DELIVERING TRUSTED ENGINEERING EXCELLENCE FOR BESPOKE FLOW SOLUTIONS

For every flow measurement application there is an optimum solution. When it comes to bespoke solutions, the pairing of skills between two companies provides specialist flow metering that is engineered to order for a variety of applications.

Specialists in flow measurement ABB has proven experience and capability in the design, engineering, manufacture, and application of a comprehensive range of differential producing flow elements - including the manufacture of some of the most complex differential pressure (DP) solutions.

Although it is over 100 years since the first DP devices were used commercially, they still form the largest installed base of all flow measurement technologies, especially in the process, power, chemical and oil and gas sectors. ABB has been supplying DP devices from their commercial beginnings in the late 19th century and have unrivalled experience in the field. In fact, engineers from ABB companies invented the Wedge meter and the Dall tube.

ABB's DP flow elements and systems provide robust, reliable flow metering in a variety of industries and applications in oil and gas (onshore and offshore), petrochemicals, power, metals to aerospace, automotive and food & beverage.

Engineering Heritage

Located in Workington in the Northwest of England, the manufacturing facility grew from the engineering heritage that Cumbria is famed for having been a powerhouse of the UK's coal and steel industry, it remains a hub of engineering enterprise. Previously part of the ABB family of companies, McMenon Engineering Services is now independent but still works hand in hand with ABB.

In its various guises, the company has been providing its flow measurement expertise to a wide range of industries for over 70 years and now provides bespoke engineered DP flow solutions to the oil and gas industry, aerospace, renewable energy facilities and the automotive industry.

John Edmondson, Business Director, says that the company today is the product of that 73 years of experience: "We are the sum of all the knowledge of the managers and engineers that have gone before."

All the most successful companies value excellent customer service, but one company providing customized flow measurement solutions really takes it to heart – few suppliers in any industry can boast that they have supplied a bespoke quote to a customer in only three minutes.

Yet, that is the kind of rapid service that ABB and McMenon Engineering Services prides itself on. The customer in question wanted an orifice carrier with a manifold but were having problems with getting the correct sizing. An email detailing their requirements got a speedy reply, with a bespoke solution design back in their inbox almost instantly.

That level of rapid response would be challenging for companies supplying slightly engineered products, but McMenon developed the solution considering the complicated flow dynamics calculations and engineering.

DP Flow

From simple orifice plates through to custom-engineered metering systems, ABB's DP flowmeters measure a variety of fluids including water, air, steam, heavy oil, slurries and molten sulfur.

Although there are many DP flowmeter types, the principle of operation is always the same. The flowing fluid is directed through a defined restriction in the diameter of the pipe, creating an increased flow velocity and an associated pressure drop. A pressure sensor is used to measure the difference in pressure in the fluid before the measurement point and at the middle of the restriction. The difference in pressure is directly proportional to the flowrate.

The overall energy in the system remains constant, but when the flow velocity or kinetic energy increases it's at the expense of the pressure energy. The DP principle is particularly useful where high static pressures are found or when fluid temperatures are too high for other flowmeter types. Crude oil extraction on the seabed is an example of where DP flow-metering can be extremely useful despite the harsh operating conditions. The various types of DP flow meter include a venturi which reduces the pipe diameter, a shaped intrusion or wedge into the pipe, or an orifice plate system, which is a plate in the pipe flow with a hole smaller than that of the pipe diameter to restricting the flow.

Bespoke solutions, engineered to order

Some 80 percent of the projects delivered are engineered to order to meet a wide variety of customer requirements. Designs may need to meet specifications for elevated pressures and temperatures, constant immersion at depth in seawater. They may need to resist abrasive particles or corrosive substances in the measured fluid, or the design may require a special testing regime.

One such speciality is the design and manufacture of venturi tubes for subsea applications. Used at high pressures and at great water depths, the units are designed and manufactured in strict compliance with API 6A and API 17D.

"Our customers are experienced with instrumentation and flow measurement, but they can only go so far – when they come up against unusual requirements, extreme conditions or equipment that just won't behave as expected, they turn to us," says Edmondson.

The recent 80-inch venturi project was destined for a geothermal plant in Nigeria to measure steam flow rates. This project needed a mixed material construction, incorporating a stainless-steel measurement section with carbon steel inlet and outlet cones.

The finished assembly was wet calibrated by ABB.

