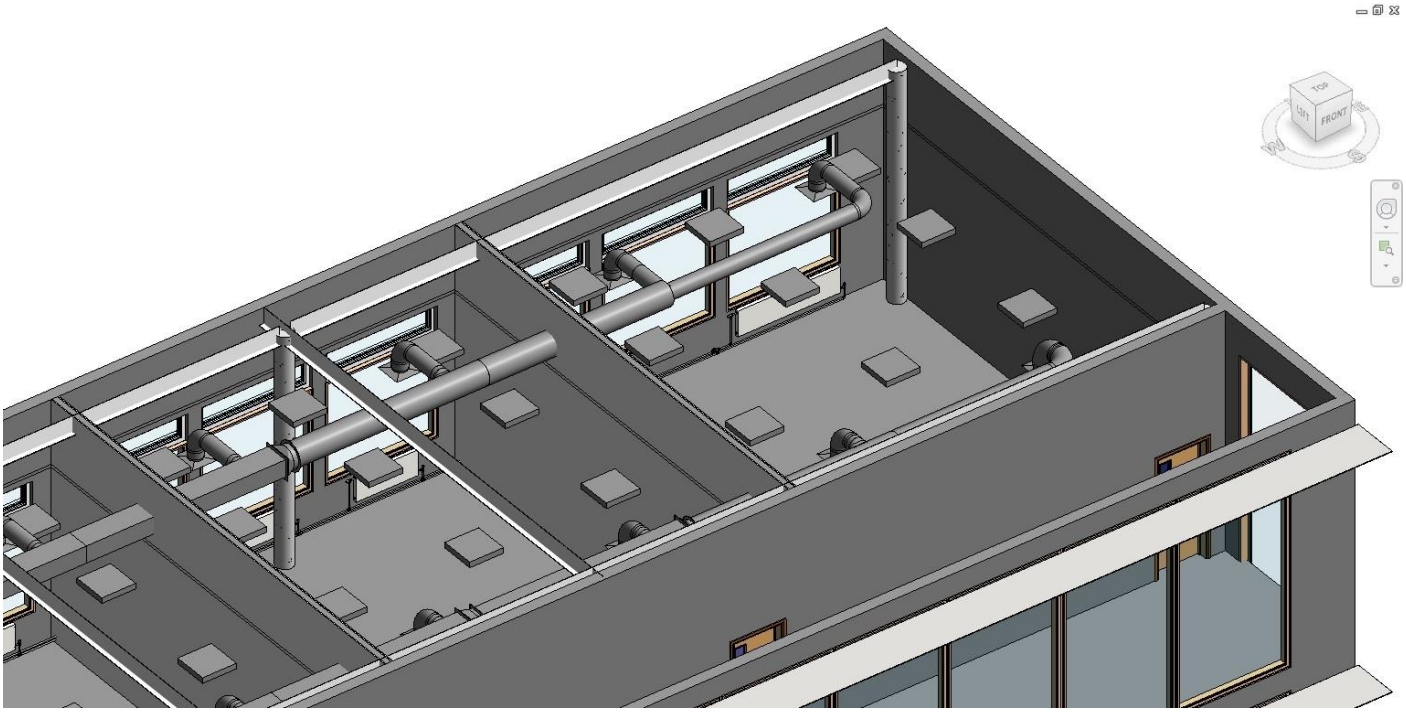
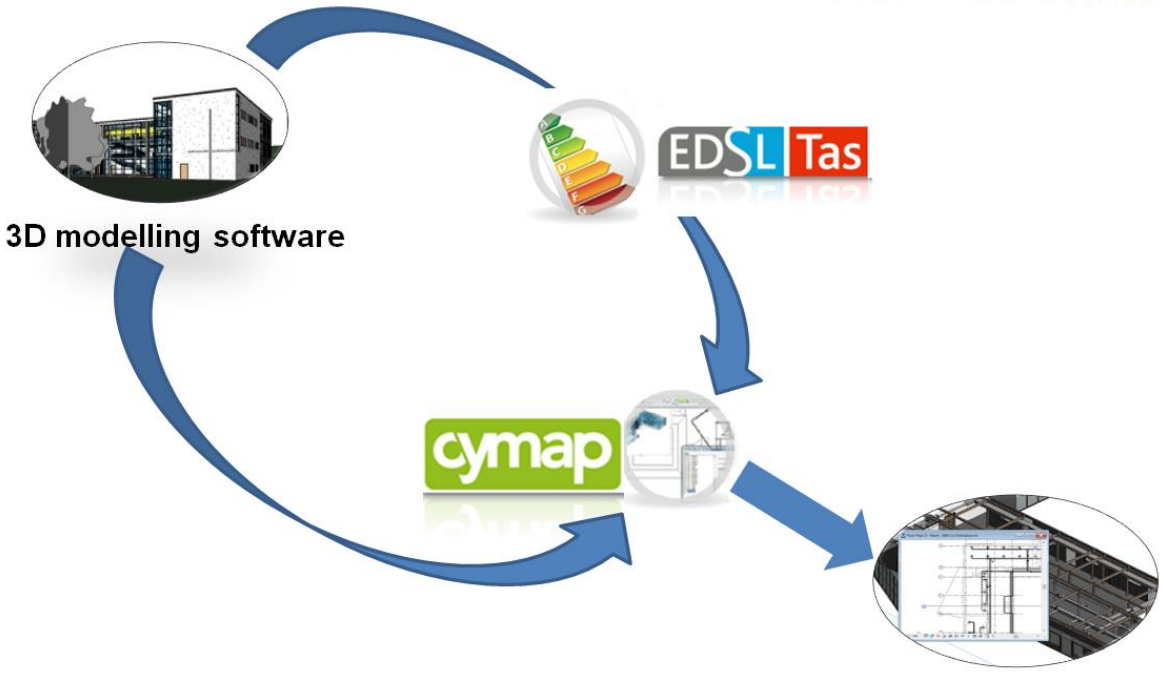
Cymap Mechanical



Contents

Cymap Mechanical Overview

Cymap Mechanical is one part of our integrated suite of Building Services calculation programs. Working on its own, or in conjunction with Cylink the Revit add in or our Psychometrics and Electrical Design software, Cymap Mechanical provides engineers with the tools to perform both routine and complex calculations quickly and easily. With the advent of BIM working practices, Cymap enables gbXML data to be imported from any 3D third party software to speed up the building modelling process to enable Cymap's steady state calculations to be run.



If dynamic simulation is a requirement on a project, building models created in TAS along with simulation results will be imported directly into Cymap if there is no 3D model.

If 3D models are available, the gbXML and floorplans can be used to set up the building model in Cymap and the results imported from TAS from either room demand or from the dynamic plant modeller integral to the TAS program.

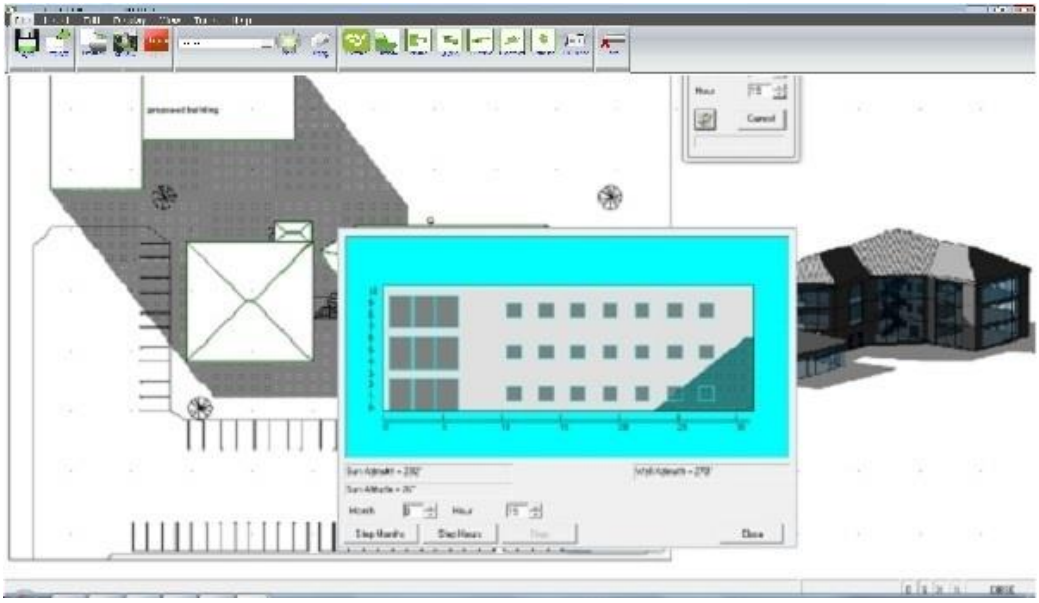
Our mechanical software allows detailed analysis of all energy calculations associated with buildings such as heat loss, heat gain, energy consumption, Part L compliance, interface with SBEM/legacy SAP2005 and plant modelling. The engineer can then design, route and size heating/chilled water pipework, ductwork, plus hot and cold water services using our unique and friendly sketching technique with fully rendered 3D views just a few clicks away.

Cymap Mechanical incorporates three major calculation standards; CIBSE, ASHRAE and DIN, so wherever engineers are working, you can be sure Cymap provides the calculations needed.

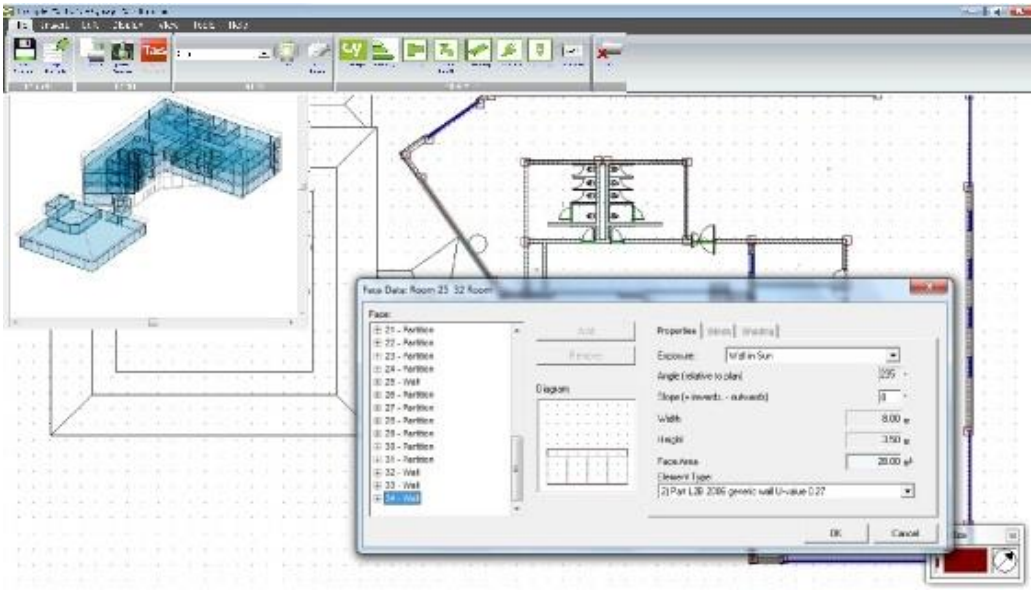
Building Program

The Cymap Building program is the gateway program to enable a building model to be created by defining room boundaries or loading gbXML geometric or DXF floor plans from any 3D architectural CAD package.

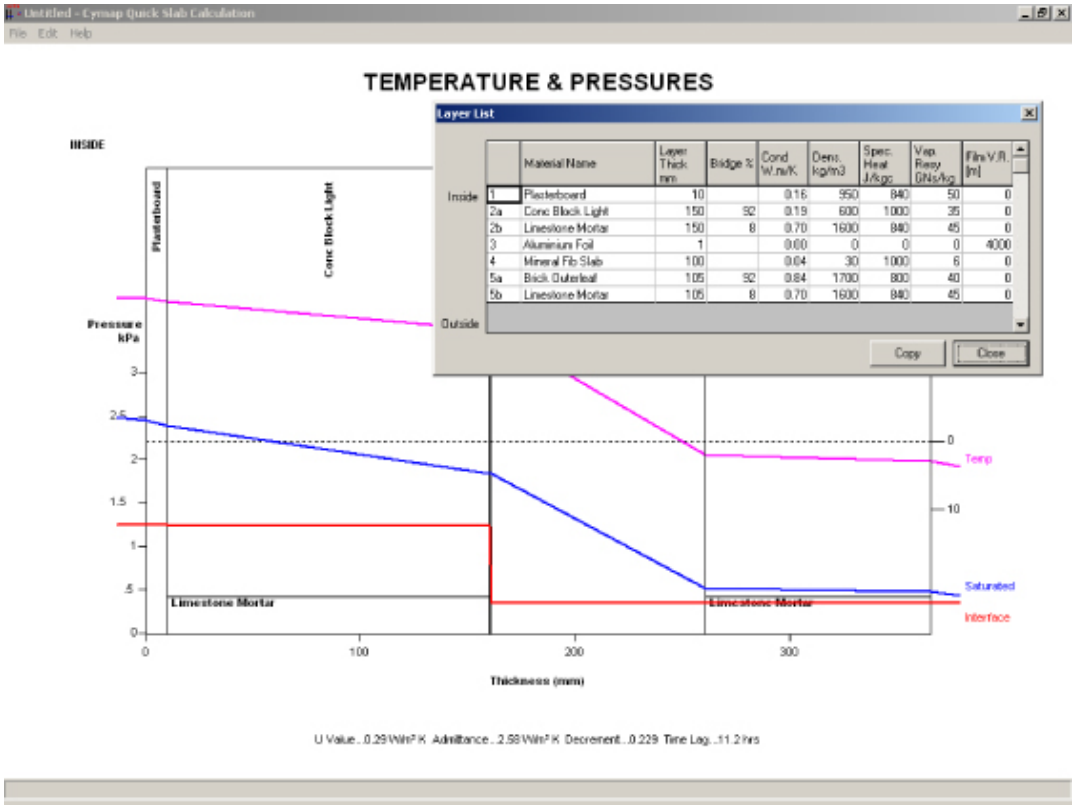
The DXF floor plans are loaded via an intuitive “wizard” to enable quick setting up of the building model.



