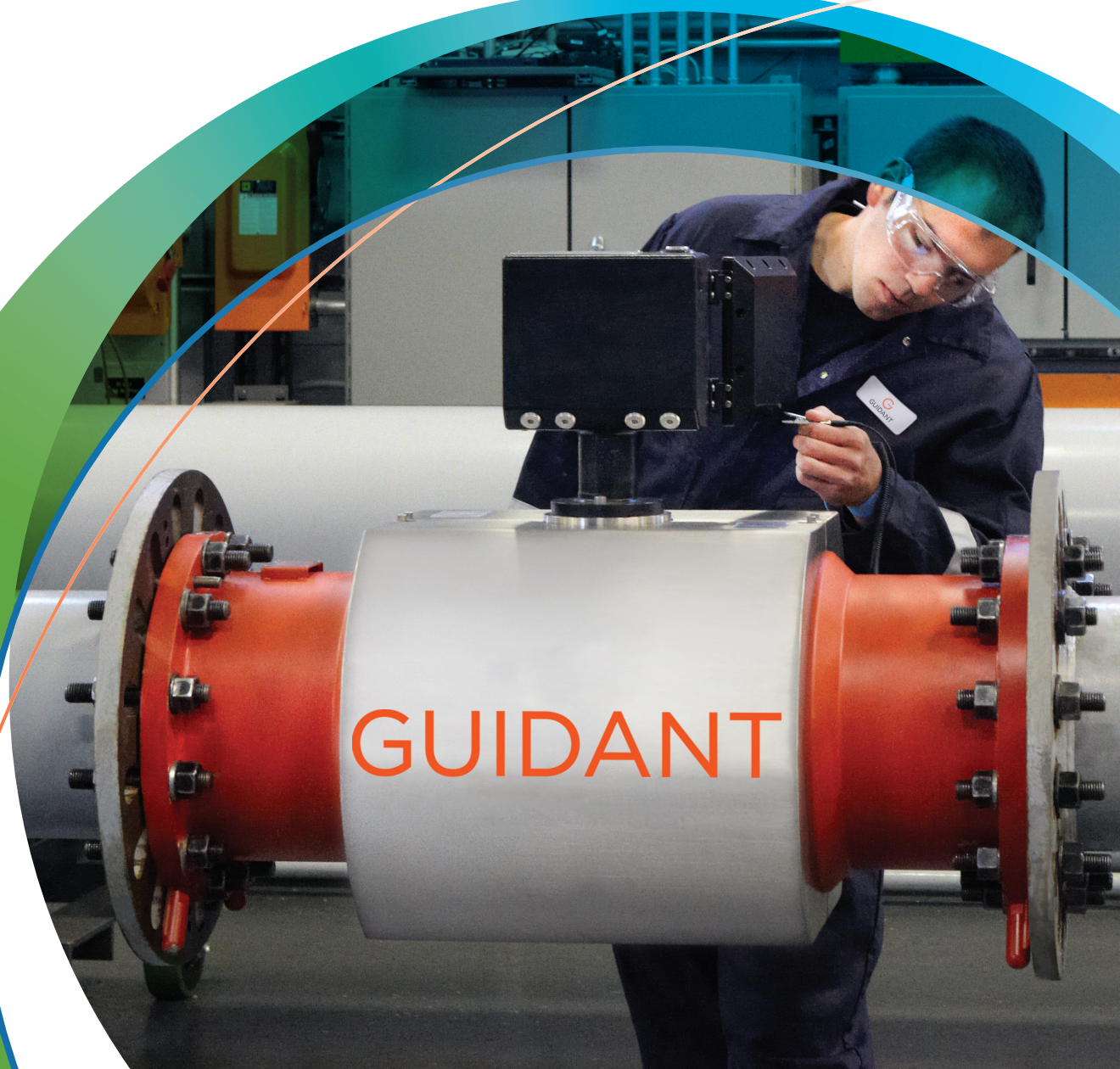




GUIDANT

Case Study: Ultra™ 8c Technology

Enhances flow measurement performance and reduces false alarms
during pipeline operations



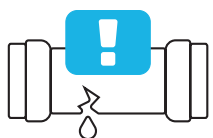
Problem: False alarms causing havoc with day-to-day pipeline operations, increasing downtime and costs

Measurement accuracy and stability is a critical function in leak detection to catch a potential pipeline leak quickly, efficiently and reliably. Numerous customers working with ultrasonic flow meters have partnered with Guidant for many of their challenging applications.

Some expressed concerns regarding measurement accuracy and its dependence on fluid profile and Reynolds number. Others made observations with regard to data transmission reliability within their leak-detection system. One of the few cases reported involved one of our customers (a major oil company in Western Canada) experiencing false alarms during pipeline operations, resulting in increased downtime and costs. After Guidant was consulted, we determined the false alarms were frequent in areas where adverse flow conditions were likely to occur.

