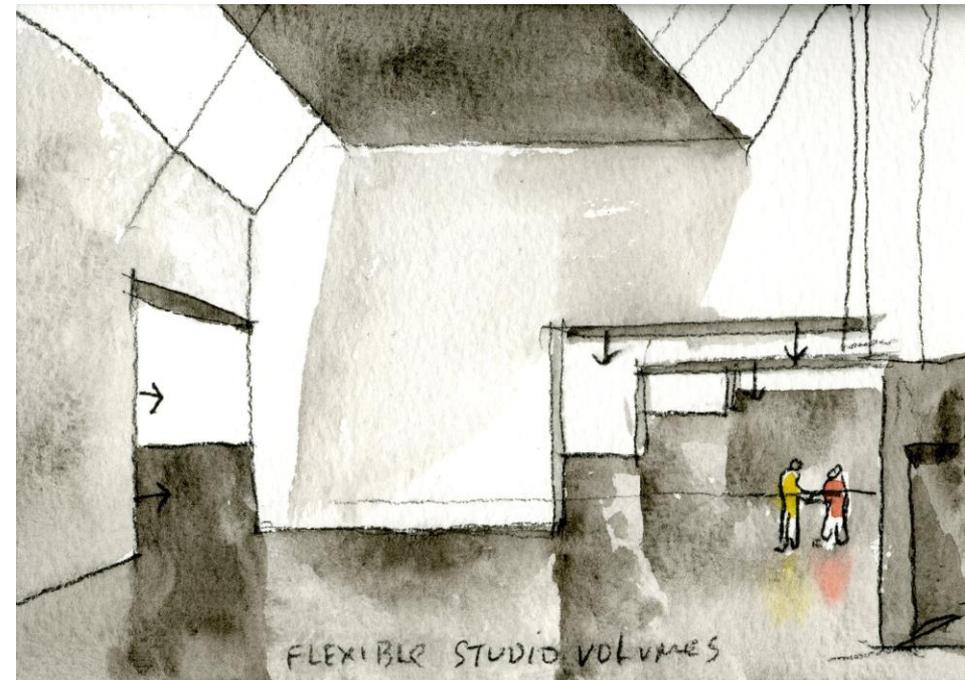


Glasgow School of Art

The project was won through an international competition for a new school of design. The work has been carried out in Collaboration with Steven Holl Architects in New York. The key points explored are the spatial outcomes of new teaching spaces and JM Architects role in the principles of designing in detail, for the skin of the building.



PROJECT DESCRIPTION

Title
Glasgow School of Art

Submission No.
03

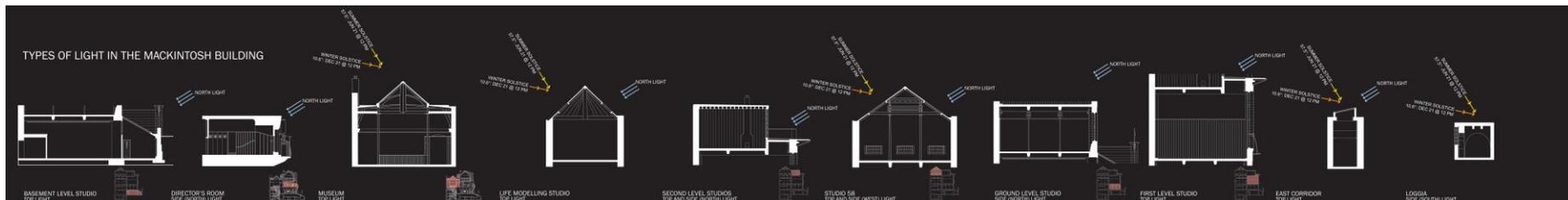
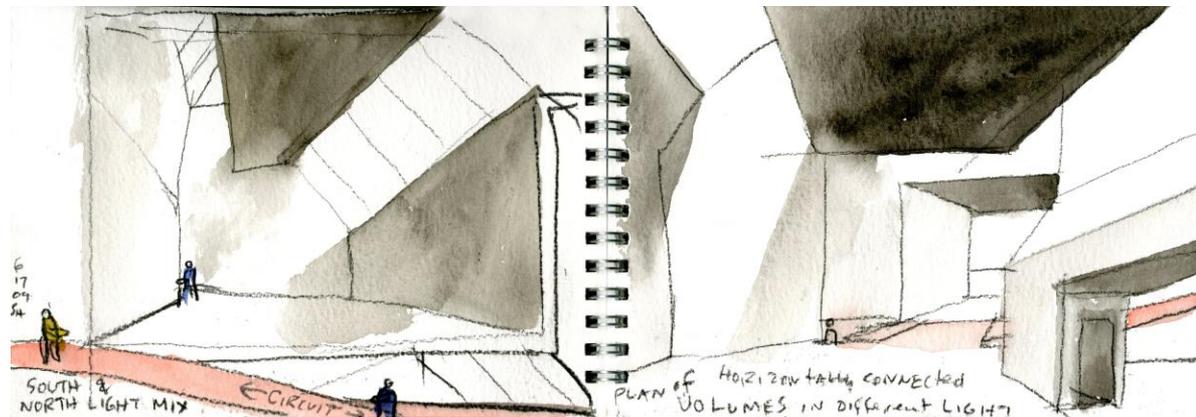
Authors/Creators
Ian Alexander / Henry McKeown

