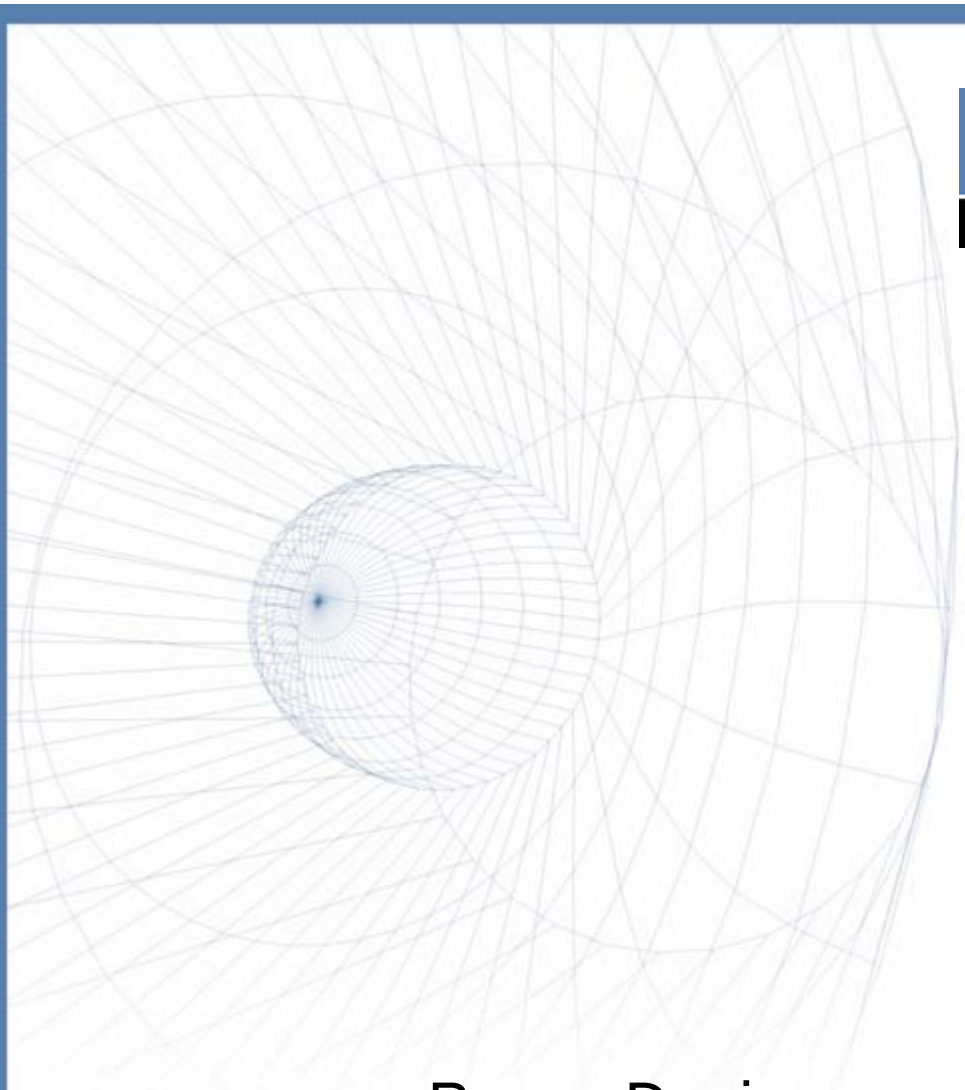

# Room Design

# Administrator Guide

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# Room Design Administrator Guide

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# 1 Introduction

This chapter introduces AVEVA's Room Design application which builds on the existing database concepts and provides 3D model data in an integrated environment, enabling quick and easy browsing and reporting on that data.

## 1.1 Who Should Use this Guide

Administrators and discipline leads should use this guide to understand the concept of creating a Room Design specification, using catalogue items and defining penetrations for doors and windows.

Administrators should have a reasonable knowledge of Outfitting database structures where they might need to configure rules and assembly geometry. A knowledge of PML is required if they need to set up PML expressions in the engineering criteria.

This guide does not cover product installation. Refer to *References*.

For details of non administrative process of Room Design refer to the *Room Design User Guide*.