Note that this customer was running a leak detection system with an installed base of six-path ultrasonic meters. It is well known in the industry that this measurement technology, when used for leak detection, does not sufficiently compensate for adverse conditions in the pipe, such as swirl and crossflow. These are some of the most common causes of false alarms occurring in measurement systems for leak detection. With a lack of visibility, the growing problem was challenging, as there was no way to determine whether a real incident was occurring.

Key Challenges



Frequent lost alarms

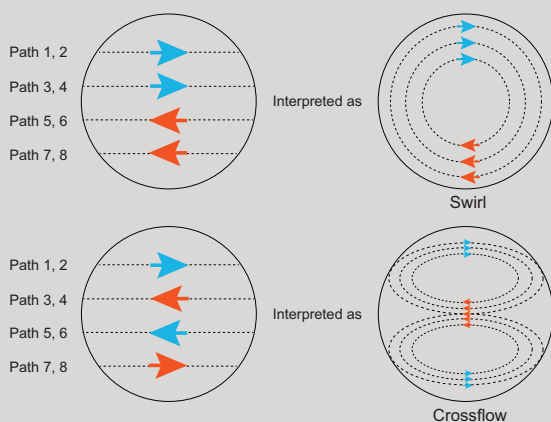


Lack of visibility on flow measurement data



Downtime and cost associated with pipeline investigations

What are swirl and crossflow conditions?



The illustration depicts an Ultra 8c path configuration.

Imagine a section of a pipe with liquid flowing in a clockwise or counter-clockwise motion across the complete section. This fluid dynamic effect is called swirl. Swirl is typically created by a double bend that is out of plane. A T-bend can amplify the swirl.

Imagine the same section of a pipe cut in half with liquid flowing in a clockwise motion through the top half of the pipe and in a counter-clockwise motion through the bottom half. This fluid dynamic effect is known by crossflow. Crossflow is typically created by a single bend.

Both effects derivate in the appearance of transversal components of the flow velocity, which eventually influences the accuracy of ultrasonic meters as it is either over- or under-read, depending on the measurement path analyzed.

Solution: Upgrading to ultrasonic eight-path technology compensates for the most challenging swirl and crossflow conditions and enhances the accuracy and performance of the existing installed base

A six-path ultrasonic meter is ideal for applications with stable flow profiles and process conditions. However, when adverse fluid dynamic effects occur (such as swirl and cross flow), the six-path ultrasonic measurement may read erratically due to its ultrasonic path distribution.

Following Guidant’s recommendations, some customers have replaced six-path meters with eight-path meters in applications where complex process conditions are known or likely to exist.

When our customer advised us that they were experiencing these pipeline issues, Guidant developed a solution to enhance the existing installed meter base and mitigate the challenges in a quick and cost effective way. With decades of expertise in ultrasonic technology, we embarked on a program led by Guidant’s Revolve™ program to upgrade the existing installed base of Ultra Series B meters to the Ultrasonic Series C with eight-path technology by adding two additional paths and using our Series B to C Upgrade Kit.

Additionally, “health bits” were introduced in our ultrasonic software, increasing the reliability of meter readings and the performance of the complete leak-detection system. The number of health bits available are 0 to 5. When a health bit is 0 (clear), it indicates a normal value. When it is 1, the value is suspect and indicates a situation that may compromise the accuracy of the reading. In such cases, the value is disregarded by the leak-detection system, significantly improving the data reliability reported by our customer.

Guidant was able to leverage our existing inventory to immediately upgrade our customer’s meters in the field. As an upgrade, it was not necessary to waste operational time by shutting down the pipe-insert spool. We appointed a dedicated engineer at the customer worksite and dedicated project managers across our facilities. The project managers coordinated the upgrades to align with pipeline outages and synchronized with our engineering and Flow Research and Test Center for testing and calibration. The process consisted of replacing an installed Ultra 6B with an upgraded Ultra 8c meter, shipping that Series B back to our facility, performing the upgrade to Series C 8-path technology, and then sending it back to the field to a suitable location. That process was coordinated multiple times.

Health Bit	Process Variable	Description
0	Flow rate	Flow-rate reading is suspect (already exists)
1	Velocity of sound	Velocity of sound reading is suspect
2	Density	Density computation is suspect
3	Viscosity	Viscosity computation is suspect
4	Reynolds number	Reynolds number computation is suspect
5	Analog output	Analog output is suspect (bad engineering variable, such as flow rate or analog (output is out of range)

Result: Customers experienced significantly fewer false alarms and less downtime after installing upgrade to ultrasonic eight-path technology

Our Ultra 8c offers advanced crossflow and swirl compensation, an intuitive touchscreen interface and an array of communications options, allowing our customers to connect ultrasonic meters to a network and easily monitor data remotely. The meter also includes a state-of-the-art interface with diagnostic capabilities, which allow customers to monitor and analyze product flow from almost anywhere. With advanced diagnostic features, physical property estimates and configurable alarms, the Ultra 8c is more than a meter: It's a complete monitoring system!

