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Illuminating the Utility and Philosophy Collision

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Introduction

Teaching construction in the new digital era is an exciting process where a balance between utility and the designer's philosophy can be achieved.

Due to the evolution of computers and in particular 3d modelling, architecture has been revolutionised in regards to its exploration of an architectural philosophy and the resulting aesthetic. In an environment where all seems possible, the designer can digitally create all manner of forms and experimental structures whilst exploring the latest materials and technology. The building, however, will still need to function well once constructed. This can be ensured through an equal amount of energy being spent on solving the more utilitarian issues faced by a modern architectural expression. These issues can be found in abundance when dealing with the space created within the structural envelope. The Interior architecture requires the same degree of design intent and exploration expressed in the creation of the exterior. The language of materials, detailing and structure should be rolled out through the entire construction, unifying both philosophy and utility throughout the process, thus producing a successful building with integrity.

To produce a design of integrity, and in order to compete within the architectural profession once qualified, the students need to be taught the relevant skills. This is important, not only to gain employment, but also to quickly engage with the new technology of a modern architectural practice when employed. It is essential that education embraces this new digital era and tailors the students learning accordingly.

Projects that engage the students in regard to the implications faced when producing cutting edge architecture [architecture that looks fantastic on the computer screen], need to be written in order to equip the student with the means to identify and provide design solutions to potential problems which will be encountered in practice. A project is required, which encourages the student to carry forward the philosophy which has driven their initial concept, and apply it to all other aspects of their architecture.

Research has shown that in practice it is the interior that often suffers most from the neglect of a continuation of the architect's original design intent. The interfaces of the mechanical and electrical services in particular seem the most effected by this. In order to combat this issue it is necessary to focus the student's attention to a specific element of the service interface problem. In doing so, once the student has engaged and formulated a method of tackling the design issues posed, it is a simple process of applying the method or technique to all other elements of service interface.

Lighting is the obvious area to explore in regard to a student project in that lighting is used both externally and internally. Lighting can interface with a whole host of materials, and in all manner of locations, from ceilings, walls and floors, to partitions or even doorframes. There are many types of luminaire to contend with: pendant, spotlight, up-lighter, wall washer, emergency and task lighting, for example. All of which require a detailed interface solution. This solution can be generated from their initial design intent, and a project is the best means from which to explore this process.

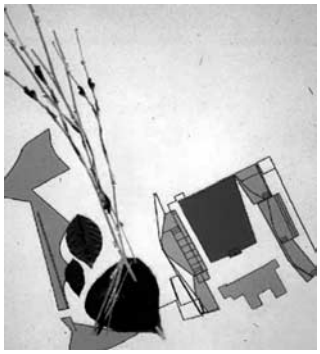
On completion of the project it is hoped that the student will have used the new digital tools at their disposal to test, and formulate a strategy to deal with, the implications of a digitally enhanced design process.

Case Study Introduction

Enric Miralles's philosophy for the New Scottish Parliament [visual 1] tests the boundaries of architectural expression. Gaining his inspiration from Scotland's rich diversity of landscape and history, Enric Miralles set about designing a parliament based on a montage of upside down boats, sticks and leaves. The upsides down boats were later to become the committee room towers and debating chamber. The leaves were later to become the forms that dictated the foyer space. The sticks shaped the landscape and punctuate many the project's exterior and Interior forms. This complicated design and strategy required a dedicated design team using the latest digital software to ensure the design intent became a reality. 3D Visualisation was used to communicate the design to the client, contractors and engineers, whilst enhancing communication within the project design team.

The 3D Software was a key factor in delivering an interior that reflected the initial design intent whilst at the same time facilitating the countries parliamentary requirements. The Interior had to combine both architecture philosophy and Utility.

