

DEVELOPMENT OF INTERDISCIPLINARY COOPERATION OF TECHNICAL DISCIPLINES IN ARCHITECTURAL AND ARTS TASKS SOLVING

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Abstract: *High Baroque architecture as well as the late phase of Gothic architecture in their top parts is based on complex spatial consideration of the architect and construction design. Because the original architects designs and vault compositions mostly have not preserved and vaults by open-plan building was poorly accessible, there occurred often to a subjective speculation of compositional principles of construction proposals and their implementation. Therefore, in the sixties of the 20th century author tried in conjunction with experts in the field of photogrammetry to measure some vaults of these structures and gain an objective view of the reality of these remarkable architectures. The aim was to eliminate errors and to bring art-building considerations with an objective reality technology*

1. INTRODUCTION

High Baroque architecture as well as the late phase of Gothic architecture in their top parts is based on a complex spatial architect consideration and virtuoso construction design. As the original architects' designs have not mostly been kept, and the important composition component - vaults of open-plan building - were poorly accessible; there often occurred subjective speculations on compositional principles of construction proposals and their implementation.

Therefore, in the 60.'s of the 20th century the author in the cooperation with one photogrammetry expert tried to measure some vaults of these structures and gain so an objective view of the reality of these remarkable architectures belonging to the composing arts displays of the often quoted architects and builders not only from the Czech lands, but also from the Central European space. The aim was to eliminate errors and bring an objective reality into the art-building considerations by means of a technical device.

Parallel with this activity relatively difficult measurements continued in other workplaces – based on classical geodetic measurements enabled by scaffolding construction in the nave of St. Nicholas church in Prague (for Kracker' fresco restoration), the building which was and still is considered a masterpiece of the so called motion (guarinistic) architecture in Central Europe (Prof. M. Korecký).

In the seventies, it was necessary to proceed in a rather complicated way due to the technical level of the then photogrammetry in the CR. As a result of this measurement (by J.Šíma) was a fairly accurate contour image that vividly portrayed the vault and allowed to obtain documentation for determination of the objective vaults parameters.

With the help of time analysis both authors M. Pavlík and J.Šíma discovered as well as published a contribution (in ČSAV Art journal) which surprisingly stated that the vault consisted of two parts each made in a different period of time with the time difference of about 20 years, conceived by two different authors. This finding was also subsequently confirmed by archival research of M. Vilímková by the plan discovery where the older phase and the completion of architect K. Dientgenhofer were distinguished in two different colors.

The author of this paper encouraged by this development as well as by the mentioned finding (with the support of SURPMO in conjunction with ing. Kunftová), photogrammetric focused the vault in another important Baroque church of St. Markéta in Prague – Brevnov in the 90's. By the analysis of this picture various speculations on the principle of building design were rejected and an original consideration of Prof. O. Stefan (with some refinements) was confirmed.

As the prospects considerations to interconnect results of rapidly developing photogrammetric devices with art-science procedures were proved there was an interdisciplinary team of CTU (FA, FCE, FNSPE) experts set up with the aim to use new technological science advantages for the progress in art-science research. The team was supported by a grant.

2. PROJECTS

In the cooperation with P.Dvořáček the vaults in the church of the Virgin Mary in Nova Paka, in the church of St. Klára in Cheb (K.Pavelka) and in St. Joseph in Obořiště were documented.

New possibilities of digital photogrammetric techniques enabled returns back to the older measurements, where inter-linking points were still manually graphically made (St. Klára, St. Joseph in Obořiště).

The author is currently working on a resumé of new art-science findings gained from the focusing of a group of guarinistic buildings in Bohemia.

The working team consisted from the experts from the FCE and FA CTU led by M. Pavlík and K.Pavelka applied the photogrammetry possibilities also at other important buildings. They used it at the vault of the Vladislav Hall at Prague Castle, known by complex lining of late Gothic ribbed patterns.

