DesignBuilder SBEM Saves Time and Cost Producing EPC for Grade II Listed Building Refurbishment

The project involved evaluating the energy rating of 5,920sqm refurbished office space in this grade II Listed building

Project details

Project Description:	Refurbishment and replacement of building services in a multi-tenanted Grade II Listed commercial building with office space to the upper five floors extending circa 5,920sqm.
Criteria:	To produce an Energy Performance Certificate (EPC) for the office floors and advise on compliance with Minimum Energy Efficiency Regulations.
Building Complexity:	Level 4
Location:	Manchester city centre, UK
Surveyors:	Jonathan Murton, Murton & Co Chartered Surveyors
Date:	September 2016

Introduction

Murton & Co Ltd were instructed to assess the energy performance of the office accommodation following the completion of the refurbishment works.

A refurbishment had been completed on the first and second floors in 2008 and involved the installation of a Hiross/AET Flexible Space system with conditioned air modules (CAM units) to provide heating, cooling and fresh air. The refurbishment in 2016 involved extending the space heating / cooling and ventilation system to the third, fourth and fifth floors. In addition, some of the windows were upgraded with secondary glazing units which met approval from the conservation officer and the lighting was upgraded to LED lamps with occupancy/absence controls.

The material changes to the space heating, lighting and ventilation as well as configuration of the floors required a new EPC to be produced to satisfy Building Regulations Part L2B. The client also asked us to advise on compliance with the Minimum Energy Efficiency Regulations due to be effective from 1 April 2018.

An EPC had been registered for the five floors in 2009 with a rating in band C (65), immediately after the first and second floors had been refurbished. This therefore set expectations for the client that the new EPC rating will be similar.

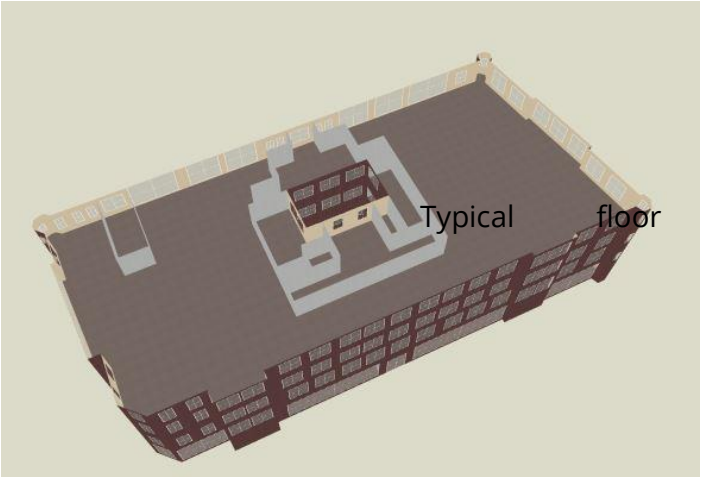
Approach and Analysis

We were provided a full set of floor plans and a specification for the refurbishment works. This information was validated during our site survey.

Rendered 3D model

Since this was an existing building inevitably there were elements of the building fabric that were unknown or at least the default values for the thermal performance as stipulated by the Non-Domestic EPC Conventions had to be relied upon. This requires the use of NCM inference and library values which DesignBuilder allows you to select directly from the software, saving significant time and effort inputting this information. Seasonal efficiencies for the space heating and cooling plant were largely available from the M&E consultants and manufacturer data sheets.

We carried out the modelling using DesignBuilder SBEM and rendered images from DesignBuilder are shown above and below.



The 3D model geometry and all the appropriate model data inputs were completed within a few hours.

A PDF of the floor layouts was imported into the DesignBuilder interface, then scaled based on our on-site measurements before tracing over the floor plan using object-driven blocks to create the floor plate and then internal partitions.

The areas for each envelope to each room are calculated automatically by the software, based on dimensions taken on site. This removes the time-consuming job of manual calculations which increase the risk of errors that are more difficult to identify in non-3D modelling interfaces.

The ground floor was not included in the calculations, other than for the heat transfer adjacencies between this and the first floor. The inclusion of the ground floor shop windows was simply for visual representation and only required a few extra minutes to undertake.

When we ran the initial calculations, the results for the EPC rating did not marry up with the expectations and presented a significantly worse rating than the existing registered EPC. We therefore checked our model thoroughly and liaised with the mechanical and electrical consultants for specific details on the space heating and ventilation system they had designed. The error checking in DesignBuilder can be undertaken efficiently and effectively due to its excellent data management system and the visual aid provided by the 3D model.

We also reviewed the existing EPC and through discussion with the M&E consultants established that the centralised space heating system had been incorrectly modelled by the previous assessor. This effectively gave a false expectation for the new EPC. We informed the client accordingly while we continued to run our calculations.

Our final calculations resulted in an EPC rating band D (91) with a BER of 62.52 $kgCO_2/m^2$.

Summary

- A grade II Listed building given a new lease of life following refurbishment to improve the space heating/cooling and ventilation and resulted in a respectable EPC band D (91).
- No immediate risk of non-compliance with the Minimum Energy Efficiency Regulations.
- Expectations of client and project delivery team needed to be managed due to errors with existing EPC. This was achieved through diligence with attention to detail and by providing an explanation of the error as soon as it was identified.
- Reliance on default values was reduced through communication with the project delivery team. This provided Murton & Co with better understanding of the refurbishment and hence technical specifications for the building services and gave the project delivery team a better understanding of the requirements for the energy rating assessment.
- Cost and time savings were gained by using DesignBuilder SBEM with the following benefits:
  - fast and efficient method of building a 3D model
  - ease of error checking and changing elements of the building fabric and building services due to efficient data management structure and visual representation of the building
  - visual 3D representation of the building afforded better communication with the project delivery team (a picture paints a thousand words!) and made our final report much more professional and informative for the client

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Murton and Co guarantees a high-quality, professional service. We are regulated by the Royal Institution of Chartered Surveyors (RICS) and accredited for energy assessments by Elmhurst Energy. Specialising in building performance assessments, we help you achieve compliance with Building Regulations and Minimum Energy Efficiency Regulations on both commercial and domestic properties, both new-builds and existing buildings. We work with a range of property professionals, from architects, surveyors and local authorities to private investors, pension fund administrators, property developers, and building services consultants. We use the latest technology to produce high-quality reports, plans and compliance certificates. Ultimately, we use a common-sense approach to get you from where you are to where you need to be.