The new building stands across from Charles Rennie Mackintosh's 1909 Glasgow School of Art in complementary contrast, forging a symbiotic relationship in which each structure heightens the integral qualities of the other. The new building significantly enhances the teaching, learning and research facilities available to GSA students and staff and the access the public will have to their work.

Centralised facilities for the GSA campus, including exhibition spaces, seminar spaces, digital media and the "Window on the Mackintosh" centre are located on the ground floor in a carefully considered balance that forges an identity as an academic building, for the school and students, but that also invites the public inside.

The illustrations shows early Steven Holl paintings for studio spaces. The diagrams below are an extract from our detailed analysis of the studio spaces in the Mackintosh building.

These illustrations help define how Holl feeds off Mackintosh but does not parody - instead he creates an essay in 'complimentary contrast'



PROJECT DESCRIPTION

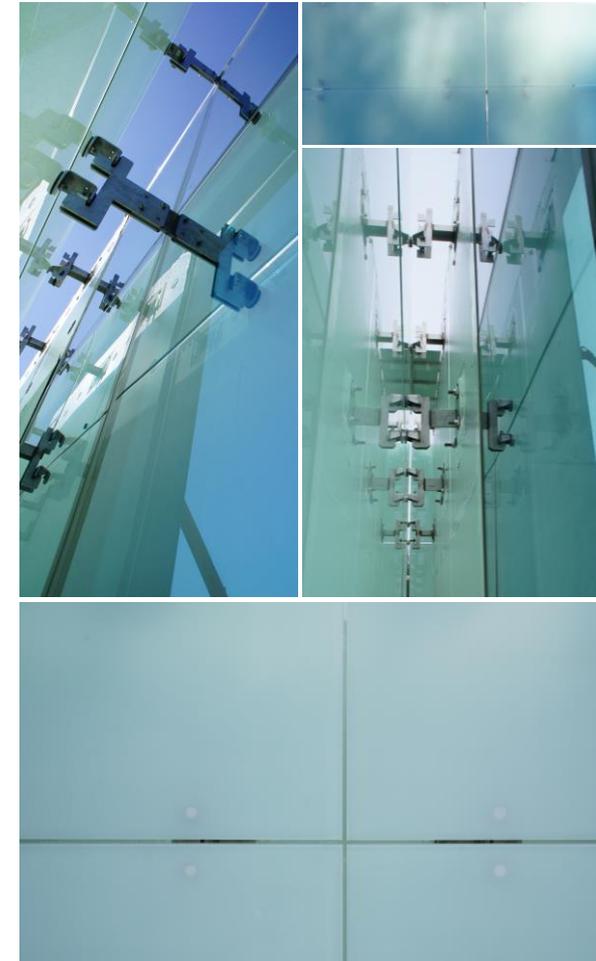
The site opposite the Mackintosh Building called for a unique, inspiring and stimulating twenty-first century architecture with a great sensitivity to light, detail, and material. Analysis of the Mackintosh Building revealed Charles Rennie Mackintosh's inventive manipulation of the building section to introduce and deploy light in a tremendous variety of inspiring and successful ways; the new design complements its neighbour, but moves forward using a new language of light.

The design began with the Studio space—the core of teaching and making art. Well-proportioned studio and workshop volumes are arranged in plan and section with natural side and top light for inspiring work environments. They are adaptable with potential for individual studios to open into larger groups, and arranged with functionally adjacent support spaces in rhythm with the studio/workshop volumes. They are illuminated with north light, with shafts of warm south, east or west light. Studios are generally positioned on the north facade provided with large inclined north facing glazing to maximize access to the desirable high quality diffuse north light throughout the academic year.