Once the building model has been set-up, the orientation and the weather details can be used from an extensive range of customisable sites.

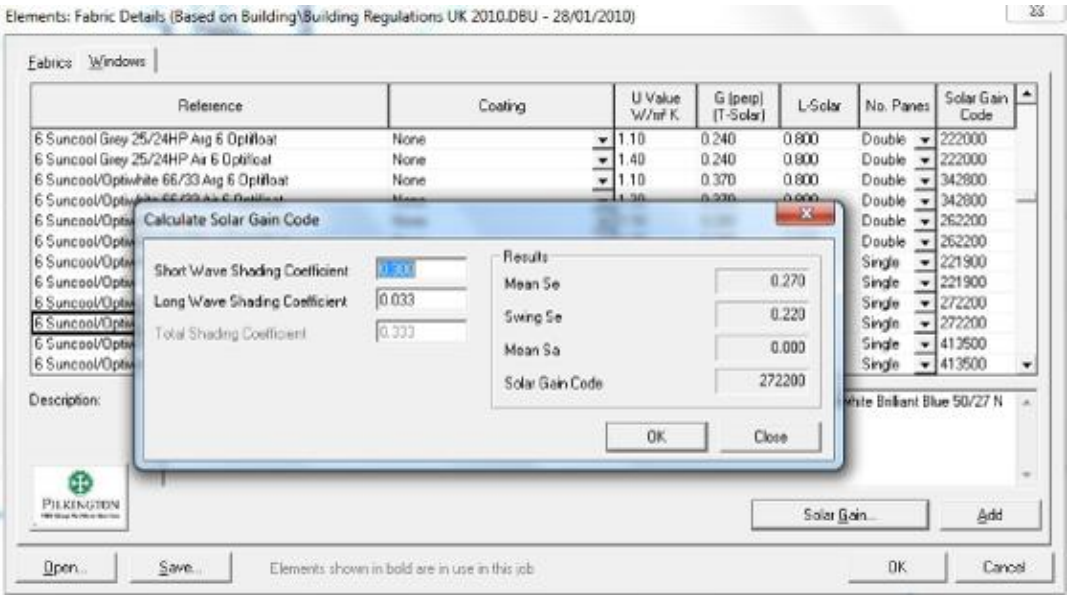


U value performance calculations can be undertaken from user driven composite fabrics, or merely used from a comprehensive database of existing composite structures typically used in today's buildings.



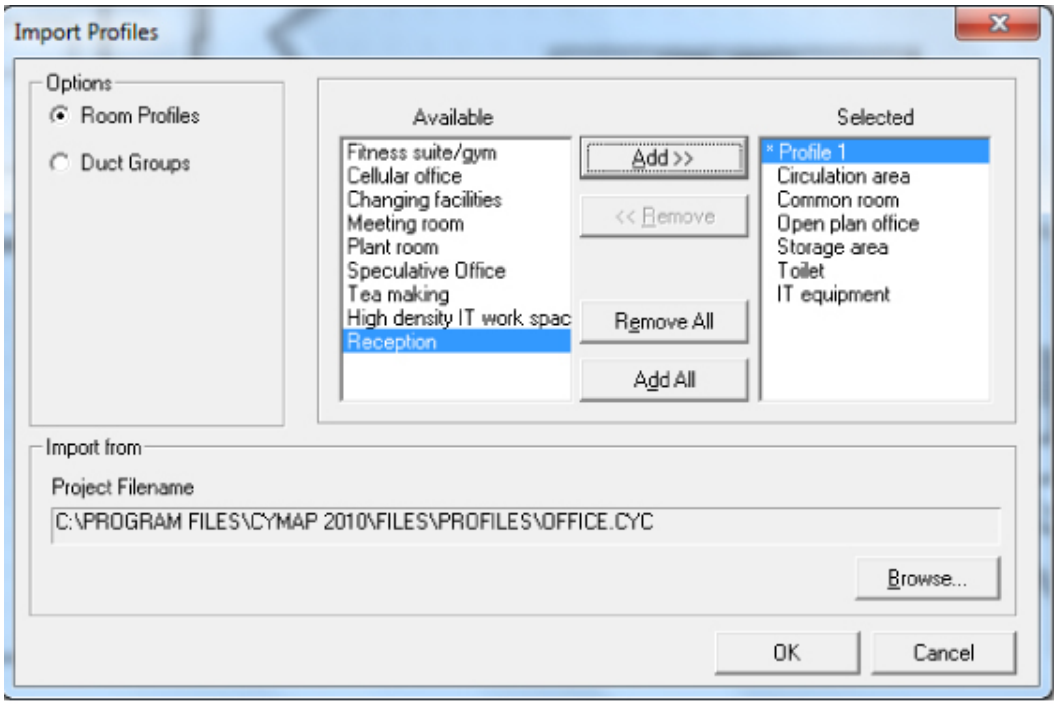
U value calculator

Also provided is a comprehensive database of glazing configurations from CIBSE tables and leading manufacturers. A simple converter allows entry of LW and SW shading coefficients, and/or base G values and total shading coefficients. A link has been also set up to Pilkington's online "Spectrum" glazing configurator.



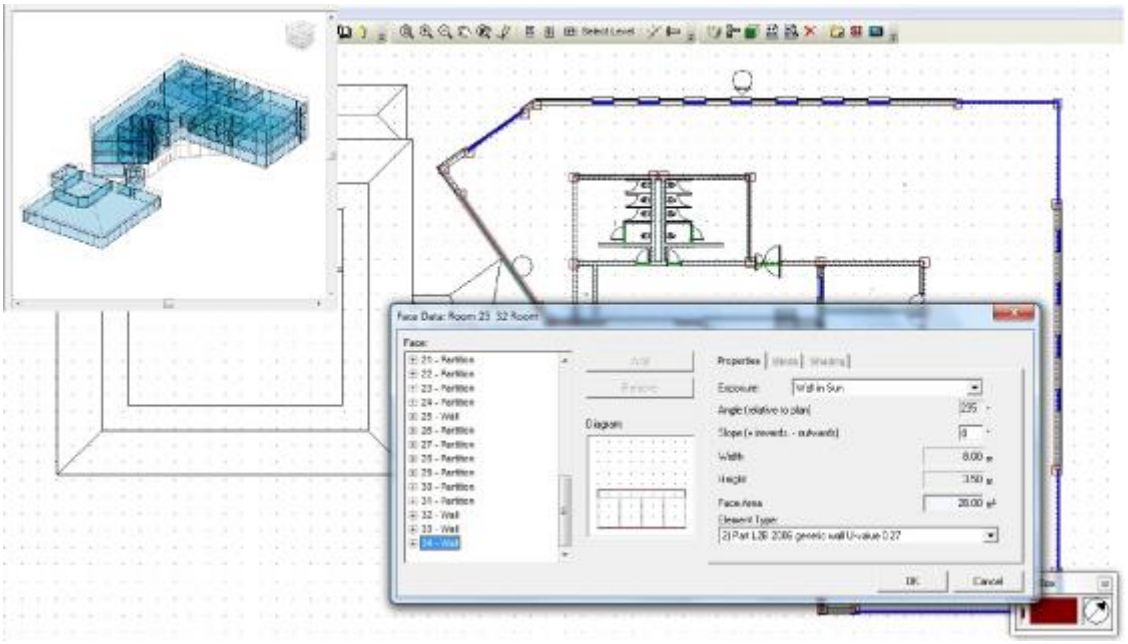
Glazing database

A comprehensive selection of building “profiles” can be entered to save the engineer time setting up complex design parameters. These can also be saved and customised for use in future projects.



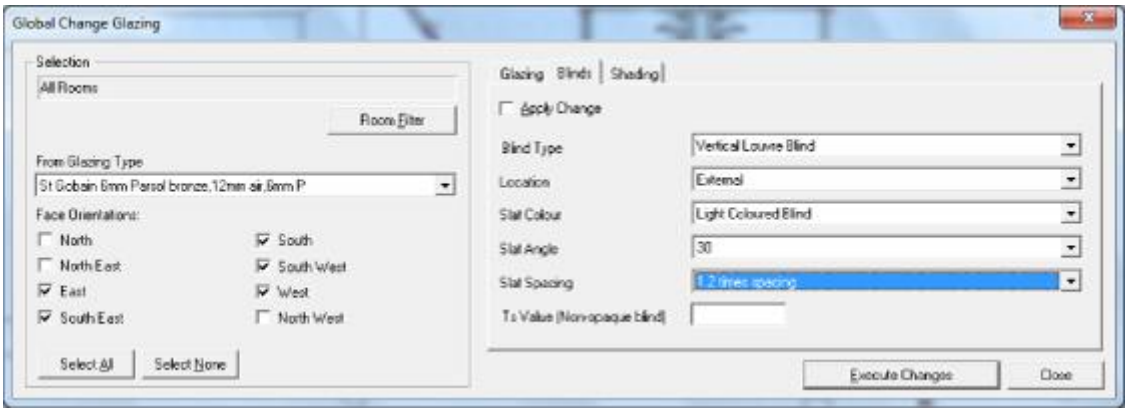
SBEM/CIBSE profile import

Once the structure of the building is determined along with the construction details and orientation, rooms can then be defined either by hand or uploading gbXML data from any of the leading 3D CAD systems even if you are not using 3D layouts. Rooms can also be defined by hand if 3D information is not available. Changes to the building can be easily achieved by re-introducing the gbXML data, based on existing rooms and rooms to be revised. A new DXF plan can be used to replace the existing plan automatically.



gbXML import/facedata

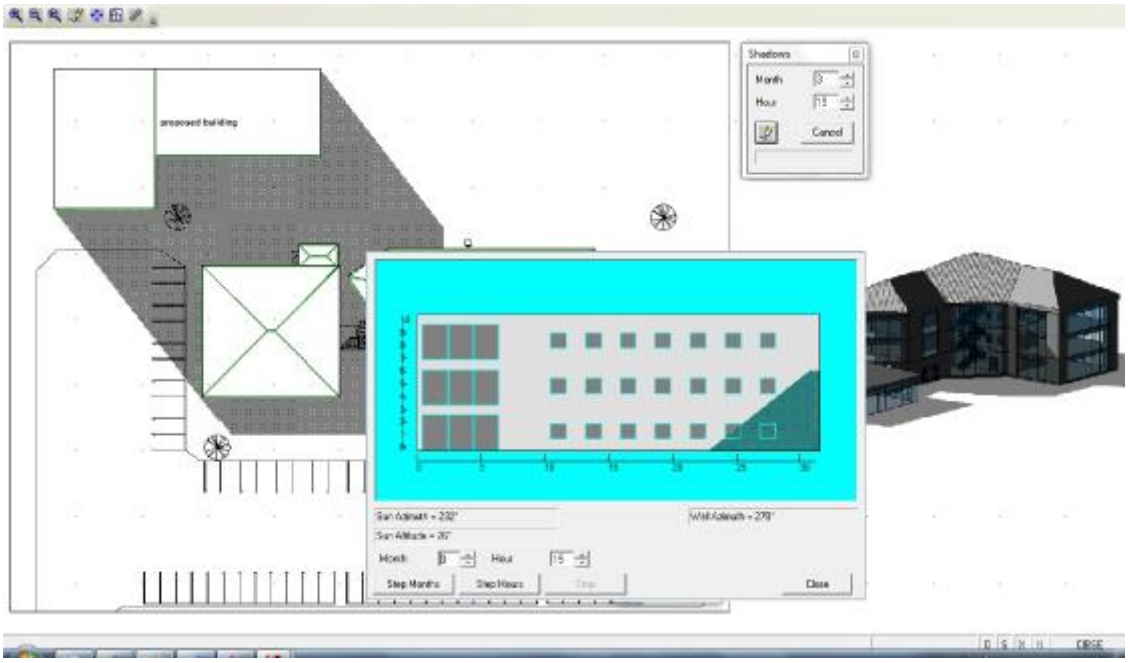
The building glazing configuration can also be considered by the implementation of Brize Soliel or any other shading device where the facade of the building can be engineered very quickly. An examination of shading devices can be undertaken with changes to glazing “G” value amended with respect to orientation and shading device in accordance with TM37 glazing principles.



Glazing editor

As the building design matures, materials and glazing can be globally, zonally or individually edited to reduce time spent making changes.

