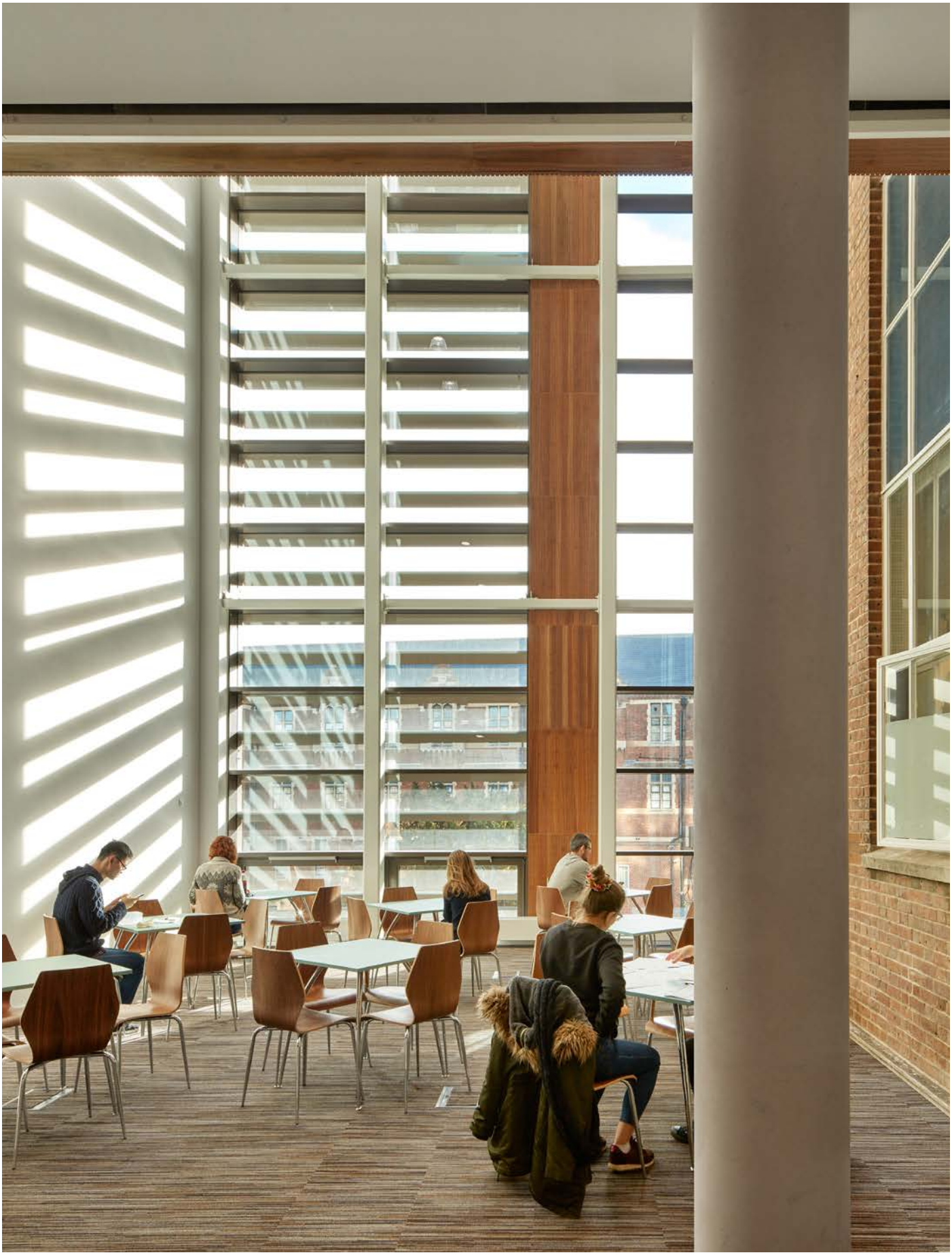
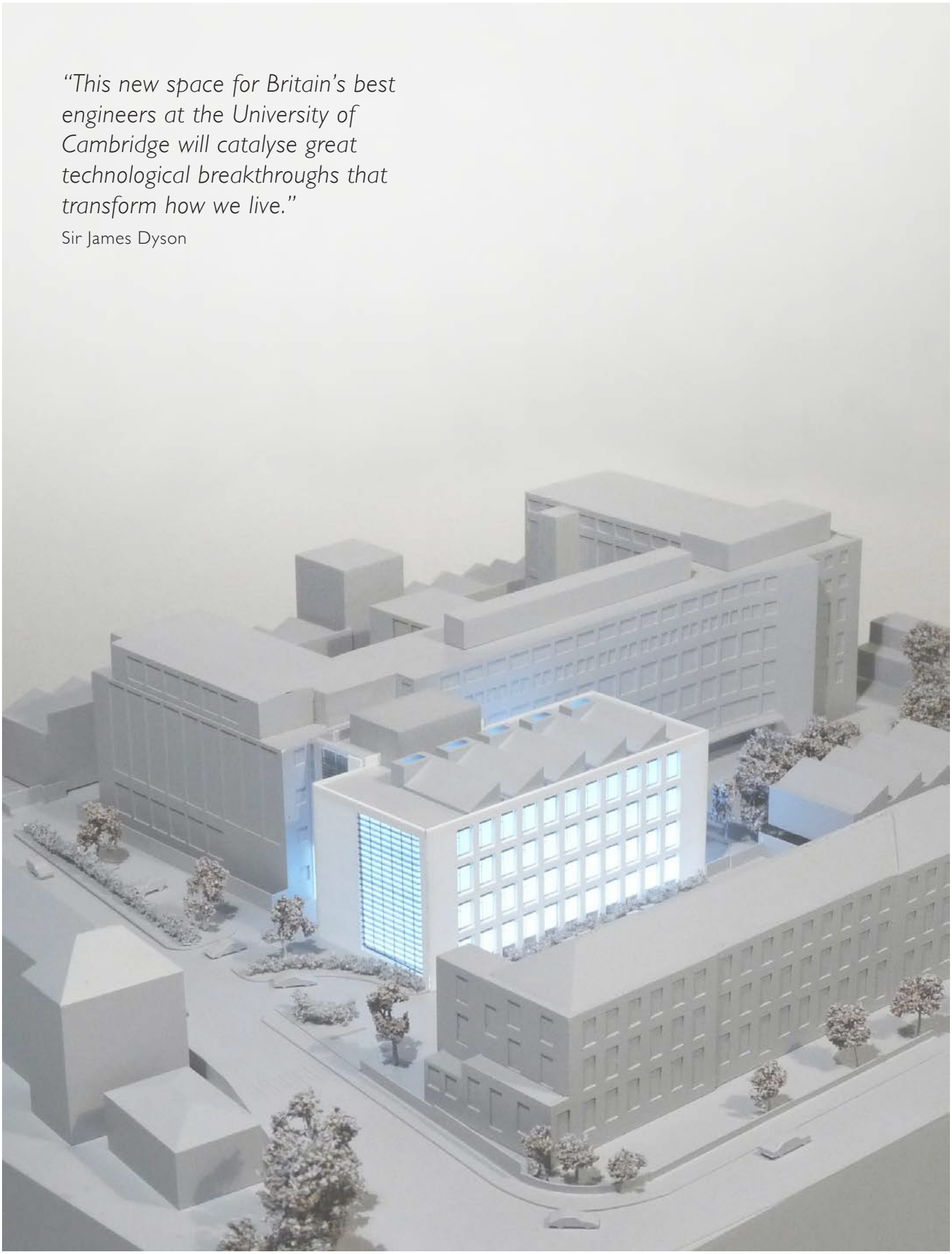
The James Dyson Building &
Dyson Centre for Engineering Design
University of Cambridge

