

GNSS TECHNOLOGIES COMBINED WITH FOCUSED EDUCATIONAL PROGRAMMES CONTRIBUTE TO INCREASED SURVEYING PRODUCTIVITY

The Application of CHCNAV GNSS Solutions in Mining and Quarrying



The latest GNSS technologies from CHCNAV have been used in combination with vocational training on the island of Sumatra to improve the productivity of surveying activities and hence contribute to local economic development.

The island of Sumatra is one of the largest islands in Indonesia, located west of Java and south of the Malay Peninsula. It is known for its fertile soils, its wide variety of animals and its natural resources, including coal, crude oil and natural gas. These support some of Sumatra's key economic activities, generating more than 60% of the region's income.

In addition to these resources, the government of Sumatra also places great emphasis on vocational training as local manpower plays an important role in



contributing to economic development on the island. PT Bukit Asam (coal), PT Semen Baturaja (cement) and PT Pupuk Sriwijaya (chemicals) are among the largest companies in Sumatra. They are continuously investigating new technologies to improve their workflows, methodologies and overall organization.

Mines and quarries are demanding users of topography. With the use of increasingly efficient equipment and techniques for full 3D digitization of sites, the operation of a mine or an open pit can be greatly optimized. At every stage, from exploration to operation of mines or quarries, CHCNAV solutions are used and recognized for their accuracy and affordability by all stakeholders.

GNSS RTK receivers, local or regional GNSS RTK networks, airborne unmanned aerial vehicles (UAVs or 'drones') and photogrammetry as well as the latest Lidar technology are all solutions that CHCNAV provides to help any mining and engineering companies increase their productivity.



Setting up control points for base rover GNSS RTK.

User pain points

Customers implementing new methodologies for 3D mapping and surveying frequently experience difficulties. These can be summarized as follows:

- The existing metrology tools may be technologically outdated, e.g. a simple theodolite and level for topographic surveys.
- High and recurring maintenance costs of aging equipment consume part of the financial resources at the expense of acquiring new equipment.
- Large mining companies have difficulty recruiting high-quality employees as they prefer to use up-to-date equipment such as GNSS receivers, photogrammetric drones and Lidar.
- Veteran employees are reluctant to learn how to use new equipment and different software, such as switching from theodolites to GNSS technology.
- High-tech solutions are often associated with high-cost equipment and are therefore considered out of reach from a financial point of view.



Staking out with an i73 GNSS rover.

Solutions

Tackling the various stumbling blocks requires an approach that integrates three essential points:

- The availability of technologies that meet the specific needs in mines and quarries such as harsh operational conditions and remote sites. The IP (water and dust protection) certification level and the ruggedness of the i73 and i90 GNSS receivers provide maximum confidence in their daily use and drastically reduce hardware downtime. The GNSS technology such as [iStar](#) optimizes the performance of GNSS surveying, both in terms of positioning accuracy and its availability in difficult environments.
- The adoption of GNSS technologies for first-time users by simplifying work processes. For example, the integration of GNSS+IMU modules allows surveyors to survey points without the need to level the range pole. Software development also plays a major role in this process, enabling the implementation of automated processes: safety checklists for the use of drones, codification of topographic surveys for optimal data processing using CAD software, etc.
- Lastly, systematically conducting training sessions with field operators contributes to increased productivity and a rapid return on investment. The training programme for this project covers the fundamentals of GNSS RTK systems. Although most of the sites in this project have network coverage for operation in NTRIP RTK mode, the ability to use the integrated radio modems provides a valuable operational back-up. The data acquisition phase with an extended codification (addition of photos, video and voice messaging to the survey points coordinates) facilitates the final processing step, cartographic rendering, volume calculation, etc.



GNSS training provided by a CHCNAV expert.

The i73 GNSS, i90 GNSS and LandStar 7

[The i73 GNSS](#) is more than 40% lighter than a typical GNSS receiver, making it more convenient to carry, use and operate without fatigue. The i73 compensates for up to 45° tilt of the survey range pole, eliminating the challenges associated with surveying points that are concealed or unsafe to reach. Its integrated high-capacity battery provides up to 15 hours operation in the field. Full-day projects can be easily completed without worrying about a power outage.

[The i90 GNSS](#) with embedded 624-channel GNSS technology takes benefit from all GPS, GLONASS, Galileo and BeiDou signals and provides robust RTK position availability and reliability. The 4G modem brings ease of use when working within RTK networks. The internal UHF radio modem allows long-distance base-to-rover surveying over distances of up to 5km.

[LandStar7](#) is the latest field-proven survey software solution for any Android devices and CHCNAV data controllers. Designed for high-precision surveying and mapping tasks, LandStar7 provides seamless workflow management from field to office and an easy-to-learn and easy-to-use graphical user interface to complete projects efficiently.



CHCNAV i90 GNSS, i73 GNSS and LandStar7 app.

Conclusion

Whether capturing natural surfaces in the exploration phase or conducting control surveys, calculating available resources, managing road ramps or calculating bench heights and widths during the mine exploitation phase, the use of CHCNAV geospatial solutions increases the safety and productivity of quarries and mines in Sumatra.

The availability of CHCNAV experts in mapping, surveying, Lidar and photogrammetric drone survey applications contributes to the user adoption of new 3D digitizing methodology.

The affordability of CHCNAV's cutting-edge technology allows for an extremely rapid return on investment and significantly removes financial barriers.

More information

www.chcnav.com