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MONITORING OF AREA THROUGH TACHEOMETER AND DESIGNING IN AUTOCAD SOFTWARE

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Abstract: This article focuses on the use of tacheometer for monitoring an area and the subsequent designing of the area using AutoCAD software. Tacheometer is a surveying instrument that combines a theodolite with an electronic distance meter, allowing for efficient and accurate measurements. AutoCAD software, on the other hand, is widely used in engineering and architectural design for creating detailed and precise drawings.

Keywords: monitoring, tacheometer, AutoCAD software, surveying, design.

МОНИТОРИНГ ПЛОЩАДИ С ПОМОЩЬЮ ТАХЕОМЕТРА И ПРОЕКТИРОВАНИЯ В ПРОГРАММЕ AUTOCAD

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Аннотация: Данная статья посвящена использованию тахеометра для наблюдения за территорией и последующему проектированию местности с помощью программы AutoCAD. Тахеометр — геодезический прибор, сочетающий в себе теодолит и электронный дальномер, что позволяет проводить эффективные и точные измерения. Программное обеспечение AutoCAD, с другой стороны, широко используется в инженерном и архитектурном проектировании для создания подробных и точных чертежей.

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Ключевые слова: мониторинг, тахеометр, программа AutoCAD, геодезия, проектирование.

Introduction: In today's fast-paced world, technology plays a vital role in various industries. One such technology used in the field of surveying and design is the tacheometer, combined with AutoCAD software (1-3). This article explores the monitoring of an area using a tacheometer and subsequently designing it in AutoCAD software to enhance accuracy, efficiency, and precision (4).

AutoCAD is a commercial computer-aided design (CAD) and drafting software application. Developed and marketed by Autodesk, AutoCAD was first released in December 1982 as a desktop app running on microcomputers with internal graphics controllers. Before AutoCAD was introduced, most commercial CAD programs ran on mainframe computers or minicomputers, with each CAD operator (user) working at a separate graphics terminal.[6, 7] AutoCAD is also available as mobile and web apps. AutoCAD is primarily used for 2 Dimensional drawings, and even though 3D modeling is available in AutoCAD other computer-aided design software like Fusion 360, Inventor and Solidworks are preferred in 3D modeling. AutoCAD is used in industry, by architects, project managers, engineers, graphic designers, city planners and other professionals (8-11).

Compatibility with other software:

ESRI ArcMap 10 permits export as AutoCAD drawing files. Civil 3D permits export as AutoCAD objects and as LandXML. Third-party file converters exist for specific formats such as Bentley MX GENIO Extension, PISTE Extension (France), ISYBAU (Germany), OKSTRA and Microdrainage (UK); also, conversion of .pdf files is feasible, however, the accuracy of the results may be unpredictable or distorted. For example, jagged edges may appear. Several vendors provide online conversions for free such as Cometdocs (11-13).

Extensions

AutoCAD supports a number of APIs for customization and automation. These include AutoLISP, Visual LISP, VBA, .NET and ObjectARX. ObjectARX is a C++ class library, which was also the base for:

- products extending AutoCAD functionality to specific fields
- creating products such as AutoCAD Architecture, AutoCAD Electrical, AutoCAD Civil 3D
- third-party AutoCAD-based application

There are a large number of AutoCAD plugins (add-on applications) available on the application store Autodesk Exchange Apps.[15] AutoCAD's DXF, drawing exchange format, allows importing and exporting drawing information.

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Vertical integration: Autodesk has also developed a few vertical programs for discipline-specific enhancements such as:

- Advance Steel
- AutoCAD Architecture
- AutoCAD Electrical
- AutoCAD Map 3D
- AutoCAD Mechanical
- AutoCAD MEP
- AutoCAD Plant 3D
- Autodesk Civil 3D

Since AutoCAD 2019 several verticals are included with AutoCAD subscription as Industry-Specific Toolset.