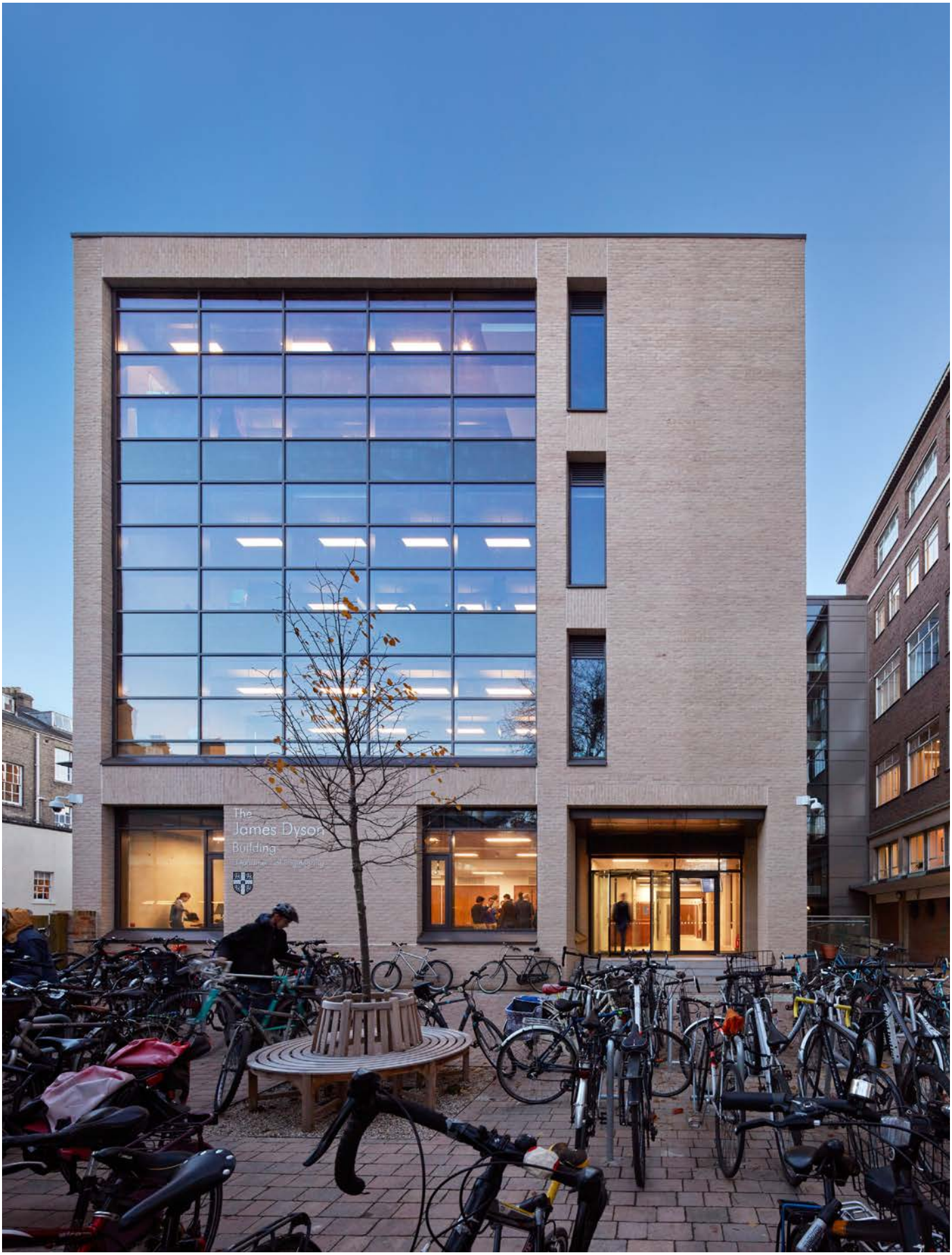
Nicholas Hare **Architects**



"This new space for Britain's best engineers at the University of Cambridge will catalyse great technological breakthroughs that transform how we live."

