Building Performance Award

PROJECT NAME – **Advance II**

2018

Summary

PROJECT / COMPANY NAME :	Dudley College **Advance II** / The DC IPI Alliance Team
PROJECT VALUE :	Investment Target £11.685M
PROJECT COMPLETION :	8TH SEPT 2018
ENTRY SUMMARY:	250 words summarising why the **Advance II** project deserves to win the Building Magazine Performance Award 2018.

The business case for Advance II is to provide Advanced Construction Skills training in the context of Further Education provision for 16 – 18-year olds including apprenticeships.

The Black Country Local Enterprise Partnership recognises that attracting inward investment to the region needs to be supported by a highly efficient construction sector to drive best value from investment.

The proposition in the Advance II strategic brief is that you can only teach advanced construction in an exemplar high performance building which is, in itself, a demonstration of low carbon performance in a carbon hungry world.

An early investment decision was taken to avoid the cost and unintended consequences of BREEAM/ Passive House certification - whilst using these criteria as benchmarks. The sustainability strategy for the project developed a “fabric first” design philosophy ensuring that challenging targets for the thermal performance of the building envelope were set, resulting in low energy demands which enables passive systems to be adopted.

The project was delivered through the first Integrated Project Insurance (IPI) Alliance contract which capped client liability for prime-cost over-runs and included the appointment of a collaborative Alliance team incentivised to deliver innovative solutions to the Strategic Brief, on programme and within the investment target. The six party Alliance includes designers, contractors, and crucially the Client.

Advance II achieves 99% of the targeted Success Criteria, whilst exceeding targets on 23% of KPIs, including an EPC A rating, reduced carbon and energy below 80% of notional building baseline targets, and 6.5% below the investment target.

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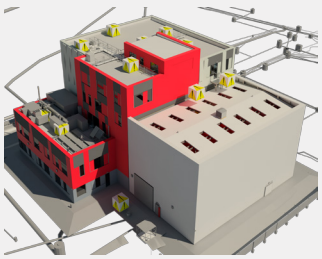
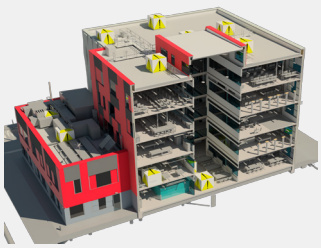
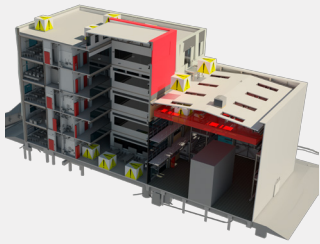




01

Advance II was delivered as the first pilot for IPI Alliance Contract

As a key demonstration project in a Cabinet Office trial, the IPI Alliance contract has enabled interdisciplinary collaboration within the Integrated Project Team (IPT).

The entire Alliance is insured together under a single loss-based insurance product plus 12 years of latent defects insurance.

This integrated insurance supports an integrated approach to drive out the waste inherent in Business as Usual (BaU) of the IPT members preparing design and specification information devised solely for risk transfer between Alliance partners.

Crucially the IPI Alliance Contract supports innovation, by aligning the whole IPT around cost, time, and quality, giving the team the freedom to act in a Best for Project mode, and inclusion of supplier expert ideas and comments.

If we build it they will come…..

02

Sustainability Strategy

In a series of facilitated Alliance workshops, a Sustainability Working Party considered sustainability strategies in response to the brief. These events not only defined opportunities for sustainable design but also examined the (traditional) barriers to integrated decision making.

Sustainability was defined as “the efficient use of resources”, thereby enabling the IPT to target a substantive reduction in capital expenditure by reducing peak installed capacity by harnessing passive measures.

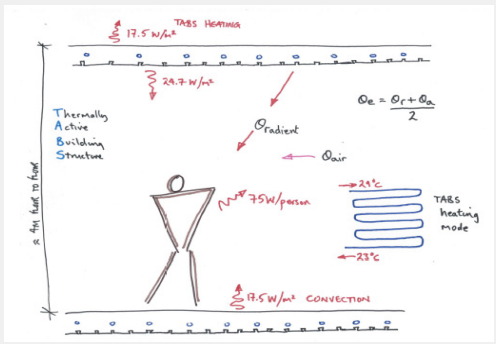
It was apparent that it is counter-intuitive for specialist MEP designers / contractors to design-out active systems. The design margin mentality of (traditional) engineers is linked to a lack of confidence to rely on passive measures to achieve comfort, rather than on mechanical systems.