## 1.2 Product Compatibility

The Room Design application can be used with the following products:

- AVEVA Outfitting Design 12.0.2 or later
- AVEVA Marine Outfitting 12.0.2 or later

There is no upgrade path capability to pre 12.0.2 versions of Outfitting Design or Marine Outfitting to the new 12.0.2 application or its elements.

## 1.3 References

This chapter lists other documents that provide supporting or complementary information to this guide.

*AVEVA Product Minimum System Requirements*

*Room Design User Guide*

*Access Platforms, Stairs and Ladders User Guide*

*Access Platforms, Stairs and Ladders Administrator Guide*

*Structural Design User Guide*

## 1.4 How this Guide is Organised

This guide is divided into chapters, as follows:

| | |
|---|---|
| *Overview of Room Design Functionality* | provides an overview of the Room Design application |
| *Getting Started* | explains aspects of starting the application and creating a Room Design specification |
| *Building Block (BBLOCK)* | describes the database architecture and the offspring administrative elements of the Building Block element |
| *Building Level (BLEVEL)* | describes the database architecture and the offspring administrative elements of the Building Level element |
| *Room (ROOM)* | describes the database architecture and the offspring administrative elements of the Room element |
| *Detail Group (DETGRP)* | describes the database architecture and the offspring administrative elements of the Detail Group element |

# 2 Overview of Room Design Functionality

The Room Design application provides a bespoke database architecture which captures the needs and requirements for the associated architectural activities. This new data model allows the disciplines to capture both the design intent for easy modification and the detail used for Material Take Off (MTO) and production requirements.

The owning element for all of the Room Design elements is the **Building Block (BBLOCK)** element which is analogous to the **SITE** element. The offspring and main administrative elements of the **BBLOCK** are listed below;

- Building Level (BLEVEL)
- Open Space (OPENSP)
- Restricted Area (RSTARE)
- Route Volume (RUTVOL)
- Stair Well (STRWEL)
- Detail Group (DETGRP)
- Boundary Line (BNDLIN)
- Area Definition (AREADE)

The elements listed above have their own offspring fulfilling specific functional objectives and these will be described in more detail in the following chapters.

## 2.1 Hierarchical Relationships of Room Design Elements

The descriptions and functions of the Room Design elements will be explained in the following chapters where these new objects have been architected to suit specific functionality and workflow to provide definite engineering purpose and their attribute set accurately mirrors the engineering criteria for that object. The attributes are evaluated by the system in response to the user's interaction with the 3D model environment and the relevant attributes are managed through the database hierarchy by the Room Design Application.

## 2.2 General Routing Path (RPATH)

The General Routing Path (RPATH) element provides a routing concept that provides a common basis for defining any open path or closed boundary based objects in the 3D environment such as those used in the WALL elements.

The primary objective is to provide consistent database schema with predictable behaviour in the creation of a path or boundary with a robust data consistency and internal checking mechanism that can persist data during the modification of the path or boundary once it has been created.

## 2.3 General Route Path (RPATH) Element

User information regarding the Routing Path element will be made available in a later Service Pack product release. Information specific to the core capabilities of the RPATH element is available in the *Software Customisation Reference Manual*.

# 3 Getting Started

This chapter describes how to start the application, create a Room Design specification, configure catalogue items and handle there penetrations.

The Room Design functionality is accessed by launching the Outfitting Design Module and selecting **Design > Room Design** from the main menu.

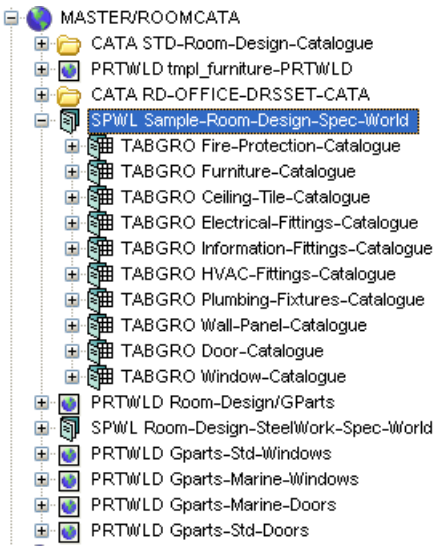
## 3.1 Creating a Room Design Specification

The Room Design selection process sets the specification reference of the newly created element i.e. (Door, Window, Fitting, Fixture etc.) to point to a GPART element in the catalogue database.