Sir James Dyson

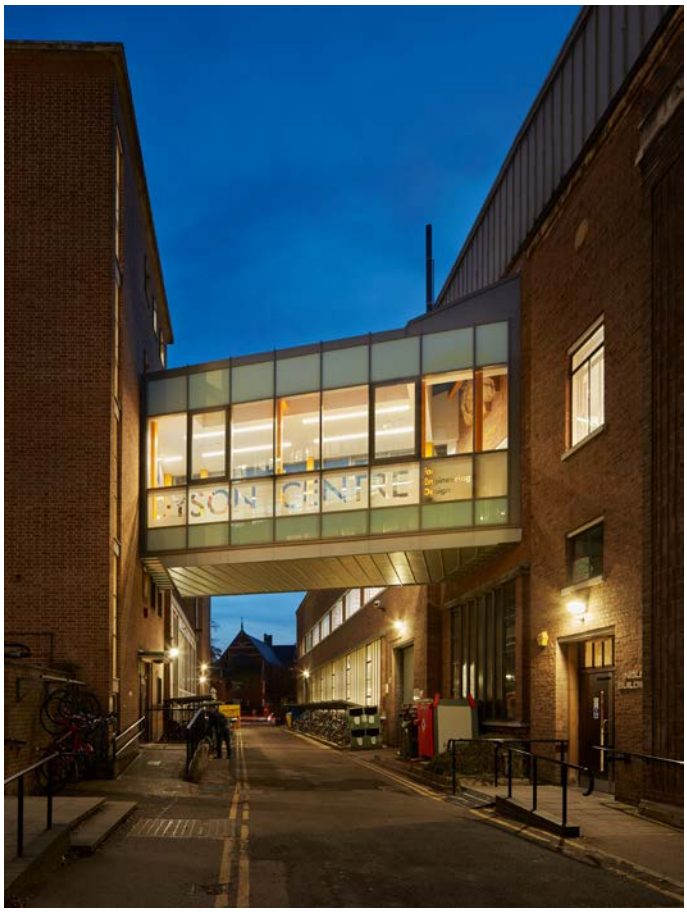



The
James Dyson
Building

The Department of Engineering at the University of Cambridge was founded in 1875 and is the largest integrated department in the university with 1200 undergraduates, 600 research students and 500 staff and fellows.

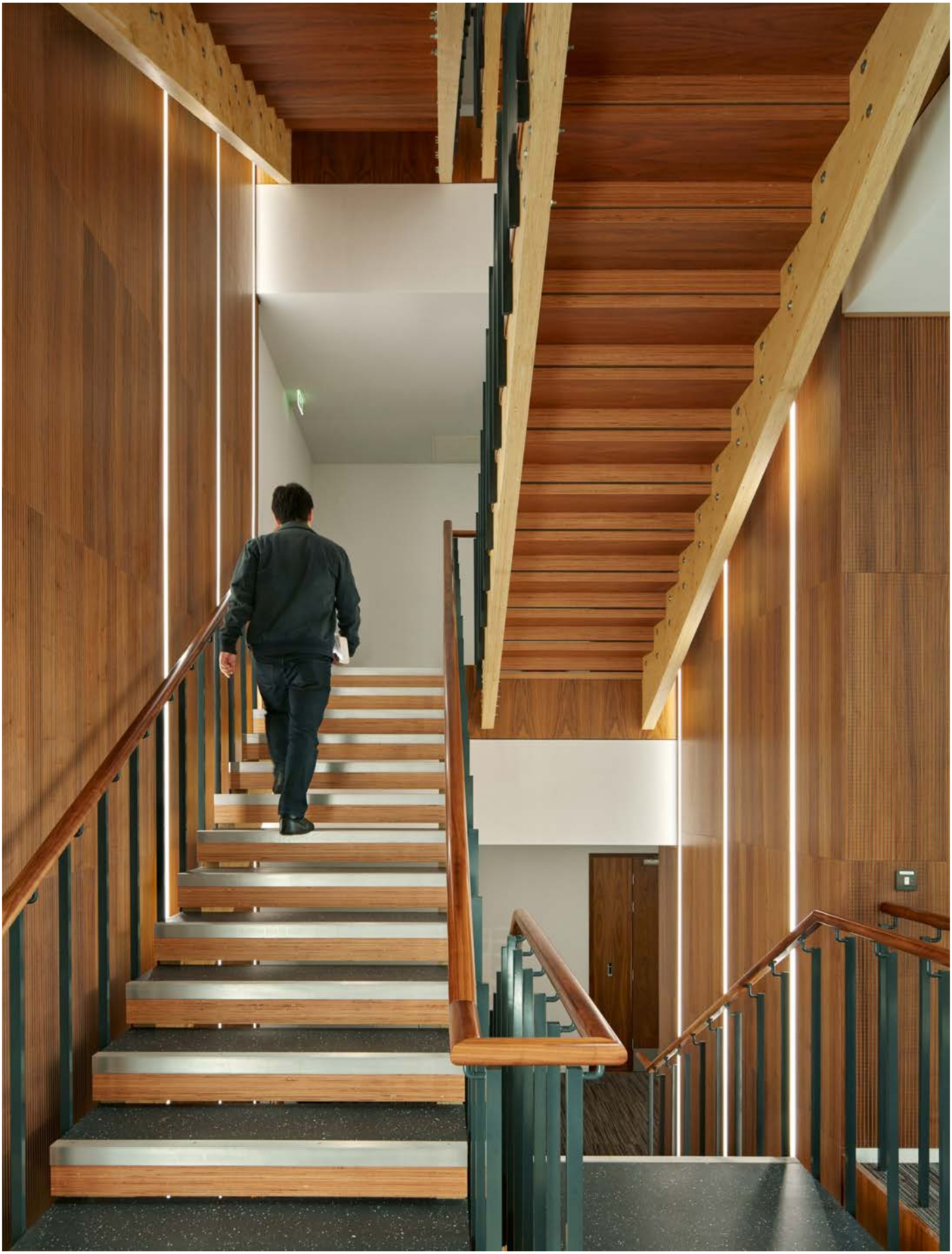
The campus is located on a densely occupied site adjacent to Fen Causeway, but is otherwise rather hidden from view behind a Georgian terrace housing the Department of Architecture and the Royal Cambridge Hotel. It is reached through a modest entrance gate off Trumpington Street. The existing departmental buildings have developed significantly since the site was first taken over in the 1920s and consist principally of the Inglis Building, completed in 1945 and the Baker Building, a structurally ground-breaking building, completed in 1965.