"*The Parliament sits in the land. We have the feeling that the building should be land, built out of land. To carve in the land the form of gathering people together*" [1]



1. Concept for The New Scottish Parliament Edinburgh. Enric Miralles EMBT/RMJM

2. Physical Model of the New Scottish Parliament Edinburgh. Enric Miralles EMBT/RMJM

Case study 1 [Concourse]

The MSP [*Member of the Scottish parliament*] concourse space was created from an initial design intent that reprises the notion of boat hulls and leaves. Twelve leaf shaped rooflight structures were to dictate the shape and spatial form of the concourse. The

tilted vesica-shaped rooflights were designed to capture and funnel northern light whilst facilitating all the artificial lighting, ventilation and fire detection requirements. The concourse space linked the four main structures, the MSP offices, Queensbury house, the Debating Chamber and the Committee Room Towers. The space was to become the social heart or the parliament.

By using 3Dimensional tools the design team were able to model and test the concourse building and its interior spaces. In conjunction with their primary 2Dimensional drawings skills the design team used 3 Dimensional modelling to solve complicated detailed design issues. The lighting for instance required a sensitive and detailed approach to how it interfaced with the architecture. The computer software could model detailed junctions, showing construction methods, cladding materials, fixing techniques, cable management and the service interface.

Once tested digitally the design team were able communicate their detailed design intentions 3 Dimensionally to the engineers and contractors. With this level of understanding and communication the concourse was built beautifully.

Each complicated rooflight with its glazed, steel and timber structure connected seamlessly. Internally clad with stainless steel and timber panelling the rooflights contained an array of services from fibre optic lighting to fire detection. The concourse space is clear evidence that philosophy and utility can be unified successfully when explored, detailed and executed using the latest digital equipment.

3. 3D CAD Model of the Parliament's Foyer

4. Main Staircase leading into the foyer

5. The Foyer space

Case Study 2 [Committee Room]

There are four tower buildings that rap around the Debating Chamber building. Externally, their reinforced concrete shells are clad in granite and oak. The roofs are shaped like upturned boats and are covered in stainless steel. The Parliament's six committee rooms are located in Towers 1 and 2.The committee rooms were designed as individual spaces to accommodate and facilitate political debate. All the committee rooms differ spatially, each housing a dramatic plaster vaulted ceiling of varying geometric complexity.

To create these committee room ceilings the design team relied on the latest digital software. By using a 3 Dimensional drawing package the design team were able to model the space in order to visualise the ceiling form and potential construction techniques. [6] Once a contractor had been selected to build the ceilings [a construction company that specialised in boat construction], the designers created further 3Dimentional models of each ceiling type. These models generated accurate geometric exploration in regards the dimensions required to fabricate the structure.

Once fabrication methods were understood and tested in part, it was clear just how difficult it would be to practically facilitate the functional aspects of a committee room. A parliamentary committee room would require a specific quality of acoustics and lighting required for broadcasting the debates. [7] In addition the rooms would have to cater for normal working conditions related to a social space, such as, ventilation, heating, general lighting and fire detection. All of which could have the potential to destroy the elegant architectural forms generated from the initial design intent if not detailed sensitively.

6. 3D CAD Model of the main committee room

7. 3D CAD Model of the committee room lighting design

8. Completed committee room ceiling showing lighting interface.

The design team modelled each detailed scenario digitally in order to generate a sensitive method of dealing with each service interface. By using the digital software packages to combine the unique architectural philosophy of Enric Miralles with the practical requirements of a parliamentary committee room space, the design team were able to realise an exceptional spatial quality both aesthetically and practically. [8] A clear indication that philosophy and utility can be unified successfully, when explored, detailed and executed using the latest digital equipment.