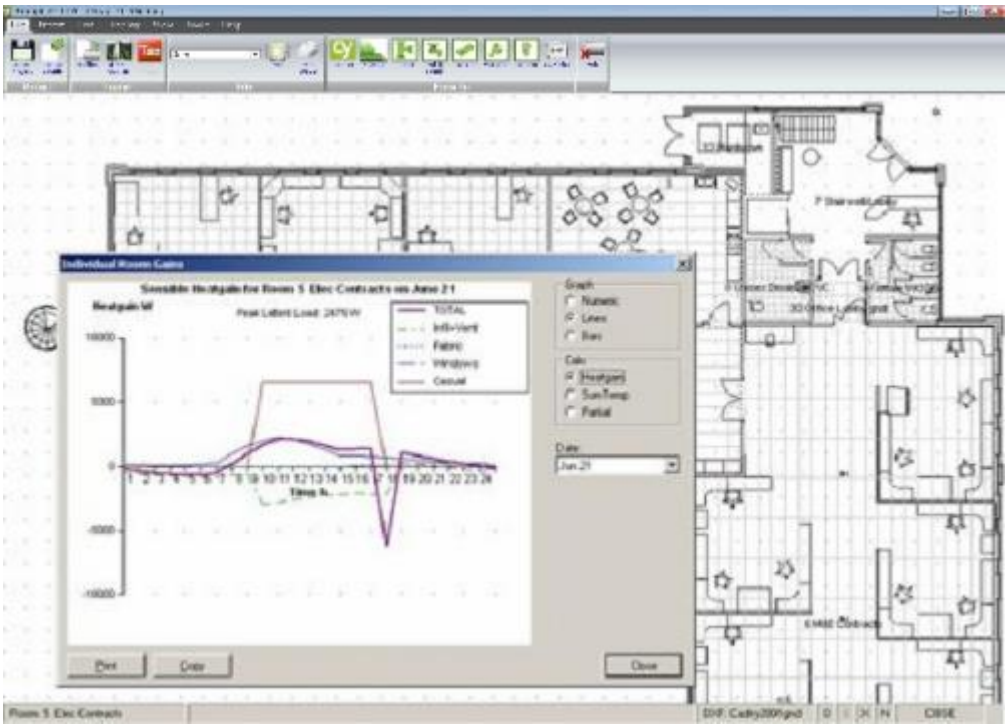
Site shading and building orientation as well as façade shadow analysis can be undertaken to give a comprehensive breakdown of the simultaneous building loads.



Orientation can easily be edited along with an inspection of the shadow cast on each separate façade.

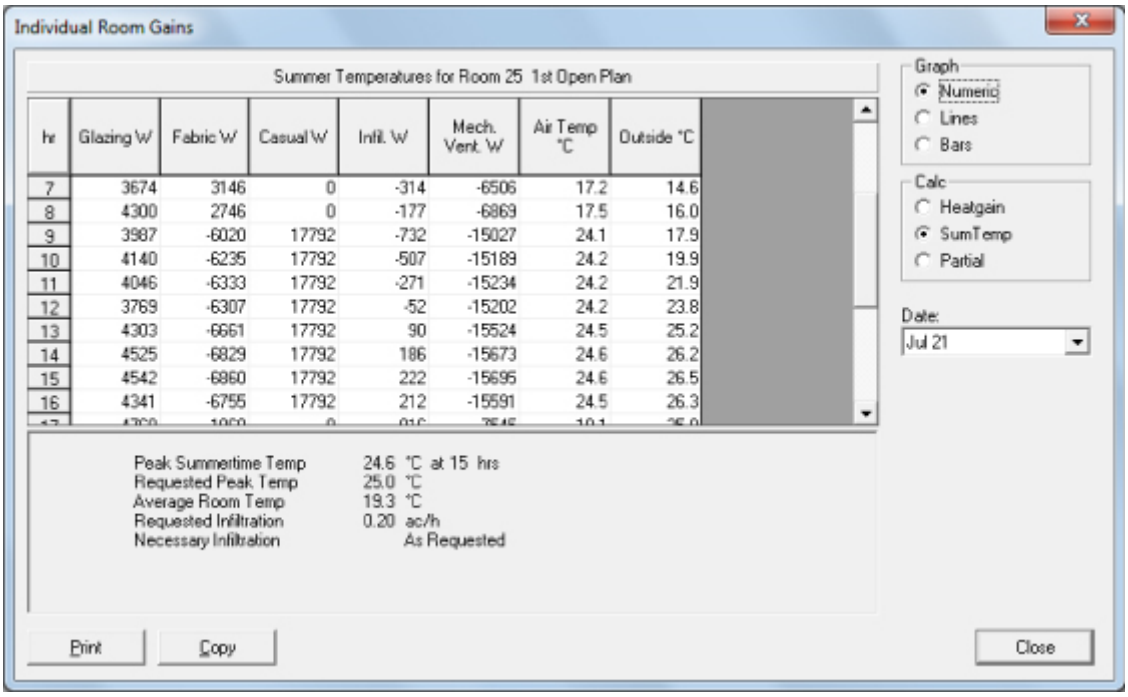
Energy Program

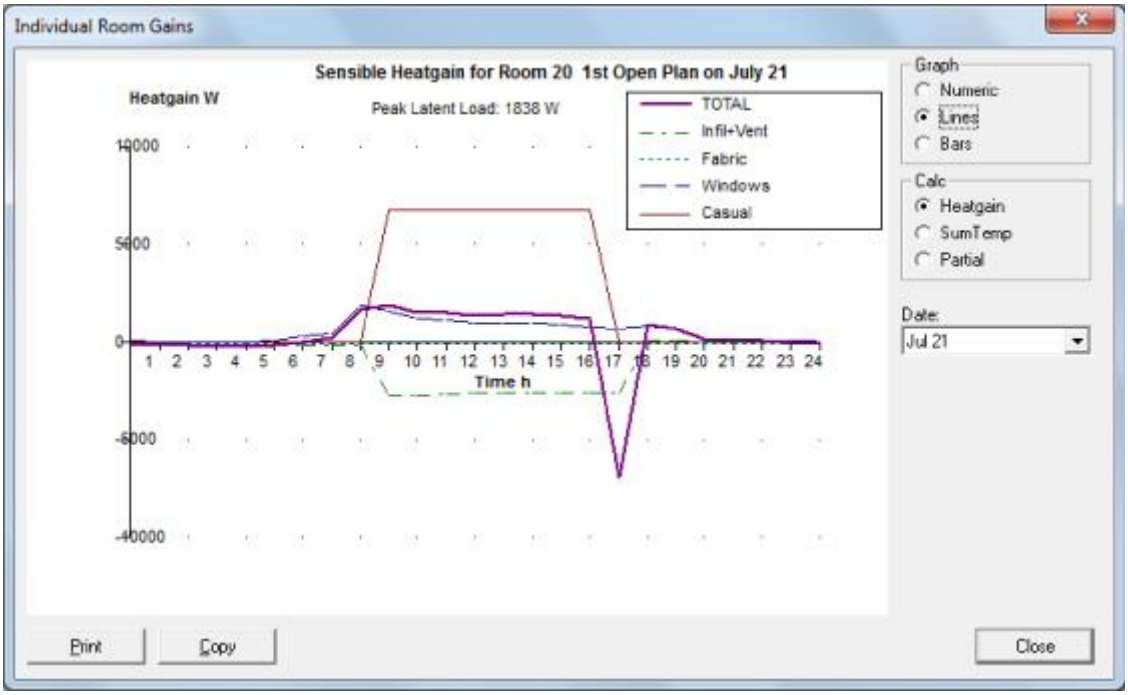
Once the Building Model has been completed the results for heat gains and losses to the space can be considered as well as the Summertime temperatures based on engineering assumptions made by the engineer. For example, the engineer can analyse the effect of pre-cooling the air to the space and the effect this has on any potential plant requirement. The engineer can also experiment with different glazing types and configurations to offer the optimum solution whether it be via natural infiltration, pre-cooled air or full air conditioning.



Heat gain calculations

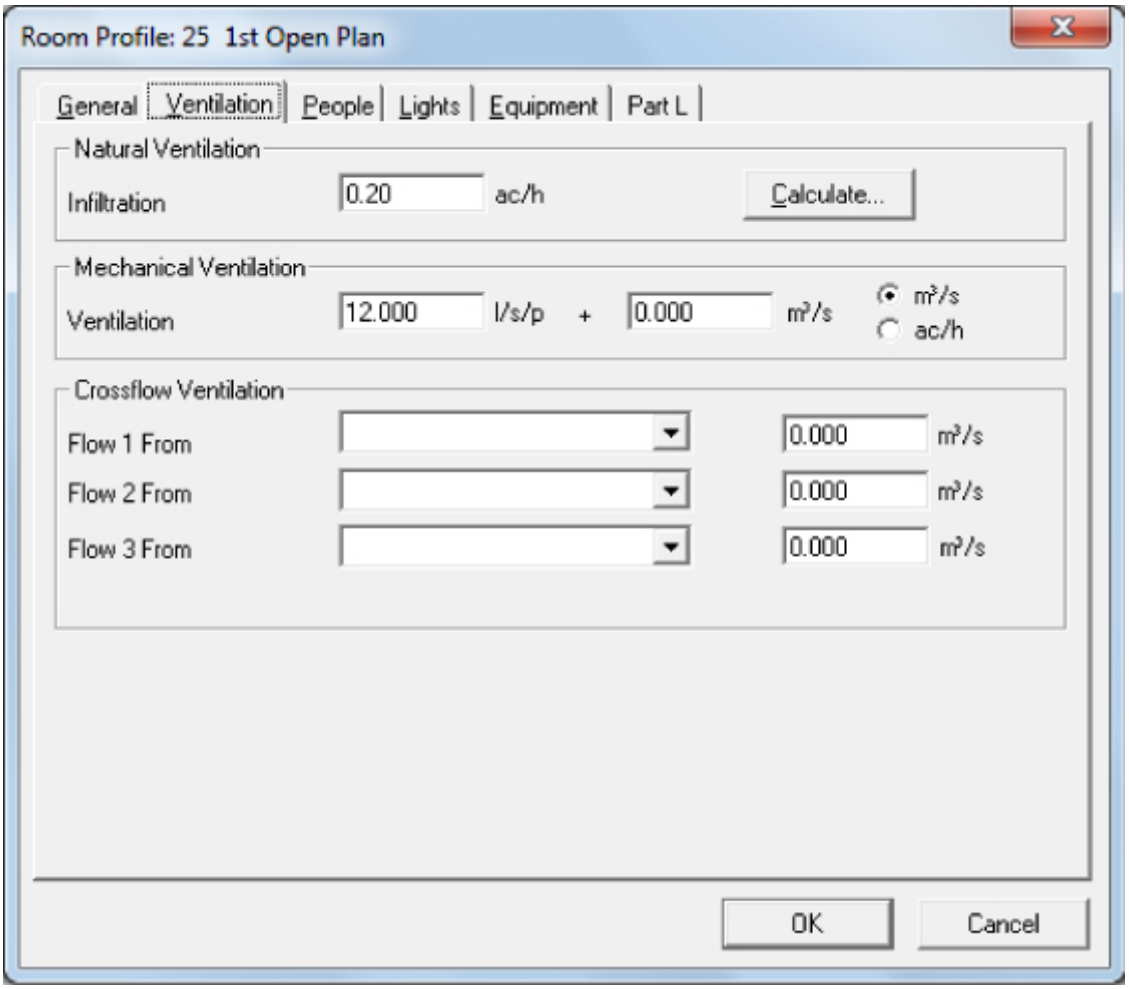
Summertime temperatures in the spaces can be determined under various conditions.


Individual Room Gains
Summer Temperatures for Room 25 1st Open Plan
hr | Glazing W | Fabric W | Casual W | Infil. W | Mech. Vent. W | Air Temp °C | Outside °C
7 | 3674 | 3146 | 0 | -314 | -6506 | 17.2 | 14.6
8 | 4300 | 2746 | 0 | -177 | -6869 | 17.5 | 16.0
9 | 3987 | -6020 | 17792 | -732 | -15027 | 24.1 | 17.9
10 | 4140 | -6235 | 17792 | -507 | -15189 | 24.2 | 19.9
11 | 4046 | -6333 | 17792 | -271 | -15234 | 24.2 | 21.9
12 | 3769 | -6307 | 17792 | -52 | -15202 | 24.2 | 23.8
13 | 4303 | -6661 | 17792 | 90 | -15524 | 24.5 | 25.2
14 | 4525 | -6829 | 17792 | 186 | -15673 | 24.6 | 26.2
15 | 4542 | -6860 | 17792 | 222 | -15695 | 24.6 | 26.5
16 | 4341 | -6755 | 17792 | 212 | -15591 | 24.5 | 26.3
Peak Summertime Temp 24.6 °C at 15 hrs
Requested Peak Temp 25.0 °C
Average Room Temp 19.3 °C
Requested Infiltration 0.20 ac/h
Necessary Infiltration As Requested
Graph
Numeric
Lines
Bars
Calc
Heatgain
SumTemp
Partial
Date:
Jul 21
Print
Copy
Close

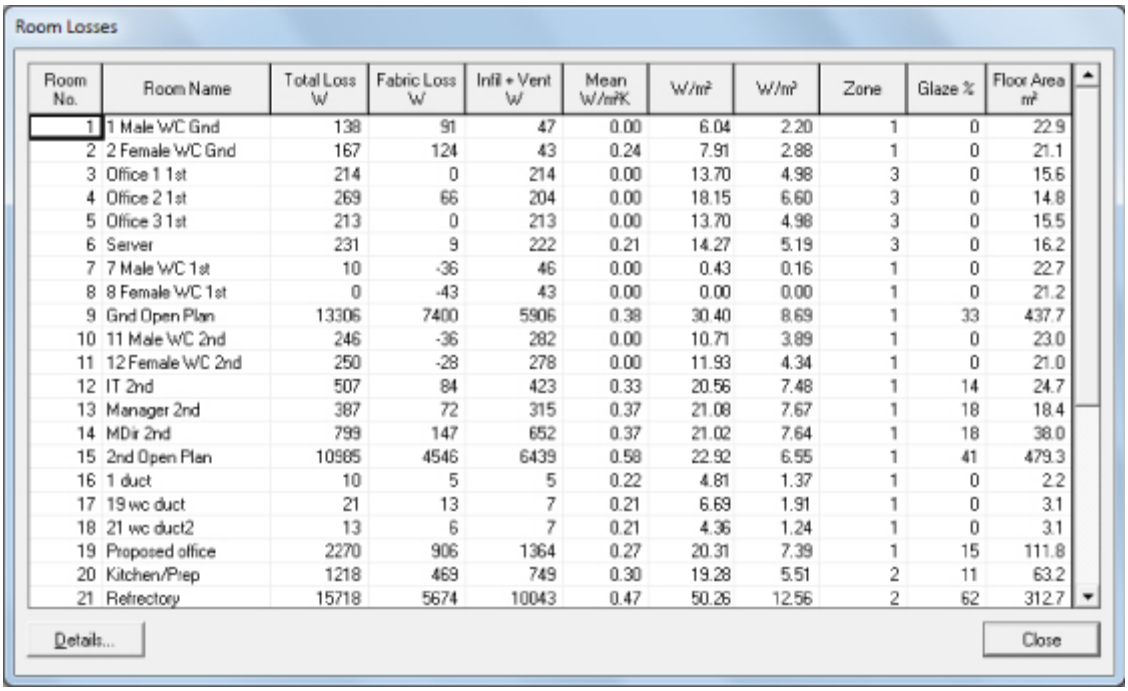

Individual Room Gains
Sensible Heatgain for Room 20 1st Open Plan on July 21
Heatgain W
Peak Latent Load: 1838 W
TOTAL
Infil+Vent
Fabric
Windows
Casual
10000
5000
0
-5000
-10000
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
Time h
Graph
Numeric
Lines
Bars
Calc
Heatgain
SumTemp
Partial
Date:
Jul 21
Print
Copy
Close

The building model is a wholly dynamic model where room temperature profiles and room positions interact to give gains and losses across partitions if necessary, as well as the effects of cross flow ventilation on gains and losses to internal spaces and zones.

