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THE (CHANGED) ROLES OF PHYSICAL MODELS IN ARCHITECTURE AND BUILDING DESIGN WITHIN EDUCATION AND PRACTICE

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ABSTRACT

Physical models have been known and been used as an important design practice tool already in antient history. Even though their role has changed, models currently still aid design decisions as form, geometry and detailing; help determine and verify material/structural behavior; visualize and communicate different stages of design projects to different stakeholders. Whereas the use of physical models within education has never ceased to be important, with models being utilized more than ever both in engineering and architectural education. It is interesting, however, to observe the trend of increased use of physical models in design practice.

This is somewhat surprising as at present, digital platforms have completely taken over analogue approaches in building design and practice. However, working in the physical domain with models in different scales and precision, in conjunction with digital work flows still offers irreplaceable input to a design project.

The paper presents a study, recently published by the author in a book entitled: Physical Modelling for Architecture and Building Design, that investigated how models are used in education and in design practice currently and presents the (changed) role of physical models today. Through examples of different types of models, case studies of working practices, as well as educational workshops in architecture and engineering, the paper puts forward the hypothesis that physical models are still a very powerful, important and current design tool. The paper concludes with current trends, opportunities and limitations of the physical model, as a tool within a digitalized design and educational practice.

In the context of this paper a physical model should be understood as a scaled down three-dimensional representation of an object, building already constructed, or an unbuilt design. A physical model shows the vision of the designer, architect, or engineer, about how they envisage the project to be - when built.