The problem that appeared was that there is a record of a fire at Prague Castle, at which one field of vault should fall. By examining of the photogrammetric focusing the change of vaulting has not been proved. Measurements remained available to the Prague Castle Administration. Subsequently identifying traceries' centerpiece in mathematics descriptive way was executed by Dr. Ing. Muk. Similarly, the arch span was focused in the church of St. Charles in Prague. Photogrammetric procedures began to be used by authors also in other contexts. For example, photogrammetry has been used for rebuilding of the Marian Column in the Old Town Square in Prague or in the case of solving the completion of the east wing of the Old Town Hall, Kren's house or Charles Bridge in Prague (K. Pavelka). Photogrammetric focusing simultaneously became required

help for architects to repair buildings supervised by the conservation staff. The problem however remains how to reduce the costs of digital focusing and maintain an adequate level of outcome.

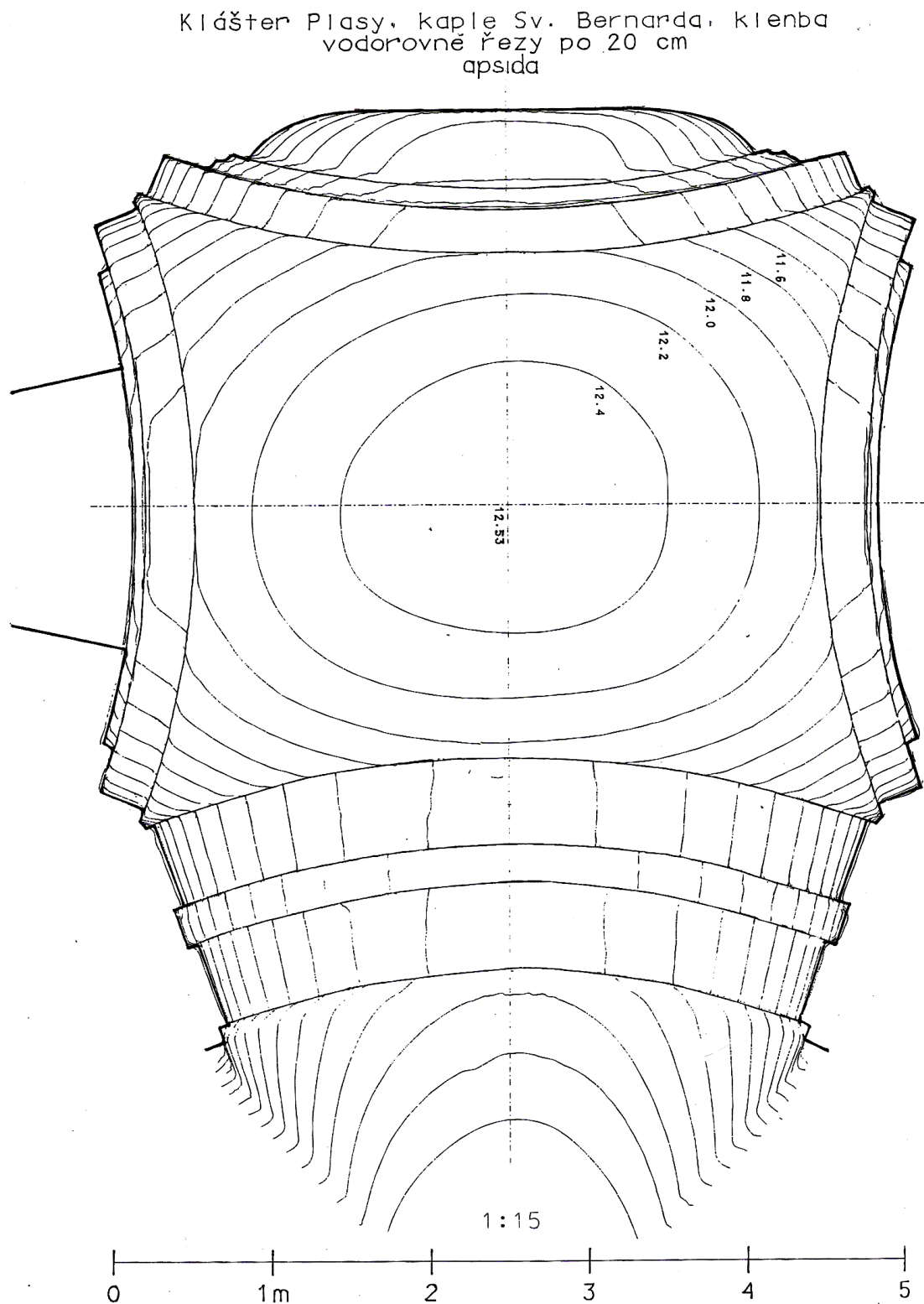


Fig.1: Plasy monastery, chapel of St. Bernard



Fig.2: Plasy monastery, presbytery of St.Bernard chapel



Fig.3: Plasy monastery, St.Bernard chapel

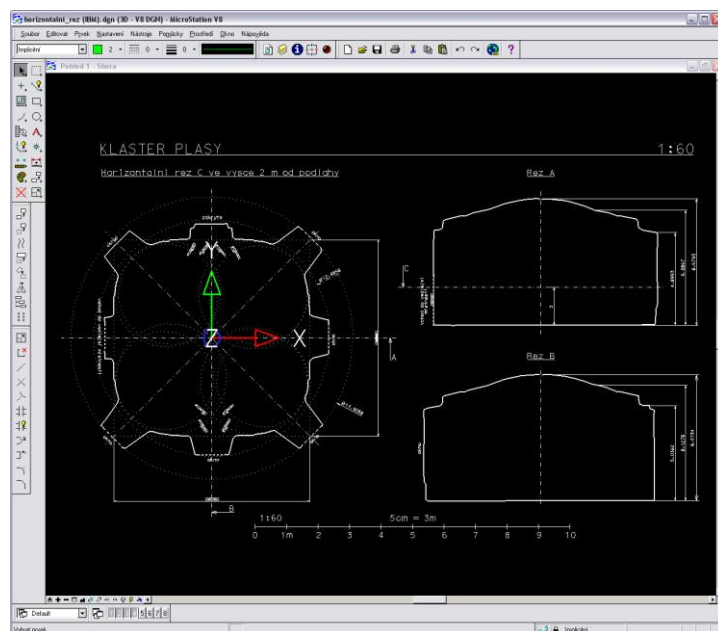
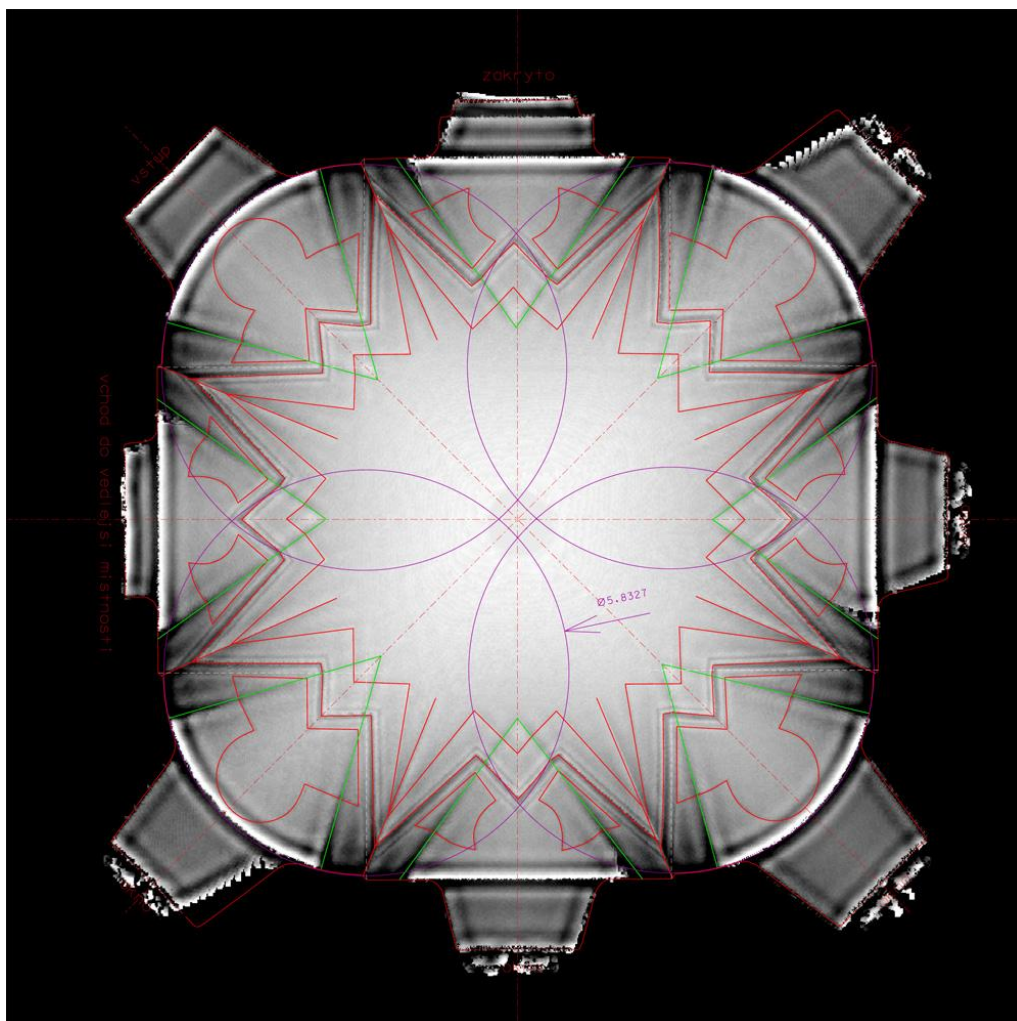


