

# **Applied Surveying Education: Documenting Cultural Heritage in 3D in the City of Ghent (Belgium) Using Laser Scanning, Photo Modelling and Photogrammetry.**

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## **SUMMARY**

For several years the city of Ghent (Belgium) and the University of Ghent – Department of Geography have been working together to document and measure important cultural heritage sites in 3D. The documentation of these historic monuments in Ghent can be used during future renovation works and archaeological research. This paper will discuss the complete measurement of the Ghent City Museum, STAM. The partnership enables students following the Master Geomatics and Surveying at Ghent University to take part in a real measuring campaign. During the project students use and compare several acquisition methods. This way the students implement their theoretical knowledge in the field. Afterwards the used methods are critically analysed and compared. The students also experience the challenges of working together on a real project. Through this hands-on-training students are encouraged to think outside the box. When problems occur, they are stimulated to think how these problems could have happened and most importantly how they can solve them. The following methods are applied during the extensive field work: engineering surveying using total station and GNSS, terrestrial photogrammetry, photo modelling and laser scanning. The deliverables are created in a CAD or GIS environment. When the project is over, students have gained a lot of extra knowledge concerning the processing of point clouds, the Structure From Motion process and the 3D modelling process in general. This knowledge can be used after their studies to assess which equipment is most suitable for any given survey project. The final products of the photogrammetric and photo modelling process are digital elevation models and orthorectified images of the historic monument. The orthorectified images are visualised and processed into high resolution orthophoto plans, in a CAD or GIS environment. Furthermore, an accurate 3D model is created of the entire historic monument with the laser scanning data.

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