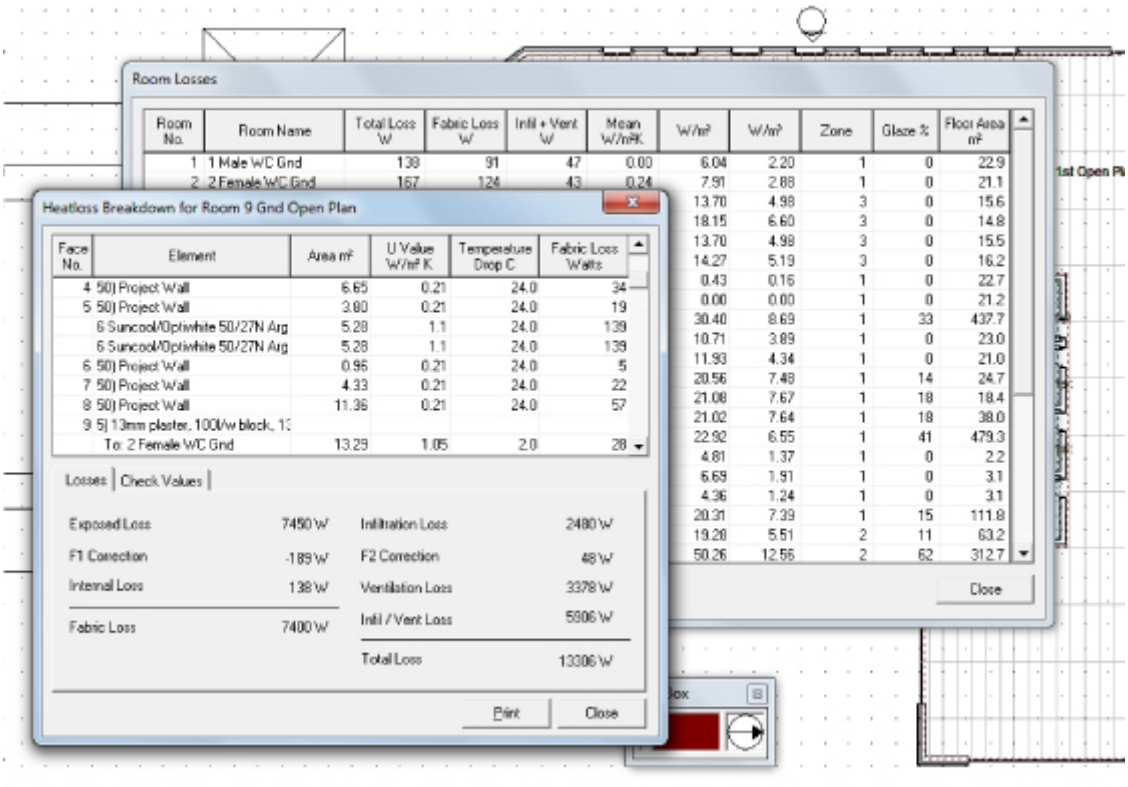
Using imported profiles from the building program, these casual gains such as lighting, occupancy and equipment are considered as part of the core calculation used in the energy results.



Heat loss calculations can also be performed on a building or zonal basis, the zoning of the rooms being undertaken by simply marking the room profile with the appropriate zone. These can be presented as either a tabular format or each room can be displayed individually taking into consideration internal gains, losses etc.

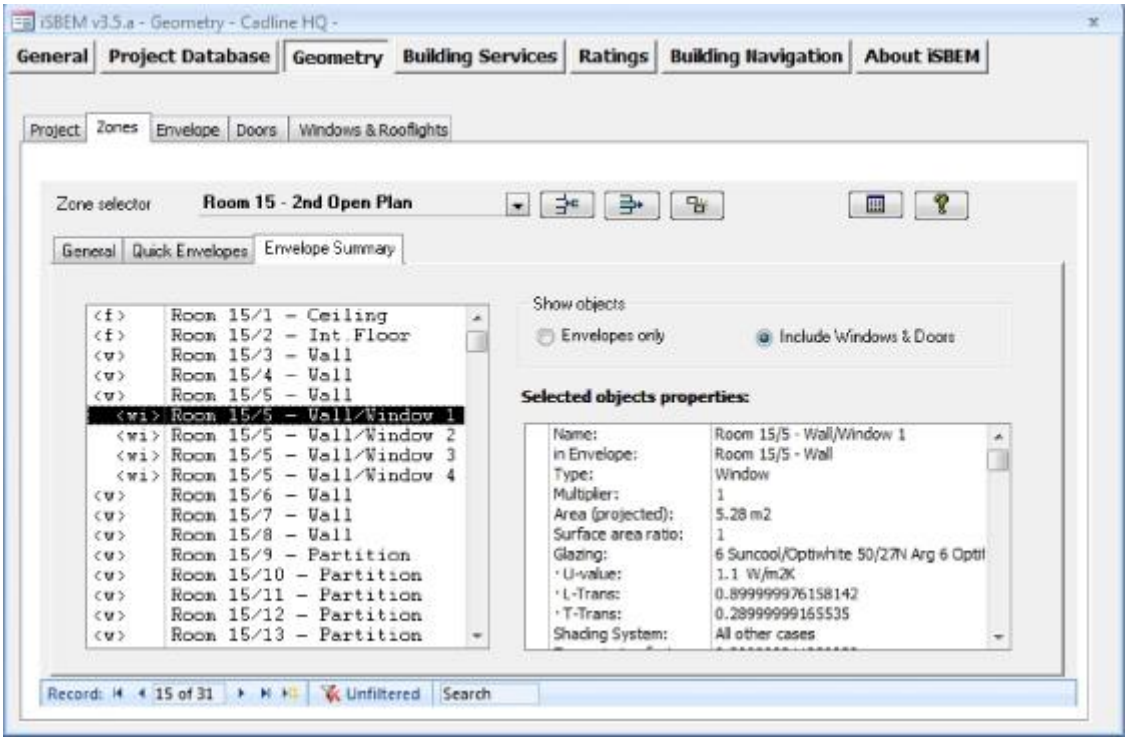


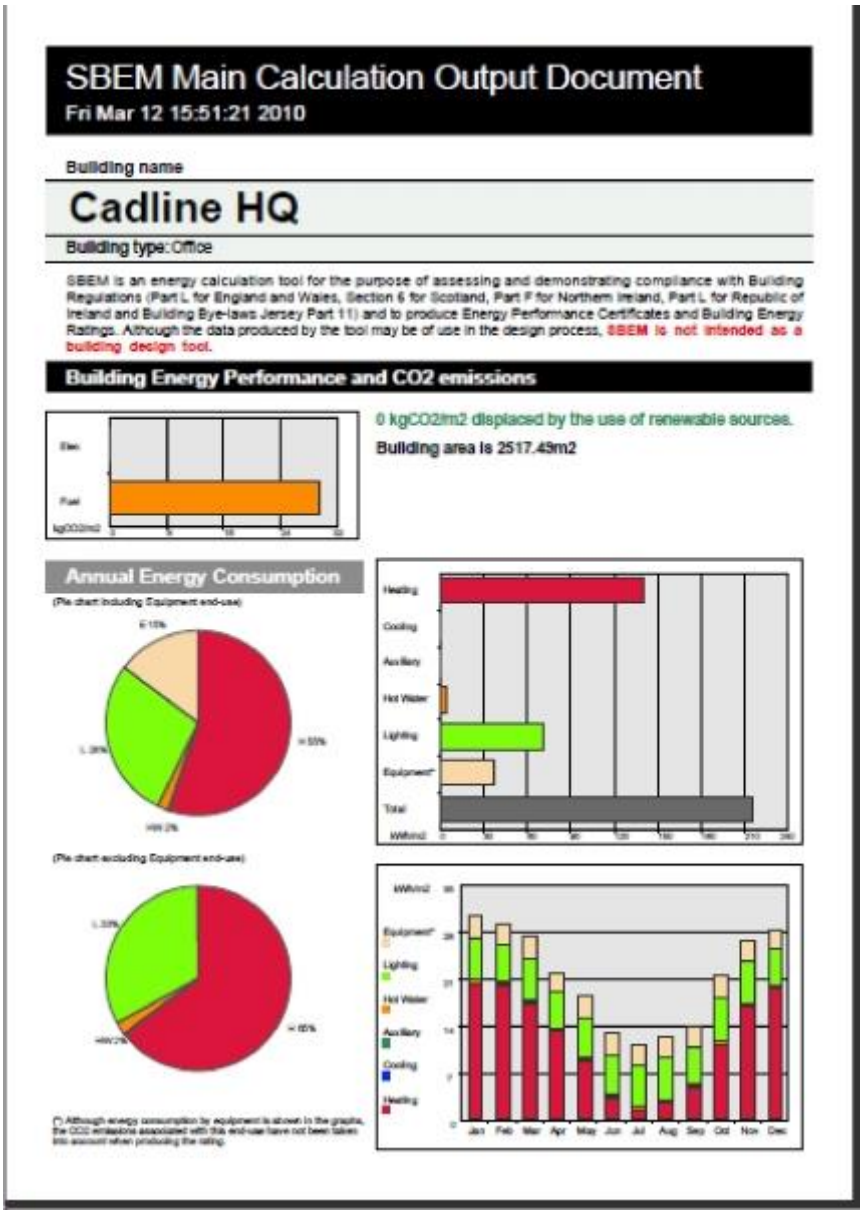
Room No.	Room Name	Total Loss W	Fabric Loss W	Infil + Vent W	Mean W/m²K	W/m²	W/m²	Zone	Glaze %	Floor Area m²
1	1 Male WC Gnd	138	91	47	0.00	6.04	2.20	1	0	22.9
2	2 Female WC Gnd	167	124	43	0.24	7.91	2.88	1	0	21.1
3	Office 1 1st	214	0	214	0.00	13.70	4.98	3	0	15.6
4	Office 2 1st	269	65	204	0.00	18.15	6.60	3	0	14.8
5	Office 3 1st	213	0	213	0.00	13.70	4.98	3	0	15.5
6	Server	231	9	222	0.21	14.27	5.19	3	0	16.2
7	7 Male WC 1st	10	-36	46	0.00	0.43	0.16	1	0	22.7
8	8 Female WC 1st	0	-43	43	0.00	0.00	0.00	1	0	21.2
9	Gnd Open Plan	13306	7400	5906	0.38	30.40	8.69	1	33	437.7
10	11 Male WC 2nd	246	-36	282	0.00	10.71	3.89	1	0	23.0
11	12 Female WC 2nd	250	-28	278	0.00	11.93	4.34	1	0	21.0
12	IT 2nd	507	84	423	0.33	20.56	7.48	1	14	24.7
13	Manager 2nd	387	72	315	0.37	21.08	7.67	1	18	18.4
14	MDir 2nd	799	147	652	0.37	21.02	7.64	1	18	38.0
15	2nd Open Plan	10985	4546	6439	0.58	22.92	6.55	1	41	479.3
16	1 duct	10	5	5	0.22	4.81	1.37	1	0	2.2
17	19 wc duct	21	13	7	0.21	6.69	1.91	1	0	3.1
18	21 wc duct2	13	6	7	0.21	4.36	1.24	1	0	3.1
19	Proposed office	2270	906	1364	0.27	20.31	7.39	1	15	111.8
20	Kitchen/Prep	1218	469	749	0.30	19.28	5.51	2	11	63.2
21	Refrectory	15718	5674	10043	0.47	50.26	12.56	2	62	312.7



Individual space details

The program also has an accredited interface with the Government's latest SBEM program which entails transferring building geometric and constructional data information into the freely downloadable industry standard iSBEM interface. This enables production of EPCs to the various standards and jurisdictions involved as set by the various legislative bodies in the UK.





SBEM Main Calculation Output Document

Fri Mar 12 15:51:21 2010

Building name

Cadline HQ

Building type: Office

SBEM is an energy calculation tool for the purpose of assessing and demonstrating compliance with Building Regulations (Part L for England and Wales, Section 6 for Scotland, Part F for Northern Ireland, Part L for Republic of Ireland and Building Bye-laws Jersey Part 11) and to produce Energy Performance Certificates and Building Energy Ratings. Although the data produced by the tool may be of use in the design process, SBEM is not intended as a building design tool.

Building Energy Performance and CO2 emissions

0 kgCO2/m2 displaced by the use of renewable sources.