These two projects – The James Dyson Building and the Dyson Centre for Engineering Design – were designed to provide additional research and meeting space, upgrade existing, rather tired workshop and library facilities as well as vastly improve circulation around the Department of Engineering. They were both part-funded by the James Dyson Foundation and ran in parallel, completing in 2016.



"Academic rigour must meet with practical invention. These buildings will bridge the gap, encouraging engineers to apply their minds to creatively experiment and try new things."

Dame Ann Dowling,
then Head of the Department of Engineering



The James Dyson Building

The James Dyson Building is a new 2,900m² state-of-the-art research facility. Located on the last available site on the campus, the building straddles the boundary between the Department of Engineering and the Royal Cambridge Hotel, occupying existing car-parks on each side. It sits adjacent to the imposing Baker Building and creates a prominent new façade to the busy Fen Causeway streetscape, serving to strengthen the identity and presence of the Department.

The building is composed of flexible, open-plan research floors with associated meeting, seminar and break-out spaces. A new atrium links it to the Baker Building at each floor and provides communal space for teaching and interaction.

The brief

The client's brief called for a building of quality and distinction, which would provide flexible accommodation that is open and welcoming, reflect the nature of their research, and assist them in attracting high-calibre students and staff from around the world. It was also an aspiration to incorporate new ideas and technologies being developed through the work of the Department into the building.

The new building was required to be highly space-efficient – maximising net-to-gross areas – and to provide a flexible environment for academic creativity and collaboration, allowing research groups to grow and shrink over time without needing to make alterations to the building.

The Department was keen that the new building should serve to strengthen their identity and presence within Cambridge, providing a new 'face' for the Department – particularly along the Fen Causeway elevation. In addition, on the entrance side, the project was an opportunity to improve the Department's busy and somewhat disorganised entrance forecourt.

