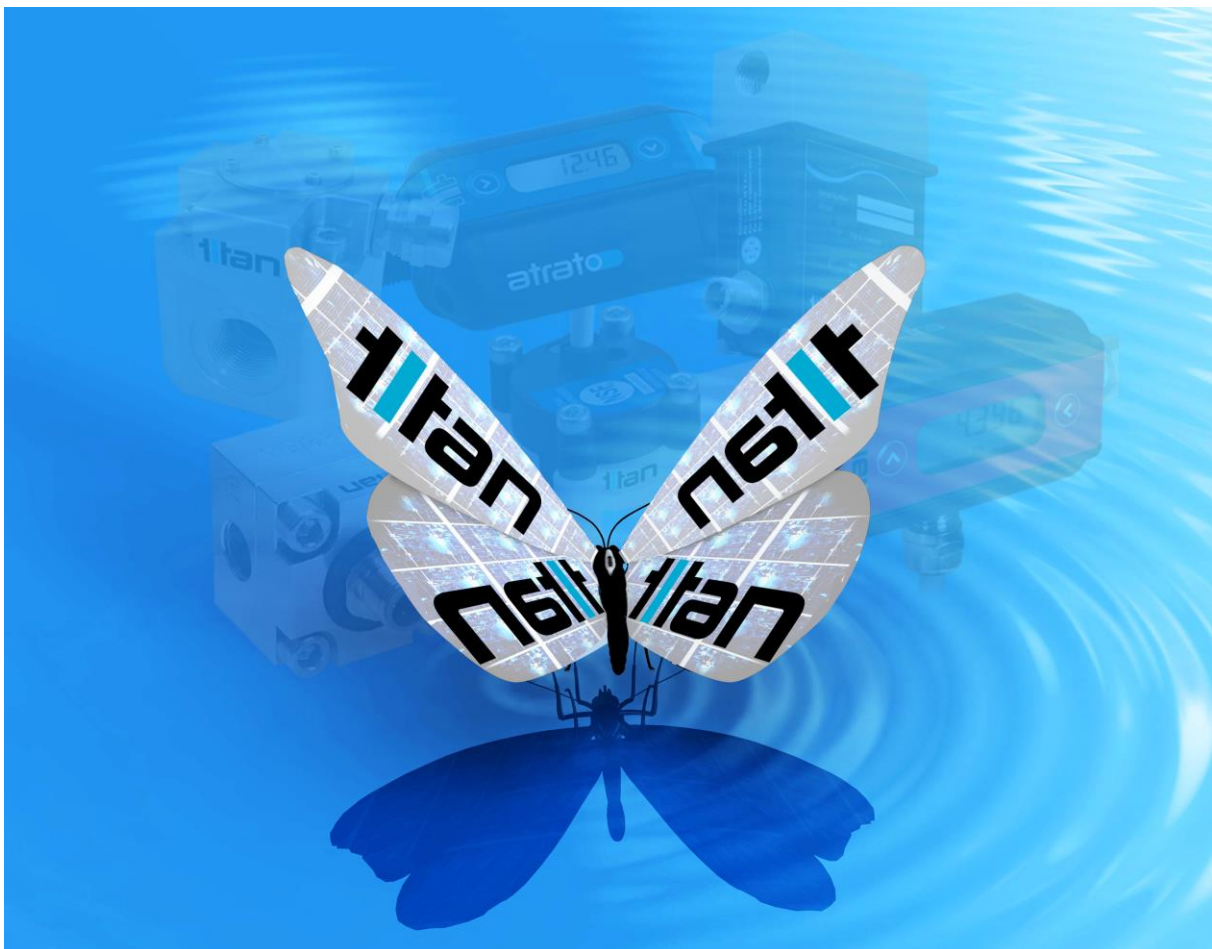
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AHEAD OF THE CURVE

Celebrating 40 Years of Innovation



Continuous innovation is a priority for the manufacturing industry to maintain a strong footing in an economy that is under constant flux.

Over the last 40 years, Titan Enterprises has provided optimised liquid flow metering solutions for a diverse range of [industries and process applications](#), its design and engineering expertise being fundamental to the company's success.

Established in 1981, [Trevor Forster](#), Managing Director of Titan Enterprises, founded the company with the aim of producing modestly priced, high-quality, [low flow measuring devices for OEM customers](#). Trevor recognised from the outset that improvisation and creativity were the key to securing their footing in the market, delivering affordable and lasting solutions that resolved issues for their customers.

“In the early days we made our own flow rigs from a laboratory balance with control electronics provided by a friend,” Trevor reflects, “and we used low-cost aluminium tooling until we could afford fully hardened steel ones.”

“More than once we’ve been told ‘You can’t do that’, but we’ve just done it anyway! The way we work with customers from research, development, through to production has enabled us to solve a lot of OEM application issues,” Trevor adds. “Through that process, we’ve helped customers decrease their assembly times, improve efficiency, and provide extra functionality.”

Starting Out

Titan’s first product was an optically detected, very low mass Pelton wheel turbine flowmeter. The extremely robust bearings had over 64 times the bearing area of the previous products Trevor was involved with. This had the effect of increasing the friction and whilst reducing the range slightly, the bearings were much longer lasting. An additional innovation was to put a by-pass on a plug valve. The operator could then select their own flow range by adjusting the valve.

Part of the Opella group saw the advantages of our concept and as a collaboration we designed our FT meter and licensed them to produce it. It was a successful product for many years and Titan eventually bought the tooling back from them and continued to produce the device inhouse.

