The Essence of Using Electronic Tachometers and GPS (Global Navigation System) in Monitoring Areas

Kasimov L.M. Assistant, Fergana Polytechnic Institute, Fergana, Uzbekistan
Ganiev Y. Assistant, Fergana Polytechnic Institute, Fergana, Uzbekistan

ABSTRACT

This article discusses the 2 most modern technologies used in geodesy and cartography today. It has South N3 andi73+IMU(GNSS) modern technology working processes and mutual advantages are explained with the help of research studies. According to him time taken to complete work on the South N3 electronic tachymeter apparatus i73+IMU(GNSS) was found to be much longer than the execution time on the GPS device.

Keywords: Electronic total station, Modern geodetic device, Global Positioning System, GNSS, Trilateration, topographic map.

Introduction

Today, while technologies are rapidly developing, new technologies are being created in every field. Including, there are some modern technologies in the field of geographic information. For example, we take the field of geodesy and geoinformatics as an example. If modern devices and technologies are available in these areas, we will give a clear example of them. First of all, we need to understand what a modern geodetic device is. A modern geodetic device is a high-tech product that combines the latest advances in electronics, mechanics, optics and other sciences. An example of such a device is the South N3 electronic total station in the field of geodesy and the i73+ IMU(GNSS) in the field of Geoinformatics.

The main part

The electronic tachometer is a device of practical applications designed for automated solutions in the field of large-scale topographic photography, planning, creation of plan and elevation networks, and performance of various topogeodetic and engineering tasks. Through it, the general station allows you to measure angles (horizontal and vertical), measure polar coordinates, measure horizontal distances and heights, as well as obtain measurement results in the calculated coordinate system, and the measurement results are recorded on a memory card. Today, among the leading manufacturers of electronic tachometers, we can mention "Leica" of Switzerland, "Trimble" of the USA, "Carl Zeiss" of Germany, "Soccia" of Japan, "UOMZ" of Russia and others [1 -3].

Robotized Electronic Tacheometer has all the capabilities of the previous group and is equipped with a service motor. The presence of radio communication devices with such motors and systems of automatic tracking of transmitters allows them to be called robotic total stations [4-5]. Such tacheometers make it possible to carry out all engineering geodetic works with high accuracy, such as tunnel construction, construction of buildings and structures, design of quarries and linear structures, monitoring of deformations of objects.

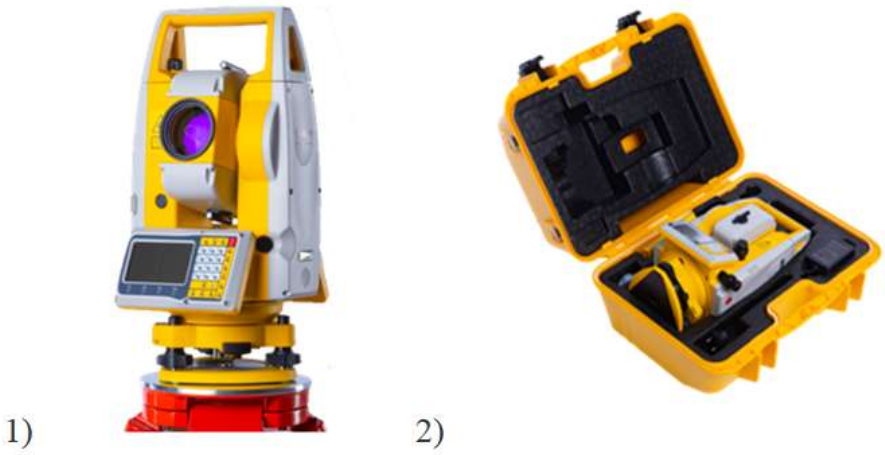

Figure 1. SOUTH N3 is a modern and technologically advanced electronic total station that allows measurement with an accuracy of 2 seconds. The high-quality laser system guarantees reflection-free measurement at distances up to 1000 meters.

GPS (Global Positioning System) uses the Global Navigation Satellite System (GNSS) network as a tracking system. It is a network that includes a series of satellites that use microwave signals that are transmitted to GPS. This allows the device to provide information about speed, location and time zone. In addition, receivers can not only monitor the location of the signal but also calculate the speed of movement and the time zone of its location. Each satellite moves around the Earth every 12 hours while transmitting radio signals received by GPS receivers. The working principle of GPS is based on a mathematical principle called "trilateration". Trilateration falls into 2D and 3D types,

- this place is under at least three satellites
- it needs to know the position and the distance between the satellites.

All this applies to signals transmitted using electromagnetic waves that travel at the speed of light, these actions occur in seconds. The remaining three satellites are used for positioning on the ground, as GPS consists of a satellite, a control station and a monitor station. A GPS receiver receives an object's location from a satellite and uses a method called "triangulation" to determine the exact location of the user or object.

