ARBE2222 | ARCHITECTURE DESIGN STUDIO | 2ND YEAR | SPRING 2017

THEME: SURFACE

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Tutors:
Tutorial groups run by: Rebecca Boyle, Andrew Donaldson, Annemarie Dosen, Mark Taylor, Josephine Vaughan, Yannis Zavoleas
Roaming tutors: Kerry Clare, Lindsay Clare, Tom Dufficy, Tania Papasotiriou, Peter Stevens, Mark Taylor, Yannis Zavoleas
External markers/moderators: Nicholas Foulcher, Jesse Lockhart-Krause
Workshop digital training and support: Tom Dufficy, Tania Papasotiriou (leader), Kalyna Sparks
Other training resources: www.idda.com.au

Pin puzzle toy –surface variations produced through the toy's direct interaction with solid objects due to its structural logic.

INTRODUCTION

The aim for this second-year second-semester core studio is to provide an understanding of digital processes and their application to architectural design. Computation, parametric design, modelling, simulation and other advanced techniques are employed to tackle a design problem of research nature, that is, prompting towards experimental uses of digital tools and their synergy with advanced analogue techniques and mainly modelling, in order to produce design propositions that extend our sense of architectural space and structure. Experimental design strategies are introduced together with a range of tools and processes of the digital interface. These strategies unfold along with the development of three assessments set as Analysis, Schematic and Prototyping.

BACKGROUND

This course focuses on the notion of surface in architecture. First, it draws upon manifestations of surface in nature in order to revisit common conceptions assuming architectural surface to be a flat element of same consistency and constant thickness and a consequence of standardising geometric norms, as these were founded in the modern aesthetics and construction techniques. Furthermore, with the new possibilities that have emerged due to digital technologies primarily related to CNC fabrication, it is generally conceded that geometricism, i.e. the analysing of complex forms to simple Euclidian shapes, soon may no longer be a prerequisite to construction. Such a prospect invites towards a complete turn in defining architectural surface from a fixed element to a malleable topological entity produced through its dynamic interactions with agents and data inputs defining a project.

Along with geometric definitions of surface developed during modernism, there were a number of pioneering architects of the same period who questioned its efficacy in meeting design aims. Related studies focused on observations for example that flat geometries often lack tectonic behaviour, as they promote rigid structures with large amount of material waste, or that geometric purity is often inefficient in cases requiring higher level of refinement. Alternative concepts were drawn remarkably without any computational aid, leaning towards softer geometries and agile structures set in response to local conditions. In retrospect, it is argued that such attempts prepared the definitions of surface that occurred three decades later, this time supported by the so-called digital revolution. References drawn from a large pool of precedents of natural origin combined with advanced computational tools have offered new meaning and ways of appropriation of surface in architecture.

COURSE STRUCTURE

The course is divided into three phases, coinciding with the assessment items as explained below:

- First phase: Analysis: Data → Ideation → Hypothesis

Involvement, weighting and duration: Individual, 40% of total mark, weeks 1-5. Submission and presentation as instructed in the Course Outline.

The first phase includes the analysis of a surface selected from a natural source. Each student will choose a surface of natural origin (such as biological or geological) and study its dynamic properties in relation to external and internal forces as those affecting consistency, material behaviour, shape, thickness, density, inner scale, organising patterns and other topological features, textures, micro/marco attributes, modes of expansion/contraction and function. After the first two weeks, it is expected that the students will be able to perform a series of abstractions to further experiment with those properties in diagrammatic formats and so to address their potential to translate into spatial and structural qualities. The study will expand between digital and analogue working platforms. It will include testing with digital and physical modelling and material testing applied onto soft topologies to produce alternatives through recursive operations in 2D/3D systematic processes. Towards the end of this phase, it will be possible to address main performative characteristics about surface along with their equivalences describing space and structure, and so to outline further possibilities to adapt any of the proposed configurations into physical sites prompting similar aspects as the focus for the next phase.

The first phase includes training on digital modelling and abstraction techniques with Rhino on Thursdays, weeks 2 and 3 for two hours for each student, plus relevant references and tutorials through the IDDA online platform.

- Second phase: Schematic: Spatial Adaptation

Involvement, weighting and duration: Individual, 30% of total mark, weeks 6-9. Submission and presentation after the break, as instructed in the Course Outline.

The second phase focuses on adapting the findings presented above about surface to a selected site in the form of a schematic architectural solution. A physical site of the greater area of Newcastle will be selected specifically to match with the qualitative criteria about surface set in the previous phase. It is important to identify scale such as urban/landscape, building, or smaller, as this decision will refer back to the content produced so far and it will define the level of resolution required for each project. The process of adapting onto a site will have to show evidence of other schematic attempts, underpinning key research strategies and conceptualisations of the study. In effect, the proposed scheme will be accompanied by variations tested, compared and presented in a diagrammatic level to better explain how surface's performative qualities identified earlier are brought together with the site and how these are translated to pragmatic factors, such as relationship with existing context, suggested activities and other points being more individualised. It is expected that the students will employ digital and analogue techniques they should already be familiar with to support their scheme and site selection including but not limited to sketching, collages, 3D models for testing and communicating ideas and video editing as necessary.

The second phase includes training on advanced digital modelling and rendering techniques with Rhino on Thursdays, weeks 5 and 7 for two hours for each student, plus relevant references and tutorials through the IDDA online platform.

- Third phase: Prototyping Architecture

Involvement, weighting and duration: Teamwork, 30% of total mark, weeks 10-13. Submission, presentation and final pinup as instructed in the Course Outline.

The theme for the third phase is large-scale prototyping. It seeks to construct a mock-up being expressive of the enquiry's outcome. Design teams will be formed within each of the tutorial groups based on project relevance. Teamwork of up to four students is suggested in order to achieve results of higher standards, refinement and detailing and to be able to design, fabricate and present complete mock-ups within the given timeframe. Each team will come up with a prototype design constructed in large size, summarising the key themes of the projects brought together. The prototype may be described as a unique component showing how surface is spatially, structurally and materially manifested. For this part, and since this is a group phase that links various projects together, prototyping will range across different scales and alternatives. The prototype should be big enough to relate to the physical world, so that it expands on surface's properties. However, it shouldn't be viewed as an augmented representation of a whole design proposition, but rather as a physical diagram abstract meanwhile clear concerning concept, linking back to the first and second assessment items. Any decision, or means appointed to present the work will consist of arguments deliberately adding to the study of the earlier phases in logical manners. This will be possible by revisiting the previous phases through concise summarizing (representations) of the works to conceptually support and to explain the aims of the large-size fabricated pieces. It is expected that the prototypes will be produced digitally and then fabricated by employing materials and techniques based on their performative qualities.

The third phase includes training on advanced digital fabrication techniques with Rhino on Thursdays, weeks 9 and 10 for two hours, plus IDDA relevant online training references and tutorials.