When Titan was approached by one of the major catalogue distributors because their offering for low flow measurement was proving unreliable, the result saw us move beyond the basic optical meter production. Obtaining some of the 'problematic' meters, Titan put them through some endurance tests and sure enough the bearings failed after just a few hundred hours. Titan's 800 series turbine flowmeters were born out of this collaboration. The revolutionary, sapphire bearing arrangement improved the dynamic flow range without compromising bearing life which is rated in thousands of hours. The detection system was then changed to Hall effect permitting the use of opaque fluids.

The design of this flow meter utilised the moulding capability to offset Titan's, then, limited machining possibilities. This permitted the manufacture of hybrid meters with moulded parts but more importantly, screwed metal bodies for more robust installation. Versions of this meter have been incorporated in a vast array of equipment and processes, from agricultural to laboratory, and food and beverage to medical.

“Our USP is our flexibility, adaptability and ability to work with customers to understand their applications and find workable solutions.”

In 1986, Titan was approached by the *Virgin Atlantic Challenger II* team. They were searching for a flowmeter manufacturer who could supply a device to measure their fuel consumption on their Trans-Atlantic Blue Riband attempt. The engine manufacturers had put severe restrictions on the permissible pressure drop in the fuel lines to guarantee the engine performance. Calculations suggested a venturi meter would have a low enough pressure loss but the dynamic flow range would be insufficient for the overall engine fuel usage. To solve the problem we inserted one

of our Pelton wheels as a type of undershot water wheel into the throat of the venturi. This proved to have an acceptable overall pressure loss and excellent linearity. Richard Branson completed the crossing in the *Virgin Atlantic Challenger II*, in three days, eight hours and 31 minutes, beating the 1952 record set by the United States.

Advancing Technology Capability

Trevor said: “From the outset in 1981 I wanted a non-invasive flow measurement solution and our patented ultrasonic technology is giving us that.”

Work on developing a viable, accurate ultrasonic meter began in 2001 with a corporate decision to develop the best non-invasive small bore flow meter in the world as part of a long-term strategic plan. One of the foremost fluid engineering establishments (The Cranfield Institute of Technology) was commissioned to develop the device in collaboration with our R&D team at Titan. The resulting patented ultrasonic technology led to an expanding line of [Atrato® ultrasonic flowmeters](#) which had the adaptability to provide solutions for a number of OEM issues.

One example was Titan’s work for a customer manufacturing cooling systems. The third world countries the products were being exported to often had poor water quality, damaging the existing flow meters. The company approached Titan to develop an alternative flowmeter that would be immune to the ‘dirty water’ problem.

Working with the Atrato®, Titan experimented with bending the flow passage around 180° whilst still carrying the ultrasound. Using unique algorithms, this technique proved to be





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successful and Titan was able to solve the customer's issue by developing an ultrasonic flowmeter that could operate accurately and reliably even with contaminated water.

“We also did some extensive pioneering work with a USA medical company to produce a disposable ultrasonic flowmeter that would measure the volume of liquid manually injected into a patient,” Trevor continues. “We are currently extrapolating our technology for use in other applications where, for example, it can reduce downtime for cleaning as the ultrasonic meters have no moving parts.”

Fast Tracking Design

Titan had been supplying flow meters to high performance vehicle and power train manufacturers for a number of years, measuring hydraulic oil both in vehicle and on the test bench. In 2014, Titan was approached by a Formula 1 racing team to design bespoke flowmeters for two very niche applications: direct fuel and engine oil flow measurements were required for the F1 racing cars. For the fuel system, Titan developed an ultra-lightweight oval gear meter capable of being safely housed inside the fuel tank itself and submerged in the fuel. F1 vehicles typically run without cooling fans so measuring the oil flow on engine test required a flowmeter accurate to 200°C with no undue pressure drop.



Using the inherent very low pressure drop of their oval gear flow meter design, Titan produced a 200°C, 50 L/minute flow meter with a pressure drop of less than 100mBar utilising specially manufactured oval gears specific to the application. Both modified flow measurement designs provided accurate flow measurement over an extended period of time, whilst housed directly in or around the noisy electrical environment of the F1 vehicle.

“We do not shy away from spending on [Research and Development](#). Industry doesn’t stand still and investing in R&D is paramount to us staying ahead of the game and taking advantage of the latest technologies. Our R&D spend is 20% of our turnover where the norm is 8-10%,” Trevor says. “We will look at applications and work closely with our customers to explore viable solutions rather than simply selling an off-the-shelf meter that may not suit their specific process or challenge. It means we may go down a

rabbit hole or two but most of the time it works out because we won't take on a problem unless we believe we can solve it."

Although Titan's R&D is primarily application driven, there are occasions where market forces encourage the team to look at product improvements. For example, the recent sharp rise in material costs and greater production lead times as a direct result of Brexit and the pandemic. However, rather than accept these and be forced to place a marked increase on its own products, Titan has taken the challenge as an opportunity to make design improvements, particularly to its [Oval Gear flowmeter range](#), without increasing the unit cost price.

Innovation at Every Turn

The focus technology for Titan at present is our ultrasonic liquid flow measurement devices. With electronics becoming faster and cheaper there is scope to produce more accurate and bespoke systems at an affordable price. This in turn allows, for example, for more sophisticated medical devices to be developed that a few years ago would not have been practical or cost-effective. Taking our Atrato® ultrasonic flowmeter product design understanding, we have pushed both electronics and physical design to improve the overall performance window. We have recently launched our new software interface for the Atrato, greatly improving its functionality.



Trevor concludes, "When you are confident in your own capabilities, willing to take a few risks, invest resources into R&D and know what your customers and market want, taking on challenges can be very fruitful."

It is this extra investment and ongoing high R&D spend that will see Titan Enterprises at the forefront of their



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sector for years to come.

To discuss an optimised flow measurement device for your OEM application, please contact Titan Enterprises Ltd.

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