

GPS TEACHING OUTREACH

Foresight in Survey Education

It's no secret that GPS systems have changed surveying. To keep pace with industry, international educational systems need to teach students how to use GPS systems and modern survey equipment, such as robotic total-stations. Within the framework of the Educational Partnership Program more than five hundred educational institutions in North and South America and Europe have been supplied with Topcon survey and GPS equipment.

Surveyors using GPS equipment can do much more work in less time; using a GPS system means that a survey project that formerly took a crew five days is now completed in just three, with fewer personnel in the survey crew. Many cities in the United States, for example, have GPS networks already set up. Steven Frank, associate professor at New Mexico State University fully appreciates this. "If you've got a GPS network in place with permanent control points, you can just send out one or two people to do property boundary surveying, construction surveying, or even mapping surveying." To function in today's environment, civil engineering students, and especially those majoring in surveying, need to understand GPS systems.

Equipping the Campus

The Geomatics Department at Oregon Institute of Technology, Klamath Falls, Oregon employs Topcon GPS equipment in close to twenty courses. According to Jack Walker, who holds the chair, higher education is being severely impacted by the recession, and Topcon is being enormously helpful in allowing tracking with state-of-the-art technology. One of the first schools to benefit from the Educational Partnership Program (EPP) was the University of Maine, which offers a four-year degree course in surveying, preparing students for licensure as a professional land surveyor in the United States. This student is familiarised with every aspect of surveying needed to pass the examinations, and is taught to manage the business aspects of a survey operation, including both verbal and written communication of survey information.

Profound Effect

The department of Surveying Engineering Technology at the University of Maine acquired its first GPS systems in about 2005: two complete sets of HiperLite + GPS systems, two bases and two rovers. They are used in several courses. On the introductory GPS course students learn basic field procedures for both post-processed data and data processed in the field; post-processed data are processed in the office. On the course entitled Advanced Practical GPS students learn more extended components of the mathematics of GPS. On the Advanced Surveying course, they learn to integrate GPS with optical survey measurements. And on the Adjustment Computations course students apply extended statistics to the use of GPS.

According to their professor, Raymond Hintz, "GPS systems have had a profound effect on everything we do as professional surveyors.

What we do today is very different from what we did twenty years ago. Measurements are not taken manually; they're done with the help of satellite signals. If GPS has that much influence in practice, then it has that same influence on what we do in education. It's remarkable how easy it is to use GPS systems, but the educational component involves applying it correctly to real-world problems. If you have a new heart medicine, you still need to know how to apply it correctly."

People Power

Hinz attributes the success of the educational programme largely to the dedication of the people involved. He has special praise

for Dominick Auletto, former vice-president of business development at Topcon, and the man who started and built up the programme, and specifically credits Topcon CEO and president Ray O'Connor and Hank Boudreau, the northeast regional manager. The programme started by focusing on approximately 25 schools that ran four-year degree programmes in surveying. The focus was then extended to engineering universities offering courses in surveying, then on to two-year associate degree programmes in surveying.

The next phase of the programme was geared toward training schools run by labour unions, where a start was made with operating engineers, and from there branched into the Labourers Union. The package of equipment originally formulated for operating engineers was Topcon's GR-3 Pocket 3D GPS system. A special programme was offered to the operating engineers' union for machine-control equipment. Dealers installed the equipment on their dozers, motor graders and excavators; a GPS package was then made available for work with heavy equipment.

Auletto is enthusiastic about the EPP programme, which he says could never have had such success without the participation of the dealers. "Once the dealers got hold of this thing, it really blossomed."

Durable Instruments

At Purdue University in Indiana the department keeps a minimum of seven total-stations as teaching tools. In 1992 Purdue bought four total-stations and ten levels, and Topcon agreed to loan a further three total-stations each year; Purdue has since bought two more total-stations. According to Associate Professor of Civil Engineering Steven Johnson these are used hard in the sophomore class. Civil engineering students use the total-stations to take fundamental measurements of distances, angles and elevations. "We don't use robotics," says Johnson. "We use a basic total-station so that they do the fundamental field operations and calculations themselves. The stations have been very reliable and have held up well under students who are just learning to operate them properly."

Multi-course Use

At New Mexico State University GPS systems have been implemented across the curriculum. The university has four Topcon HiperLite + GPS units. There is a GPS course here, but the GPS equipment is also used on other courses like Public Land Surveying, Introductory Survey Measurements and Introduction to Satellites and Geodesy. Every class that includes field exercises will have at least one session using GPS. New Mexico's basic surveying course is Survey 222 - Plane Surveying. "We have the students run a traditional traverse using conventional surveying equipment, and then run it using GPS equipment so they can compare the two," says Associate Professor Steven Frank. "Students usually produce superior results with GPS equipment because it's easier to use. They don't have the sophistication needed to use conventional equipment in the way it needs to be used to get the same results." The campus at New Mexico is well suited to the use of GPS equipment because there are few trees to obstruct satellite signals.

The EPP has so far supplied survey and GPS equipment to more than five hundred educational institutions in North and South America and Europe.