

# **Advantages of the Integration of Image Processing and Direct Coordinate Measurement for Architectural Surveying - Development of the System TOTAL –**

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## **ABSTRACT**

First, a short comparison of different types of edifices, different types of recording, different instruments and different surveying methods is given. Four surveying methods are taken into account: manual measurement, photogrammetry, tacheometry and scanning. Two of these methods will be described in greater detail, due to the fact that they are less common: scanning and tacheometry with a totalstation controlled via notebook.

On the one hand the methods compete up to a certain amount, on the other particular surveying methods are suited more or less well to detect special qualities of a building or a monument. In reality a certain method is not always used how it fits best for the problem. Which one is chosen depends on the experience of the surveyor or of the equipment available. Quite often there is no single method which alone is a perfect solution, it is rather a combination of different methods that would produce the best results or allow the most rational way of working. In consequence, the question arose whether it would be more effective, cost-reducing and time-saving not only to more often use different surveying methods side by side, but also to achieve a synthesis of different methods and to integrate these methods into one system.

The investigation was extended now to find out which of the special characteristics of the methods should be combined. As a result, a new measuring system was designed. It consists of several different elements of modern tacheometry, photogrammetry and scanning. It was named TOTAL, which means **T**acheometric **O**bject-oriented Partly (**T**eil-) **A**utomated **L**asersurveying. It is based on reflectorless measuring by a totalstation that is equipped with servo-drives, and controlled by a notebook. Several cameras are implemented in addition, two of them fixed to the totalstation, as well as one external camera.

TOTAL allows fast and precise capturing of geometry, and of visual aspects of buildings and monuments in a single move. Several new possibilities make it possible to record geometry quite accurate. Control points allow fast production of ortho-images derived from rectification on-site. Another important function of the cameras is their ability to precisely point and control. The images may also serve as an archive, and may then be accomplished with numbers and coordinates and serve as a basis of an MIS, a Monument Information System. A very interesting tool is the automated profile-measurement, which offers the

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possibility to continue profiles automatically even without direct sights. The system was used with great success at monuments in Germany and Italy, e. g. at the Basilica of Maxentius on the Forum Romanum, Rome.

Several examples show, that considerable benefit derives from a close combination of certain elements of the methods mentioned above in a single instrument.

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