Project: Philosophy meets Utility (Student Tectonics Project)

Aims of Module

This module aims to introduce the student to:
- Detailing and Detail package management
- The principles and practice of three dimensional and orthographic drawing used to explain construction methods, material use and service interface

Learning Outcomes

On completion of this programme the Student will:
- understand the requirements of a production information package
- demonstrate an advanced understanding of the language of materials, components and connections
- demonstrate an advanced understanding of the specification of materials
- understand advanced detailing problems and propose solutions
- demonstrate advanced orthographic drawing skills
- demonstrate advanced 3d CAD Modelling skills
- identify and solve detailing issue using digital medium
- demonstrate skills in communicating design intent both verbally and 3Dimensionally

Description of Module

The module is delivered as a series of set projects that engage the student with the world of detailing, material manipulation, construction, and drawing package management within the new digital era.

Introduction

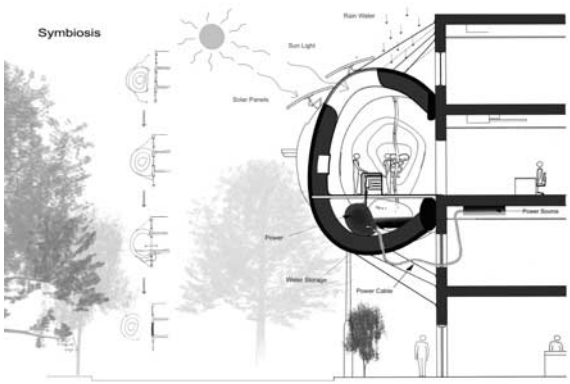
"The necessity to become a little mad is not part of an architectural education. To dare to put forward ideas, to offer up visions to realise the unexpected requires pushing the imagination. But how crazy should we get? Not too much: people still have to use the costly stuff that we produce. Not too little: lets be less boring in the future. The architectural imagination is a combination of utility and philosophy. It responds to specific needs and situations, but keeps in mind that architecture is also a thought about how we want to live in our world. These two, utility and philosophy should not drift apart. The secret is to unify them and to always let them be mutually enforcing" [2]

Due to the arrival of the digital era, architecture has become globally more diverse. Architects/designers are free to express themselves through the exploration of shape, form and materials, which are easily tested and visualised using the latest computer software. It is important however to realise that these digital tools at our disposal are not only to express superficial architectural philosophies, but to create exhilarating buildings with depth and character. In order to ensure this depth and integrity happens, the architect/designer should apply the same degree of energy in all aspects of the design process. The same philosophy and method used to create the exterior should be employed when creating the interior detail.

By using the digital software available, the architect/designer is able to visualise every construction scenario. In doing so the architect/designer can:

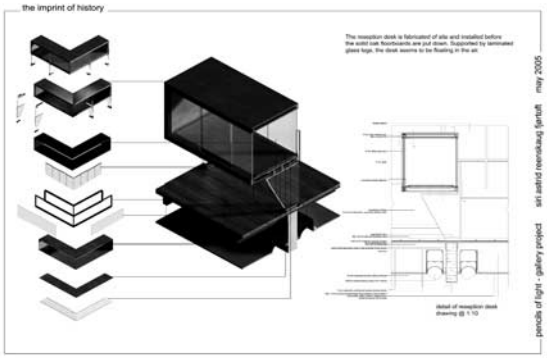
Expose and solve potential detailed design issues
Express their design intention to an Engineer
Explain the project in depth to the client
Aid in the tendering process
Enhance communication within the project design team

This 3rd Year programme is an extension of the main 2nd Year Design Theory and Practice [DT&P] programme. The submission for the DT&P programme is based on drawings and models designed for client presentation.

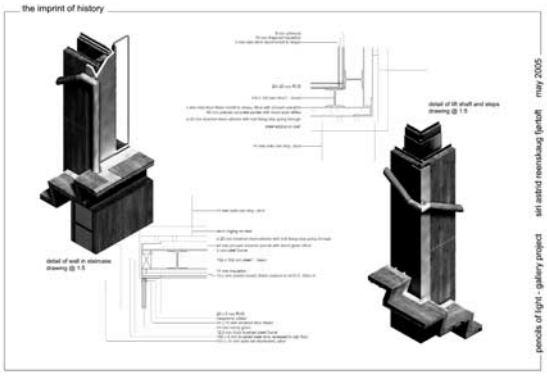


9. Student Project by Christy McGarry, Napier University,
10. Edinburgh Scotland

The 3rd Year Tectonics students will inherit the 2nd year designs and will concern themselves with the development of a 'production information package' based on a series of working drawings and 3D modelling designed to convey detailed information which is sympathetic to the initial design intent .