For example, AutoCAD Architecture (formerly Architectural Desktop) permits architectural designers to draw 3D objects, such as walls, doors, and windows, with more intelligent data associated with them rather than simple objects, such as lines and circles. The data can be programmed to represent specific architectural products sold in the construction industry, or extracted into a data file for pricing, materials estimation, and other values related to the objects represented.

Additional tools generate standard 2D drawings, such as elevations and sections, from a 3D architectural model. Similarly, Civil Design, Civil Design 3D, and Civil Design Professional support data-specific objects facilitating easy standard civil engineering calculations and representations.

Softdesk Civil was developed as an AutoCAD add-on by a company in New Hampshire called Softdesk (originally DCA). Softdesk was acquired by Autodesk, and Civil became Land Development Desktop (LDD), later renamed Land Desktop. Civil 3D was later developed and Land Desktop was retired.

About Tacheometer: The tacheometer is a modern surveying instrument that combines the features of a total station with a theodolite. It measures both horizontal and vertical angles as well as distances. The instrument utilizes electronic data collection capabilities, making it more efficient than traditional surveying methods.

Monitoring an Area using Tacheometer: A tacheometer enables surveyors to monitor an area effectively by capturing precise measurements. It helps professionals collect data regarding elevation changes, land topography, and architectural features within an area. By establishing control points and conducting precise measurements, surveyors can accurately monitor any changes or developments occurring over time.

Designing in AutoCAD Software: Once the monitoring phase is complete, the collected data can be imported into AutoCAD software for designing purposes. AutoCAD is a powerful computer-aided design (CAD) software that allows users to create 2D and 3D models efficiently. By utilizing the accurate measurements obtained

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from the tacheometer, professionals can produce detailed designs that meet specific project requirements.

Benefits of Combining Tacheometer with AutoCAD Software:

The integration of tacheometer measurements into AutoCAD software offers several advantages:

a) Accuracy: Tacheometers provide highly accurate measurements, reducing human errors during data collection. When combined with AutoCAD's precision tools and features, designers can create accurate representations of real-world objects.

b) Efficiency: The seamless transfer of data from tacheometer to AutoCAD software streamlines the design process. It eliminates the need for manual data entry, reducing time and effort required for designing.

c) Visualization: AutoCAD's 2D and 3D modeling capabilities enable designers to visualize the area being monitored accurately. This helps in identifying potential design challenges or improvements.

d) Collaboration: AutoCAD allows multiple professionals to work simultaneously on a project, promoting effective collaboration among team members. The tacheometer data can be shared easily within the software, ensuring everyone has access to the latest information.

Project analyzing:

Maps that are similar to these maps are usually used when surveying an area, because it is very convenient to study and analyze the details of the areas through such maps, and the area being designed in the AutoCad program is the places shown in this kmz filewill drop via Google earth Pro (figure 1).

