THE CONTRIBUTION OF 3D TOPOGRAPHY IN THE IMPLEMENTATION OF INDUSTRIAL PROJECTS

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Abstract: *3D topography can play a determinant role in the implementation of industrial projects, especially for the modernization projects developed within the existing ones. Thus, through the best positioning possible and through three-dimensional modeling of the topographical existing details, the designer will succeed in implementing the new project.*

Keywords*: topographical measurements, topographic methods and instruments, 3D modeling.*

1. Introduction

The significant increase in the volume of civil, industrial, socio-cultural, hydrotechnical constructions, of communication ways and arts works etc., the gradual replacement of the traditional processes of construction and the application of new procedures confronts the specialists with the need of a more detailed knowledge of the changes of geometric forms and space positions of the constructions, both during the preparation of the project, when testing the construction components and structures, as well as during the implementation and exploitation of constructions.

Raising the quality of constructions, choosing the optimal solution from a socio-economic point of view is done by completing the calculation of resistance and stability with laboratory experimental research on models and measurements and observations of constructions made using high tech equipment and methods.

2. Describing the studied objective

One of the key issues is the modernization of constructions and already existing industrial plants which undergo both physical and moral wear, therefore exceeding environmental and quality standards imposed by the development and upgrading of technology in different fields.

Such an example is the vast project to be implemented within Turceni Energy Complex by the Austrian Energy & Environment Company for the construction of a desulphurization plant whose main purpose is to eliminate sulfur from the gases resulting from combustion of solid propellant material used in the production process.

Thus, in order to achieve the proposed project all the aspects and elements from the field were considered in order to successfully materialize the location of new buildings and facilities whose position must take into account the position of the already existing buildings.

3. Surveying the details

In order to precisely determine the detail points, the mini-prism for details positioned at ground level (drainage ditches, pits, the facilities' perimeter, access roads, etc.) and the laser beam

were used in order to avoid the obvious “offset” which occurs by positioning the prism on the edges or line of the details to be measured (corners of buildings, pillars supporting the pipe networks, support columns for the various facilities etc.) and for the measurement of inaccessible detail points that should be revealed in the digital topographic plan (buildings’ height, pipes, different parts of plants).

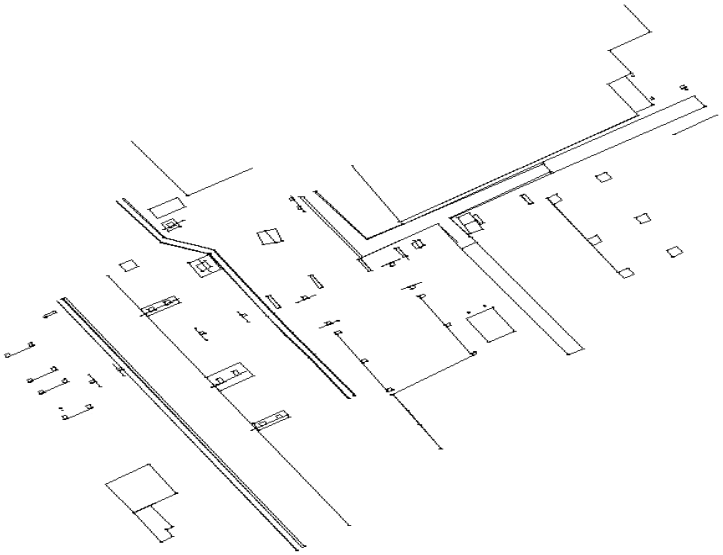

Fig.1. Digital Topographic Plan

The importance of the precise determination of details is represented by the avoidance of projected elements which will be materialized in project’s implementation.

Thus, the designed elements to be materialized should avoid a possible collision with existing elements listed above or their presence should be signaled in order to take an appropriate measure in terms of their diversion or demolition for achieving the purpose.

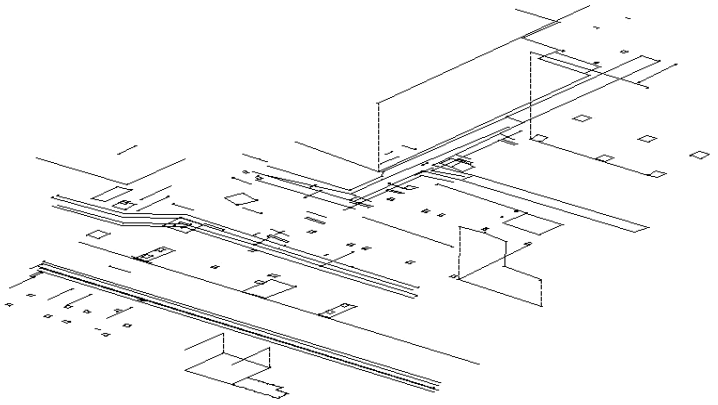

Fig.2. Topographical Details – 3D Sight

Another important element in achieving this project is represented by the determination with a better precision of the area of connection between the existing installation of gas uptake and the conveyor pipe line of the burnt gas to the plant to be built.

Thus, the axes of gas ventilation plants were established to be a defining element. For their determination there were measured the fixed components of these plants represented by the connecting flanges of various structural elements, these having a regular circular shape.

Fig.3. The Circles for Determining the Axes

One of the encountered difficulties was placing these installations very high which would have led to a very high increase of the vertical angle and to a great sighting distance which would have allowed the intolerable increase of the measurement laser spot. For the measurements, there were located and determined three new station points on the neighboring buildings which solved the problem of reducing the vertical angle and the very large distance and the obstructions problem that would have existed if the station points were located on the ground. Thus, the detail points were measured from three different perspectives which led to a considerable improvement of the accuracy of determining their position.