Spaces that do not have a requirement for the same quality of natural light, are located on the South facade (opposite the Mackintosh building) where access to sunlight can be balanced with the occupant's needs and the thermal performance of the space through application of shading or informed shaping of openings. The skin/ shroud is the arbitrator of how light is captured to the buildings profit, as a phenomenological material, shaped and conditioned by the architect to create ambience, and delight in equal measure

The building provides much needed studios and centralized workshop facilities, the Centre for Advanced Textiles, new digital media spaces, a lecture theatre and seminar rooms, exhibition space, a refectory for staff and students and a range of informal learning areas.

The interpretation centre for the Mackintosh Building, phase 4 of the Mackintosh Conservation and Access Project is also on the site. Located one level below, a 300-seat lecture theatre has direct access to the lobby as well as the centralized workshop and associated assembly spaces.

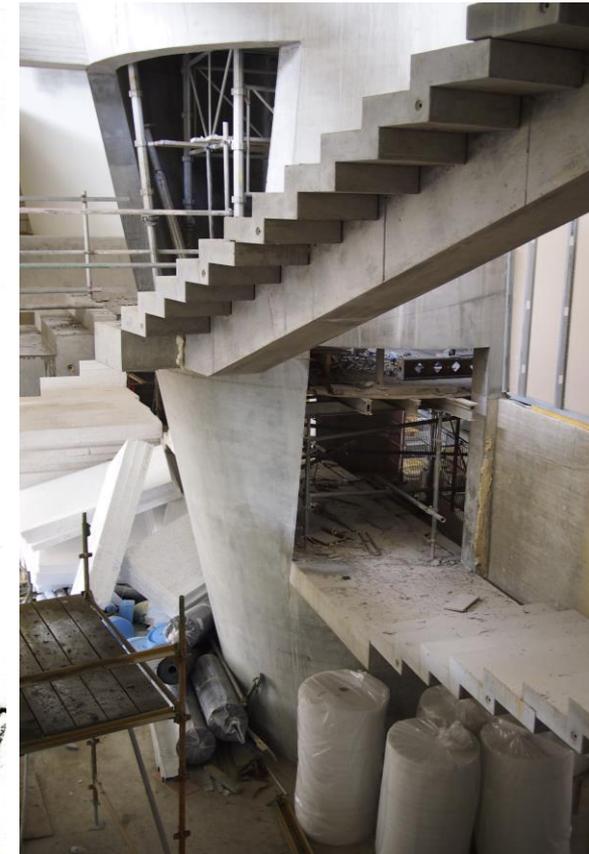
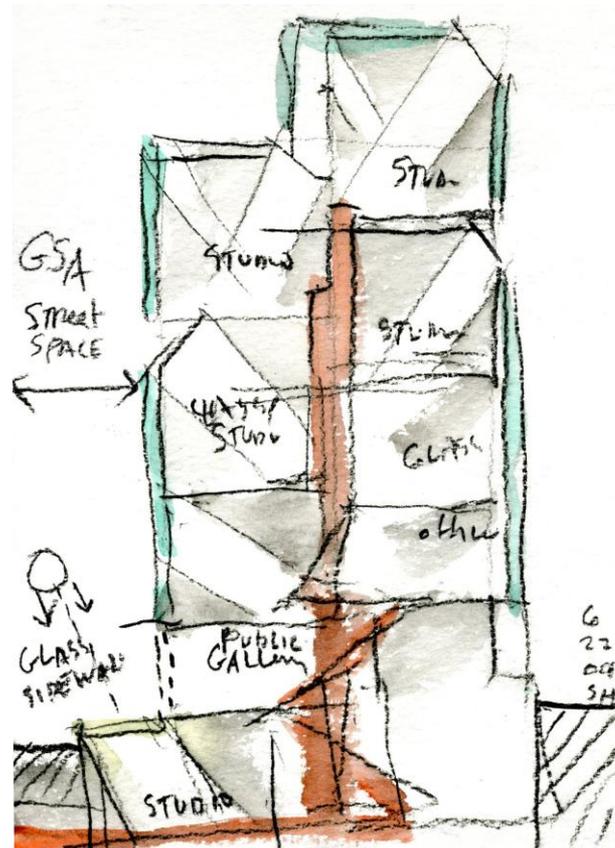


Illustrations of work in testing - 'thin skin' shroud being hung onto the mock-up

PROJECT DESCRIPTION

Immediately above the ground floor are the school directorate and administrative offices (on the south) whilst studio space occupies the entire north side at this level and moving up through the building. The new GSA refectory is located on level 2 above the offices, bringing the entire school up and into the building on a daily basis.