Building area is 2517.49m2

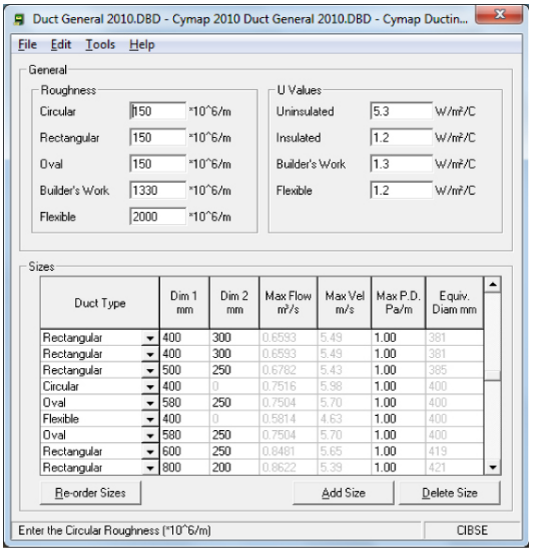
Annual Energy Consumption

Energy consumption of buildings can also be undertaken to calculate the cooling, heating, lighting and equipment costs based on plant efficiencies, building and plant operating times as well as diversity of occupation.

Ductwork Program

Once the Building Energy results have been completed the ductwork routes can be designed and routed on the floor plans using DW 144 standards. All pressure drops, fan duties and data required for submission of calculations can be undertaken.

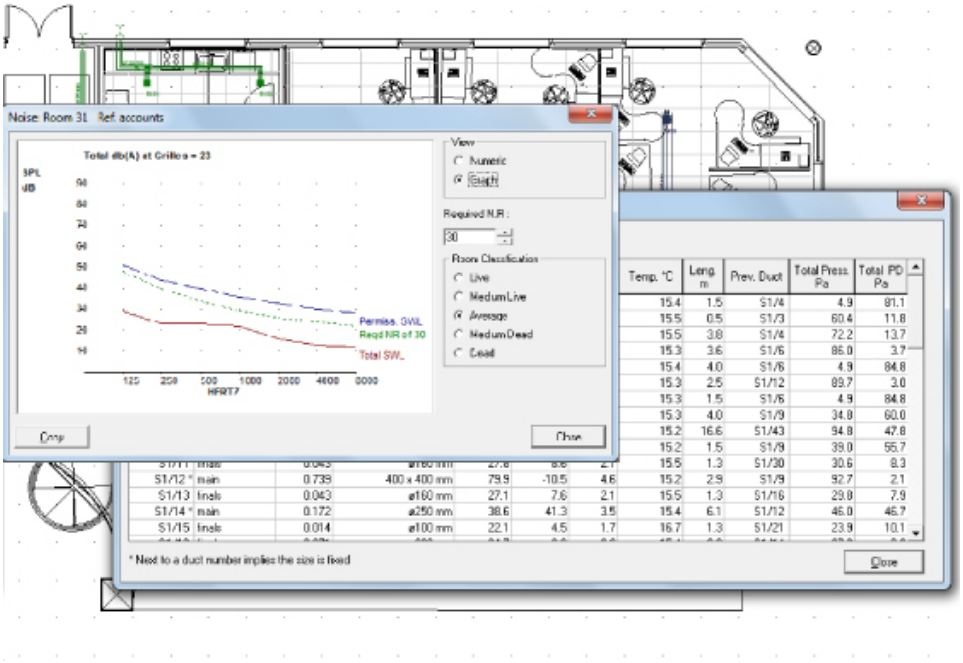
An extensive range of sections, types and sizes of ductwork have been included in a database which can be edited to suit an engineer's input requirements. Selection criteria can be based on velocity, unit pressure drop or volume flow rate for any given size of duct. The unknowns are calculated using industry standard principles.



Ductwork database

Supply and extract grilles and registers can be placed on the layout with a snap on/off function allowing grilles to snap to input ceiling grid positions. Light fittings and electrical items already positioned can be “activated” so their positions can be shown during grill placement.

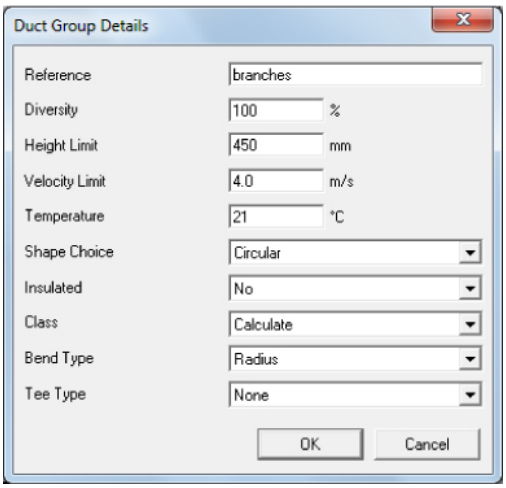
The selection basis of the grill depends on the system being connected i.e. extract from WC areas may be expressed as AC/H but grilles sized for office areas may use cooling flow rates as the basis of calculation. Once the ductwork has been routed back to the AHU entry/exit point and the network of ducts completed, a full schedule of ducts, grille/fan noise, fan duties and branch/duct balancing pressures can be viewed.



Various sections of duct can be edited and designed according to certain rules that can be set up by the engineer, for example, ductwork passing through a restricted ceiling void can be set-up with a maximum depth so that any duct the “rule” applies to will be sized on this basis.

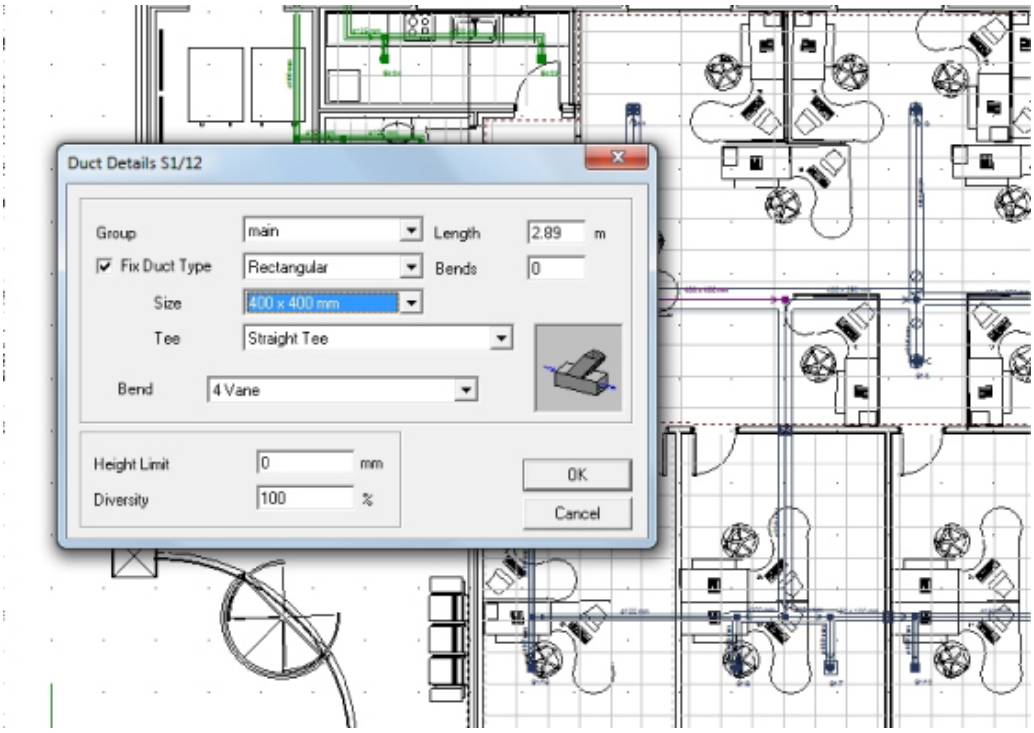
The building model is a wholly dynamic model where room temperature profiles and room positions interact to give gains and losses across partitions if necessary, as well as the effects of cross flow ventilation on gains and losses to internal spaces and zones.

Using imported profiles from the building program, these casual gains such as lighting, occupancy and equipment are considered as part of the core calculation used in the energy results.



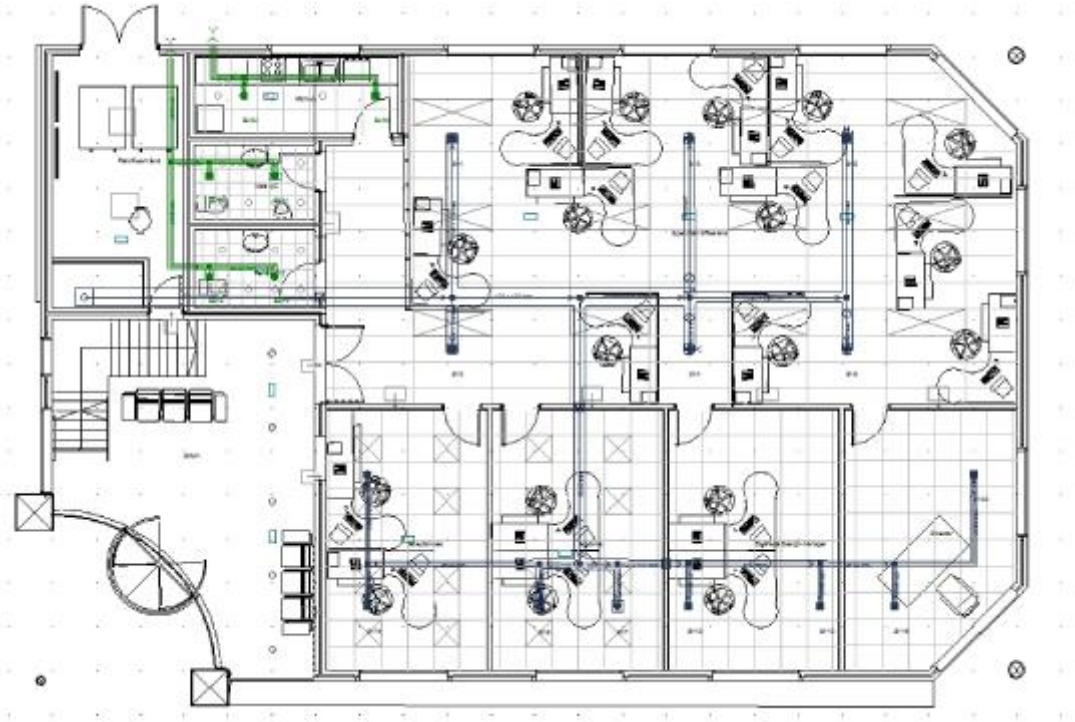
Duct selection basis

Various duct fittings can be entered with resistances or "K" factors applied as well as being able to edit each section of ductwork. All ductwork fittings have pressure drops and "K" factors associated with them to help perform the build-up of total pressure drop of the index ductwork leg, which is identified.



Edit ductwork

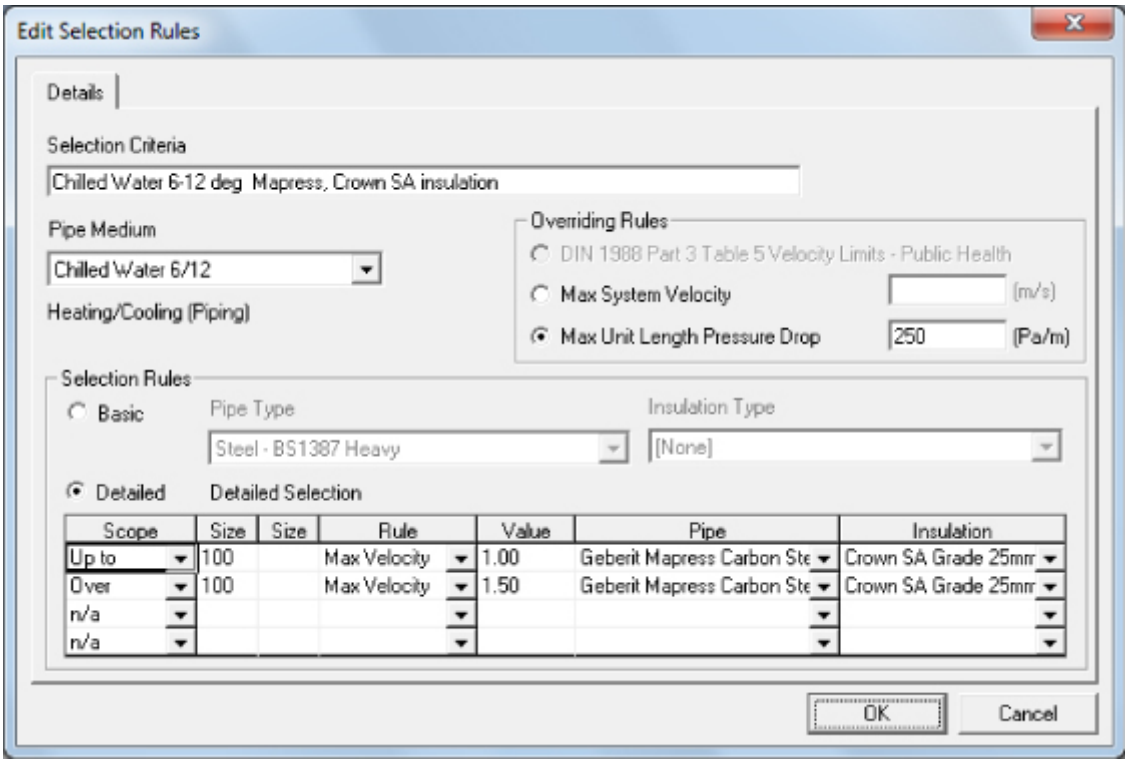
Once the layouts are complete they can be transferred to CAD via a DXF plot program where they can be plotted out directly or exported to CAD via DXF format files.



