



Wales & West Utilities

Transforming the accuracy and precision of on-site data capture and transmission

Key points

- Improves asset data quality and safety
- Accelerates data capture and validation
- Eliminates paperwork and reduces costs
- Greatly improves record keeping and makes it easy to identify historical records faster than before
- Future maintenance work and reactive emergency incident management should be safer and more efficient due to better asset location data

Summary

As Wales & West Utilities replaces old metal gas mains with new, long-lasting plastic ones across Wales and the south west of England, it wants to be sure that those new pipes are easy to find and maintain in the future.

By adopting a mobile digital data capture solution from AMT-SYBEX and Leica Geosystems, the company can use high-precision Global Navigation Satellite System (GNSS) equipment to map each asset to its exact geo-locational coordinates, down to the centimetre.

Capturing the information digitally also saves time for field engineers and back-office teams and reduces the risk of errors - ensuring that Wales & West Utilities will always know exactly where its pipes are.

The challenge

Safety is a top priority for Wales & West Utilities. The company invests £1.4m a week in replacing all old metal gas pipes within 30 metres of buildings with new plastic ones – reducing leakage and improving safety.

As it upgrades its pipes, the company also wants to upgrade its data, and gain an even more accurate understanding of where its assets are.

Data capture solution

A newly introduced mobile solution with advanced GNSS equipment helps Wales & West Utilities record the location of new pipes and all the relevant metadata

The solution

Wales & West Utilities has worked with AMT-SYBEX and Leica Geosystems to build a new mobile solution that uses high-precision GNSS equipment to measure and map the exact coordinates of each new pipe as it is laid, as well as capturing important metadata about valves, junctions and other components.

The benefits

- Digital data capture saves time for field engineers and back-office teams
- High-precision GNSS increases the accuracy of asset data and reduces the risk of errors
- Asset data can be transmitted from the field to the office in seconds, not days
- Eliminates paper-based processes, cuts costs and reduces environmental impact
- Future maintenance work should be safer and more efficient due to better location data

Replacing a paper based process

- Improves data quality
- Enables more pipeline to be sketched
- Reduces paper work and cuts costs

Set up as an independent network in 2005 after previously being part of National Grid, Wales & West Utilities operates 35,000km of gas distribution pipelines that transport gas to 2.5 million homes and businesses throughout Wales and the southwest of England. The company's priority is to keep its 7.5 million customers safe and warm, with gas connections and a gas supply they can rely on, and a level of service they can trust.

Putting safety first

Britain's gas network is the oldest in the world, dating back to the early 1800s—and although its gas mains have been upgraded over time, many thousands of miles of pipeline are still made from cast iron and other ductile metals. Over time, these pipes degrade and may eventually fracture, leading to gas leaks that impact the environment, reduce efficiency, increase costs, and can pose a danger to people and buildings.

Replacing these metal mains with more modern plastic pipes can significantly improve the security and reliability of the network,

reducing the risk of leaks and the number of repairs required. For this reason, the Health and Safety Executive has advised all the gas distribution networks to accelerate the replacement of metal mains, especially those that are within 30 metres of a building.

Upgrading infrastructure

Replacing old cast iron pipelines is a hugely resource-intensive task. Wales & West Utilities is nearly halfway through its upgrade program, replacing more than 400km of pipe every year.

Wales & West Utilities has taken this advice on board, and is already nearly halfway through a 30-year replacement programme. On average, the company replaces more than 400km of pipe every year.

Beverley Robinson, Data Records Manager at Wales & West Utilities, comments: "It's a huge programme, and it's very important for the business and for the regulator. In addition to capturing the information in the field my team is responsible for validating the data that comes in, keeping our asset repository up to date in our SAP ERP business systems, and producing reports for the regulator about our replacement programme progress."

Part of the effort is to ensure that when the new pipework is laid, the company updates its asset data to keep track of how the pipes, valves and joints fit together, what they are made of, and where to find them. Recording the position of a pipe accurately may seem like a simple task, but it can create complex problems.

Problems with paper-based processes

Simon Barrett, Records Officer at Wales & West Utilities, explains: "In the past, our measurement engineers would go out on site with a paper map, a clipboard and a measuring wheel, and would draw the new pipes on the map, with measurements relating to above-ground points of reference: for example, the pipe might run parallel to a road, at a distance of 75cm from the kerbstone.

The reference point

Previously, locations of laid pipes were recorded with paper forms and maps, using reference points such as the distance from a kerb. If a kerb is moved, the reference point is no longer valid, causing major issues.