This meter has eight crossing measurement paths distributed over four parallel planes across the pipe section or complete measurement and cancellation of the transversal components of the flow velocity. As a result, the Ultra 8c maintains its measurement accuracy in the most difficult applications, including no flow conditioning, 5D upstream and transition region flow.

During a two-year period, Guidant upgraded 34 field meters ranging in size from 16 to 30 inches. The conversion program provided our customers access to enhanced measurement data, resulting in significantly lower false alarms and operational downtime. As an additional cost saving, the Series B to C Upgrade Kit enables you to keep your existing electronic enclosures in the Series B meter models.

Guidants's upgrade program adds substantial value to existing meters, providing as good as new 8-path meter technology for a fraction of the cost of new meters.

Benefits

A Clearer View of Your Pipeline Health

Our solutions help you future-proof your assets with upgrades that deliver evolving industry-driven enhancements. Ultrasonic eight-path technologies--coupled with our pipeline integrity solutions--provide a clear view of your pipeline's health and reduces environmental risks using enhanced analytic insights and proactive pipeline management.

Added Measurement Paths

A total of 16 transducers give the Ultra 8c crossed measurement paths across four separate planes, boosting crossflow and swirl compensation and measurement accuracy over a wider range of product type and flow conditions. Improved measurement ability provides more reliable accuracy in flow calculations, making it ideal for custody transfer.

Health Bits Improve Leak Detection System Performance

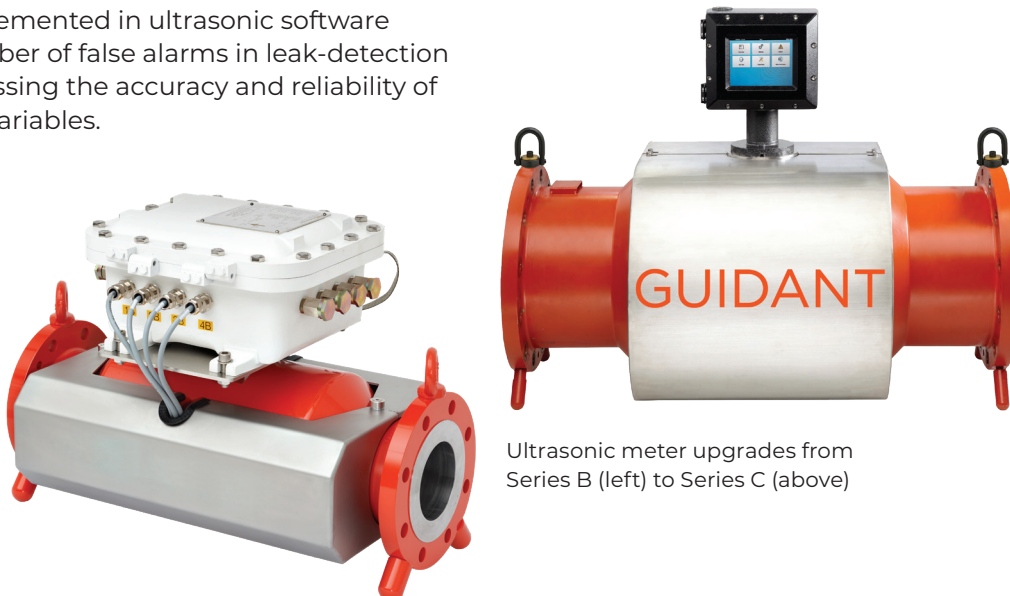
Health bits implemented in ultrasonic software reduce the number of false alarms in leak-detection systems by assessing the accuracy and reliability of meter-reading variables.

Measurement Path Substitution

Having more ultrasonic paths is a strong advantage in the unlikely event of one or more failing to properly measure. The Ultra 8c meter applies the path substitution strategy to mitigate the effect of losing one or more of the eight measurement paths by using other working paths to substitute the failed path with a calculated value based on recorded profiles.

Reducing Cost of Ownership

The straight-through run of an Ultra Series meter results in a nearly nonexistent pressure drop, reducing pumping and operating expenses. Fewer moving parts means less maintenance, making the Ultra 8c meter a smart choice for harsh operating environments and a boost to operational flexibility and maintenance costs. Converting existing meters to Ultra 8 technology adds substantial value to installed bases, compared to the expense of installing new meters.



Ultrasonic meter upgrades from Series B (left) to Series C (above)

About Guidant

As the undisputed leader in liquid and gas custody transfer solutions with the largest global install base, Guidant's legacy is built on more than 90 years of expertise, accuracy, reliability, and best-in-class technologies. We are a private company focused on the measurement solutions business, serving emerging and established energy markets across the globe.

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