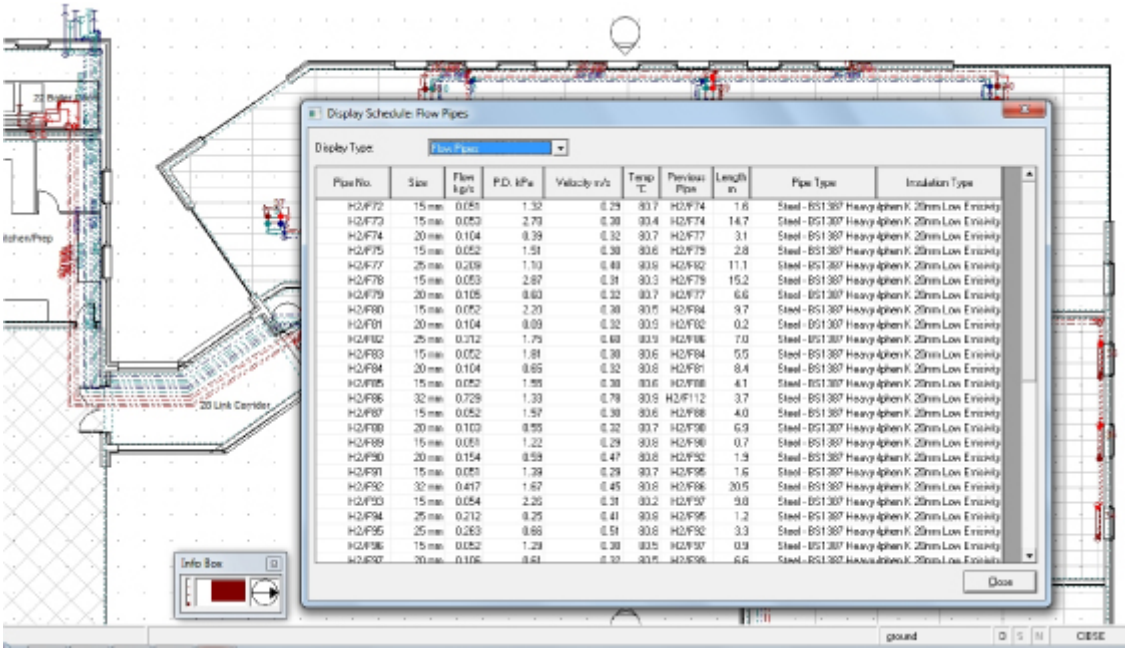
Pipework Program

Once the Building Energy results have been completed, the heating and chilled water pipework design can be completed, to scale, on a floorplan with all routings design, pump duty and resistance calculations as well as Bills of Quantities, all defined in one easy operation. Unlike other packages that treat floor plans separately, you can route services seamlessly between floors, as opposed to creating nodal junctions and linking these up separately. This method of working ensures greater accuracy when designing systems where heat losses and pressure drops for pump neutral point locations are critical.

Using an extensive pipe database that can be fully edited by the engineer, pipe selection rules can be applied to each separate entry point to each separate system. This enables a mixture of piped systems where characteristics such as pressure drops, flow and return temperatures and different classes of pipework can be used on the same project without resorting to changing general details. Each system has its own “entry point” where data associated with that particular system is defined. Flow and return headers can also be used instead of entry points so each circuit can utilise independent design characteristics.



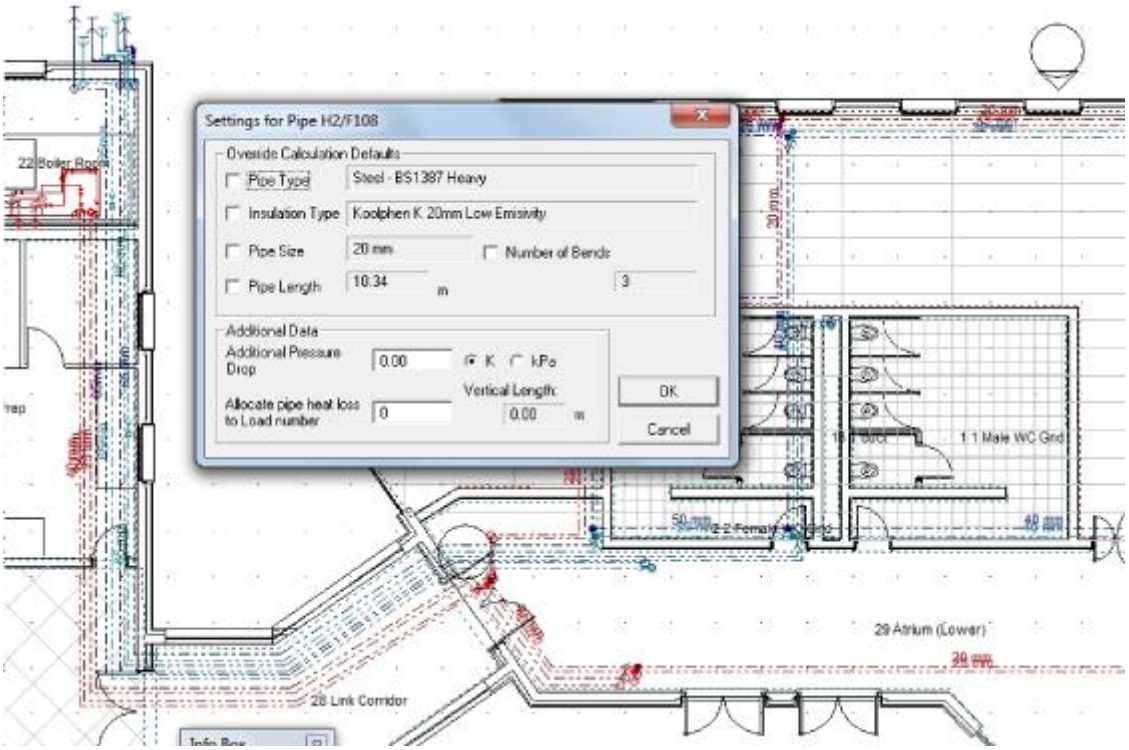
Pipe selection rules in database



Pipe schedule

From an extensive range of manufacturers' heat emitters, radiators and other heat emitters can be placed in the room space (based on heat gains and loss information dynamically transferred across to the program) and sized. Connection details, mounting heights etc., can be ascertained before placing the heat emitters. The ability to re-set and size heat emitters with pipe connections maintained is useful for architectural changes such as changes to windowsill heights.

The pipework can then be very simply routed from the load back to the supply point in the plant room, with other parts of the system built up to complete the whole network of pipework routes. As the engineer is using the DXF back drop, all pipe lengths in any plane are to scale, however, each individual run of pipe between nodes can have its attributes edited to enable existing systems to be modelled. Additional resistances, bends and lengths can be input by quickly selecting a pipe.



Editing individual pipe

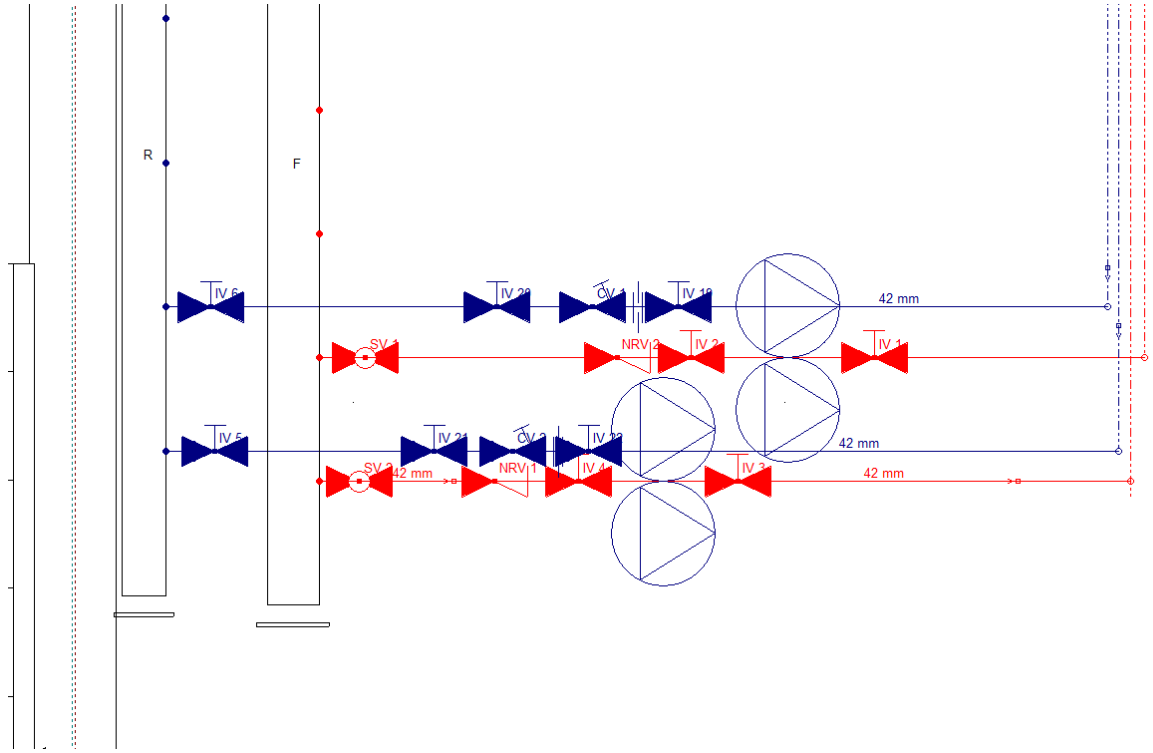
Once complete, the Index Run, Pump Duty, Schedules and Bills of Quantities can be ascertained with exportation to leading estimating packages either directly or by CSV format.

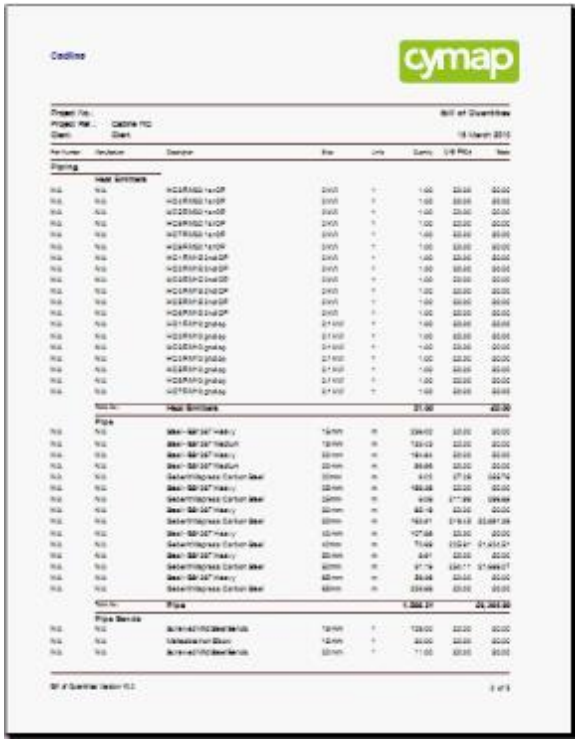
2D or 3D DXF files of the services layouts can be exported back into CAD to either overlay on existing 2D layouts or as a wireframe 3D in 3D layouts. These routings can form the basis for third party packages such as Autodesk's Revit MEP to create full 3D clash detection and presentation as well as installation drawings or basic 3D wireframe conceptual layouts. An alternate method would be to use Cadline's Cylink program where services can be exported via this add-on application that sits in the Revit MEP platform.

Pumps and various other items of plant such as boilers and calorifiers can be added and where applicable, electrical details entered and utilised in the electrics program where the loads are passed across to the Wiring schematic software.

Valves of various types can be incorporated to provide detailed commissioning results using either generic manufacturers' valve information or VDI 3805 files.

Each valve type has an equivalent Revit generic library part representation when exporting to Cylink.

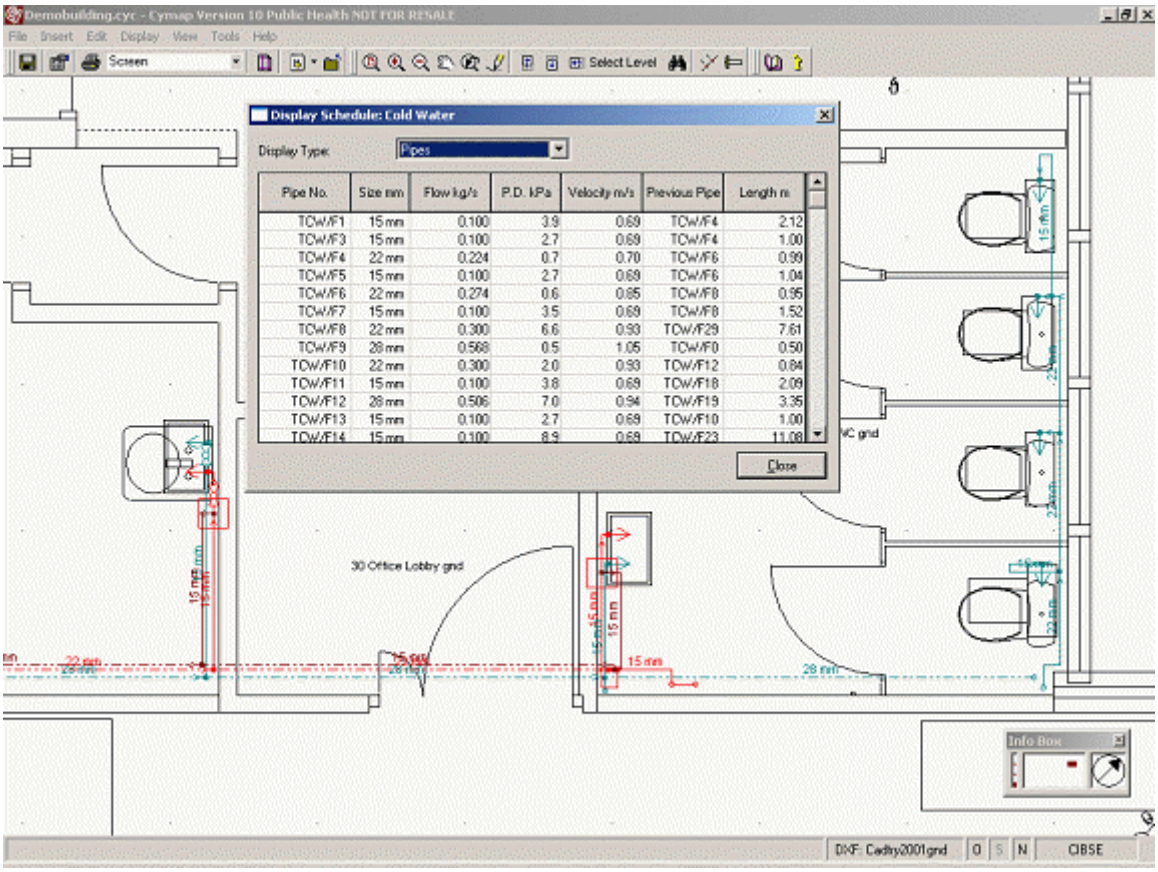




Public Health Program

The Cymap Public Health program allows the engineer to route, design and size Hot and Cold water services as well as Gas services.

