

# Principles of reverse engineering in artistic casting on the example of "The Sleeping Lion" by Teodor Kalide

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## Abstract

### Statement of the Problem:

The work aimed to make a cast of the so-called "The Sleeping Lion" by T. Kalide made of the CuSn10 alloy, which is related to the tradition of artistic foundry in Gliwice (Gliwice Huta Królewska). A miniature of this casting is in the Artistic Foundry Museum in Gliwice. A reverse engineering method was used to create the casting model. Cast - the original was copied with a hand-held 3D scanner EinScan PRO HD Shaning. To make the pattern were planned to use photopolymer resins to create a casting model using the Masked Stereolithography method, characterized by a low ash content after firing from the mould cavity. The work carried out showed that satisfactory results could also be achieved by printing a casting model using the FDM printing method from ABS plastic. The castings were made by firing models method in plaster-cristobalite moulds in Mario di Maio's vacuum devices. It is a modern method of making artistic, jewellery and dental castings.

The essence of the work was also to define the principles of scanning solids that are not a composite of simple geometric figures, mastering the processing of data from the scanner and creating a foundry model using the 3D printing method based on the received data.

The proposed technology is a modern variant of lost-wax process, also called investment casting (IC), and recently the burned models method, and is being developed, thanks to the possibility of using 3D printing, in the artistic and technical direction for rapid prototyping.

### Conclusion & Significance:

The work aimed to make a casting, the so-called "Sleeping Lion" by Teodor Kalide, who is associated with the tradition of artistic foundry in Gliwice (Gliwice Huta Królewska) and GZUT (Gliwickie Zakłady Urządzeń Technicznych). The shape of the casting i.e. the foundry model, was recreated by scanning. The models were made using 3D printing. Originally, it was planned to use only photopolymer resins to create a casting model using the Masked Stereolithography (MSLA) method, characterized by a low ash content after firing from the mould cavity. The work carried out also showed that satisfactory results could be obtained by printing a casting model using the FDM method from ABS plastic. Castings made of the CuSn10 alloy were made in plaster-cristobalite moulds using the fired model method using vacuum equipment from Mario di Maio.

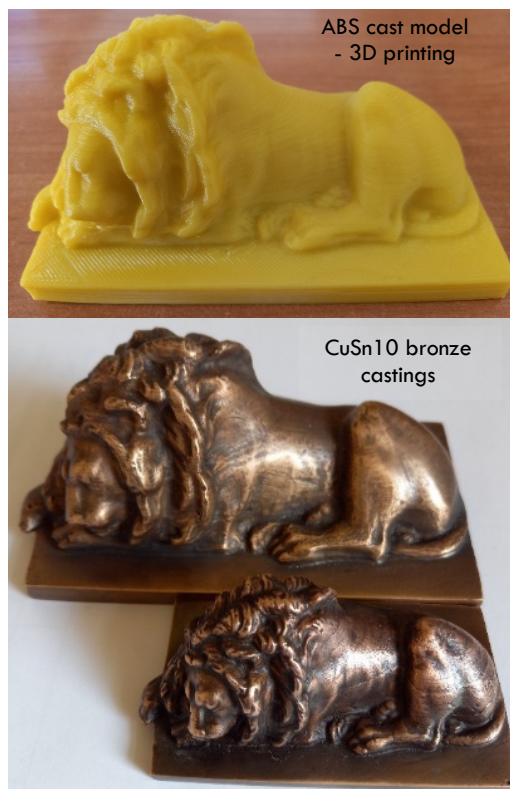


Figure 1: Cast model and CuSn10 tin bronze castings of Lion miniature by T. Kalide

### Recent Publications

1. J. Gawroński, M. Stawarz, J. Szajnar, T. Wojarski: Artistic casting. Forming and casting in false cores and by lost-wax process. SUT Publisher, Gliwice, Poland, 2013.
2. J. Gawroński et al.: Foundry Engineering. Laboratory of the technology of forming, melting and casting metals. SUT Publisher, Gliwice, Poland, 1993.
3. K. Żak, K. Tobolik, B. Witek, D. Wilczak, M. Chodak, A. Dulcka, T. Wróbel, J. Szajnar: Design and execution of an artistic cast (a miniature of the Gliwice radio station mast) using a model produced by 3D printing. ZSPN Sferoid, no. 25, 2023, pp. 129-140.
4. J.C. Ferreira, A. Mateus: Rapid tooling aided by reverse engineering to manufacture EDM electrodes. The International Journal of Advanced Manufacturing Technology, vol. 34, no. 11, 2006, pp. 1133-1143.
5. J. Kosmola et al.: Laboratory of the reverse engineering. SUT Publisher, Gliwice, Poland, 2010.

### Photograph



### Biography

Prof. Jan Szajnar is a scientist in the Department of Foundry Engineering of the Silesian University of Technology and is an author or co-author of over 400 publications in the scope of crystallization of metals and alloys and foundry technologies. He is chief of the Foundry Commission of the Polish Academy of Science..