The original competition brief detailed the aim of Professor Seona Reid, Director of the Glasgow School of Art, for “creative abrasion” between the students and faculty. In Steven Holl Architects and JM Architect's design, this translated to a “Circuit of Connection,” which encourages the ‘creative abrasion’ across and between departments that is central to the workings of the school. The open circuit of stepped ramps links all major spaces - lobby, exhibition space, project spaces, lecture theatre, seminar rooms, studios, workshops and green terraces for informal gatherings and exhibitions.



Illustrations show Steven Holl's first sketch for the circuit of connection and the actual circuit of connection being constructed in the new building

PROJECT DESCRIPTION

Along the South elevation, at the same height as the Mackintosh main studios, there is a landscape loggia in the form of a Machair that gives the school an exterior social core open to the city. Natural vegetation with some stonework routes water into a small recycling water pond which will also reflect dappled sunlight onto the ceiling inside.

A homage to Mackintosh in space, “driven voids of light” allow for the integration of structure, spatial modulation and light. The driven void light shafts penetrate the building’s core, and simultaneously deliver natural light and vertical air circulation through the depth of the building, providing direct connectivity with the outside world through the changing intensity and colour of the sky.

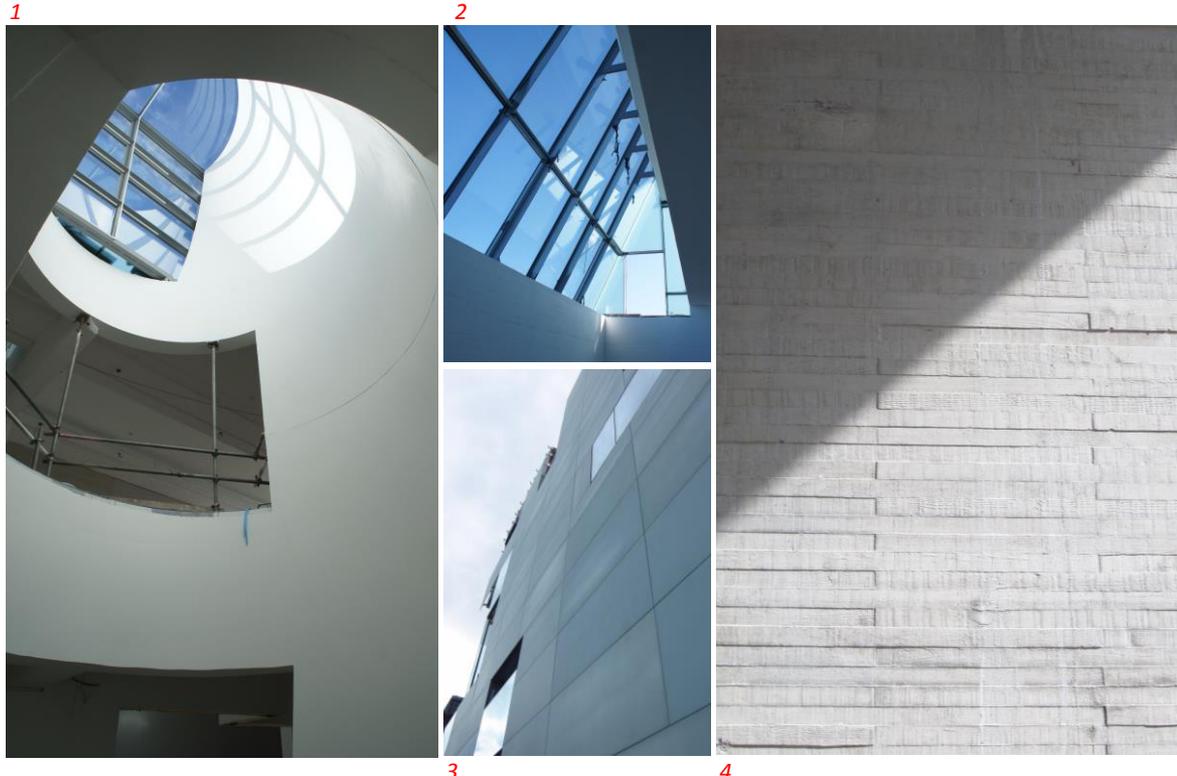


Illustration shows the inter-connection of the ‘circuit of connection’/ and the ‘driven voids’ providing visual and physical connections to studio spaces