11. Student Project by Siri Astrid reenstaug Fjortoft, Napier University, Edinburgh Scotland



12.

This ten-week programme provides the opportunity to expand a design project and consider key detailing issues, which include:

- Materials
- Specification of components [Luminaire units, conduit, ballast, ventilation requirements and protection from the elements]
- Finishes
- Incorporation of lighting
- Methods of fixing
- Incorporation of services

Brief

Architecture of any size and complexity would require a relatively large package of production information, (including general arrangement, assembly, component, mechanical, electrical and structural drawings and detailed specifications and schedules).

Information would range in scale from large structural components down to keyhole escutcheon plates.

The brief is to consider one area of the second year project (approximately an area covering an A1 sheet at scale 1:20) and produce a comprehensive set of working drawings and 3d visualisations. The selection of an appropriate area is essential; it must be complex enough to provide several detailing 'challenges'. For example, a standard stud partition wall would not be an acceptable element to detail, but a 'complex' wall that included storage/display/reception/seating/lighting etc. may be sufficiently challenging.

Once an element of your design has been chosen a detailed three-dimensional CAD Model is to be constructed, materials and lighting attached.

Choice of element must be made by week 02, and 'revealed' at tutorial

Submission

There are two assessment points within the project:

Submission 1
At this crit, all design work must be complete. Drawings pinned-up must be complete drafts ready to be turned into final drawings for the presentation crits
(1:20 layout section & plan (extent approx. A1 sheet), showing the layout of space, objects, and finishes)

Submission 2
A full set of complete working drawings (as described in submission requirements) is required to be submitted at this crit. To be presented alongside the original 2nd year project
JPEG views of Element should be printed in colour and presented as an integral part of the presentation showing not only the complete detail but also an exploded version.

Workbooks, showing development, should also be submitted.

Assessment Criteria

This program represents 75% of the submission requirements for DM30017
Allocation of marks between the submission components is as follows:

1:20 Plan and Section	15
1:1 / 1:5/ 1:10 Assembly Details	25
3D Model	40
Workbook	20

(Based on the following: Innovation, development, functionality, presentation & Technical competence)

01 1:20 Layout Section & Plan Checklist

Section to include the following elements:

- structure
  all fixed furniture and fittings
  handrails and balustrades
  suspended ceilings
  lighting luminaires
  door furniture (handles, kickplates etc.)
  skirting and trims
  air delivery grilles/ducts etc.
- Hatching (where materials are cut through)
- Grid Lines (and key dimensions off grid lines)
- Finished Floor & Finished Ceiling Levels
- Cross Referencing information to assembly drawings
- Title Box to include: job title
  drawing title
  drawing number
  scale
  revisions
  drawn by

02 Assembly Drawings Checklist

Drawing set must include 1:10 plan and sections of an element within the space (e.g. a reception point, bar, etc.) With cross-referencing to 1:5/1:1 details of key junctions and connections. Drawings to include the following information:

- Hatching (where elements are cut-through)
- Dimensions
- Title box for each separate drawing
- Annotation describing: components
  materials
  size
  finish
  colour
  method of fixing

e.g.
42.4mm ms CHS handrail welded to 15mm* ms rod bracket all powder coated RAL 3001*

*42.4mm**	*(Size)*
ms CHS handrail	*(material & component)*
welded to	*(fixing)*
*15mm**	*(size)*
ms rod bracket	*(material & component)*
all powder-coated	*(finish)*
RAL 3001	*(colour)*

03 3D CAD MODEL Checklist

- Model must include:
- Lighting
- Materials
- Cabling
- Method of fixing

04 Workbooks Checklist

Work books should show a day by day documentation of detailed design development i.e.