Fig.4: Cistercian monastery in town Plasy - postprocessing in software Microstation. Right - vectorisation of the raster ortoimage, created from laserscan data and enhanced in Photoshop software.

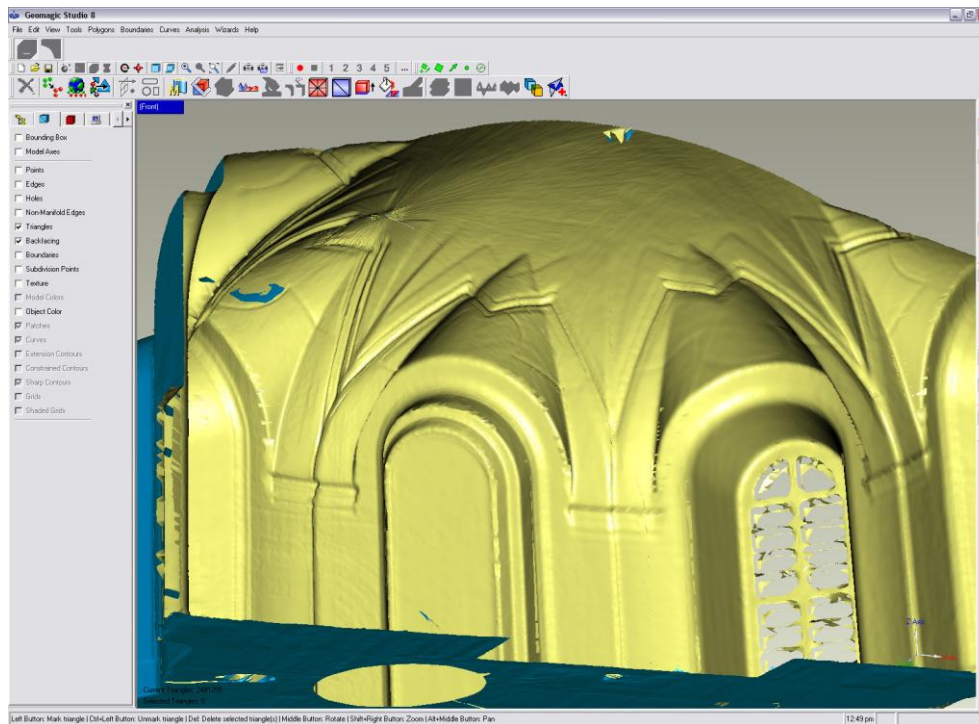


Fig.5: Cistercian monastery in town Plasy - The view of the interior of the 3D model created from laserscan data.

