GEO INSTRUMENTS

MonStar Least Squares Processing

Applications

AMTS are advanced optical monitoring systems built around high-precision robotic total stations. The systems provide automated monitoring of deformation and settlement in structures and excavation support systems.

AMTS operate autonomously, obtain frequent measurements, and can achieve accuracy approaching that of standard geotechnical instruments.

AMTS systems from GEO-Instruments include controllers to provide unattended 24/7 operation and wireless communications for data transfers to GEO's offsite servers.

GEO's servers are configured with a suite of specialized applications, collectively called GeoCloud, that process readings from different types of instruments and distribute alarms, plots, and data to authorized users via the web.

MonStar, developed by GEO-Instruments, is one of the specialized GeoCloud applications. Monstar automates the least squares processing of AMTS data.

Features

• Runs on GeoCloud servers.

- Automatically processes AMTS data files sent to a project import folder.
- Compatible with data files from AMTS built around Leica, Trimble, and Topcon robotic total stations.
- Parses data by time stamp, checking for a minimum number of observations for each target per reporting interval, and formatting the data for STAR*NET.
- Calls STAR*NET to run a rigorous least squares adjustment on the combined data from all AMTS for each reporting interval.
- Post-processes STAR*NET's statistically robust output into the format required by the client and forwards it to online reporting software, integrating the results with those of other geotechnical sensors.
- Archives both unprocessed data and adjusted data for review and backup purposes.

Advantages

- Corrects for instrument movement between observation cycles, allowing instruments to be installed within the zone of influence or expected movement.
- Allows for an unlimited number of fixed reference points to be used in the least squares adjustment.
- Allows adjustment of large blocks of historical data by user defined reporting interval.
- Provides comprehensive statistical reporting for monitored points.
- Allows adjustment of multiple observations to targets resulting in more consistent reported values.
- Provides uniform coordinate system for all instruments and monitoring on the site.
- Links observations of the same target from multiple instruments and also observations between instruments, strengthening the observation network and increasing precision.
- Outputs data in format suitable for display on a web based data presentation system, integrating AMTS measurements with measurements from other types of instrumentation.



Transbay Transit Center

GEO monitored the SEO system with a strong geometric network of 6 AMTS, 250 target prisms, and 30 control prisms.



Green Line Metro

GEO monitored 2.5 miles of the Green Line with a network of 15 AMTS and 960 prisms during construction of a test track.



Hernando de Soto Bridge GEO monitored bridge piers with four AMTS after unexpected settlements occurred during a seismic retrofit project



I-5 Undercrossing GEO monitored two massive retaining walls with 2 AMTS and a laser scanner while twin tunnels were bored through their foundations.