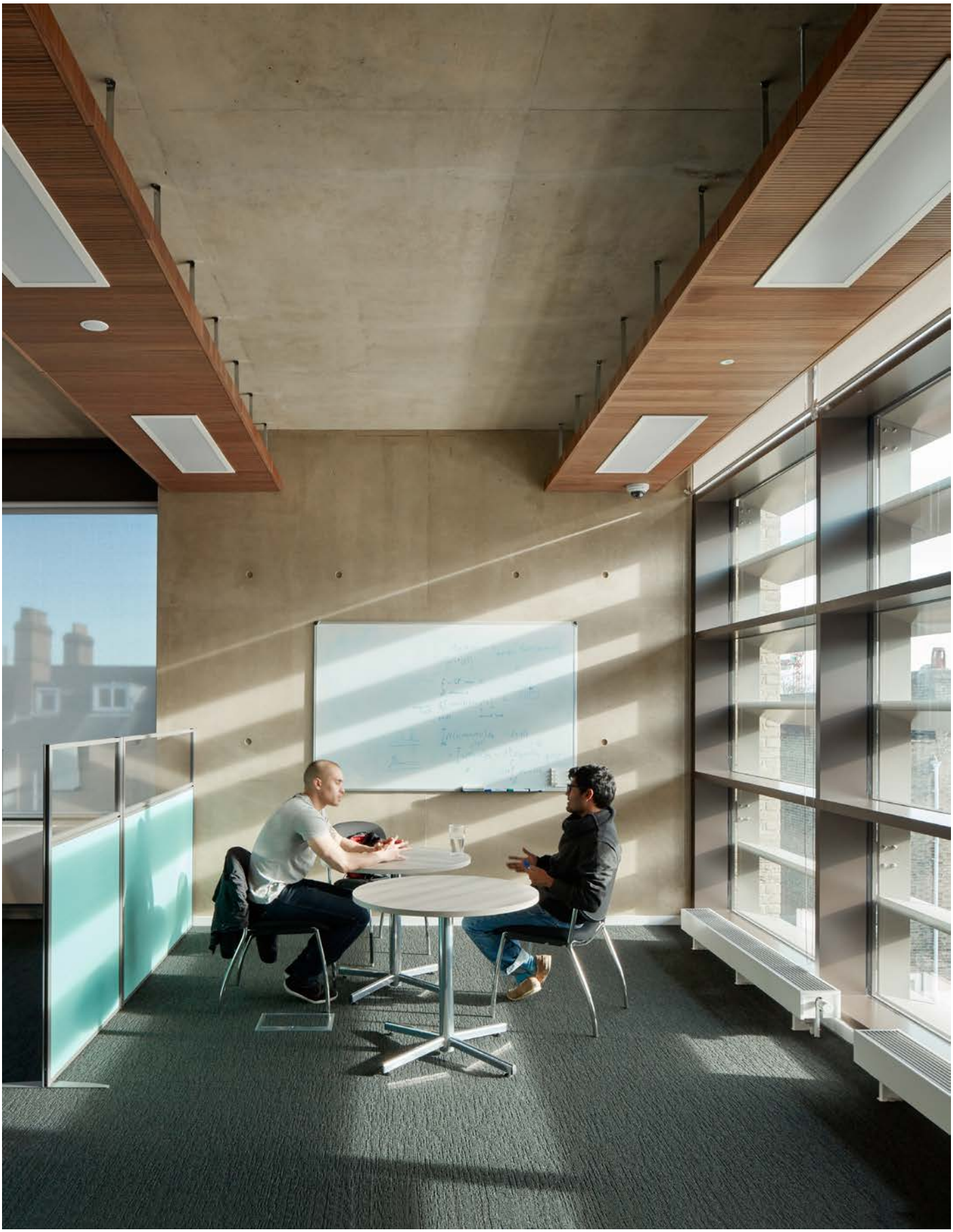
There were very high aspirations for a low-energy, low-carbon building that would reflect the innovative work that goes on in the Department, while also drastically reducing energy and life-cycle costs. The design team was challenged to provide a building that uses no more than 100kWh/m²/annum (including unregulated energy) – an exemplary target within the University for a building of this type.

The building

The siting of the building with its link to the Baker Building required the closing of the existing vehicular route through the Department. This allowed the forecourt in front of the main entrance of both the Baker Building and the new building to be upgraded as a predominantly pedestrian and cycle zone – albeit with a limited number of car parking spaces.

The new building is a four-storey, concrete-framed structure. Most of the accommodation is composed of open-plan floors. These are flexible, column-free spaces of approximately 10m x 38m, running the length of the east side of the building and facing east towards the hotel. Adjacent to these is a narrower strip of accommodation comprising a small number of cellular offices, toilets, kitchens and other ancillary accommodation.

A new atrium links The James Dyson Building to the Baker Building with an engineered timber stair mediating between the various levels on each side. This is the only stair in the new building, which was carefully fire engineered to mitigate the need for additional fire stairs. The atrium contains a meeting room on each floor and two large multi-purpose teaching/study spaces facing out towards the Fen Causeway.