"But what if a few years after we've laid the pipe, the road is widened and the kerb moved? Then our reference point is no longer accurate, and our crews could easily end up digging in the wrong place. Or what if we're laying a pipe somewhere that doesn't have any convenient reference points nearby, such as the middle of a field?"

After the initial data was captured, the downstream processes were also laborious. The engineers would scale up their field sketches and draw the new pipes on a larger map, which they would post to head office. Then the head office team would review the map and enter the data into the company's central mapping system, Esri.

“We had to wait days for the latest information to arrive from the field, and processing the data was time-consuming for everyone,” adds Beverley Robinson. “We also used a lot of paper, which was wasteful and impractical. Our measurement engineers need to be able to work outdoors in any conditions, and when it’s raining or windy, dealing with paper maps can be a big problem.”

Improving efficiency

The solution has allowed Wales & West utilities to digitise workflows and reduce manual effort at every stage.

Finding a solution

Wales & West Utilities wanted to find a solution that would take the burden of locating assets away from the user, and provide a precise, unambiguous view of where each pipe is laid. It also wanted to digitise the whole workflow, and reduce manual effort at every stage.

“For a few years, our leakage teams have been using a mobile solution called Affinity Geofield from AMT-SYBEX, which gives them access to accurate mapping data while they’re working on-site - even if they’re in a remote area where they don’t have a mobile data connection,” says Simon Barrett. “When we saw that Geofield could be used for drawing assets too, we saw its potential to help with some of our paperwork issues.”

To solve the other half of the problem, the company decided to use Leica Zeno, high-precision GNSS equipment from Leica Geosystems, to locate each pipe’s geographical coordinates to an accuracy of centimetres. However, integrating the Leica Zeno GNSS hardware with Geofield would be a first-of-its-kind project.

No connection, no problem

The solution makes it possible to work without the need for a constant mobile data connection.

“One of the biggest challenges was to ensure that the system would still work even if our measurement engineers lost their data connection,” explains Simon Barrett. “Normally, the system works by using Leica SmartNet Real-Time Kinematic GNSS services. The engineer holds a receiver which takes positional data from a constellation of GNSS satellites. These readings are then compared with the readings taken by nearby base stations, whose precise locations are already known. By comparing the two, you can correct any errors in the readings and achieve incredible accuracy.

“However, if you don’t have a mobile data connection to the base station, you can’t compare the readings, so you can’t do the correction. Since our engineers often work in remote areas where there’s little or no mobile phone signal, this was potentially a big problem.”

The project team solved this challenge by building a post-processing feature: effectively, if Geofield can’t find a mobile data connection, it will store all of the uncorrected readings from the Leica Zeno

equipment locally until the connection is re-established. Once connectivity is restored, it can then process all of the readings in a batch, and provide accurate, corrected geo-positioned data.

Digital data capture drives operational efficiency

With the solution in place, Wales & West Utilities is already saving time and reducing paperwork for field teams and back-office staff alike.

Getting more done

Geofield has made it easier for measurement engineers to carry out their work.

Simon Barrett comments: “Geofield makes life so much easier for our measurement engineers. You can stand at one end of a new pipe and simply tap on the screen to start drawing. Then you walk along the route of the pipe, continue to tap as you go, and the pipe is drawn accurately on the map on-screen. You can easily add curved pipe sections, valves and junctions, and you can fill in forms to capture metadata, such as the diameter of the pipe or the materials used.”

He adds: “Producing our as-built drawings via this new system contributes to each of our measurement engineers being able to cover approximately two kilometres more pipeline per year than they could with our old paper-based method.”

Beverley Robinson comments: “Once the data has been entered, it is transmitted instantly to our head office, so there’s no more redrawing and no more waiting for plans to arrive by post. When our office team is reviewing and validating the data against our records in SAP, everything is now on-screen, so there’s no need to deal with a large, unwieldy paper map; we can zoom in and out to see the detail we need.

Absolutely accurate data

“Geofield is enabling us to build up an absolutely accurate set of data about the assets we have, and precisely where they are.

Simon Barrett
Wales & West Utilities

“The Geofield forms also include automatic validation rules, which help our engineers enter the right data in the first place. This cuts down the number of errors and the amount of time we need to spend on manual reviews.”

“Geofield is enabling us to build up an absolutely accurate set of data about the assets we have, and precisely where they are,” says Simon Barrett. “In the future, when we need to come back and repair a main, we’ll know exactly where to dig—so we can minimize the time, disruption and cost of each job.

“There are also important safety implications: if a company or a local authority needs to know whether we have any mains in an area

where they want to do some construction work, we can be absolutely confident about our answer. In the same way, if there's a gas leak or another safety-critical problem, we can be sure of the affected location, which speeds up resolution of the problem.”

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