

Kinematic and RTK surveys

For site work, *kinematic GNSS* is used for control surveys, detail surveying (mapping) and construction measurements. As for all precision surveying with GNSS, kinematic methods require one or more reference receivers to be located at known positions, whether these are local or part of a commercial network. However, compared to static surveys, the rover is moved from point to point during a survey and this is why **it is** called kinematic (or on the move) surveying.

During a *post-processed kinematic survey*, all the data collected by the reference and roving receivers is stored in handheld computers, controllers or on board receivers and then transferred to a host computer after the fieldwork has been completed. The host computer is then used to compute the positions of all the points surveyed. Consequently, the results for the coordinates of all the surveyed points are not immediately available. A major disadvantage with post-processed surveys is that setting out cannot be done.

This problem is overcome by using a *real-time kinematic* (or simply *RTK*) GNSS surveying system in which correctional data is transmitted from the reference receivers to a rover which combines the reference station observations and coordinates with its own observations to compute position. To be able to work in real time, the software that would be used for post-processing has to be installed in the rover and it is also fitted with a communications link. As they can compute position in real time, RTK systems are used extensively for setting out on site and for detail surveys because it is possible to check work before leaving the site.

When using RTK system for a detail survey, the rover stops at discrete points and collects data for a short period of 1 or 2 s (this method is also known as *stop-and-go surveying*) after which a feature code can be entered into the receiver or its data collector to identify the point. Topographic and GIS surveys can also be carried out using a handheld receiver. The complete system can also be mounted on a vehicle of some sort, with data collected at pre-determined intervals. This is a very useful technique in construction surveys for measuring longitudinal profiles and cross-sections very quickly and for obtaining data for forming digital terrain models, especially those covering large areas.

RTK surveys can be carried out using two methods in which correctional data is continuously transmitted between reference receivers and the rovers used on site. In one method, a reference receiver is installed close to a site at a location known as a base station and one or more rovers work in conjunction with this. This has several names, including *local base station RTK*, *conventional RTK* or *single reference station RTK*: local base station RTK will be used in *Surveying for Engineers*. A local base station RTK system is set up by the contractor and is usually based on an arbitrary local coordinate grid-on some sites, more than one base station may be established.