PROJECT DESCRIPTION

The structure of the new Glasgow School of Art is the complimentary contrast of the original 1909 building. The exterior of the new building is wrapped in a thin skin of matte glass complimenting and contrasting with Mackintosh's stone skin on the 1909 building. The material, that was developed, a diaphragm of glass, with specialist interlayers, was a direct development of the materials that Holl used in the Vanke Center in Shenzhen, China. The use of this material softens the light on the Mackintosh building ensuring the studios continue to benefit from the quality of light as envisaged by the designer, and avoiding any risk of glare being reflected into the great north studios of the Mackintosh School of Art. Inside the building, wood formwork has given the concrete a textured finish, while steel formwork was used for the driven voids of light, to provide smooth surfaces that reflect light down into the section of the building.

The new building, rated BREEAM Excellent, integrates several innovative sustainable design features, such as storm water retention, collection and reuse, and green roofs. The driven voids of light provide natural ventilation throughout the building, eliminating the need for air conditioning. A new biomass plant serves the new Glasgow School of Art, the original Mackintosh building and the Bourdon Building.



1: 'Driven void of light'
2: Studio light
3: 'Thin skin', rainscreen
4: 'Thick bones', walls

CONTEXT

Glasgow School of Art has its historic location in Garnethill in the heart of Glasgow. The site is urban. It is bounded by Renfrew Street, Dalhousie Street, Scott Street and Renfrew lane.

The site, situated on a drumlin, is prominent in places but embedded within the urban grid. It is visible on the skyline from the M8 yet from certain aspects on neighbouring Sauchiehall Street it can be quite discreet.

One of the challenges of the site is building a new building facing Charles Rennie Mackintosh's existing art school building(grade A listed), completed in 1909.

The design of the proposals was always measured against detailed drawings and sections through the location.

Indeed as a research piece every single window type in the existing Art School was drawn as an analytical reference for the new design. In terms of planning considered views of the new structure were essential to giving an idea of how the proposals sat in the context.

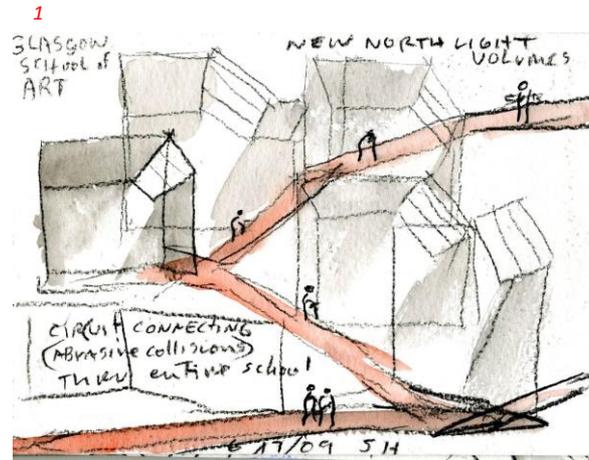


Views in context



RESEARCH QUESTIONS

1. What are the spatial outcomes for the new art school building that creates a new teaching environment?
2. How was the intent to create a non-reflective glass 'shroud' achieved in both aesthetic and technical terms, and live up to the status of 'thin skin'?
3. Design in Detail. How was the design intention of the new art school translated into the architecture of the fabric and the buildings materiality?



- 1: Principle 3: 'Circuit of Connection'
 2: Principle 2: 'adaptable studio with proportion and light'
 3: Principle 5: A new language of different light
 4: Principle 5: A new language of different light

AIMS AND OBJECTIVES

Design Principle 2: Adaptable studios with proportion and light

What are the spatial outcomes for the new art school building that creates a new teaching environment?

