# 3D DIGITAL TECHNIQUES APPLIED TO NEW DESIGN PRODUCTS BASED ON CULTURAL HERITAGE ELEMENTS

*DE CÓZAR MACÍAS, Óscar David [(a)]; FLORES RODRÍGUEZ, María Sonia [(b)]; BLÁZQUEZ PARRA, Elidia Beatriz [(a)]; LADRÓN DE GUEVARA MUÑOZ, Carmen [(a)]; MARÍN GRANADOS, Manuel Damián [(a)]*

[(a)] Escuela Politécnica Superior. Universidad de Málaga
[(b)] Fundación Centro Tecnológico Andaluz de la Piedra (CTAP)

## Article Information

Keywords:
*3D DIGITALIZATION*
*3D SCANNING*
*HERITAGE ELEMENTS DOCUMENTATION*
*PRODUCT DESIGN*
*CHARACTERISTIC CURVES*

Corresponding author:
*de Cózar Macías, Óscar David*
*Tel.: 0034 951 952 281*
*Fax.:*
*e-mail: odecozar@uma.es*
*Address: c/ Doctor Ortiz Ramos s/n. Escuela Politécnica Superior. Universidad de Málaga. 29071 Málaga*

## Abstract

The aim of this paper is to present the 3D digitalization and posterior treatment of complex heritage elements existing in the Alhambra Palace, so that they can be used as the starting point for the development of new products.

Not only are the direct results of 3D digitalization exploitable and essential for the documentation, recording and research of heritage elements, but also these 3D files compiling the original elements are to be used as the blueprints for the future development of new products and designs, such as constructive elements regarding their application at interior design and architecture projects. The enrichment provided in new products is undeniable as they will depart from the same provenance as the heritage element, which allows the product to increase its market value, and the opening of new Market niches.

It is very important to highlight that any new product creation process will be grounded in full respect and protection of cultural heritage. For this reason, under no circumstances will the original elements be completely reproduced, not even partial developments of them since this action could undergo the risk of a non-responsible reproduction of the heritage elements.

## References

[1] K. Lambers, H. Eisenbeiss, M. Sauerbier, D. Kupferschmidt, T. Gaisecker, S. Sotoodeh, T. Hanusch, Combining photogrammetry and laser scanning for the recording and modelling of the Late Intermediate Period site of Pinchango Alto, Palpa, Peru, Journal of Archaeological Science, nº 34 (10), (2007) pp. 1702-1712.
[2] D. Lichti, N. Pfeifer, H-G. Maas, Theme issue Terrestrial Laser Scanning. ISPRS Journal of Photogrammetry and Remote Sensing, n.o 63 (1) (2008).
[3] A. Marambío, P. García Almirall, Escáner laser: modelo 3D y orto imágenes arquitectónicas de la iglesia de Santa Maria del Mar en Barcelona, ACE: architecture, city and environment, nº 2, (2006) pp. 178-187.
[4] O. Monserrat, M. Crosetto, Deformation measurement using terrestrial laser scanning data and least squares 3D surface matching, ISPRS Journal of Photogrammetry and Remote Sensing, nº 63 (1), (2008) pp. 142-154.
[5] F. Salvadori, Three-Dimensional Scanning Techniques Applied to 3D Modelling of Pottery Finds, Proceedings of Archäologie und Computer, Workshop 7, November 20 th – 22 th, 2002, Vienna.
[6] A. Rodríguez, J.M. Valle-Melón, J.I. Casar, J. Esteban, Aportaciones metodológicas a la gestión y explotación de nubes de puntos procedentes de escáneres tridimensionales, aplicados a la documentación geométrica del patrimonio. El caso de la portada de los hierros de la catedral de Valencia, Proceedings of IX Congreso Internacional (CICOP) de Rehabilitación del Patrimonio Arquitectónico y Edificación July 9 th -12 th, 2008, Sevilla, pp. 357-362.
[7] N. Yastikli, Documentation of cultural heritage using digital photogrammetry and laser scanning, Journal of Cultural Heritage, nº 8 (4), (2007) pp. 423 – 427.
[8] J.P. Lavelle, S.R. Schuet, D.J. Schuet, High Speed 3D Scanner with Real-Time 3D Processing, IEEE International Workshop on Imaging Systems and Techniques, 2004, pp.13-17.

[9] S. Zhang, P. Huang, High-resolution, real-time 3-D shape measurement, Optical Engineering, (2006), pp.123601.
[10] C. Teutsch, Model-based Analysis and Evaluation of Point Sets from Optical 3D Laser Scanners, volume 1. Shaker Verlag, 2007.
[11] B. Curless, From Range Scans to 3D Models, ACM SIGGRAPH Computer Graphics, Vol. 33, Issue 4, (2000), pp.38-41.
[12] J. Roca-Pardiñas, H. Lorenzo, P. Arias, J. Armesto, From laser point clouds to surfaces: Statistical nonparametric methods for three-dimensional reconstruction, Computer-Aided Design, nº 40 (5), (2008) pp. 646–652.
[13] L.W. Macdonald, Digital Heritage: Applying Digital Imaging to Cultural Heritage, Amsterdam-Boston, 2006.
[14] M. Farjas; F.J. Garcia, Modelización Tridimensional y Sistemas Laser Escáner 3D aplicados al Patrimonio Histórico, Ed. de la Ergastula, 2008.
[15] C. Pérez de Rivera, Estudio de mercado. El mercado de materiales de construcción en Marruecos 2014. ICEX España Exportación e Inversiones. 2014.