



Accurate GNSS-verified location of utilities and assets—to replace outdated maps, as well as paper and CAD drawings—was the primary motivation behind Dow Corning's GIS effort.

GIS ENHANCES SAFETY + EFFICIENCY

at Dow Corning's Midland Plant

While the concept of using GIS to accurately identify and map physical assets is widely accepted in cities, towns and municipalities throughout the country, that approach has not yet found the same level of broad acceptance within private industry. Perhaps because of a misplaced perception that it is far too costly or complex an undertaking, corporations have been less eager to employ this GPS-based approach to asset management. However, some, like Midland, MI-headquartered Dow Corning Corporation, have discovered the benefits a comprehensive GIS audit can provide. For them, not only is it providing a much-needed alternative to an outdated paper map system, it is opening up the possibility for a wealth of additional uses throughout the organization.

Mammoth in Midland

One of the largest employers in Midland, Dow Corning was founded nearly 70 years ago to advance the science of silicon-based materials. Today the company's sprawling Midland manufacturing site is the oldest and one of the most complex silicone manufacturing facilities in the world, employing more than 1,200 people to create the more than 2,500 products it sells worldwide.

"This is the original site at which Dow Corning began back in 1943, though it has grown significantly since that time," according to John Keyes, P.E., civil engineer for the company's Energy & Infrastructure Department. "Today, the Midland facility encompasses dozens of city blocks of manufacturing infrastructure—items such as buildings, utilities, piping, and so on—all of are currently only recorded on outdated paper maps. Though

>> By Larry Trojak

functional, the lack of any real locational accuracy increases the risk of problems in areas such as emergency response and onsite construction work. Left unchanged, it would continue to do so.”

Having previously worked with municipalities, Keyes was familiar with the use of GPS in locating and mapping utilities. He had, in fact, already seen the successful implementation of a program to integrate underground water, sewer, literally the assets of an entire township, using GPS and GIS.

“I thought it was a very innovative idea and felt that we could benefit from a similar approach here at the Midland plant,” he says. “We are constantly handling projects that involve our underground utilities and right now we have only paper drawings or CAD drawings of our utility locations. But some items are missing, some are incorrect; it’s not the most ideal process at all. We needed a centralized location where we could pull up a map and say: ‘This is where that utility is located, this is the elevation it’s at,’ and so on, and not have any conflicts with future construction. Dow Corning is constantly seeking ways to work more safely and efficiently, so in mid-2010, we started looking into what would be needed for us to get there.”

Survey Grade is a Must

Again, because of experience he had gained working on the municipal side of the business, Keyes contacted Bob Busch at Mi-GPS, a locally-based distributor of Topcon products and solutions. He says they were extremely helpful in showing what was available to meet their needs and offering suggestions as to the best combined hardware/software solution to get them there.

“We needed a unit with survey grade accuracy for locating and recording our assets, so they recommended the Topcon GRS-1,” he says. “And, because I’ve previously done some work with ESRI products— ArcPad, ArcMap, etc.—they worked that functionality into the package they put together for us. For me, there was a bit of a learning curve for both the GRS-1 and the ESRI software, but Bob and Mi-GPS were great in supporting our efforts; it’s been a very good experience.”

To ensure they get survey grade RTK accuracy on a consistent, reliable basis, Dow Corning is utilizing the Michigan Department of Transportation’s Continuously Operated Reference Stations (CORS) network.

Right: Dow Corning civil engineer John Keyes says the GIS effort will be key to infrastructure upgrades, given that the Midland plant, Down Corning’s original manufacturing facility, was built in the 1940s.



Left: Topcon’s GRS-1, working in conjunction with Michigan DOTs CORS network, provided the survey-grade RTK accuracy needed for the GIS project.



“Some of our utilities are extremely close together—it’s not uncommon to have a number of different utilities within a two-foot radius—so we needed centimeter-level accuracy. Tapping into MDOT’s CORS network made perfect sense and doing so was a simple process—just a matter of licensing, actually. With all that in place, we started the project in late December of 2011 and have been at work gathering data on a semi-regular basis since.”

Data Collection Effort

To appreciate the benefit of a comprehensive, accessible GIS database, one only needs to see the complexity of the facility itself. What appears to be hundreds of miles of pipe runs throughout the plant, moving a wide range of material—both above ground

and below—between the various onsite production centers. That can include everything from chemicals and gases used in the production process to more common components such as water, wastewater, etc.

“In terms of our needs, we are pretty much like a small municipality or township. As such, we can occasionally experience a pipe leak, or need to relocate a section of pipe to accommodate an expansion. In such cases, having this GIS info will enable us to more safely and quickly locate and address issues and projects. To get to that point, we are going out and using the GRS-1 to generate shapefiles of assets. Our approach for gathering info varies: on some days I will focus on one specific attribute or utility and on others I will focus on one area and collect

all the different utilities—pipes, poles, valves, manholes, catch basins, hydrants, cleanouts, whatever—within that area.”

That process is a day-long affair, given the time needed to formulate a plan, set up and calibrate the GRS-1 at the location, lock the position, and do the actual work. Rather than “stockpiling” a massive amount of data to be worked on at a later date, Keyes says that he generally prefers to take readings and process that data immediately. Doing so involves downloading the newly-gathered shapefiles from the GRS-1 to their desktop computer at the office.

“Making the transition from field work with the GRS-1 to in-office work is seamless since Mi-GPS configured our Topcon unit to run ESRI software,” he says. “Once in-house, we can easily take the shapefiles of the assets we’ve collected and do any necessary updating or correction. We import the data into ArcGIS and, in a sense, connect the dots to give us a real representation of the asset locations. In addition, an engineering firm with whom we have subcontracted is taking those data points and constructing a 3D model which will further improve our ability to easily identify all parts of the plant’s infrastructure.”

Building on GIS

Keyes says the data gathering portion of the project is an ongoing one and, because it is only a small (but important) part of his overall job, will probably take a year or better to complete. Once the GIS database is fully in place, he says, they have plans to take the effort forward in a number of ways.

“For day-to-day use, the most valuable aspect of this will be for emergency response,” he says. “It will be invaluable to know that, when we have to shut down a section of pipeline, we will be able to immediately and safely identify where the appropriate valves are located then go out there and isolate that pipe. Long term, however, we want to get to a



When completed and processed, it is hoped that the data collected will prove valuable in generating a flow analysis scenario to better understand capabilities, identify shortcomings, and plan for future growth in the massive piping system located at Midland.

point at which we can create flow models based on our GIS effort. These models will allow us to simulate our various pipe networks and, using capacity analysis and studies on flow conditions, know what our infrastructure is capable of handling, identify any inefficiencies, help us plan for future growth, and more. It really opens up a world of possibilities for us in that regard.”

He adds that, while Dow Corning’s operation in Barry, South Wales, is also using GIS for its own mapping applications, there is a lot of opportunity to “share the wealth” throughout the company’s other locations, both here and abroad.

“I’ve already had other people come up with other suggestions as to how

the GRS-1 and its capabilities could help them,” he says. “So there’s a level of excitement about what we’re doing. Personally, I would like to bring this technology to other sites and try to get something similar accomplished, so that we would all be running within the same system and accessing a centralized location of data. That’s well within the realm of possibility; I think the use of the GRS-1 is limited only to one’s imagination.” 

Larry Trojak is a communications writer for his own firm, Trojak Communications, in the town of Ham Lake, Minnesota. He is a frequent contributor to construction and survey magazines.

About Dow Corning

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