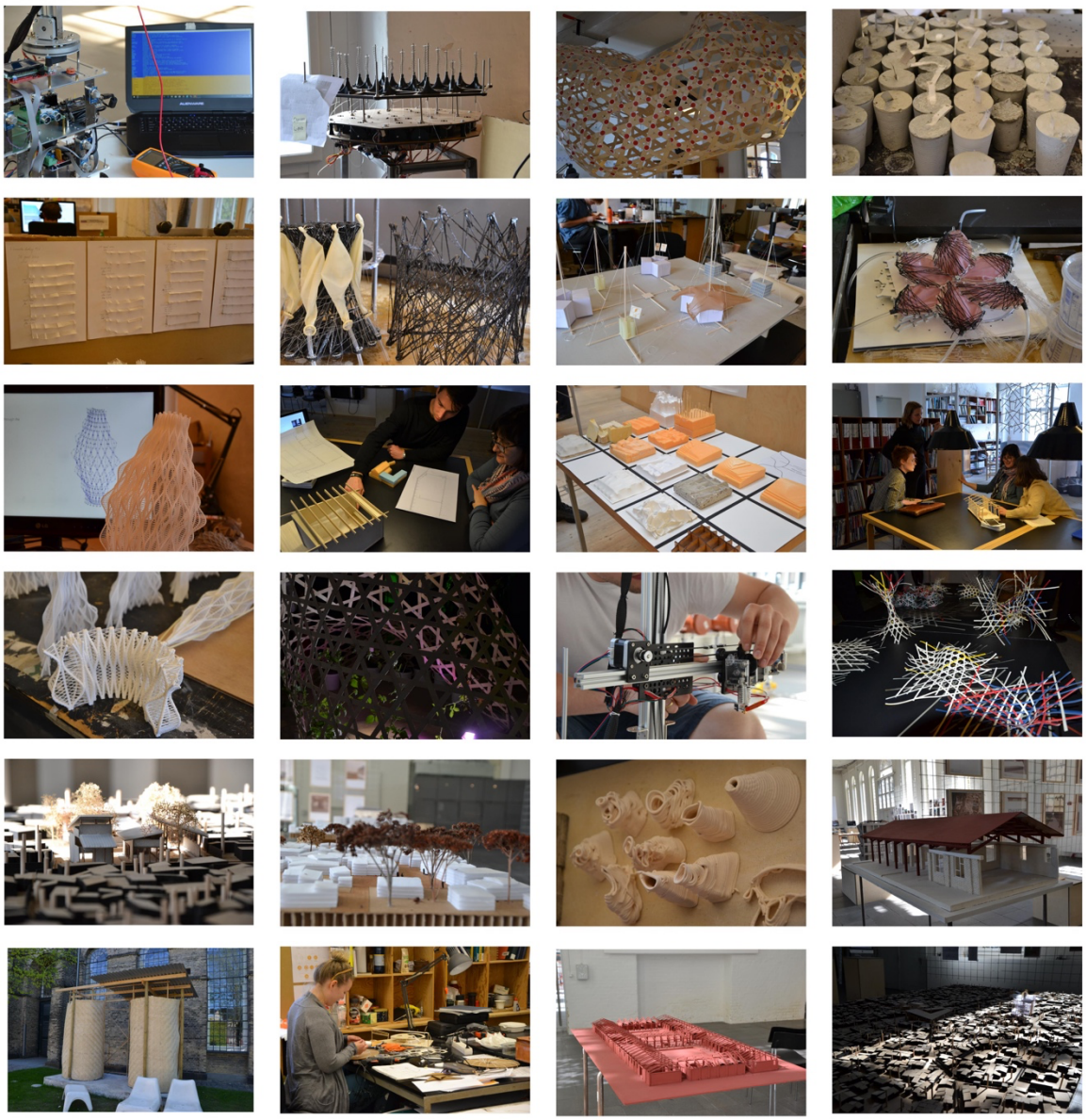

Fig. 1. Physical models have different roles in building design practice and education today. The image presents models in different scales ranging from material testing, structural understanding all the way to testing and exploring concepts in the realm of urban studies

Physical models allow us to see. They, however, are not only a visualization tool; physical models facilitate explorations with materials, forms and structures, but also testing of concepts and structural

behavior. They enable us to understand specific design aspects, as well as offering us a tool that can guide a sequence of events, as for example the construction of a building. Models, depending on their role, can be constructed in different scales and to diverse precisions. They can be crude- dirty models in the early design phases, or fine and finished- as a visualization and presentation of a design phase that communicates the project. They can be small in scale or can be full-scale prototypes and anything in-between depending on the role they have been assigned in the project. Regardless of all these differences, all physical models have one very important feature in common: they are three-dimensional.

Whilst design discipline professionals (designers, architects and engineers) are trained to have a spatial understanding, lay people do not always have the skill to read 2D drawings and appreciate the spatial meaning these drawings are meant to have. So, if a drawing has been created in 2D, it is not everyone that can understand it in 3D. Building designers, however, often draw in 2D, yet their drawings represent a 3D object – that is realized as a structure or building that when constructed – always has three dimensions.

Models are therefore present a very powerful communication tool that enables exchange of ideas beyond the design team. They allow for discussions not only with design professionals, but also with others: as the public, investors and clients. This characteristic of physical models is very important. Combined with other opportunities that arise from working with models is why, throughout history of human creation, physical models have had important roles, some of them very relevant still today.

The paper is a time journey of how physical models have been used in the past, their current roles and offers some suggestions of how they may be utilized in the coming future.

In that several roles of physical models have been identified and are presented, following the outline of the text in the recently published book.

They are as follows:

To CREATE- Physical models as an exploration and conceptualization tool

To SEE – Physical models enabling visualization, representation, and communication

To UNDERSTAND – Physical models aiding understanding through testing and verification

To GUIDE– physical models as tools for construction definition, guiding assembly and task sequencing

To LINK – physical models linking physical and digital environments

3 case studies:

dRMM - pioneers of timber architecture developed through physical modelling

Mamoru Kawaguchi – physical models aiding design, verification and construction of complex spatial structures

Søren Jensen Engineers – interplay of computational tools and physical models, achieving highest precision

The paper concludes with the findings that the roles of physical models currently are very different to their historical applications. Also, that physical models are used more than ever currently. This is mainly a result of the ability of connecting the physical and digital environments, working in both realms, and switching between them easily. The interchangeability of digital/physical offers great opportunities both for practice, as well as for education. It is likely that the future will bring new ways of negotiating between the physical and the digital, opening further and unforeseen opportunities. Although it is impossible to predict this rapid development and growth in the digital realm of both tools, processes, and workflows, it is certain that the trend will grow. With those new opportunities, advancements for better linking physical and digital environments will also become more available. In any case – it is very likely that physical models are here to stay (with new and altered roles) remaining an essential tool within both design practice and education.

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