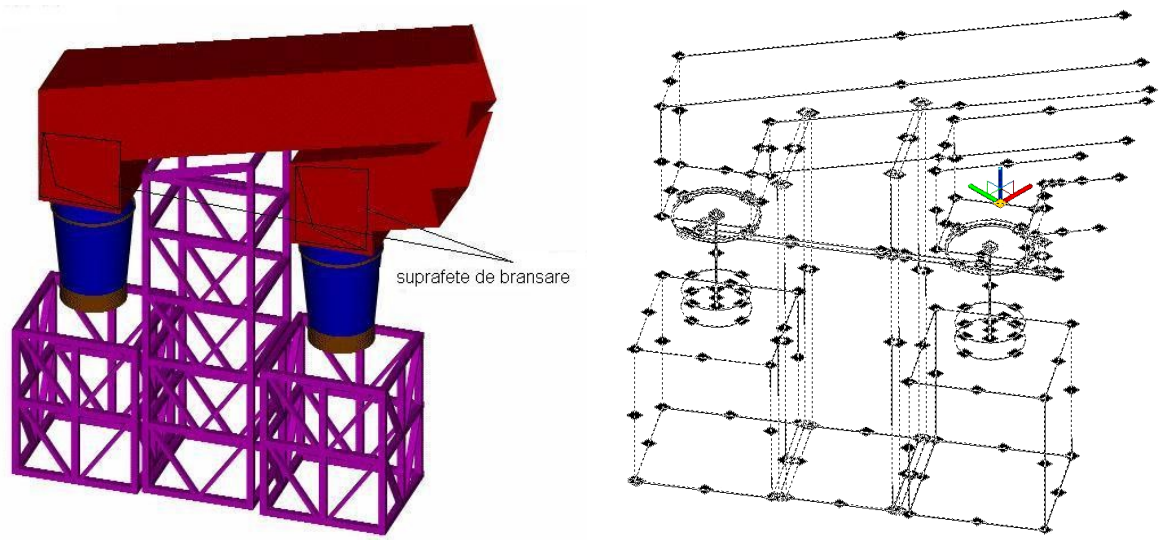

Fig.4. “Connection Area”

4. 3D Modeling of Details

One of the most important problems arising after drafting the digital plan is represented by “communicating” the results to their beneficiary in terms of a better understanding of the details as represented on the plan by point, line, polygon entities which are devoid of physical content, they reflect only rudimentary spatial position of the detail itself.

Aces in a reconstituted three-dimensional effect to relizat "primary" elements from the existing measured and having as final details of a relevant spatial highlighting a well defined area, such as by positioning a unitary system is both available and details of elements designed to be able to reach a viable solution.

Thus, was made a “primary” three-dimensional reconstruction of the existing elements starting from measured details and having as final result a relevant spatial highlighting in a well

defined area, so by positioning in a unitary system of both available details and designed elements to be able to reach a viable solution.

Highlighting the detail elements was achieved using editing commands - 3D solids, 3D mash, 3D polyline, 3D forms etc. provided by AutoCAD and which allow a suitable reconstruction of the measured details.

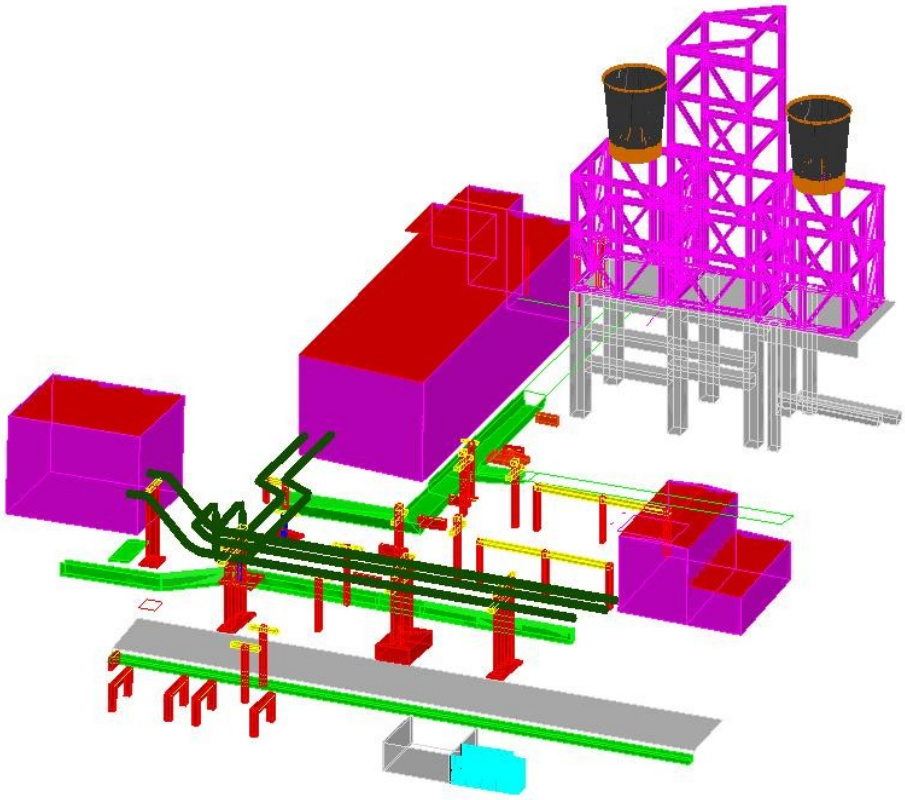

Fig.5. 3D Modeling of Measured Elements

5. Conclusions

In the current context, the development of measurement tools, of techniques and computer programs and data processing makes possible the communication and visualization of results in an interactive way, three-dimensional modeling and spatial visualization of measured elements can play a decisive role in the economy of implementing a certain project.

6. References

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