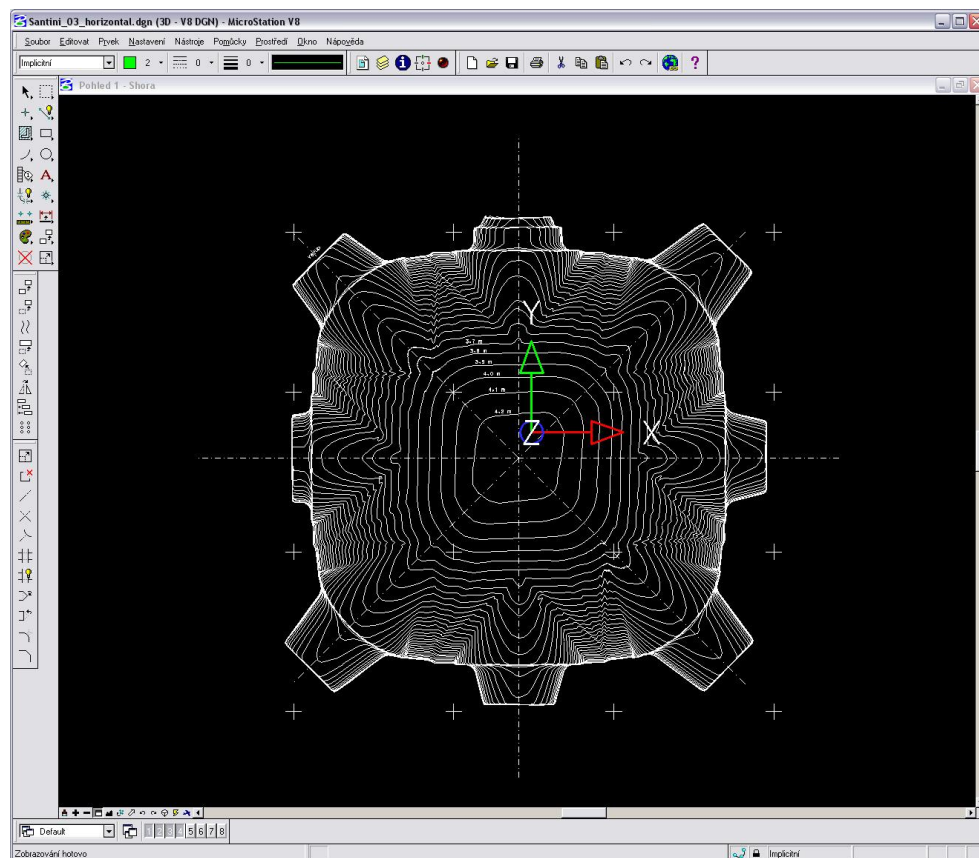


Fig.6: Cistercian monastery in town Plasy (St Benedict chapel) - cross section of the model created from laserscan data.