Meeting the energy target

The building design focuses on passive design principles to meet the very low energy target of 100kWh/m²/annum. Key measures include:

- Natural ventilation to all occupied areas
- High levels of insulation (more than 100% improvement on Part L)
- Optimum balance of glazing vs. opaque elements to external envelope
- Exposed concrete structure for thermal mass benefits
- Photovoltaic arrays delivering 16% CO_2 emissions reduction
- Target air leakage rate of 2.5m³/h/m²
- Innovative monitoring of both structural and environmental elements

In particular, the building employs ventilation 'chimneys' that facilitate natural cross-ventilation across the 10m deep floorplates and low-velocity mixer units (Breathing Buildings units) to help provide tempered fresh air during the winter. The University has a clear strategy for BREEAM that avoids the 'purchase' of credits in favour of more direct measures to improve energy efficiency. A BREEAM 'Very Good' rating was targeted with 'Excellent' for the energy section.

"Installing CSIC sensing technologies transforms the building from a passive block of material into a living creature. We will be able to ask the building how it is feeling and the building will be able to reply."

Dr Mohammed Elshafie, CSIC

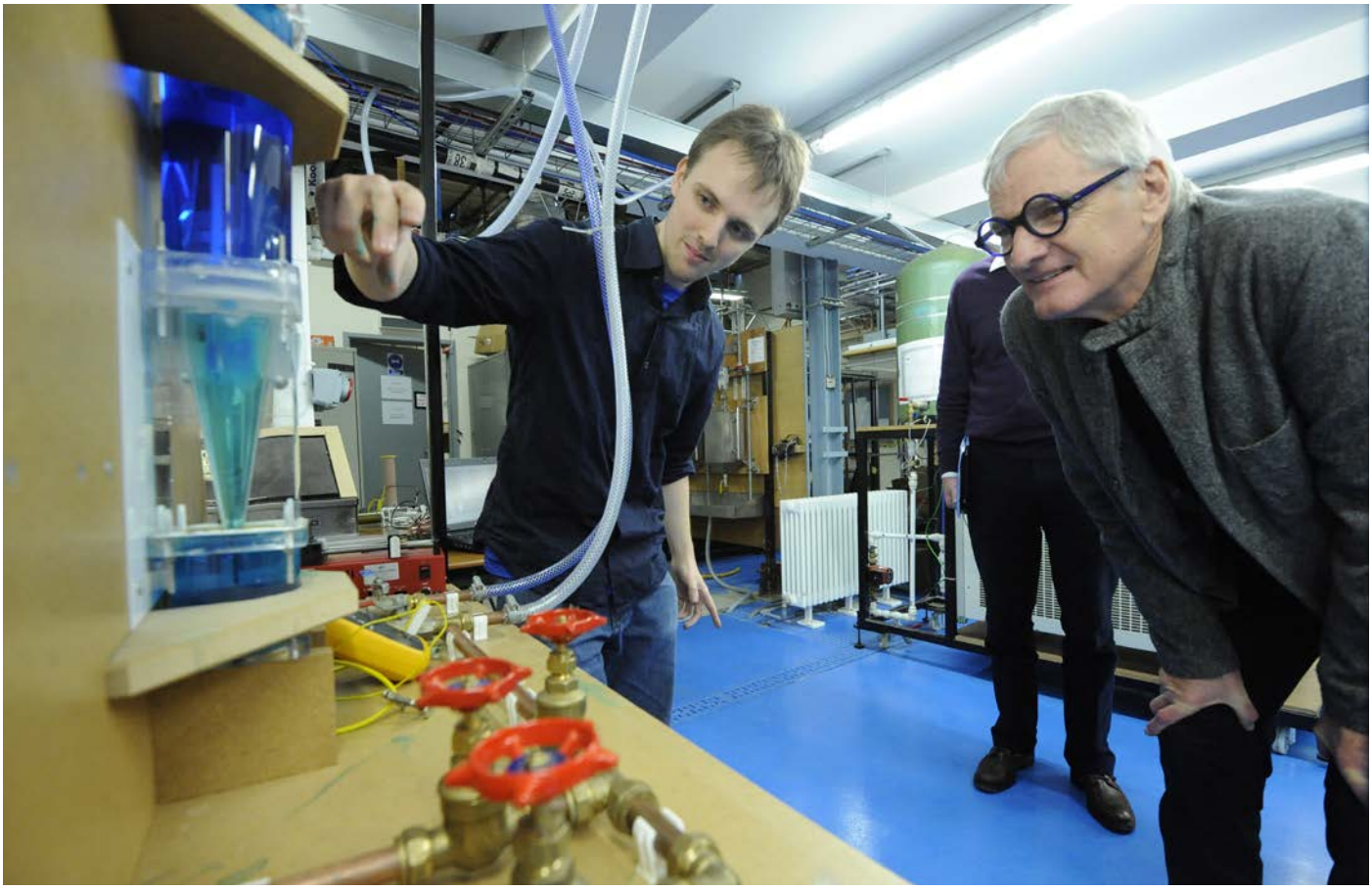
User involvement

The project provided an opportunity for the researchers within the department to showcase their work and use the building's fabric to develop their research. Several interested research groups within the Department were actively engaged in the design process, and where appropriate, new ideas and technologies were incorporated. These include optic fibre probes built into the concrete frame to allow monitoring of the structure over time and the partial use of carbon-negative, magnesium blocks.

Soft Landings