Figure 2. The i73+ has a built-in transceiver radio module compatible with major radio protocols, making it the perfect choice for a portable embedded UHF base and rover kit with fewer accessories.

The i73+ is a high-performance NTRIP rover when used with a handheld controller or tablet and connected to a GNSS RTK network via CHCNAV LandStar field software. The i73+ is a very robust and reliable receiver that can fail for any terrain survey, mapping or construction site.

Even in a complex electromagnetic environment, the i73+ initializes the IMU in 3 seconds, requiring no repeated restarts. It provides an accuracy of 3 cm up to a 30-degree polar tilt, increases the point measurement efficiency by 20% and stakeout by 30% [7-10]. The i73+ GNSS eliminates the challenge of measuring hidden or dangerous points, making surveyors' work safer and more efficient. GNSS surveys are made easier by eliminating the need for the operator to focus on the perfect alignment of the survey pole.

Figure 3. Measurement methods from a GPS device. 1. Under the walls 2. In the cadastral area 3. On the lands 4. On the roads

Results

We decided to use both modern technologies during our research. Our research area was Tumor MFY in the Dang'ara district of the Fergana region. The task before us was to make a geodetic and topographic survey of the area and extract information about all the details there. We worked on it with the help of two types, i.e. South N3 electronic geometry and i73+IMU GPS devices. The accuracy of both devices is high. Therefore, we focused on their performance. Accordingly, at first, we worked on an electronic total station, and it took 4 days for a distance of 7 km. Then the work was carried out on the i73+IMU model GPS appartment and it was completed in almost 1 day. During operation, the natural conditions were the same for both devices. It became clear from the work process that due to the time spent on moving the station on the electronic total station, a lot of time was spent on carrying out geodetic topographic research in the area. In addition, the coordinates and absolute height were conditionally entered in the South N3 electronic geometer for carrying out geodetic search works. I73+IMU GPS did not encounter such obstacles because the base was connected to the satellite. Therefore, the work was completed on time. I73+IMU GPS did not encounter such obstacles because the base was connected to the satellite. Therefore, the work was completed on time. I73+IMU GPS did not encounter such obstacles because the base was connected to the satellite. Therefore, the work was completed on time.

Figure 3. Details from our workflow.

Conclusion

The following is our conclusion from the conduct of this work and the results obtained from it. The accuracy of both devices is high, but the technology of operation is completely different from each other. This caused them to perform different tasks even under the same conditions. For example, in GPS, the work of moving the station is not done, that's why the work efficiency was high. The results obtained from both devices were plotted in AutoCAD.

References

1. Kasimov, M., Habibullaev, E., & Kosimov, L. (2020). Determination of the chimney roll. An International Multidisciplinary Research Journal, 10(6), 1313-1318.
2. Akhmedov, BM (2022). Knauf Insulation is Effective Insulation. Central Asian Journal of Theoretical and Applied Science, 3(6), 298-302.
3. Makhmood, K., & Khasan, M. (2021). Horizontal Survey of Crane Paths. Middle European Scientific Bulletin, 18, 410-417.
4. Madumarov, B. B., & Manopov, Kh. V. (2022). NACHALO RABOTY S ARCGIS. ARCMAP. Central Asian Journal of Theoretical and Applied Science, 3(6), 325-333.
5. Abduraufovich, QO, Valievich, MX, & Dilshodbeko'gli, HE (2020). Some issues of re-utilization of casing strings, unused water intake wells (for example, some countries in the south-western sahel). ACADEMICIA: An International Multidisciplinary Research Journal, 10(6), 1568-1574.
6. Kayumov, O., Kenda, D. Yes. Ya., & Manopov, Kh. V. (2019). VÍDNOVLENNYa TA ZBÍLShENNYa PRODUKTIVNOSTÍ VODOZABÍRNIX SVERDLOVIN. LOGOS. MISTETsTVO NAUKOVOÍ DUMKI, (8), 47-50.
7. Rakhmatullayev, GD, Manopov, XV, & Mirzakarimova, GM (2020). Current problems of increasing soil fertility. ACADEMICIA: An International Multidisciplinary Research Journal, 10(6), 242-246.
8. Rakhimjonovna, KK, & Mukhdin, MK (2022). TYPES OF GEODETIC WORKS IN THE CONSTRUCTION OF HIGH-RISE BUILDINGS AND STRUCTURES. British Journal of Global Ecology and Sustainable Development, 10, 98-103.
9. Rakhimonovna, KK, & Abdulhai son, AA (2022). Create a Layer of Maps Those are Part of the Livestock and Poultry Astral. Central Asian Journal of Theoretical and Applied Science, 3(11), 61-67.
10. Khakimova, KR, Ahmedov, BM, & Kasimov, M. (2022). No. 5.-S. 456-459. 8. Abduvakhobovich AA Methods of Improving Physical and Mechanical Properties of Light Concrete on the Basis of Chemical Additives. Texas Journal of Multidisciplinary Studies, 8, 165-167.