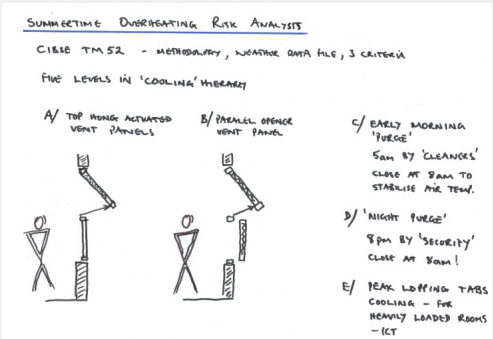
Rather than working in isolated disciplines, the multidiscipline Sustainability Working Group had interactive real-time discussion of opportunities by using sets of rules of thumb based upon prior knowledge of what works in practice.

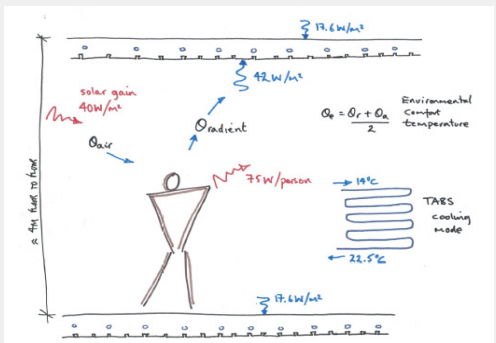
The likely room thermodynamics was analysed to determine a "thermal budget" for passive design at 45 W/m2 based on assumptions: people density of 6 - 7m2/person yielding 10 W/m2, laptops/PC/screens at 5 W/m2, and controlling fabric heat gains.

Further discussion on enhancing the thermal capacity of the structural slab identified Uponor's Thermally Active Building Structure (TABS) as a potential for augmented thermal mass suitable for both winter heating and summer “peak-lopping” cooling.

Natural Ventilation strategies are well documented in CIBSE guidance - yielding three potential modes: shallow plan, cross-vent, and deep plan with buoyancy driven airflow through a ventilation tower: this informed the design layout and massing of the Advance II building.

