

Real-Time Kinematic GPS to CADD

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- RTK GPS has the potential of real time solutions to engineering design accuracies (better than 0.10 ft. 90% of the time)
- This can only occur in “open sky” conditions (not near trees, buildings, and other obstructions)
- Fortunately RTK GPS gives you accuracy indicators while surveying, and the data collector can be set to not record about a certain error estimate level.

- Historically precise GPS involves a base and rover with both systems collecting raw data.
- The raw data is processed in the office into a vector from the base to the rover.
- If the base has coordinates the vector is used to generate coordinates on the rover.

- In RTK GPS the raw data is processed in the field real time using
 - (1) Radio link or
 - (2) Cell phone text transmission

Thus with an RTK base on a known position the rover position is calculated real time.

The base is usually near the rover (on site up to 2 miles) but newer technology is allowing it to be further away.

Multiple rovers can work from one base.

- Checks in RTK surveying

The rover should “check in” to a second known position at the start of a survey, and approximately every half hour during the survey. In a higher precision survey any number of known positions can be checked into.

These check-in’s can be stored to validate reasonable data is being collected and proper field checks are being made.

- All RTK data collector systems allow for point name, feature code, and descriptive information to be entered.
- In Geopak the feature code can be automatically assigned attribute (ground vs. feature) and zone through a defined look-up table.

How to do chains????

Geopak allows identification of user definable
line codes for items like

begin line (we will use B)

change geometry (straight vs. curve) (G)

place gap in chain (U)

reverse curve (R)

Close chain (back to first point) (C)

end line (E)

- The chain building system is independent of the data collector software or vector who provides the collection hardware.
- Example: to start a centerline of feature code CL in the description field one enters
- B CL

Straight is assumed, if it started on a curve the entry would be

B G CL

If not changing geometry all later shots would simply be designated CL.

- End chain is really not needed, as beginning a new chain after the last point automatically ends the previous chain.
- Multiple chains of same feature collected at same time is handled using Geopak's "apply best match" feature. Multiple EP chains could be assigned feature code of EP1, EP2, etc. in the field and Geopak would recognize the closest feature code match of EP yet know how to connect the various EP chains correctly.

- All RTK GPS collection systems store data in their vendor specific formats.
- Fortunately all vendors allow exporting to text files all coordinate and attribute information.
- A standard format for text output is
- Point_id,N,E,Z,description
- Where description would contain the line code (if needed), feature code, and possibly and additional description

- Through user defined ascii text import, Geopak will be able to read this information and develop the traditional CADD information we are used to getting from .xyz coordinate files and chains from .obs
- Live example
- Questions and answers

- Latest trends in RTK GPS
- Longer line RTK
- Cell phone RTK eliminates the problems that existed with radio link having a limited range.
- BUT RTK often will not produce as precise solutions as the distance from the base grows. One needs to be very careful not to extend the range beyond the needed accuracy of the survey.

- Eliminating the need for a survey crew's base.
- Vendors are now establishing regional networks of permanent RTK bases in certain urban areas where the market warrants it.
- A user takes advantage of these bases instead of having to utilize their own on a job site.
- The permanent bases process between each other real time enabling better solutions than a single base as the systematic errors in GPS can be modelled.

- The future – Precise Point Positioning (PPP)
- The Canadian equivalent of NGS now maintains a web site where for post-processed data they will accept your data and determine a PPP solution for you usually to better than 5 cm. of a vector type solution
- Unfortunately it requires use of the precise ephemeris (satellite orbits) which is unavailable until approximately 14 days after the survey date.

- More future – Real Time PPP
- A few companies are beginning to model the precise ephemeris real time.
- A surveyor purchases an access fee to one of these companies services and eliminates base stations altogether.
- This service is already being marketed to the 0.1-0.2 meter accuracy needs.
- Questions and answers