A comprehensive database that has a multitude of pipe configurations can also be edited to suit specific design requirements which can be customised and rolled out to suit engineers' design requirements.



Systems, whether tank fed, mains pressure or boosted can be modelled using the floor plans and once designed all bills of quantities taken off.

Current methodologies include BS6700 and CIBSE demand units, with BS 806 and CIHPE design methodologies being rolled out in 2017.

Hot water circulating returns can be included as part of the HWS system along with circulating pump duty calculations.

Gas appliances can be added and pipe work sized according the pressure requirements.

All pipe sizes can be fixed to simulate existing systems as well as the addition of pipe fittings, which will be quantified as part of the bill of quantities.

Users can also add their own appliances and edit data such as loading units and flow rates to suit their particular designs.

Psychrometrics Program

The Psychrometric program offers quick and accurate convergence.

The Cymap Psychrometrics program can be used to determine varying psychrometric conditions at different positions of a pre-determined plant cycle.

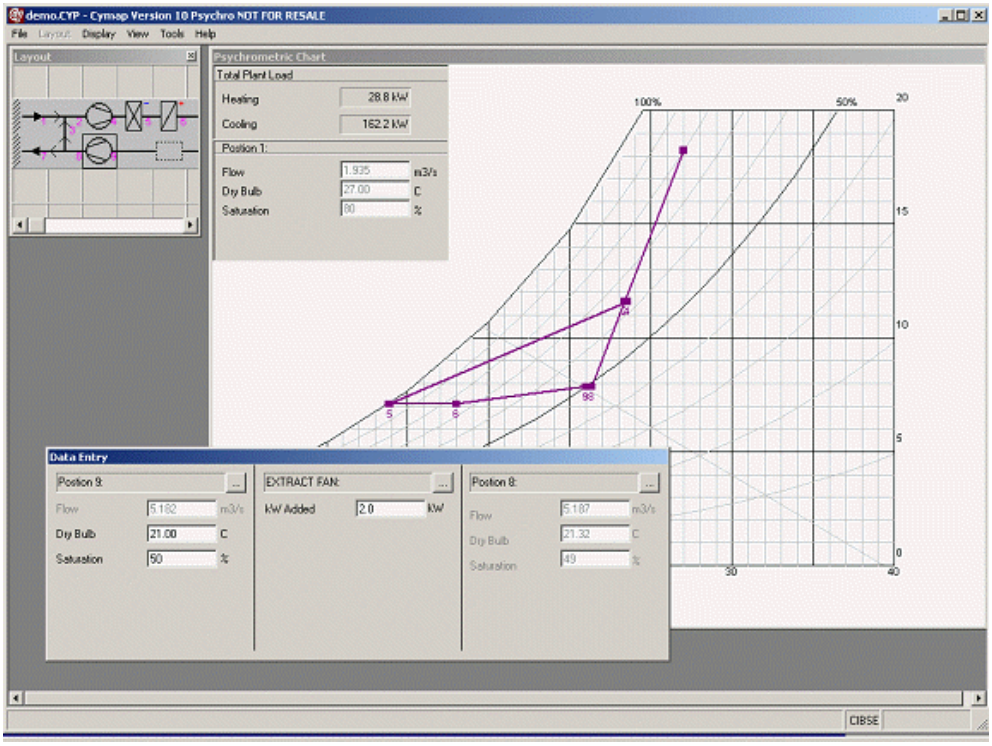
The engineer has the ability to build up a “system” using symbols to represent different components of a plant.

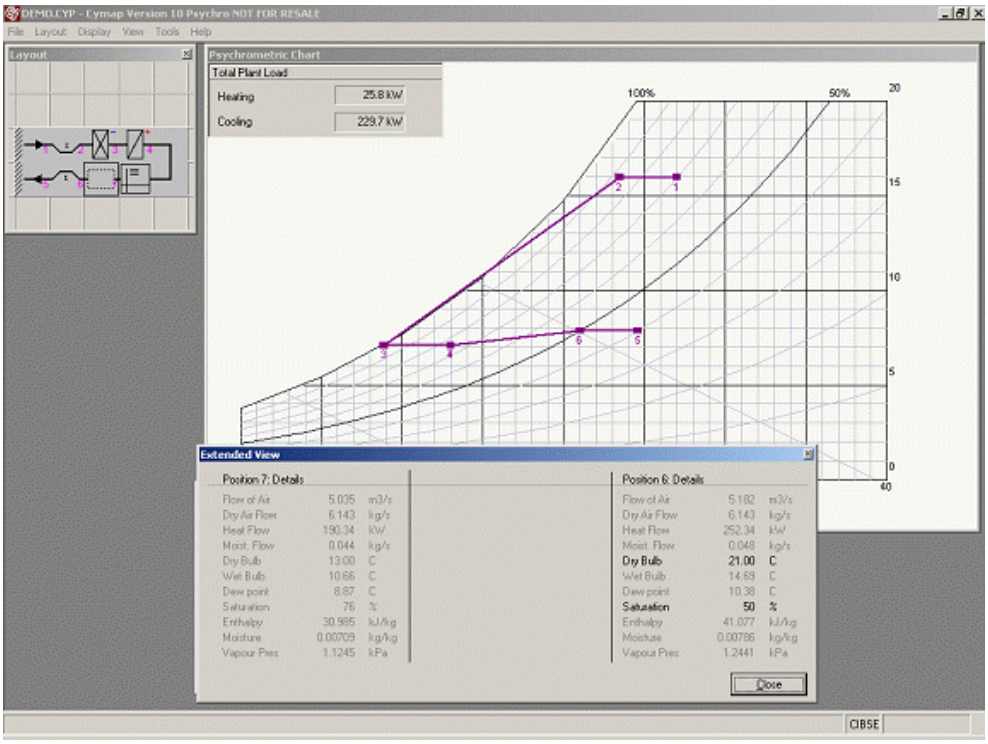
By manipulating data inputs the engineer can determine, for example, free cooling and recirculation requirements for varying fresh air loads, which in turn gives off coil mixed air temperatures.

Careful psychrometric analysis is an important part of producing an efficient air conditioning system. You can select from a built-in range of standard systems such as dual duct, VAV or induction units, or build your own layout from scratch.

The graphical interface allows you to add or remove air conditions at any point. Alterations are reflected on the chart, instantly demonstrating the effects of your changes.

Once the system has been described a psychrometric chart is drawn. Air conditions can be entered for any position, with the implications of each entry instantly evaluated. The system can be tested to ensure it performs satisfactorily for a wide range of weather conditions and internal loads, so can be fine-tuned to produce the most energy- efficient control settings.



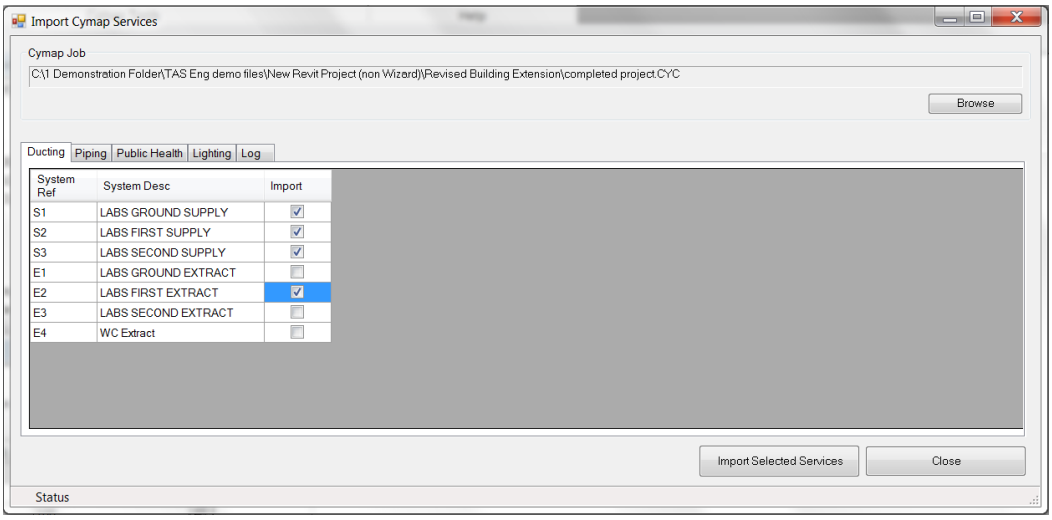


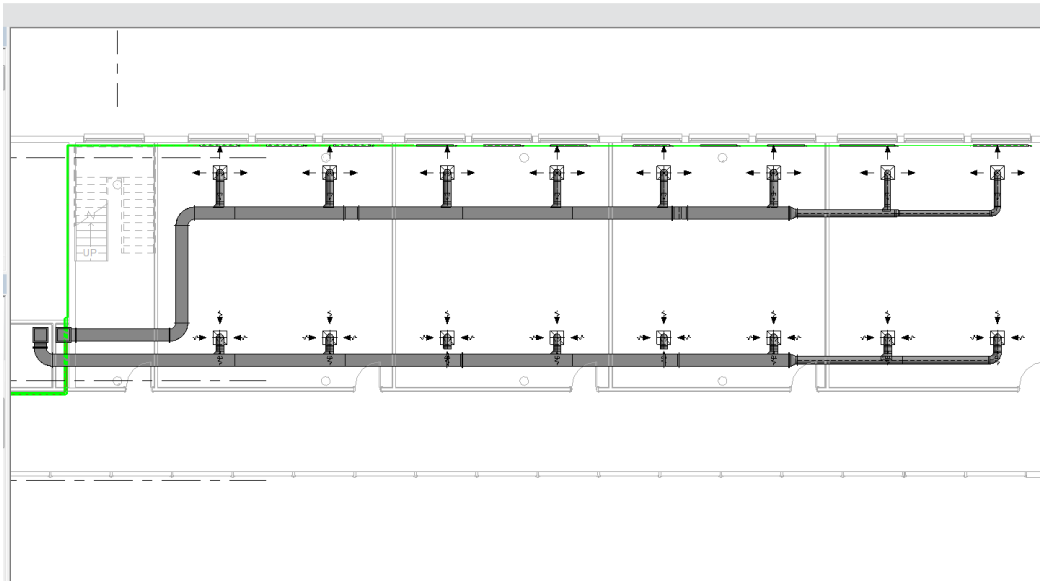
Cylink

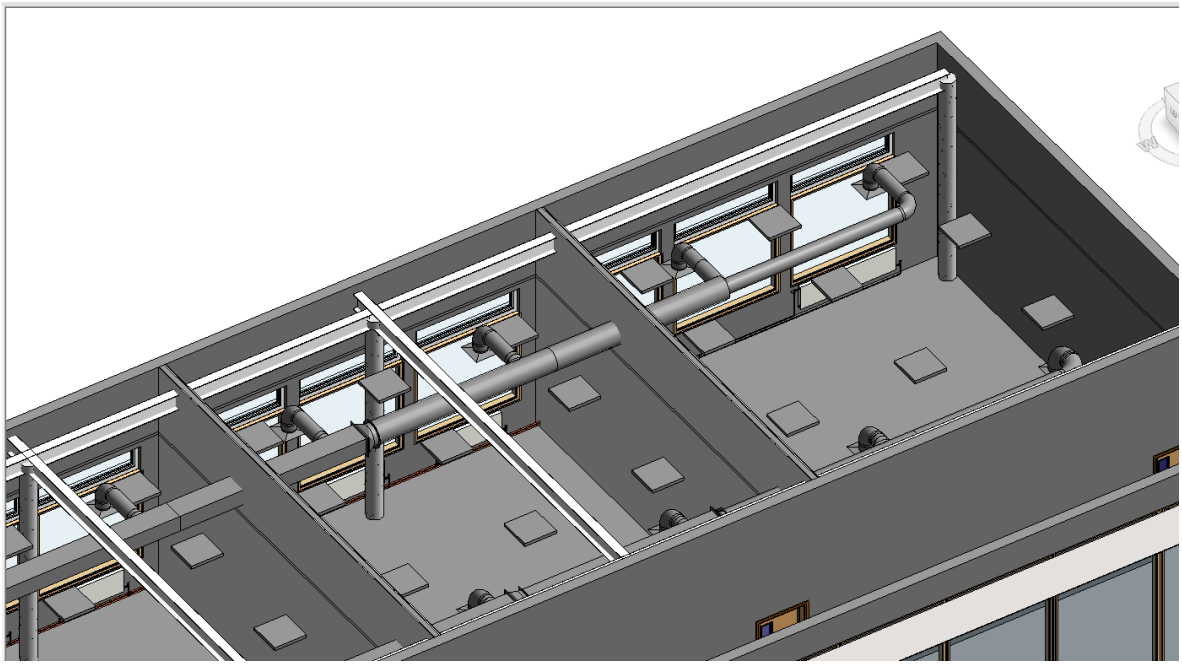
Cylink is an application that is installed on the Revit 2016/2017 platform to convert Mechanical and Electrical services into a fully co-ordinated 3D federated Revit model by loading a customised template with generic content such as plant and valves, which can be customised to suit design requirements