The use GPARTs enables SFITT or TMPL elements to be used interchangeably with each other as the GPART has the ability to reference either item types through the CATREF and TMPREF attributes.

The GPARTS are selected by selecting a TABITEM from a TABGROUP in a process described below:

The structure for the selection tables used in the sample data is as follows:




The Specification world (SPWL) contains a new kind of table called a Table Group (TABGROUP) which contains one or more Component Table (CTABLE) elements.

The TABGROUP item in the hierarchy represents a category of items that will be displayed in the Room Design application.

In order for the standard selection form used in Room Design to pick up the catalogue items as shown above, a number of data items need to be set in the catalogue so that the application knows where to look for them.

Room Design allows a number of item types to be created using the appware. i.e.

- Furniture
- Ceiling Tiles
- Doors
- Windows
- Electrical Fittings
- Fire Protection Fittings
- HVAC Fittings
- Information Fittings
- Wall Panels

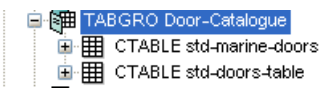
For each category of items at least one TABGROUP will be required (users may create their own) for each of the item types listed above.

The standard selection form used in Room Design looks in the catalogue for specific TABGROUP attributes so that the correct items are obtained for the specific part of the application and this is achieved by setting specific purposes for the TABGROUP.

The current list of Room Design tabgroup purposes are as follows:

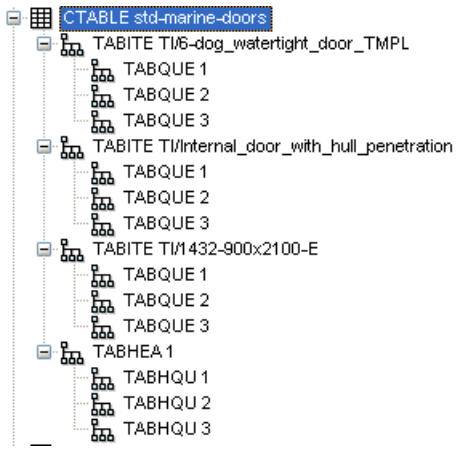
| | |
|---|---|
| Furniture | = FURN |
| Ceiling Tiles | = CLTI |
| Doors | = DOOR |
| Windows | = WIND |
| Electrical Fittings | = ELFI |
| Fire Protection Fittings | = FPFI |
| HVAC Fittings | = HVFI |
| Information Fittings | = INFI |
| Wall Panels | = WLPN |

The CTABLES represent sub-categories of each TABGROUP type so for instance the above example shows a category TABGROUP named ‘Door-Catalogue’ this owns the subcategory CTABLES named ‘std-marine-doors’ and ‘std-doors-table’ each of which contain references to components of that specific type.




Each individual CTABLE element contains one or many TABITEM elements, TABITEMS provide the individual links to GPARTS by their PARTREFERENCE attributes but they may

also own a series of Table Question Elements which are used to set up the Choose form with relevant selection information.




With just a single list of TABITEMS, the Choose form definition would simply be a single column list of tabitem names. The ability to add TABQUESTIONS adds a set of extra columns for the choose forms and enables extra selection criteria to be applied.

For example:

| TYPE | WIDT | HEIG | NAME |
|---|---|---|---|
| Internal escape, Double door, open inwards, no step | 750 | 2045 | /GP6-dog_watertight_door_TMPL |
| Internal single door with hull penetrationg item | 750 | 2045 | /GP/Internal_door_with_hull_penetration |
| Single leaf External mounting door type 1432 | 900 | 2100 | /GP/1432-900x2100-E |

