



# Topcon's GPT-7000i solves measurement issues for ENGlobal

Houston firm named No. 1 in U.S. growth

**W**orld-class. We read or hear this term every day. It's used to describe an organization that is capable of providing superior services – the very best available – across the globe.

ENGlobal Engineering, Inc., a subsidiary of ENGlobal Corporation (AMEX:ENG), is truly a world-class engineering firm.



Based in Houston, Texas, the company's branch offices and subsidiaries provide state-of-the-art design, engineering, and systems management services to many leading petroleum producers and process industry clients. In 2004 and 2005, ENGlobal was named the #1 fastest growing engineering firm in the United States by ZweigWhite, an engineering, procurement, and construction consulting firm. Engineering News-Record cited ENGlobal (July 2005) as no. 58 in the Top 500 Design Firms; no. 10 in the Top 25 in Petroleum; and no. 5 in the Top 20 in Pipelines.

Process industries and energy producers are constantly modifying plant installations to improve efficiency or comply with environmental regulations. Industrial piping is designed schematically, built on site, and adjusted in the field to match existing conditions. There are no "as-built" surveys to reference when changes are proposed. Errors in measurement can mean time-consuming and costly rework when construction is underway. At the fast pace of production, these delays translate directly to lost profits and



**ENGlobals' typical job site - a maze of piping, tall structures, difficult access, and potentially hazardous conditions.**

consequently damages the client/contractor relationship.

The need for on-call engineering services by large industrial plants has spurred the growth of ENGlobal's Lake Charles, Louisiana, office. Staff engineers and designers are frequently called upon to make detailed analysis of existing piping and structures to ensure that the new components will fit as designed. To accomplish these requests, crews must be sent to the site to locate and document existing features.

Typical project areas are a maze of piping and structures cascading upward from ground level. Getting to the points of required measurement can be difficult. Some locations are accessible via existing stairways. Some can be reached with a ladder. In other cases, a motorized man lift or a scaffold must be used. Scaffolding is an expensive proposition. It must be planned, designed, and checked



**Ben Sherrod and Castille Hebert on site with Topcon's GPT-7001i.**

daily for safety by certified personnel.

Positioning a man at elevated locations takes time. Once in position, a tape measure or plumb bob is dropped to the ground to determine the location. Detailed field notes are created to document the precise point of measurement. Working in these areas, under potentially hazardous conditions can lead to error.

Back at the office, points obtained from the site reconnaissance are entered into CAD design programs for analysis. Sometimes ambiguities in the field notes become evident. Was the measurement taken to the inside or outside of the flange? A one inch deviation discovered at the time of construction can result in delays and costly rework of piping. The only way to provide a reliable answer is another trip to the site.

Castille Hebert, civil/structural designer at the Lake Charles office, sought a better way to obtain and document the locations of existing installations. His search led him to a revolutionary new instrument – Topcon's GPT-7000i digital imaging total station.

The use of total stations for plant measurement tasks was not a new concept for ENGlobal. Other offices used total stations that required a reflecting target. Placement of the target at elevated locations is still an issue and a resultant labor cost. The GPT-7000i offered two major advantages. The instrument can measure without a reflector at distances up to 820 feet – well within the working range of ENGlobal's projects.

More importantly, the GPT-7000i contains a digital camera that captures a wide-angle view of the general area and close-up views of each point measured. Detailed field notes are no longer required to validate point data. To provide the highest degree of accuracy



**(Above) Wide-angle view shows general area of measurement point numbers  
(Below) Close-up view shows exact point of measurement - bottom of upper flange**



possible, Hebert chose the GPT-7001i. The "1" indicates a one arc-second model.

ENGlobal has experienced a new level of speed and accuracy with the GPT-70001i. Hebert described a recent project: "We had to 'as-built' the location of a tank," he explained. "The client wanted to take the tank up, install a ring wall foundation for environmental compliance, and put the tank back in the exact same location." Existing connections to nozzles had to match up. The crew went to the site and took 30 shots in 30 minutes. "It took us longer

to set the control than it did to take the shots," Hebert said. "We were in and out in a minimal amount of time. If we had to do it the old way, it would have taken three to four days."

Ben Sherrod, project engineer, has operated the GPT-7001i in the field on several projects. In the office, Sherrod does extensive 3D modeling of proposed installations. He described one project that attested to the instrument's accuracy. "We did a steam line that was 700 feet long with vertical expansion loops," he said, "we shot all the points we needed in half-a-day – what normally

would have been a week's worth of work. The difference between what they measured in the field and what we shot was three-sixteenths of an inch over 700 feet."

Hebert asked Sherman Guillory, a piping designer at the Lake Charles office, to get involved with the use of the GPT-7001i and evaluate its performance. "I was a little skeptical, not so much that I don't trust technology, but because my name is put on these drawings," Guillory said. "I wanted to double-check by measuring what we shot and checking it against existing drawings."

Guillory used Topcon's TopLink software to import field data obtained on several jobs with the GPT-7001i.

"Since I have seen the actual shots and used the generated data, I have no doubts about the high degree of this instrument's accuracy," he said. "I can always go back to the pictures and see exactly where every shot was taken - that's a great advantage." He said another important aspect is safety. "Our crews feel more comfortable securing field data because the need to climb has been significantly reduced or eliminated completely."

Pie Bridges, business development manager, told the story of a client that recently discovered a 70 percent error rate in plant measurements. To avoid subsequent problems, the company invested in a laser scan survey at a high cost.

Extensive preplanning was required and the entire plant had to be included. The lengthy turnaround time for data delivery delayed the plant's production schedule.



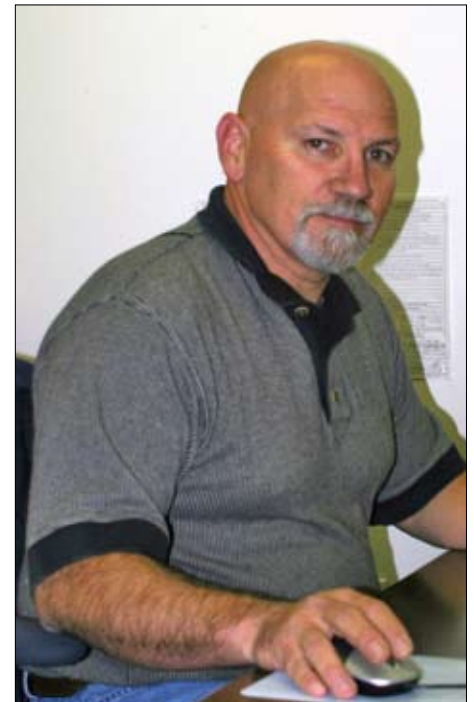
**Ben Sherrod shoots an elevated structure with Topcon's GPT-7001i**

For the type of information that ENGlobal's clients typically need, laser scanning is expensive and creates more data than actually needed.

Bridges told this client about the GPT-7001i. "Our clients are excited about the addition of this new technology," she said. "Although it minimizes the time required to obtain field data, accuracy is never compromised but only enhanced."

She said ENGlobal's crews can go to the site and obtain only the necessary data in a short period of time. Depending on the client's scope, the results can be returned the same day or the next morning.

"We only shoot what we need and human error is virtually eliminated," she said. "Because this technology is cost-effective, our clients don't have to go through an act of Congress as they would to get a laser scanning budget approved."



**Sherman Guillory, piping designer**

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