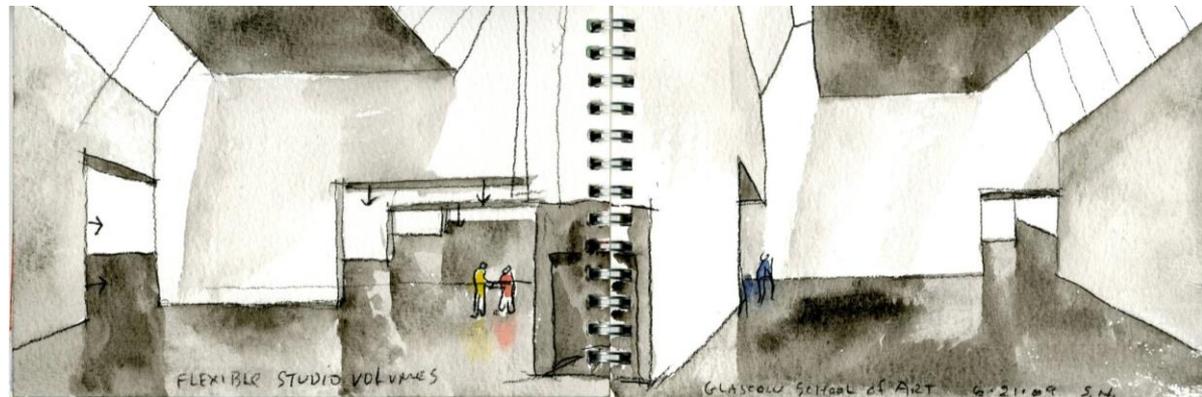
The new art school building is in essence a section of studio volumes that are linked vertically and horizontally.

They are set out on a 15m grid which echoes the dimensions of the studios in the original art school building by Charles Rennie Mackintosh. The plans are enfilade in nature with views up and down and along depending on their position in the section.

At certain key moments 'driven voids of light' cast in concrete penetrate the section of the building in a diagonal geometry that brings light, integral structure and ventilation to the building. At certain points through carved voids a multitude of views are opened up visually connecting the circulation ramps and studios.

The section is both simple and complex. As the sun rotates around the building, light and shadow fill the spaces creating different moods and atmospheres in different times of the day, and there is an impact of the sky, clouds and sun on the glass.

The analysis of these spaces the observation of these changes and their relationship back to the architectural principles that frame the project are worthy of investigation.



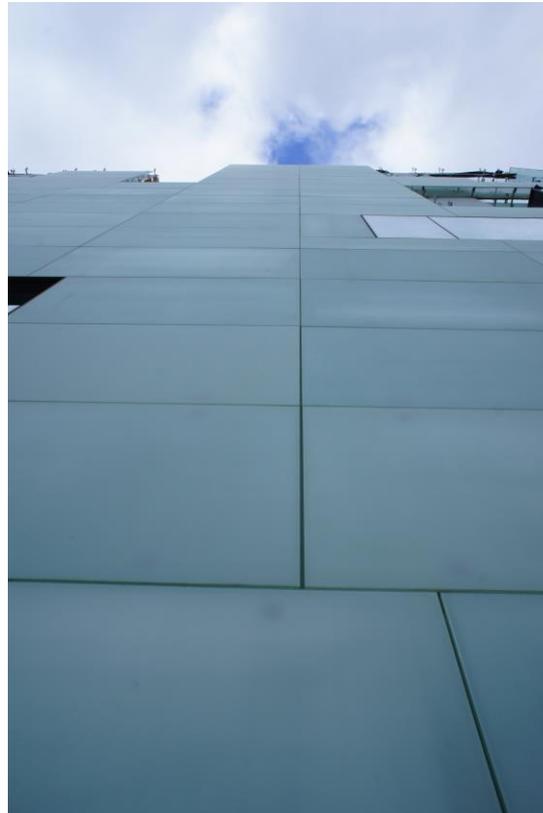
Illustrations show Steven Holl's first paintings of adaptable studio space, and above: an adaptable studio space in construction

AIMS AND OBJECTIVES

How was the intent to create a new reflective glass shroud achieved in both aesthetic and technical terms, and live up to the status of ‘thin skin’?

The starting point for this question lies in Steven Holl’s preoccupation (bordering on obsession) with phenomenology in architecture and in this case the phenomenology of light in architecture. In his book, co-written with Juhani Pallasmaa and Alberto Perez-Gomez ‘Questions of Perception: Phenomenology of Architecture’ Steven Holl articulates his thinking in this subject. This important theme runs through the project, and this question highlights our role in ensuring the phenomenological outcomes articulated by Steven where made manifest in the project.