Working shoulder to shoulder

The close association with ABB stems from the time both companies where in the same fold and that sense of partnership continues to this day. Bringing the advanced measurement technologies of ABB together with the bespoke design and fabrication skills of McMenon produces a complete solution to customers' flow measurement challenges, one capable of serving companies across the globe.

Says Edmondson: "As part of the ABB McMenon relationship, we export to 63 countries, with a lot going to the oil and gas industry. Many of these orders involve clusters of critical components and as such must be bought from trusted suppliers and vendors. What ABB can bring to the party is their global reach - they're recognized and trusted."

David Bowers, Product Manager Process & DP Flow at ABB agrees: "The strong relationship, with both companies providing top level skills and technology, means that we can compete at any level, whether it's having the right product performance and specification, or offering the right price and delivery. It's the full package and ultimately, that's what this relationship means to the end user."

A complete service

This wealth of knowledge has allowed ABB to become one of a select band of companies able to offer complete contract manufacturing and engineering services to flow measurement users. "We are one of the few manufacturers offering flow measurement instrumentation practically from start to finish," says Edmondson.

From raw stock and forgings, McMenon manufacturing facility can complete 90 percent of all necessary processes in house – cutting, machining, rolling and welding. The company employs 180 approved welding procedures and can work with 50 different types of specialized steel, allowing it to meet any flow measurement requirement.

The company's capabilities include fabrications of up to 5 tonnes in-house and up to 10 tonnes through sub-contractors. The welding techniques available include submerged arc welding, automated and manual gas tungsten arc welding, automated and manual gas metal arc welding and flux cored arc welding. Onsite plate rolling has a capacity of material up to 25 mm thick, while plate profiles can be cut from 1 mm to 50mm thickness.

We can also offer welding of a wide range of special materials, with techniques including cladding and buttering of high-performance alloys, welding of nickel and nickel alloys, cobalt alloys, Monel, Hastelloys, Inconels and Incoloys, creep resistant steels and dissimilar metals.

Flow measurement products include orifice plates, averaging

pitot tubes, wedge meters, flow nozzles, venturi meters, subsea venturi meters, and cone meters. Size is also no barrier, with flow products ranging from an inch in diameter up to 80 inches.

Taking the pain out of sizing flow solutions

As well as its skills in fabrication, ABB offers customers its Solve software tool that makes it easy to size and specify DP flowmeters. Used on-line or off-line, Solve allows customers to size multiple solutions and develop full meter specifications and part numbers, for projects ranging from a single instrument to an entire plant.

Users can transfer process variables between meter types to compare their performance, a feature particularly useful for problem applications. Solve sizing software also helps in the selection and sizing of other products, such as temperature sensors and thermowells.

The results from the software are used to develop a solution for each customer's project, combining both metalwork and flow measurement technology.

Expert team puts McMenon in pole position

Craig Marshall is one of McMenon's engineers. He outlined some of the recent challenges that the company has overcome: "There have been a couple of averaging pitot tubes recently that have had to be made longer to account for weak frequency calculations. Some have had to be made from much harder materials or be designed for very high temperature operation.

"With some wedged flowmeters, we've had to put an internal coating on to make them harder for a pharmaceutical application. Some units ended up having multiple valves on top, such as double block and bleed valves. It's all part of integrating a full solution for the customer."

Before joining McMenon two years ago, Craig worked with the National Engineering Laboratory in Glasgow, an organisation which holds the national standard for flow measurement. Says Craig: "NEL are certainly at the top of the food chain when it comes to traceability in terms of calibration and research and flow measurement.

"I spent more than a decade there looking at calibration of flowmeters and different types of technology, research and development all the way through to consultancy. This kind of research experience now marries quite well with the practical manufacturing capability that McMenon has."

David Bowers of ABB works closely with McMenon on many projects. He likens them to a Formula 1 team: "In F1, every detail is addressed, every small improvement makes the car perhaps 0.1 of a second faster and the same ethos is evident at McMenon – they bring the best people together with the right facilities and the result is a constant improvement in their ability to satisfy customers."

Author Contact Details

David Bowers, Product Manager Process & DP Flow, Spirit IT

• **ABB, Howard Road, Saint Neots, PE18 8EU** • Tel: +44 1480 475 321 • Email: enquiries.mp.uk@gb.abb.com • **Web: www.abb.com/measurement**