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Rolf Witt, (left) sales manager with ADMAR, explains the features of the Topcon Machine Control Box to DDS operator Brad Card

Rocket Science Gets Down And Dirty

by Jim Thornton

"The use of Global Positioning System (GPS) Satellite technology in construction is where 'rocket science' meets dirt moving," said Admar Supply Company Sales Manager, Rolf Witt. "The developments in three-dimensional grade-control and positioning technology in the past few years represent a major advancement in the way construction gets done, yet the dramatic benefits of this technology are still not totally known by many contractors," Witt added.

The science behind satellite positioning and machine control is sophisticated, but the benefits to the operator, contractor and project schedule are tangible and within anyone's grasp. How does this satellite system whirling about, high above the earth, unseen by human eyes impact a contractor's business? Just ask end users like Sean Donohoe of DDS Engineers and Constructors.

DDS Constructors open the door to the future Donohoe founded Donohoe Development Services (DDS) in 2001. The Clarkson University Graduate, licensed Professional Engineer in New York and Pennsylvania, had a vision of taking his business to a new level. Having experience as both



(From left) Jeff Jarosinski, DDS General Superintendent; Shawn Donohoe, DDS Owner and president; Mark Stratt, ADMAR; Tom Scroger, DiMarco Site Superintendent; Rolf Witt, ADMAR and Brad Card, DDS Operator (in rear).

Since DDS's inception in 2001, the company has completed in excess of 75 major construction and engineering projects in the greater Rochester, NY area. The Rochester metro area is made up of Monroe, Genesee, Ontario, and Wayne counties. These projects include design, earthwork, utilities and pavements for residential subdivisions such as Evergreen Park in Mendon, NY to commercial / industrial projects such as the new 101,000 s/f FedEx

(Federal Express is no longer the formal name, FedEx is the formal name) Ground distribution facility in Henrietta, NY. DDS Engineers have been brought in to assist with design/build projects for the many local general contractors and land developers.

DDS was recently retained by DiMarco Constructors LLC of Rochester, NY to perform site work on a new student housing complex now underway at Monroe Community College. Their responsibilities include earthwork, utilities, drainage, paving, curbs, and sidewalks. The project posed numerous opportunities for Donohoe and his team to showcase their engineering and construction abilities. Poor soil conditions required substantial cut and fill for the size of the site. Approximately 20,000 cubic yards of material had to be excavated and exported. The excavation was then

backfilled with suitable material and compacted in controlled lifts. Another challenge on this project was to maintain as much of the natural landscape as possible. Unique storm water management ponds were designed to incorporate much of the existing vegetation and specimen trees on site. According to Donohoe, Dave Hofmeister, a Professional Engineer with DiMarco Constructors, worked closely with the Monroe Community College Association on the design of the project to ensure the landscape would retain its natural setting. As far as challenges go, DDS General Superintendent, Jeff Jarosinski, added they have had more than their share of weather-related delays but maintained the project is on schedule.

Given the unique and complex conditions on this project, Donohoe knew it was the right time to make a substantial investment in his business and further integrate his companies' engineering and construction abilities. This project would be a first for DDS with the application of Global

Positioning Satellite (GPS) technology on a dozer. Donohoe embraced the technology several years ago when he began to research GPS and related construction applications. Donohoe asserted, "This was the right project to pull the trigger." Donohoe believes that the development and application of GPS technology is the most exciting and revolutionary development in the industry today.



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an engineer and contractor, he saw an opportunity to create two separate sister companies DDS Engineers, LLP and DDS Constructors, LLC. By combining the resources of a full service civil engineering firm with the practical knowledge of a site contractor, DDS provides a seamless integration of design and construction. DDS Constructors currently employs 40 associates and DDS Engineers employs 10.

Donohoe credits Admar Supply Company for assisting DDS with their final selection. DDS chose a Topcon system that would satisfy their current and future needs. ADMAR is the exclusive factory authorized Topcon dealer in Upstate New York. Sean Donohoe stated, "There was no way we would have taken this leap of faith without putting our hands on the equipment first."

According to Rich DiMarco II, Admar Supply Executive Vice President, "Admar is very unique in the positioning products industry, because we own several GPS equipped dozers and we have the expertise to bring them out to a customer's 'real' site and allow them to get hands-on experience with machine control. This is a new product and we understand the contractor's need to get stick time." He continues, "We have five branches across New York State and we see the same thing everywhere we go: once the contractor uses the Topcon system and sees the results on their site, they are always very excited."