Our research and involvement was to take Steven Holl’s ‘phenomenological’ position into the aesthetics, and technical realisation of the ‘thin skin’ of the new building, through detailing, experimentation, modelling and testing



Illustrations show the ‘thin skin’ and ‘ghost’ fixing method during construction

AIMS AND OBJECTIVES

In relation to the research and development of the glass shroud.

The critical requirement of the 'thin skin' rainscreen was that it would not reflect sunlight into the studios of the existing Mackintosh Building while remaining enigmatic, and refined. JM were influential on insisting with Steven Holl that no visible fixings should appear on the surface of the skin, so that its uniformity and appearance would be seamless.

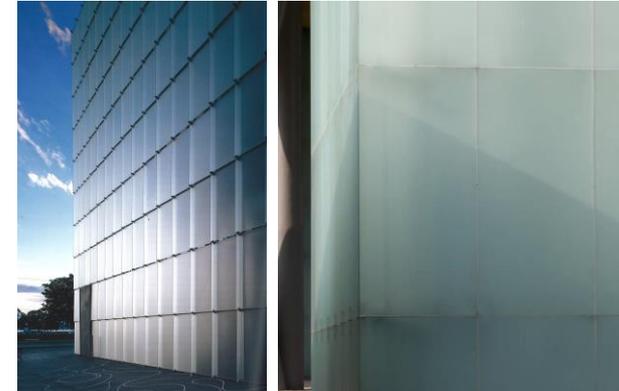
To do this, many man-hours were spent discussing and developing the specification with internationally renowned glass manufacturers and suppliers, such as Saint Gobain Glass, Pilkington Glass, Cricursa Glass and later in the process Gray Dick, Hanson Glass and Warwick.

Following a year of research and development of the design intent only one firm 'Warwick' were prepared to take on the design and develop the final product.

The product is made up of 6mm acid etched heat strengthened outer layer, a 7 layer P.V.W.R interlayer, a bespoke membrane developed specifically for the project – and as far as we know a world first in terms of rainscreen design - bonding the 6mm layer to a 12mm toughened inner layer.

The ghost fixing and suspension bracketing are bespoke for this building. The inner 12mm layer is pre-drilled to received the circular ghost fixing, and the P.V.W.R interlayer bonds the fixing to the panels of glass. From the outside there is a faint shadow, which shows the location of the fixings – 'ghosts'.

During the exhaustive testing period, it was not thought possible that these fixings would actually work. At this time Steven Holl was prepared to move to a through fixing, a mainstream solution. JM Architects maintained that this would be an aesthetic and material weakness in the design and persevered to the final solution – the 'ghost' fixing.



Bregenz, Vanke, and the GSA

AIMS AND OBJECTIVES

Design in Detail. How was the design intention of the new art school translated into the architecture of the fabric and the buildings materiality?

Design in detail is a principle that we use when teaching our students and we thought it highly appropriate that this became the methodology for taking the detailed design of the school into a set of production drawings .

This process involved continuous dialogue with SHA, sharing of knowledge from previous projects using precedents and using expert advice from those in the construction industry. In particular, we engaged with Arup Facades London; their lead designer who worked on the project was the designer of the Pilkington Glass spider fixing.

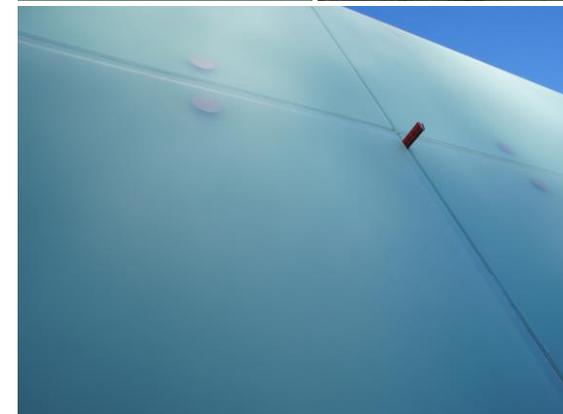
The design in detail process instigated a complete review of detailing in previous SHA projects. We examined walls, windows, doors, floors, ceilings, lighting and integrated servicing. We noted, for example, how corners met, how handrails were crafted and how doors sat in walls. The detailing however is entirely bespoke for the project.

Part of the outcome of the design in detail process was the creation of full size mock-ups for the driven voids of light and the external bespoke glass rainscreen and concrete walls. In addition internal walls of various types were built to test the gauge of the internal timber shuttering.

