**ABSTRACT**

Architectural Ornamentation is increasingly (once again) considered as an integral part of architectural composition, and hence: an issue in education and research...

This Paper documents the steadily evolving ambitions and outcomes of an on-going MSc study course, which has been now been running for some seven years and is still steadily developing.

The original initiative, playfully dubbed ‘Ornamatics’ - expressing the ambition towards interaction of compositional and instrumental themes such as Ornamentation, Informatics and Aesthetics - was triggered by the opportunities of - then emerging - Computer Aided modeling and Manufacturing (CAM) techniques, coupled with an academic interest in Composition and Perception in the context of - contemporary - Architecture.

Through the years, the course has continually progressed, on the level of technical opportunities as well as design exploration tasks. Due to the characteristic mix of 'local' and international students - bringing with them particular skills and fascinations - the exercise has become something of an academic 'melting pot', through the (inter)active exchange of ideas and new 3D modeling skills.

The communication techniques the students use may be considered 'digital hybrids', as they are free to use any design media they see fit or consider challenging.

As a consequence, students tend to make use of varying combinations of visualisation techniques, notably: freehand sketching; collageing and cutting/folding; 3D mathematical programmes; analytical schemes (using colour); 3D 'sketch' modeling and computer-aided rendering and drafting.

During the tutoring sessions, individual ideas, inspirations and developments are communicated using targeted digital slide presentations. The physical outcomes of study amount to a series of tangible, physical models generated with the use of a range of CAM instruments: 3D printers, 2.5D milling devices and 20+ laser cutters.

Throughout the series of Ornamatics 'events' so far, Process and Communication, as well as Imagination and Instrumentation have been essential for the course's appeal and success. Themes students have explored through the years have included: the DigiTile; the Ornamatics Capital and the BK Faculty Façade. New tasks and applications are under development...

The full Paper will address the development of this experimental educational application, going into various compositional inventions and technical innovations, as well as considering the ways in which such design conceptions may be communicated: with oneself as well as with groups of academics and professionals.

**INTRODUCTION**

Architectural Ornamentation is increasingly being reconsidered as an integral part of Architectural Composition, and hence: an issue in education and research...

This Paper documents the steadily evolving ambitions and outcomes of the Form and modeling Studies group to raise the awareness amongst students concerning the expressive potentials of Detailing in architecture and the qualities of - implicit and/ or explicit - Ornamentation.
Contrapiece of the Paper is a reflection upon an on-going MSc elective course, which has now been running for some seven years and is still steadily developing. Ornamentation: The developments of this experimental application are addressed, going into aspects of compositional invention and technical innovation, as well as considering the ways in which such design conceptions may be communicated with oneself as well as with groups of academics and professionals.

Furthermore, the Paper looks at two studies addressing ornamentation on different sides of the educational 'spectrum':

- Firstly, a first-year BSc Form Studies exercise, in which an attempt is made to acquaint 'absolute beginners' to architecture with the expressive means on the level of the architectural Detail;
- Lastly, recent visualisation developments in the context of a case-based Research project in which spatial modeling techniques are employed to identify and demonstrate the 'tactile' qualities of architectural Form on the level of the 'Critical Detail'.

The Ornament as a 'lost cause'

Ornamentation used to be considered an essential aesthetic condition of architectural composition.

With the influx of Functional Modernism in the early twentieth century, but particularly with its establishment as the predominant stylistic modus operandi in the post-war years, ornamentation lost credibility and became considered as an undesirable - even unethical - aspect of design.

The credo: 'Less is More...'

In truth, 'less' only tended to truly imply 'more', on a perceptual level, in the hands of extremely gifted architects, who had often been 'classically' trained and relied on an acute sense of proportion and a perfectionist attitude to detailing (as well as the budgets that go with prestigious commissions). Such as the 'inventor' of this provocative motto: Ludwig Mies van der Rohe...

My thesis would therefore be: 'Less is More Difficult...'

Creating a visually attractive result on the level of detailing involves great skill. Otherwise, in the hands of lesser 'gods', the results tend to be bland, monotonous buildings, with a sensory 'poverty' on a tactile level. In the eyes of many 'holders', such 'industrial' modernism does not arouse a sense of beauty, but instead is often experienced as a kind of perceptual deprivation... It was therefore not surprising that a younger generation of 'post-modernist' architects took a critical stance against such a 'brand' of architecture and sought more stimulating stylistic alternatives.

In the words of Robert Venturi: 'Less is a Bore...'

However, the architects of the Post Modern 'movement' tended not to re-introduce ornamentation on the level of the architectural detail, but rather through the 'iconic' re-interpretation of historical architectural motifs on a larger scale - often on the (scale) level of the building as a whole. In such cases, detailing often tends to be flat and schematic, to underline the impact of the 'grander' gesture. The result: buildings that still display a certain, sensory 'poverty' add to a sense of: 'something's lacking...'