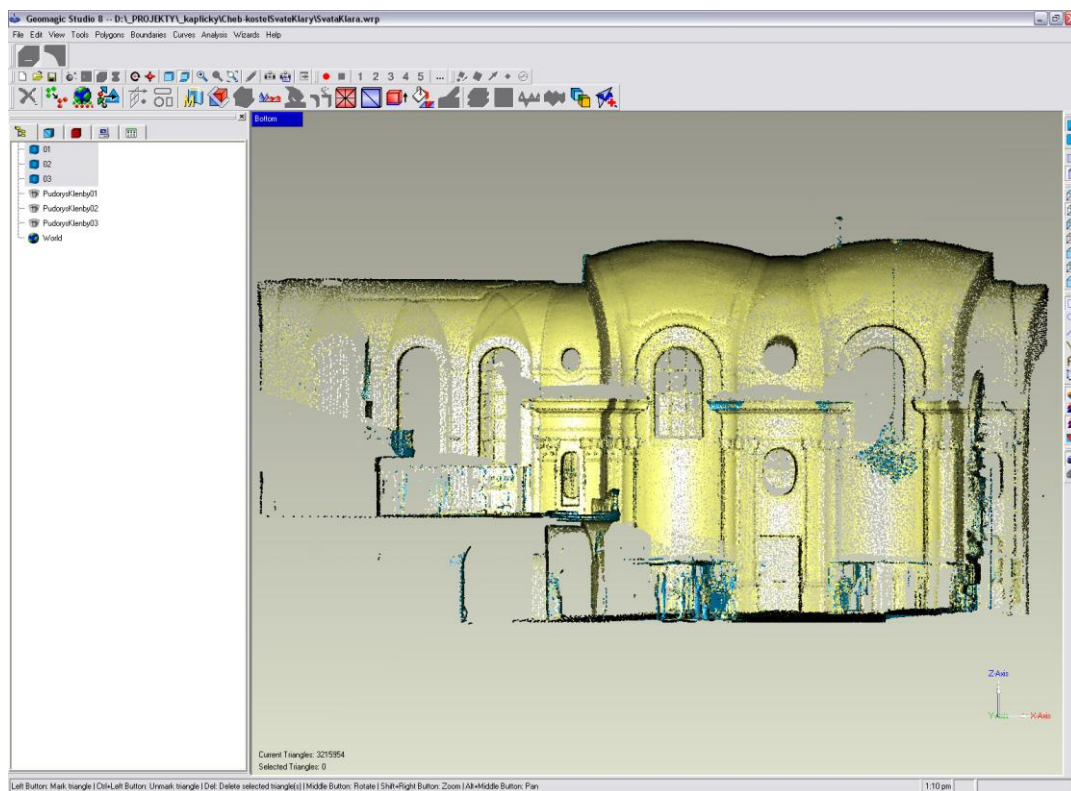
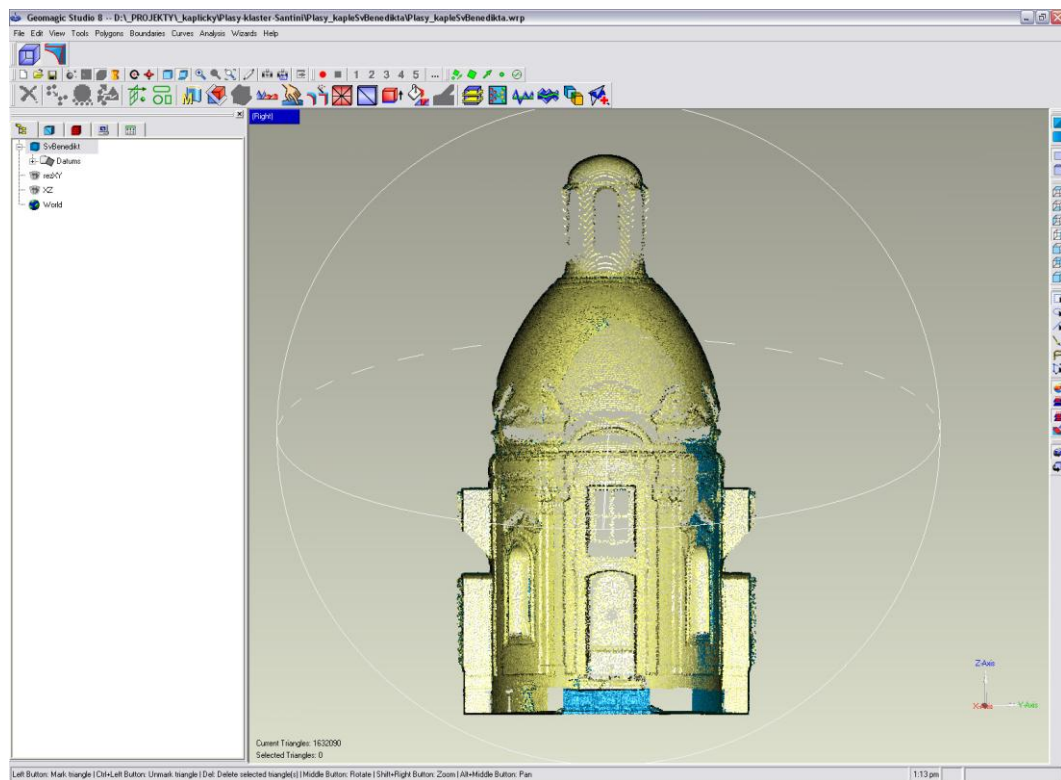


Fig.7: Church of St Clara in Cheb - postprocessing in software Microstation.