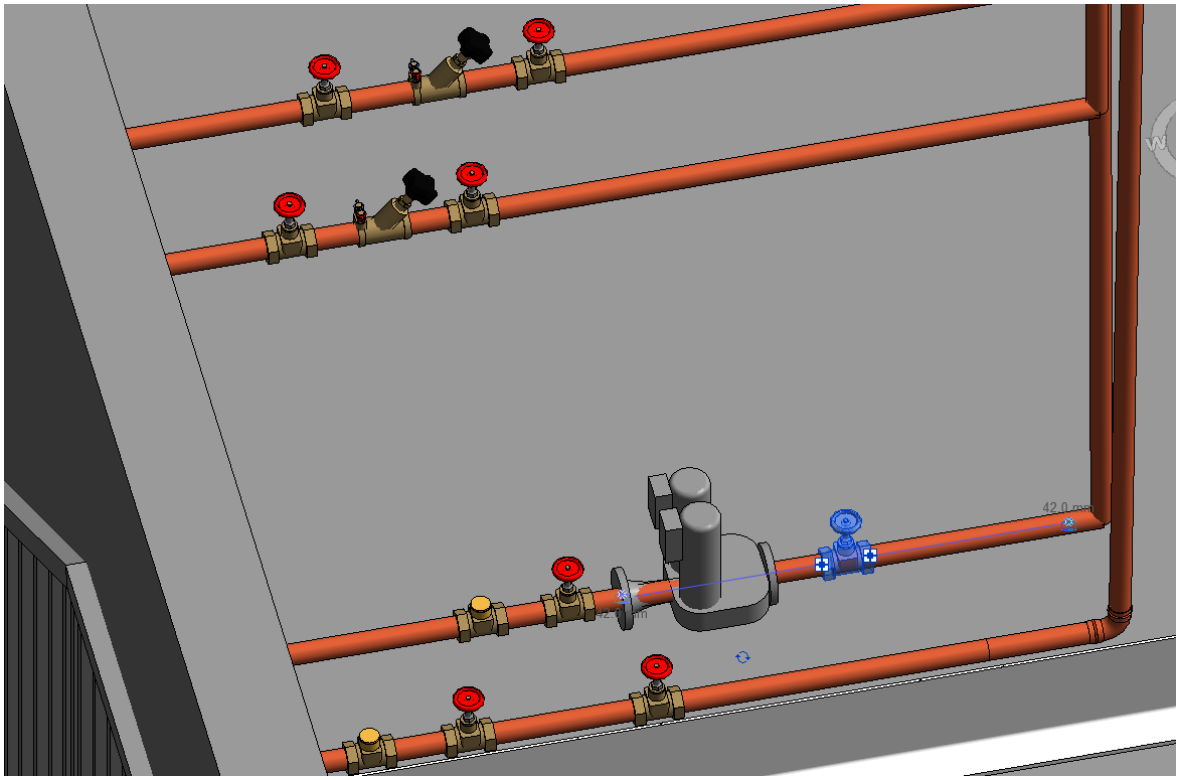
The services routes and sizes are converted via the Revit API to create a full 3D co-ordinated layout in the federated model the original Cymap model is based on.

Services can be imported separately, system by system, from a simple selection process for both Mechanical and Electrical services.


Import Cymap Services
Cymap Job
C:\1 Demonstration Folder\TAS Eng demo files\New Revit Project (non Wizard)\Revised Building Extension\completed project.CYC
Browse
Ducting
Piping
Public Health
Lighting
Log
System Ref
System Desc
Import
S1 LABS GROUND SUPPLY
S2 LABS FIRST SUPPLY
S3 LABS SECOND SUPPLY
E1 LABS GROUND EXTRACT
E2 LABS FIRST EXTRACT
E3 LABS SECOND EXTRACT
E4 WC Extract
Import Selected Services
Close
Status



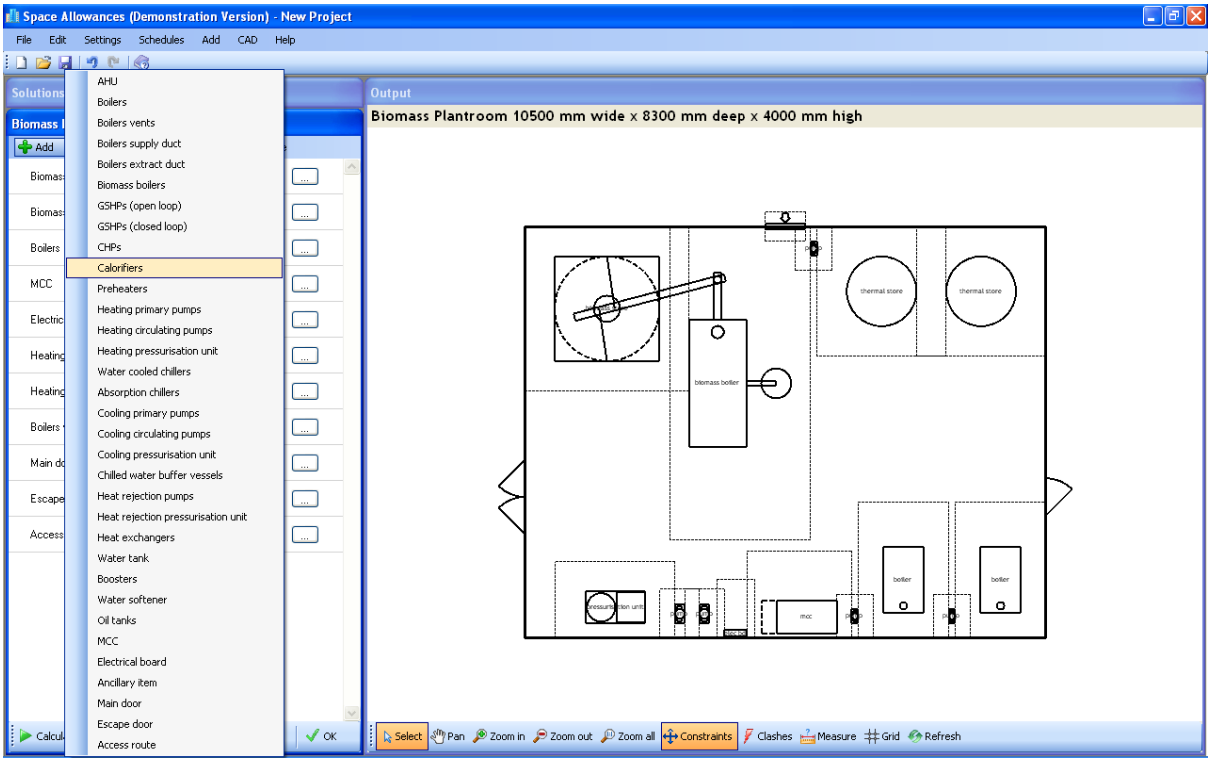


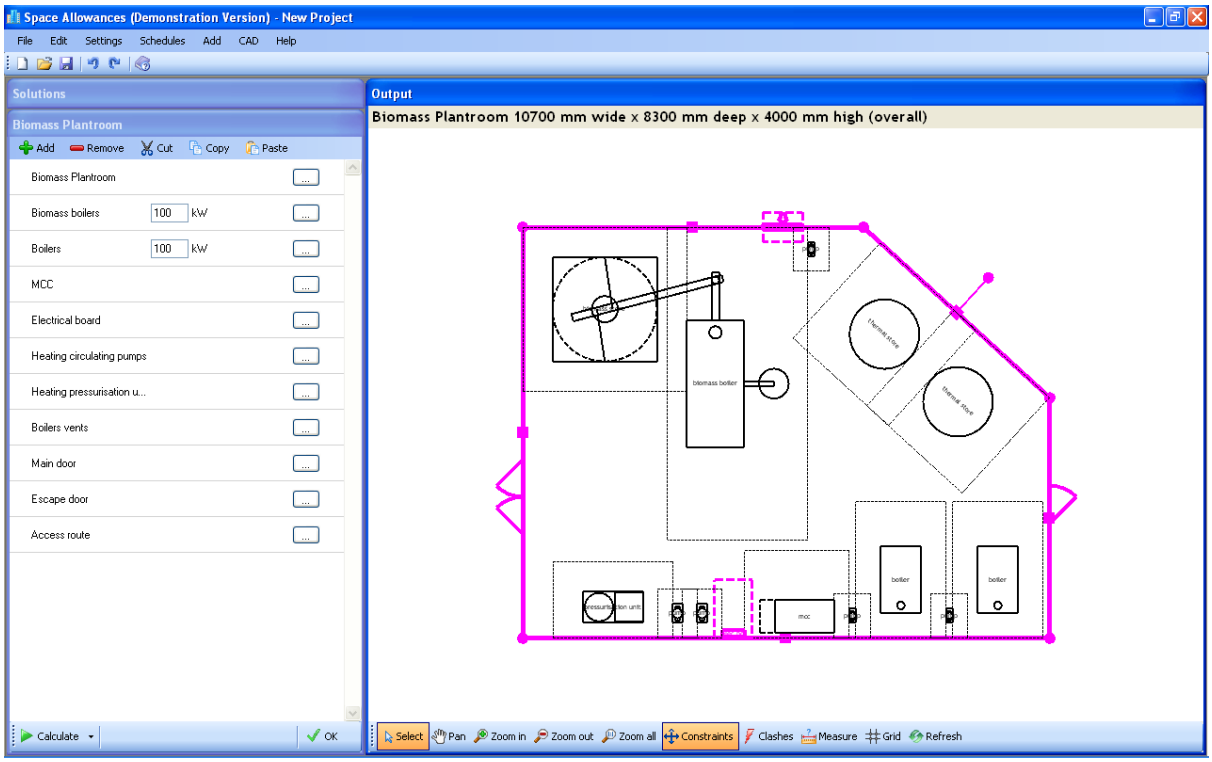


Cyspace

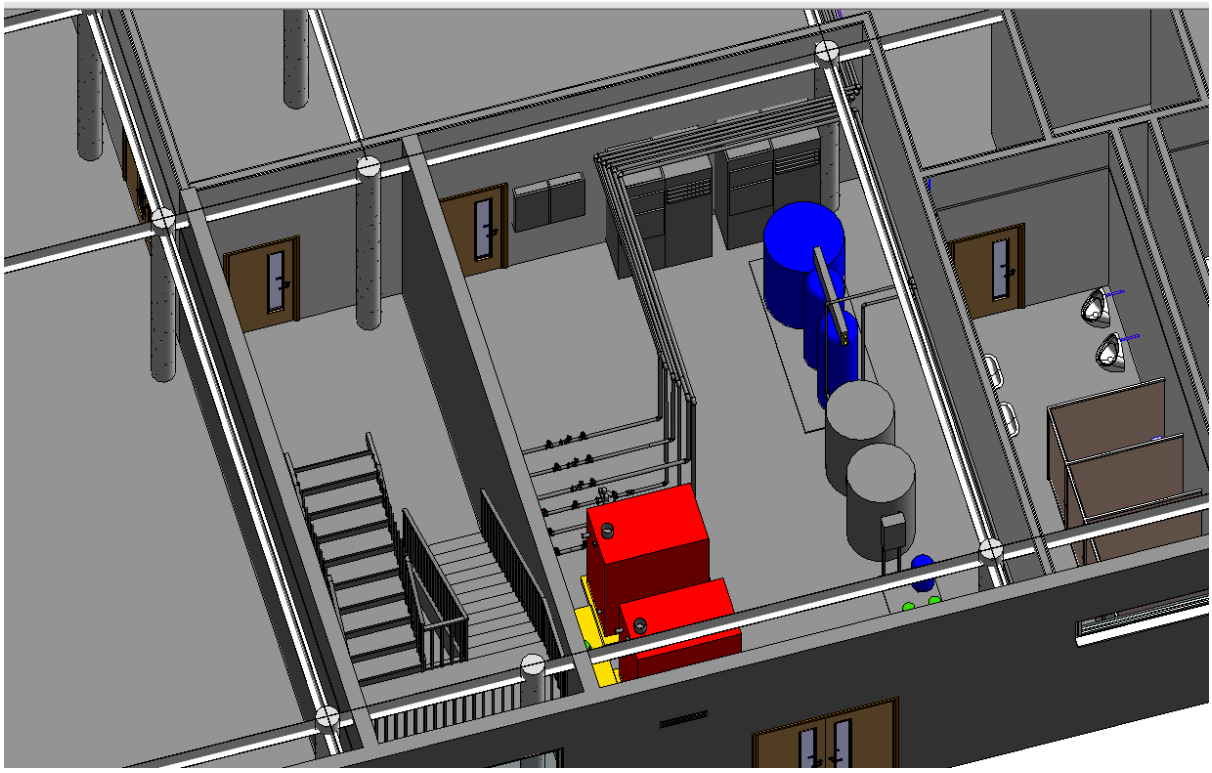
Cyspace is an application that allows the user to convey to the architect, early on in the project lifecycle, the spacial requirements needed to ensure sufficient space is allocated to plant and services. This utilises “worse case” dimensions and clearances, from a database of manufacturers plant. A solution is produced based on the plant items employed and a scheme is presented to the engineer that can be edited

The solution can be overlayed on a DXF or drawing file to show whether the spacial requirements have been met with any further re arranging of either the plant positions or the size of the allocated space reviewed.





Outputs can be exported to 2D cad and sketchup as well as an add-in to Revit enabling the 3D plant layout to be positioned in the space.



Risers, ceiling voids and electrical services can all be accounted for as well as roof top chilled and AHU plant spaces.