I would therefore like to put forward a playful alternative to Mies' classic 'sound-bite': 'Mach is More...!'

The Return of Ornamentation

In recent years we have been witnessing the 'come-back' of the Ornament in contemporary architecture, whereby particular trend-setting architectural firms - such as Herzog & de Meuron - have steadily 're-invented' ornamentation, particularly on the level of the building 'envelope': the package of the building's facade.

Initially, such ornamentation tended still to be relatively 'flat', as one of the ground-breaking techniques was the printing of decorative patterns and graphic 'samples' on glass. However, gradually but steadily, new modes of architectural ornamentation have been explored, introducing more 'plasticity', comparable to classic mouldings.
result: Articulation as well as Variation of building components and surface patterns on the level of architectural Fabric and Feature.

The current practice of stylistic invention is, albeit indirectly, the result of technical innovations in the field of Fabrication, particularly on the level of Computer-aided Manufacturing. In this sense, new 'tools' such as computer-aided milling, laser cutting, and 3D printing, as well as casting techniques, using different types of moulds and materials, are steadily shifting architectural conventions. Thereby, an important impulse has come from a change in production procedures: from large-scale, standardised industrial component fabrication, towards a practice of 'production on demand'.

Such developments are of interest for architectural practice, but no less for education. In this sense, the 'New Ornamentation' might also serve to raise the awareness of students towards a greater understanding concerning the expressive opportunities of architectural detailing - an aspect of design in which they tend to be relatively underdeveloped and consequently: insecure.

This contribution briefly considers three education-based applications at the faculty of Architecture in Delft, the Netherlands, and their results, whereby expressive detailing and ornamentation play a prominent role:

- A first year BSc Farm Studies exercise in which details are considered as composition;
- An on-going, experimental MSc elective exercise, playfully entitled 'Ornematics';
- An explorative Research development, towards elucidating the 'tangible' qualities of - critical - details, on the basis of precedent studies using digital, spatial modeling techniques.

The Detail as Composition

![Figure 1: First year BSc Farm Studies exercise The Expressive Detail, selection 1.](image-url)
The aspect of architectural detailing - both in a technical as well as in a compositional sense - tends to be a weak point of first years, but also of more 'advanced' students. This probably is a consequence of the fact that many students have very little affinity with physically making things and as such find it hard to understand the workings, but also the opportunities of the expressive detailing. In recent years, things have not improved with the introduction of a generation of overly-complex digital modeling software applications, which were not conducive to design-thinking on the level of the detail. Recently, things have improved with the availability of more 'tangible' 3D 'Sketch' platforms.

The students' inhibitions, when it comes to detailing, may also be due to the fact that, at least in the Netherlands, detailing as such is not really taught in a structured manner. All too often, in complex design projects with a limited timeframe, the details tend to 'come last'...

The first year BSc course of the Form Studies group in Delft is a yearlong 'line' programme, consisting of some twelve individual - but thematically linked - exercises. Each of these has a specific creative task, with clearly defined ambitions and constraints. Approximately two thirds through the year, the challenge that is set: the 'Expressive Detail'. In a lecture, at the beginning of the third half-semester, the aesthetic qualities of architectural details are highlighted, by focusing on details from different eras and from around the world, notably: Gothic and Renaissance as well as exemplars of Japanese carpentry: Buddhist versus Shinto... In this particular Form Studies exercise, the students are subsequently required to create an autonomous model of a fictitious building 'fragment'. The emphasis lies on the manifestation of Tectonic aspects, developed with a 'compositional eye'.

![Figure 2: First year BSc Form Studies exercise: The Expressive Detail, selection 2.](image)

The models may articulate - and even exaggerate - issues of building and design, such as: forces (pressure, tension, connection), the coming together of different components (dimensions, profiles, joints) and the layering of materials.
(unraveling, relief, colour). Exploring such issues by hands-on modeling, using relatively simple materials such as cardboard, wood, plastics etc., frequently results in surprisingly clever - even ingenious - form combinations.

The exercise underlines the fact. The Detail is an essential aspect of design that deserves not only to be taken seriously, but approached imaginatively and with the possibility of creating implicit and even explicit features. Ornaments. A meaningful by-product of the exercise is that students perceive how effective it is to study aspects of detailing in three dimensions: in drawings, as well as in physical and digital models.

The Ornamatics laboratory

Approximately seven years ago, Martijn Stellingwerff and myself started an explorative, experimental course - playfully titled 'Ornamatics' - expressing the ambition towards bringing together compositional and instrumental themes such as Ornamentation, Informatics and Aesthetics. The initiative was triggered by the opportunities of - then emerging - Computer Aided Modeling and Manufacturing (CAM) techniques, in combination with an academic interest in composition and perception in the context of contemporary Architecture.