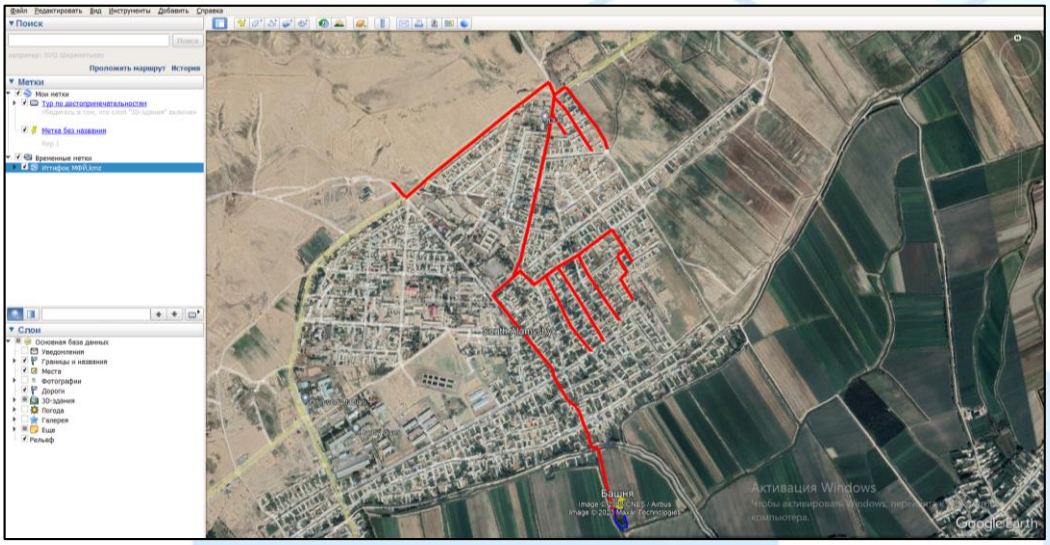

Figure 1. Version of land (kmz file).

After going to the area and measuring, the camera work is usually the process of dumping the obtained count values into AutoCad. values are in the form of numbers and are adapted during the process of dropping into AutoCad. For example we can show 10 points features according to X and Y.

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T1. 5000.000,4000.000,550.000,
1. 5042.714,3938.463,546.627,
2. 5050.886,3946.722,546.616,
3. 5041.574,3955.040,546.561,
4. 5033.718,3973.388,546.991,
5. 5037.457,3975.792,546.922,
6. 5010.594,3987.666,548.017,
7. 5008.570,3987.585,548.622,
8. 5015.112,3988.321,549.035,
9. 5017.082,3993.153,549.159,
10. 4989.267,3987.260,549.200,

By combining the big points of auto, a drawing like in the kmz option is created. Autocad is a drawing project, and the lines in it are adjusted according to various conditional symbols. such as roads and ditches.

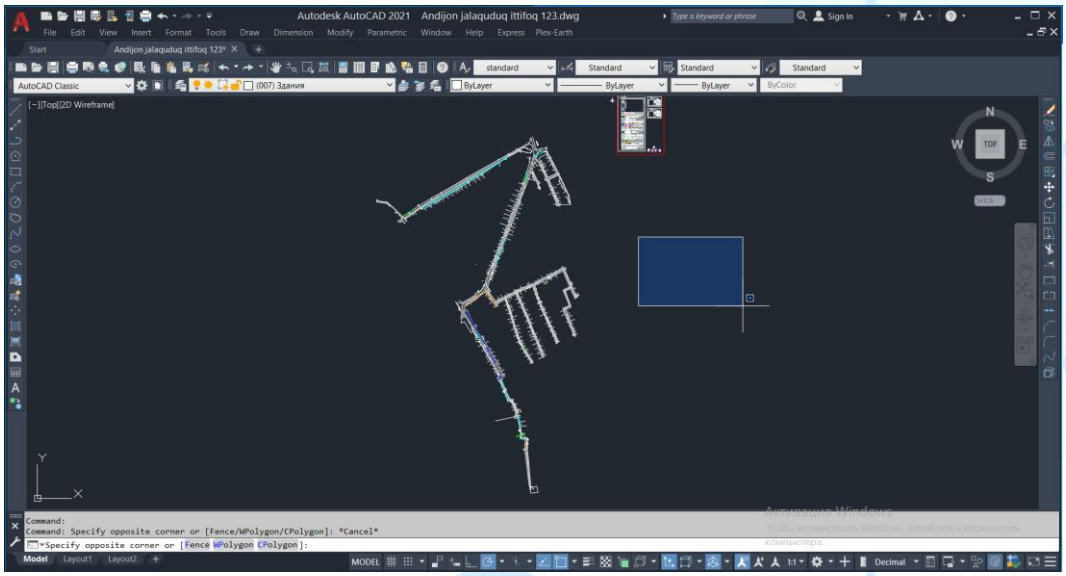

Figure 2. Finished project.

Conclusion:

Monitoring an area through tacheometer and designing in AutoCAD software offers significant advantages in terms of accuracy, efficiency, and visualization. By utilizing modern surveying instruments like tacheometer and leveraging powerful design software like AutoCAD, professionals can enhance their ability to monitor areas effectively and create precise designs that meet project requirements. This integration of technology plays a crucial role in various industries such as architecture, construction, urban planning, and infrastructure development.

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