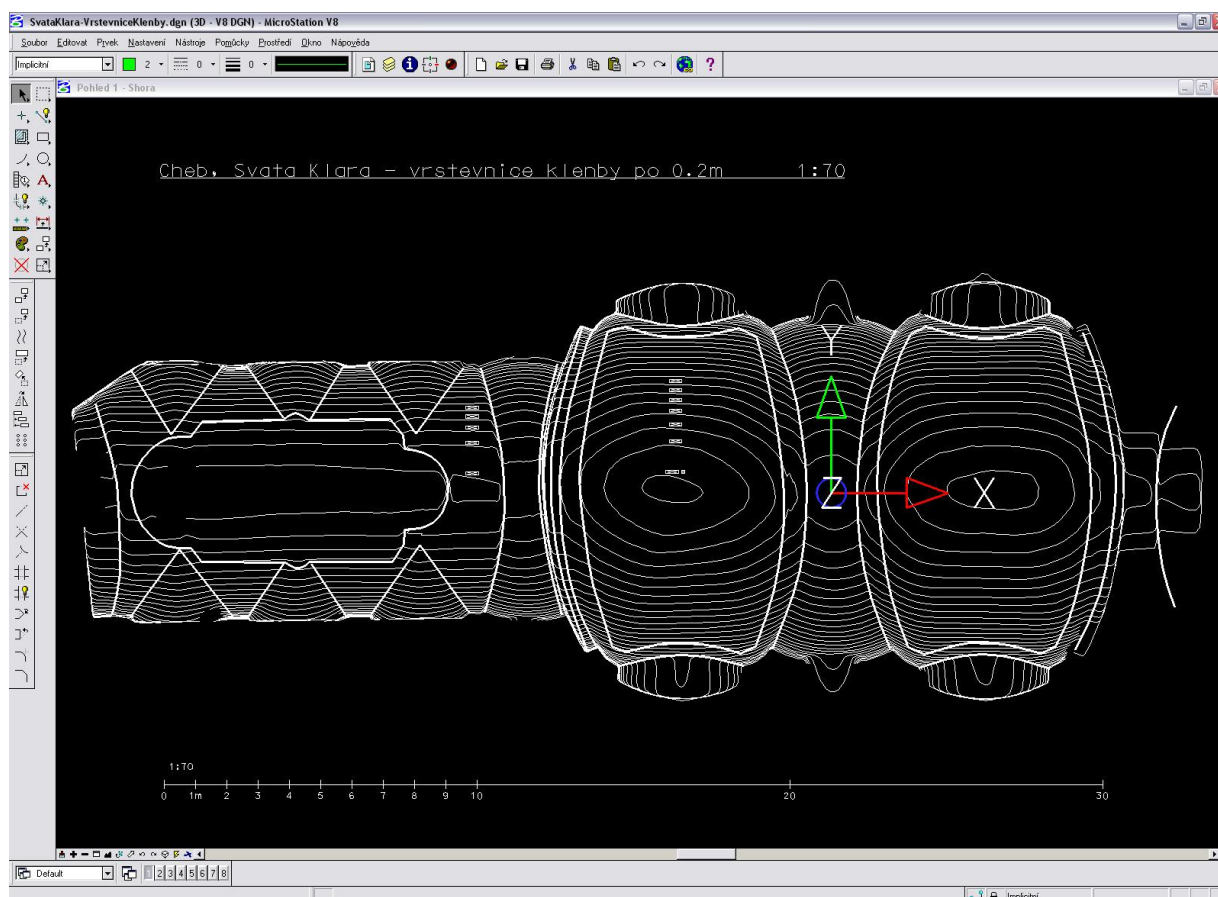


Fig.8: Church of St Clara in Cheb - cross section of the model created from laserscan data.

For measurement, a panoramic laser scanner Callidus CP 3200 was used. It has not a precise resolution in details (cca 6-8 mm), but it is still suitable for this type of work. Processing of all data was made in Bentley MicroStation and Geomagic Studio.

3. CONCLUSION

In this paper, the results of a new technique laser scanning with some historical interesting remarks were described. This technology helps historians for better understanding of context.

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