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# THE 3D PRINTING OF MODELS AS THE METHOD OF INCREASING THE QUALITY IN THE ARCHITECTURAL DESIGN

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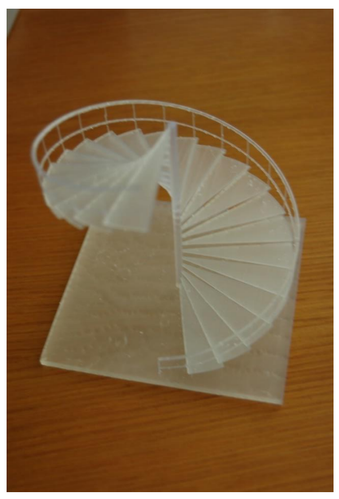
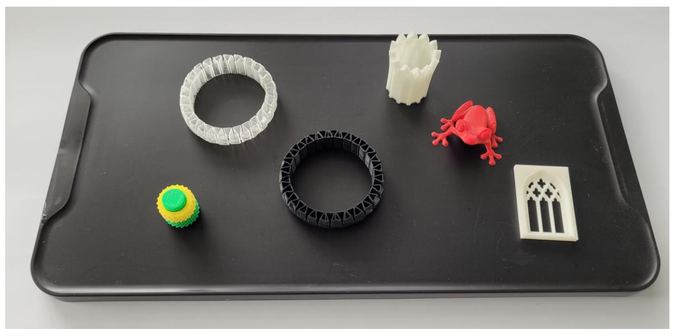


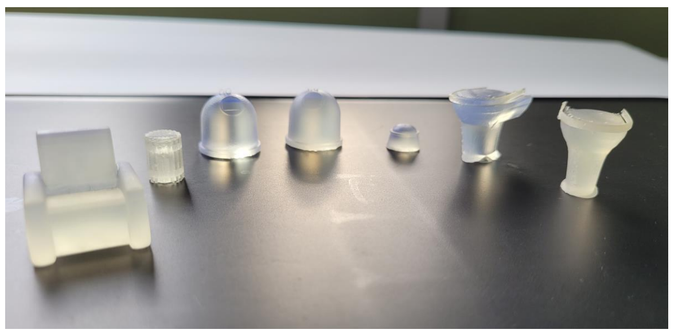
## Introduction

Contemporary architectural design is at a high level when it comes to the use of computer techniques. There is plenty of sophisticated methods based on a three-dimensional digital mapping of space. In the case of an architect's needs, the most important are CAD and BIM. Space grids that can be generated in that software may have an additional application. Virtual solids made of a mesh of points are one of them. They can be quite easily imported into the memory of 3D printers or CNC machines. Rapid prototyping (RP) joins different methods, like CAD and 3D printing, together. The design process can be additionally varied if the technology of 3D printing is used in making architectural models. Particularly noteworthy are the possibilities of constructing shapes that would be unattainable on a small scale using traditional methods. Recognizing the advantages and disadvantages of 3D printing is an important. The suitability of AM for making mock-ups is undeniable. It seems important to use it not only after designing the object but also during conceptual work.

## Material and Methods

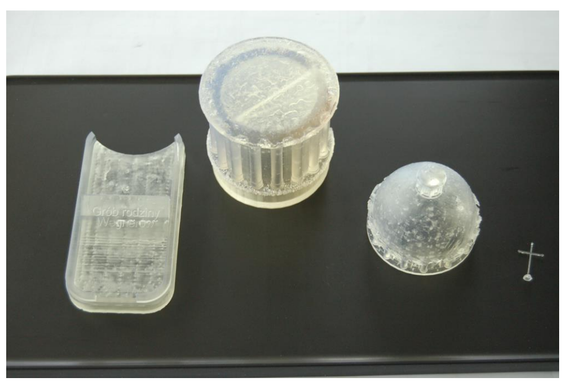


A few little 3D printouts in FDM technique



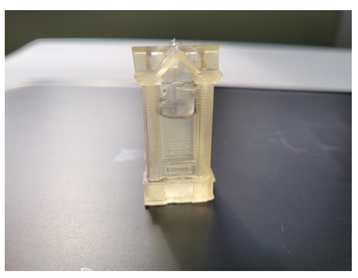
A few little 3D printouts in FDM technique