A Soft Landings process was fully incorporated into the briefing and design stages and has continued during construction and into aftercare. The client is committed to delivering a building which meets high standards of energy efficiency, maximises use of renewable energy, creates pleasant and suitably controlled working conditions, and takes account of climate change adaptation. The process of refining and optimising the controls and performance of the systems continues through regular Soft Landings meetings.


METAL
ONLY



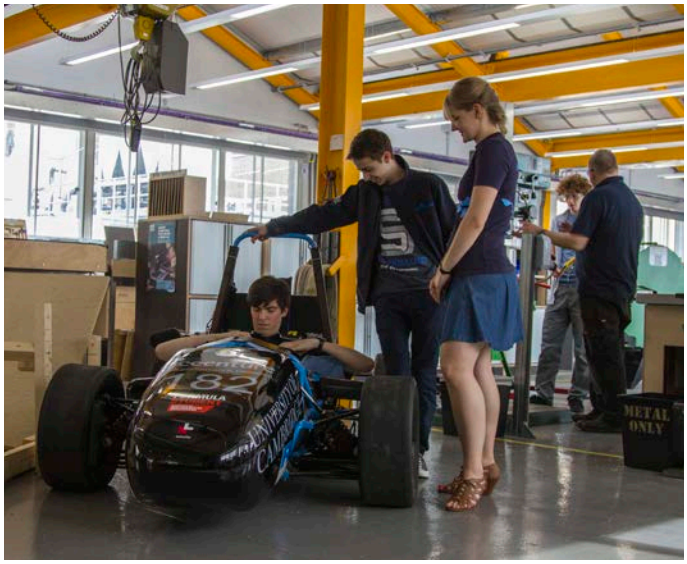
Dyson Centre for Engineering Design

This element of the project involved the re-modeling of one of the Department of Engineering's existing workshop spaces within the Inglis Building. The new facility includes a Bio-inspired Robotics Laboratory as well as a flexible, open-plan space capable of accommodating a variety of practical design and workshop-based undergraduate activities.

In order to improve circulation around the campus and create a stronger connection to the Centre a new link bridge has been built. This provides a route into the Baker Building from the Centre through the refurbished library. Also fully refurbished as part of the works was the large lecture room which was provided with raked seating and new AV systems.

"Nicholas Hare Architects have been most thorough and conscientious at all stages of the design process and to the complete satisfaction of the Department of Engineering... In addition, they have lead and actively encouraged other members of the design team to deliver to programme whilst maintaining the user based design aspirations and goals."

David Green,
Superintendent of the Engineering Workshops



Client:

University of Cambridge

Civil & structural engineers:
AECOM

MEP consultants:
AECOM

Cost consultant:
AECOM

Project Manager:
Peter Brett Associates

Acoustic consultant:
Ramboll

Fire Safety consultant:
Fire Ingenuity

Contractor:
Morgan Sindall

Nicholas Hare **Architects**

3 Barnsbury Square London N1 1JL
020 7619 1670
info@nicholashare.co.uk