I²SL Conference 2019

Delivering global best practice in temperature and vibration control

Oliver Milton & Matthew Ollier

Hawkins\Brown
Learning objectives

Learning objective 1
Recognize the significance of a strong and ambitious **client vision** to challenge pre-conceived standards and norms, reinforced through the role of a design champion.

Learning objective 2
Practice open mindedness and **honest discussions** amongst the project and client teams to deliver high quality, better-value-for-money solutions long term.

Learning objective 3
Demonstrate an understanding of how to collaboratively develop **bespoke methods** of designing and verifying unprecedented performance standards.

Learning objective 4
Identify the importance of placing equal value on improving **health and well-being** within research facilities alongside onerous technical program requirements.
An introduction

Oliver Milton
Senior Partner

Matthew Ollier
Partner,
LA Principal
About us

- Architecture
- Interior Design
- Masterplanning
- Research

Our Offices

- London
- Manchester
- Edinburgh
- Los Angeles

Practice of the Year
Employer of the Year
Technology Practice of the Year
Building of the Year

RIBA Stirling Prize
Project context
The Beecroft Building
Science area
The Beecroft Building

Historic context

Townsend Building

University Museum

Radcliffe Science Library

Keble College

Lodge

Keble College Chapel

University Parks

Grade I Listed

Grade II Listed
The Beecroft Building
Existing site
The Beecroft Building
Existing site
The vision

It will contain state-of-the-art labs, comparable to the very best worldwide, and will enable us to do research that is impossible in our current facilities.

Professor John Wheater
Head of the Department of Physics (2010-18)
University of Oxford
The Beecroft Building

The brief

- High specification laboratories for nano-scale research
- Temperature control to +/- 0.1°C
- Vibration control up to VC-M

- Collaborative environment to encourage researchers to work together in fluid groups
- Collection of single, paired and group offices for quiet study
The Beecroft Building
Existing Physics accommodation
Building arrangement
The Beecroft Building
Building organisation

Above Ground:
- Theoretical offices
- Collaborative atrium

Ground Floor:
- Public spaces
- Shared reception

Below Ground:
- Experimental laboratories
- Interstitial service floors
Theoretical Physics: Transforming working practices
Theoretical Physics
The challenge

- Collaborative environment adjacent silent thinking spaces for individual work
- Balancing visual connectivity and acoustic separation
Theoretical Physics
The solution

- Collaborative core
- Acoustically isolated ring of quiet offices
Theoretical Physics
The solution

- Encourage main circulation through the collaborative atrium
- Escape stairs tucked away
Theoretical Physics
Theoretical Physics

The solution

- Staggered platforms as stages
Theoretical Physics
Theoretical Physics

The solution

- Balancing visual connectivity and acoustics
- Fin balustrade maximises visual links
- Staggered glazed screens provide acoustic attenuation whilst retaining physical connectivity
Theoretical Physics
Theoretical Physics
Experimental Physics: Advancing scientific research
Experimental Physics
The challenge

- Unprecedented combination of extremely onerous vibration and environmental control criteria in urban location
- Conflicting requirements
- Limited reference projects
- Designing for unknown users/uses (balancing flexibility and cost)
Experimental Physics

The solution

- Collaborative team approach
- Building on existing relationships, drawing on a range of experiences and expertise
- Develop bespoke combination of design tools, methods of testing and verifying the design
- Vibration performance:
  Finite element model and staged validation strategy
- Environmental performance:
  CFD model and 1:1 system mock-up
Experimental Physics
The solution

- Zoning
- Structural isolation of moving plant(room)
Experimental Physics
The solution

- Layered performance approach through strategic layout
- Locate most vibration sensitive labs at the lowest level
- Base structural performance plus enhancements

A. VC-D: Structural design
B. VC-G: Keel slab
C. VC-M: Keel slab, ‘box-in-box’ construction, disabling of all services
Experimental Physics

The solution

- Isolated laboratory enclosure
- ‘Box-in-box’ laboratory
- Floating keel slab
- Air spring system
- Interstitial service floor
- Laboratory vestibule
- Acoustic cable pass
- Movement joint
Experimental Physics
Experimental Physics
Experimental Physics
Lessons learnt
The Beecroft Building
Lessons learnt

Design
– Design champion crucial to ensure vision is retained and met
– Reliance on design team experience and ‘common sense’ - collaborative approach essential
– Time and money allocated to mock-ups, validation and commissioning
– Robust monitoring of as-built performance at key stages of construction
The Beecroft Building
Lessons learnt

Build
- Standardisation despite bespoke requirements to achieve cost and programme efficiencies
- Utilisation of off-site construction methods (frame, M&E, unitised facade, balustrading)
- Integration of pre-cast concrete elements into the final material palette of the building
The Beecroft Building
Lessons learnt

Operation
- Early engagement with the client through soft landings meetings to establish requirements during the design stage
- Dedicated budget and time for commissioning
- Knowledge transfer is key to ensure efficient operation in line with design intent
Thank you