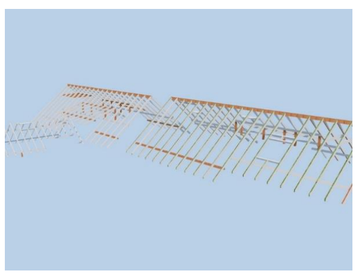
A view at the burial chapel of the Wegner family in Ostaszewo before assembling and an architectural model of the Master's degree graduate project by Natalia Taczkowska. Digital and architectural modelling: Natalia Taczkowska

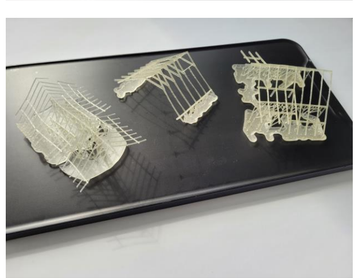


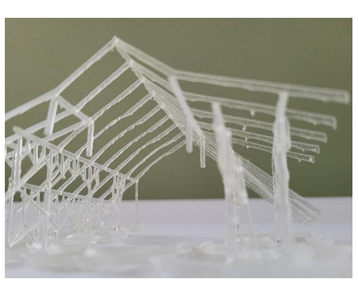
## Results

The 3D printing techniques can be implemented into architectural practice at different stages – from planning, conception, and architectural design to realisation and even production of building elements. It can significantly help in the attractive presentation of the project from the first idea to the final technical documentation. It is worth recalling the fact that the model is much more faithful to the human eye in the actual spatial relations than visualisations or even animations. Sometimes computer renderings give a somewhat distorted image in comparison to reality. This allows a designer to make more accurate decisions at the design stage as well as evaluate the project after its completion. Research has shown that making models applying 3D printing to architectural practice has both advantages and disadvantages.

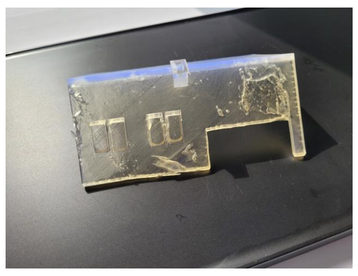


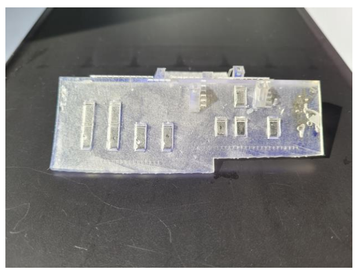


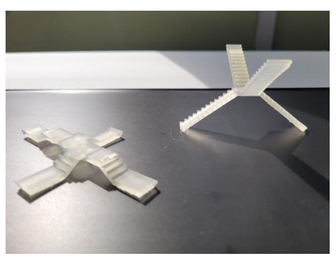


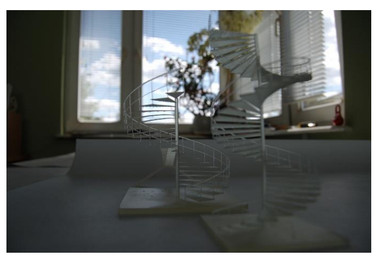


The 3D printed (in SLA technique) model of a roadside shrine designed in Nowy Dwór – the remaining hardened resin inside the outer casing is visible; a visualisation of a roof truss, and its 3D printouts









The 3D printed (in SLA) models of roof fragments and stairs

## Discussions & Conclusions

3D printing is an interesting and increasingly sophisticated technical novelty among architects. In selected aspects, it can support the design process, but it will not replace an architect in most of his or her activities. The suitability of additive manufacturing for making mock-ups is undeniable. It seems interesting to apply it not only after designing the object for its presentation but also during conceptual work. The use of additive manufacturing techniques can further establish their position in the architect's work as a useful tool in the professional workshop. In many cases of applying 3D printing to make architectural models (e.g. stereolithography), the advantages outweigh the disadvantages.
The application of these techniques is optional and may enrich the professional workshop and improve the quality of the presentation of the project, as well as the work itself when used in creative work. However, it is only a certain addition. As such convenience and relief for human work in the tedious creation of mock-ups in a traditional way, it may be present in the design process to a greater extent in the future as another advanced tool in the hands of an architect.

## Acknowledgements

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