Though the years, the course has continually developed and progressed, on the level of technical opportunities as well as design exploration tasks. Due to the characteristic mix of 'local' and international students - bringing with them their own particular skills and fascinations - the exercise has become something of an academic 'melting pot', leading to the interactive exchange of ideas and new 3D modeling and manufacturing skills.

The course explores new ways of studying, evolving and realizing architectural ornaments in contemporary architectural design and combines a focus on new forms of ornamentation, with the active utilization of computer aided modeling and manufacturing techniques. The thesis: computer aided modeling and drafting protocols - in
combination with new production technologies - can contribute to wholly new approaches to shaping building elements.

Some examples of techniques, which have recently become available and are actively utilised in the course: 3D Rapid Prototyping; 2.5D Milling and Computer aided Shape Cutting (notably using laser and water jet modes). Such new approaches not only create new opportunities for traditional production processes (including physical modeling), they also offer new perspectives for design and manufacturing on the level of architectural components and connections.

The issue of Ornamentation requires the students to investigate historical architectural styles and current production techniques, developing a critical view concerning aesthetic issues and an innovative approach to the design and production of building components. The design communication techniques that students use in the context of the Ornamentics exercises may be considered as 'digital hybrids', as students are free to use any design media they see fit or consider challenging. As a consequence, students tend to make use of various combinations of visualisation techniques, notably: freehand sketching; collaging and cutting/folding; 3D mathematical programmes; analytical schemes (using colour); 3D 'sketch' modeling and computer-aided rendering and drafting.

During the tutoring sessions, individual ideas, inspirations and developments are communicated using targeted digital slide presentations. The physical outcomes of study amount to a series of tangible, physical models generated with the use of a range of CAM instruments: 3D printers, 2.5D milling devices and 2D+ laser cutters. Throughout the steadily evolving series of Ornamentics 'events' the focus has come to lie on issues like Imagination and Communication, as well as Instrumentation and Process. This approach has been essential for the course’s appeal amongst students and its public relations success.
Compositional themes that have been actively explored, though the years, have included:
- The Digital Tile: creating and modeling 'tile-able' elements for spatial patterns and divisions;
- The Ornametica Capitol: devising new ornamental elements connecting columns and beams;
- BK City Façade: designing and modeling facade alternatives for the Architecture faculty;
- In the latest edition (April - June 2012), the focus has been on creating ornamental Bandstands.

**The Tangible Detail**

The last visualisation approach, which is considered here, is part of an on-going Research study entitled the AA Variations. In this explorative project, targeted at reaching a deeper understanding of the issues of the Composition and Perception of architectural Form, ten (market gardener's) houses, all situated in one Dutch municipality, are being studied in-depth on different levels of design.

The ten 'cases', which are analysed and compared, span a period of roughly a century. The projects have been selected as being more or less representative of a particular stylistic convention, specific to the Netherlands in the twentieth century. Each of the projects is systematically unraveled on the basis of four main categories: Form, Facade, Fabric and Feature. The main 'instrument' for the analysis and demonstration of the workings of compositional phenomena, per project, is computer-based spatial modeling, using widely available 3D 'sketch' modeling platforms.

**AA Variations**

![Critical Detail](image)

The visualisation approach that is addressed here is a relatively recent development, whereby the projects are considered on the level of their 'critical' details. The method involves identifying those details that may be considered as being representative for the project and more or less 'define' the building on the Feature levels. Subsequently, an
An attempt is made to zoom in on the *tangible* articulation of building components, connections and ornaments and to reach insights concerning their aesthetic impact.

The working method involves taking 'slices' from the 'corpus' as a whole, essentially where key elements - such as roofs, walls, windows and gutters come together. These 'representative' parts of the composition are then modeled in detail. Subsequently, this procedure is repeated for more complex detail-combinations, notably the most eye-catching corners per building. In the context of this Paper only one of the ten projects is considered and illustrated, the highly complex Borendse House of 1923, a late work of Dutch Expressionist architect Michel de Klerk (1884 - 1923, one of the leading architects and artists of the so-called 'Amsterdam School').

**Conclusions**

In this Paper a case is made for the *imaginative* consideration of the design phenomenon of The Detail - and as a consequence: The Ornament - in architectural education and research. Whereas the architectural Ornament tended to be overlooked - or be consciously ignored - only a few years ago, expressive detailing and ornamentation are - fortunately - 'back on the agenda' in architecture. It is therefore my considered opinion that in academia this development is not only interesting on the level of architectural content but also a poses challenge on the level of design Pedagogy. In this context, studying and developing *ways of visualising* details evocatively, for the benefit of analysis or design, may be considered as a didactic opportunity for teachers of architecture.

This Paper has given a brief characterisation of three, wholly different, visualisation approaches, in the hope that this might arouse a level of interest and potentially stimulate the exchange of ideas - and potentially the sharing of methods - towards furthering the innovation and creative visualisation of contemporary ornaments.