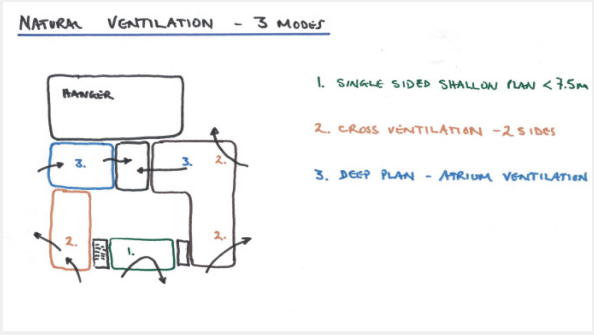


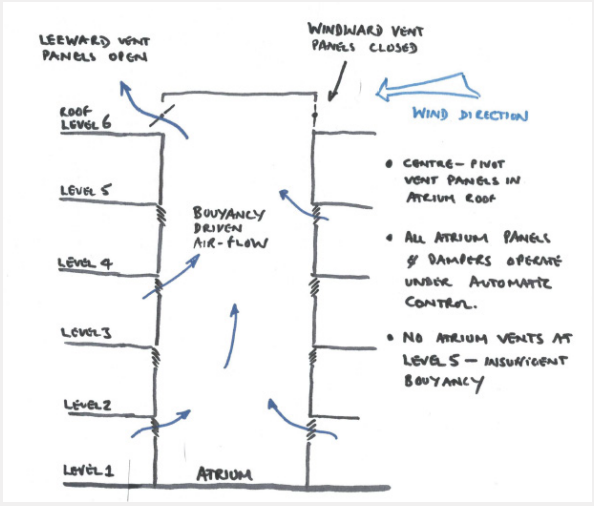




02

Sustainability Strategy





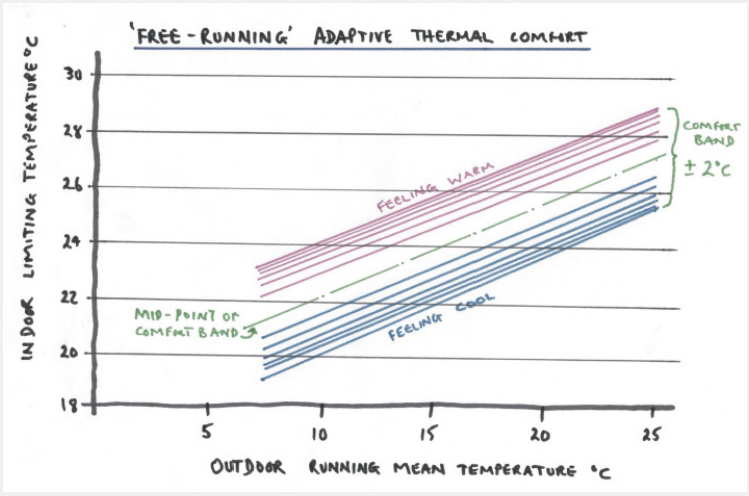
03

Achieving Thermal Comfort

In response to the strategic brief objectives of a low-carbon, low energy solution for the Advance II building the Alliance team adopted several innovative systems and techniques which work together to help achieve comfortable conditions whilst satisfying the brief.

The CIBSE Adaptive Thermal Comfort model acknowledges that perceptions of comfort by building occupants is enhanced where they have elements of direct control over their environment.

The model also assumes that occupants adapt to seasonal changes in weather conditions by adjusting clothing and accepting a seasonally adjusted control setpoint.



04

Engineered Natural Ventilation System

Advance II also has an “engineered” Natural Ventilation system, rather than a traditional mechanical ventilation solution.

This includes trickle ventilation systems for winter-time ventilation for health, and manual control of opening vents and windows which can be user adjusted for fresh air to suit occupancy and to help avoid overheating in summertime.

05

Commissioning

Despite effort to define commissioning time on construction programmes these plans frequently fail due to over-runs of core works and pressure to resolve extensive snagging lists.

Advance II was genuinely different to Business as Usual in that the IPT set a construction activity plan which gave access to the building and its systems for commissioning some 11 working weeks before handover.

System Operational Interface testing :

‘proving the interoperability of the building systems’

model images

06

Soft Landings

BSRIA Soft Landings methodologies were adopted by the IPT throughout the Advance II project as a mature user engagement tool.

Systems Operational Interfaces (SoI) were addressed to test the performance of interfaces between systems in response to external stimuli - such as loss, and reinstatement of power supplies.

Proving Performance of engineering systems and the building fabric response was a revelation to the IPT. All Engineered systems were checked for their planned operational performance twice in the proving process. The heating controls were temporarily reset to initiate maximum load whilst heating the building from 20 to 27 deg C, this verified the installed gas heating capacity is able to heat up the mass concrete floor slabs.

Whilst the building was still “overheated” from the heating proving Morning Purge and Night Purge operations were initiated to demonstrate that the manual interventions to open windows to instigate natural ventilation, is sufficient to "purge" the heating energy and return the building envelope to comfort conditions.

"Fit for Defined Purpose" sign-off of the facility was enabled by close consultation with the Technical Independent Risk Assuror (TIRA) who openly reviewed all setting to work, commissioning, SOI testing, and proving results. Collectively this process ensured that a defect free handover was achieved.

Winter Seasonal Commissioning entailed using certified instrumentation to log key performance parameters in two separate teaching / workshop spaces over a week. Logs included air temperature, mean radiant temperature, and CO2 levels in ppm. The BMS sensors were (re-)calibrated such that BMS logs can be directly compared to instrumentation logs.

Summer Seasonal Commissioning is currently in progress and consists of similar instrumentation and BMS logs, from rooms vulnerable to overheating. The logs include weekend data, when the college is closed, to help examination of how effective overnight purge is in achieving comfort conditions during occupied hours.

Conducting the summer seasonal commissioning during an unprecedented heatwave will give give actual performance data on how comfort can be achieved in the face of climate change, Post Occupancy Evaluation of the perception of comfort levels achieved has been planned for mid September to avoid the busy start of academic year for users and staff.

07

The Ultimate Accolade

The client loves the result – both the building and the commercial outcomes – such that they have initiated a OJEU tender process for a nearby £27m investment target!

Alliance Members

- Dudley College - Client
- Derry Building Services - services engineering specialists (design and installation)
- Fulcro Group - services engineering specialists (principle and detailed design), Information Manager and Project Coordinator
- Metz Architects (part of the Fulcro Group) - architect
- Pick Everard - structural engineer
- Speller Metcalfe - constructor

Advisors and Assurers

- Griffiths & Armour - Insurance Broker
- IPInitiatives - Independent Facilitator (IF)
- SECO (Belgian)/BLP - Technical Independent Risk Assurer (TIRA)
- Rider Levett Bucknall - Financial Independent Risk Assurer (FIRA)