- Sketches
- Specifications
- Text
- Reference Images
- Dates / times
- Detailed exploration of interface solutions

Schemes of interest

Sverre Fehn	Bishops House Museum, Hedmark, Norway
Carlo Scarpa	Castel Vecchio Museum, Verona
Carlo Scarpa	Querini Stampalia Foundation, Venice
Zumthor	Sheds for Roman Houses, Chur, Switzerland
Wilfried Bruckner	Schwabish Hall, Baden-Warttemberg, Germany
Lamott Architecken	Public Library, Landau, Germany
Edward Souto de Mooura Humberto Vieira	Hotel in Former Monastery of Santa Maria do Bouro Braga, Portugal
Massimiliano Fuksas	Tuscolano Museum of Roman Archaeology Frascati on the outskirts of Rome

Reading List

Architects' Working Details, Volumes 1 - 7, Susan Dawson, Emap Construct
Detail, Review of Architecture Journal
Building Construction Illustrated, F D K Ching, Van Nostrand Reinhold
Mitchell's Internal Components, Alan Blanc, Longman
Construction for Interior Designers, Roland Ashcroft, Longman
Interior Design Illustrated, F D K Ching, Van Nostrand Reinhold
Working Drawings Handbook, Keith Styles
Architect's Pocket Book, Charlotte Baden-Powell

Company Lighting Catalogues of interest

Zumtobel
IGuzzine
Louis Poulsen
Bega

Sites of Interest

Carlo Scarpa	http://www.studiocleo.com/gallerie/scarpa/scarpatitlepage.html
David Chipperfield	http://www.davidchipperfield.co.uk
Sverre Fehn	http://www.pritzkerprize.com/pritzpho.htm
Norman Foster	http://www.fosterandpartners.com
Mies Van der rohe	http://www.bc.edu/bc_org/avp/cas/fnart/fa267/mies.html
Rem Koolhaas	http://architecture.about.com/library/weekly/aa042200a.htm
H. Hertzberger	http://www.hertzberger.nl/index_intro.html
Eva Jiricna	http://www.ejal.com/PAGES/00MENU.html

Marking scheme

A (70-100%)	outstanding
B (60-69%)	excellent
C (50-59%)	good
D (40-49%)	adequate
E (30-39%)	needs more work (fail)
F (0-29%)	fail

References

1 El Croquis, 100-101, Enric Miralles + Benedetta Tagliabue, 2000, pp144-145
2 Imagination Liquid Politic, Ben van Berkel & Caroline Bos 1999, p21

		Computer Lab		Notes
Week01	Introduction to Project	Project Launch 2nd Year presentations of recently completed design project to the 3rd Year	Students are to pair-off into Project Groups	3rd year are to quickly familiarise themselves with the inherited project with the help of the 2nd year designer
Week02	Project Groups meet for "Question and answers"	Tutorials	Relevant lecture programme	
Week03	Project Groups meet for "Question and answers"	Tutorials	Relevant lecture programme	
Week04		Submission 1 [Presentation of 1:20 Drawings]	Feedback	Feedback [marking up the drawings with red pen]
Week05		Re-Submission of Student drawings after feed back session		
Week06	Project Groups meet for "Question and answers"	Individual Tutorials	Relevant lecture programme	
Week07		Detail Surgery		Detail Surgery is a drop in facility where the lecturer will answer questions as they develop the students are required to bring photos, sketches and work books that explain the problem and show location and structure
Week08 02-05		Detail Surgery		
Week09		Detail Surgery		
Week10		Submission 2 Final Presentation by project group [Ref to the Brief]	Feedback	