The GPS system that DDS chose consists of the Topcon HiPer Lite + survey base and rover, the Topcon FC100 Data Collector with Pocket 3D software, and a Topcon 3D GPS machine control system. Admar installed the machine control system on DDS's John Deere 700H dozer and provided the training to get DDS personnel comfortable working with the system. According to Donohoe, the TOPCON system is very

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enabled dozer every day and quickly attained a strong proficiency level. "I found the Topcon equipment to be pretty easy to learn," said Card. "Now I'm able to replace stakes myself and check grade both on and off the machine. I'm also doing quick topos of stockpiles to verify quantities." The GPS-equipped dozer was used to cut-and-fill, grade sub-base material, and finish grade topsoil. The system was particularly helpful grading the odd-shaped detention ponds with surgical precision. Substantially cutting down on survey staking was another obvious benefit Donohoe was quick to point out. Staking was reduced by as much as 75% on this project. One example Donohoe cited was during construction of the Loop road, where no offset stakes were needed. Two DDS personnel rolled out the geotextile fabric in front of the dozer and checked the grade with the Topcon rover unit as they moved along. Lost time due to missing survey stakes are a thing of the past. Donohoe attested, "This system allows you to get data

on the fly. You don't need to bring back surveyors for staking, re-staking, or worry about lost time between stakeouts. This system allows you to eliminate the things that keep you awake at night."

When asked about overall productivity improvements, Donohoe stated "We are saving a lot of time and I put our overall productivity gains in the neighborhood of 25%." Donohoe's future plans are for DDS to add additional GPS systems to their dozer fleet. The benefits extend well beyond the bottom line of the site contractor. Bob Reich, Project Superintendent for DiMarco Constructors explains, "There is no question that the use of GPS and machine control on this project helped keep us on schedule, in spite of the rain delays we experienced." He continues, "The accuracy of the work was also very high." As DDS continues to grow and flourish, Donohoe foresees many applications for GPS to enhance productivity and efficiency as well increasing the accuracy and quality of the services DDS provides their customers. With his recent acquisition of Rochester Utility Contractors (RUC), the combined companies have more than doubled in size to 130 employees.

DDS is currently bidding on upcoming land development projects, including residential, commercial, and industrial projects. For additional information contact DDS Constructors at 585-924-5150 or DDS Engineers at 585-427-9210 or email to www.ddengineers.com

Positioning satellites circle the earth at altitudes anywhere between 6,000 to 12,000 miles. The two systems currently being utilized for positioning are the U.S. NAVSTAR Global Positioning System (GPS) and Russia's Global Navigation Satellite System (GLONASS). Both systems were originally implemented to provide highly accurate navigation



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user-friendly for operators. The machine control system improves the efficiency and productivity of newer operators.

Admar's Machine Control Specialist, Tom Krenzer, said, "It takes a dozer operator about 30 to 60 minutes to get up and running with the system. From there we can complete their



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information to their respective military forces around the world. A consortium of European countries is also developing a third global navigation satellite system called GALILEO. While the satellite systems are owned and operated by their respective countries, the navigation information is available "free" for civilian applications for the greater public good. A growing number of commercial products including the Topcon line of Grade Control, Machine Control and Land Surveying equipment use the satellite networks information.

Each of the satellites contains a radio transmitter which transmits a signal which is then "picked up" by a GPS receiver on the ground. The GPS receiver on the ground contains a

computer that calculates its own position by getting signals from three or four of the satellites, using a process called trilateration (this is similar to triangulation). The result is provided in the form of a geographic position (longitude and latitude). Satellite systems are widely used for land surveying and machine control; however, a minimum of five satellites is needed to overcome obstructions such as trees, buildings, and steep slopes. This is where Topcon's GPS+ technology shines. As Admar's Survey Products Specialist, Doug Kutzbach explained, "Topcon GPS+ users currently have access to all 41 satellites in the GPS and GLONASS systems. Topcon's newest G3 technology will soon give users access to more than 80 satellites." Kutzbach continues, "So not only do we offer the most user-friendly grade control system, Topcon products also offer the best uptime and greatest accuracies." Admar's Machine Control

Specialist, Tom Krenzer, explained that Admar could configure a 3D Topcon system to meet the present and future needs of their customers. Topcon's systems are available for dozers, graders, scrapers, and excavators as well. Topcon's GPS systems can be installed on any make and model of machine. ADMAR installs and services Topcon systems in-house. In addition to 3D GPS systems, Admar also offers a complete line of Topcon 2D laser grade control and automation products. For more information on all of Topcon products contact Admar Supply at 1-800-836-2300 and talk to one of their in-house Machine Control Specialists or visit www.admarsupply.com. You may also visit Topcon at www.topcon.com



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