At a much more detailed level custom designed light fittings were built and tested as prototypes within the built fabric.



Development of the 'ghost' fixing



Testing of the glass 'shroud'

RESEARCH METHODS

In this instance JM Architects worked hand in hand with Steven Holl Architects during the competition, design development and design in detail phases of the project. He referred to us as his 'critical partners'.

We completed the design and access statement with SRM, for the planning application, this included a forensic analysis of the existing Mackintosh building: - extensive solar studies in relation to all seasons and issues of glare, a detailed urban analysis of the site and Garnet Hill in relation to the city, studying the cityscape and impact of the new building, and the essence of the new work to ensure that the scale, form and materiality would not have a deleterious impact on the Mackintosh Building.

- We designed and provided the majority of the content in the design of the 'written challenge' an element of the competition, this was presented as a book.
- We developed an approach –Macro to Micro analysing both the city and the building
- We designed, facilitated and presented a 16 week consultation process across the city with all principle government agencies, student cohort, staff cohort and all other relevant stakeholders.
- We had design workshop sessions with SHA in New York and Glasgow to review the design and progress of the detailing
- We were involved in the sampling and approval process for all the materials
- **We researched the making and detailing of the glass façade 'thin skin'**
- We researched the making and detailing of various bespoke fittings for the new building .
- We researched shutter types and the finish to the concrete, for an extreme smooth finish for the driven voids, to a rough board finish.
- We took part in weekly Skype conversations as the detailed design and research into final materiality progressed.



Design in detail, full size mock-ups of the driven voids and top: the 'thin skin' glass shroud

DISSEMINATION

Publications

The Architects Journal

22 03 11 'Holls Glasgow School of Art Gets Go Ahead

10 11 10 'Facing up to Mackintosh', David Porter

17 09 10 'Steven Holl unveils Glasgow school of Art

The Building Design

17 09 10 'Steven Holls Glasgow School of Art Designs Revealed' Klettner, A.

24 07 10 'Holl unveils art school'

Architect, Oct 2009

Architectural Record, Nov 2010

Future 28-29, Dec 2011

GA Document 122, Oct 2012

Mackintosh Society Journal, Dec 2010

MacMag 35, 2010

Perspective, July 2013

Wallpaper, Nov 2013

WIRED, Dec 2013

El Croquis, Steven Holl Architects, Jan 2014

The Glasgow Herald

May 09 'starchitects' Fade out of contention for top commission', Miller, P.

Sept 10 'Design for art school building unveiled' Miller, P

Jan 10 'Glasgow school of Art architect promises 'light' and 'green' design

Jul 12 'Work Well Under Way For New Art School', Miller, P

Sept 12 'Art school Sees The Light', Miller, P

The Observer

Feb 11 'Glass Warfare Comes To Glasgow', Rowan Moore

April 2009 'Back to School' Fly Be inflight magazine

Platt, C. and Carter, B (eds.), 'Uneasy Balance' MSA Publications June 2013

Online Press

ArtForum, 9 Sept 09

Architects Journal, 8 Sept 09

ArchDaily, 25 March 2011

Architectenweb.nl, 11 Sept 09

Architects Journal, 5 Oct 09

Architects Journal, 8 Mar 11

Architizer, 20 Sept 10

Arcspace.com, 4 Oct 10

ArtDaily, 21 Sept 10

ArtINfo, 26 Sept 10

BDOonline, 17 Sept 10

Core 77, 17 Sept 10

DesignBoom, 9 Sept 09

Designboom, 21 Sept 09

Dexigner, 12 Sept 09

Dwell, 14 May 10

e-architect, 21 Sept 10

e-Oculus, 15 Sept 09

Evening Times, 23 May 11

Evening Times, 25 May 09

Inhabitat, 20 Sept 10

UK Wired, 17 Sept 10

WAN, 29 Sept 10



View of studio spaces

ESTEEM INDICATORS

The project was won in an international competition

The building has been widely reported in the press at a national and international level.

It has been covered by the BBC on the news.

Louise Lockwood is currently undertaking the making of a documentary for the BBC

El Croquis are currently producing another volume on the work of Steven Holl and the Art School is to be included.

The School of Architecture have used the building/ building construction as a live teaching aid for students.

The building is the subject of numerous student research projects.

The building is the subject of numerous academic articles.



View in context; looking up Renfrew Street

PHOTOGRAPHIC MATRIX