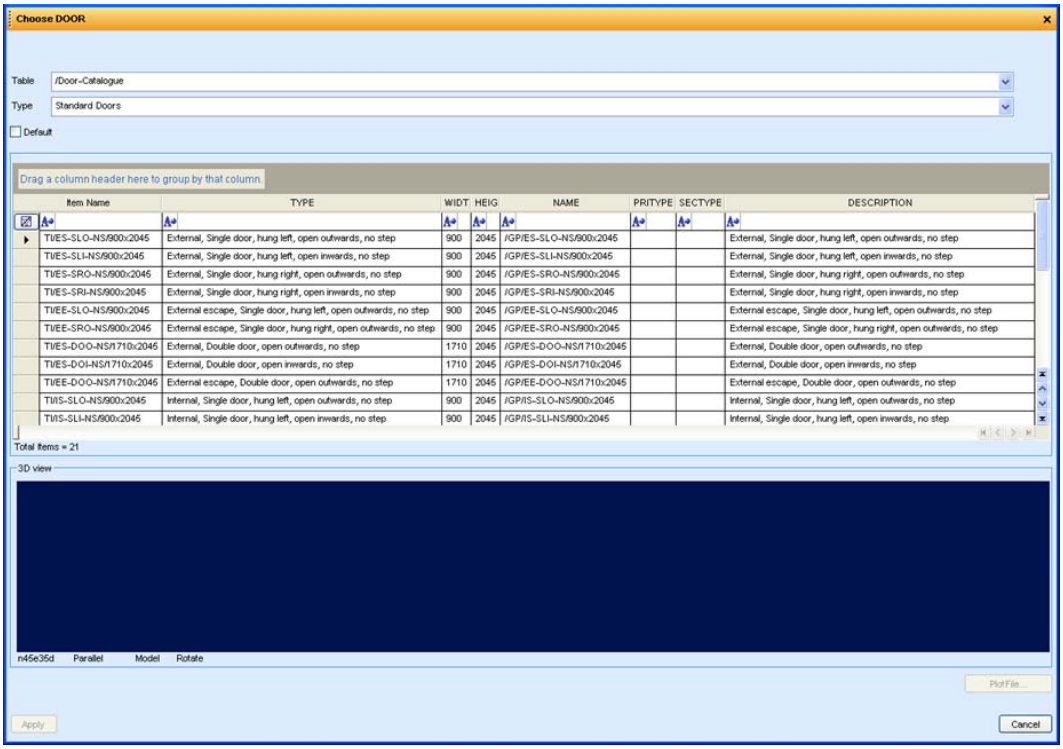
To get the output above, requires 3 TABQUESTION elements defined as follows:

1. Tpurpose = TYPE, Tanswer = ‘Internal escape, Double door, open inwards, no step’
2. Tpurpose = WIDT, Tanswer = 750
3. Tpurpose = HEIG, Tanswer = 2045

To obtain the headings the CTABLE requires a Table Heading (TABHEA) to be defined. This has a matching set of elements with purposes matching the table question elements and these are used to define the list header. This requires 3 Table Header questions (TABHQU) with purposes set to TYPE, WIDT and HEIG respectively.

Providing the catalogue has been set up in accordance with the rules listed previously the Room Design application will be able to pick up the relevant catalogue items for each detailing discipline.

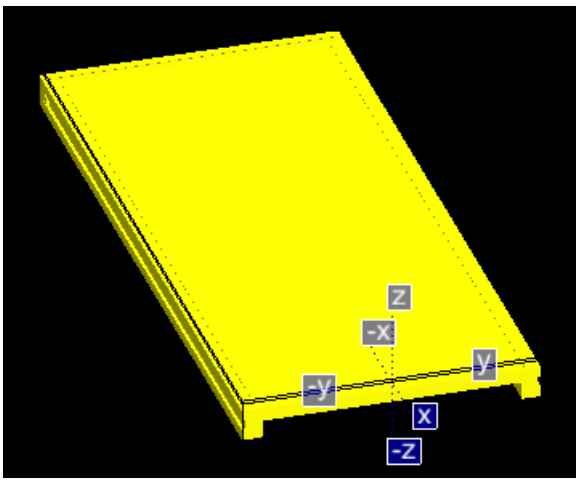
The example below shows the Doors and Windows detailing application which has picked up all relevant door types mentioned previously and is displaying them for a door selection operation.




## 3.2 Doors and Window Catalogue Items

The Doors and Window Room Design application will accept both fittings (SFIT) and template (TMPL) elements as doors or window elements. In the catalogue, these are referenced by GPART elements, and subsequently Tabitems.

In order to work correctly with the Room Design application, the component orientation needs to be correctly aligned with the wall faces. The convention is that the face of a door i.e. the opening direction is aligned with Z in the catalogue and the vertical direction of a door points in the –X direction.



The origin in the standard sample doors in the centre of the door, but could easily be modelled as left or right depending on opening direction.

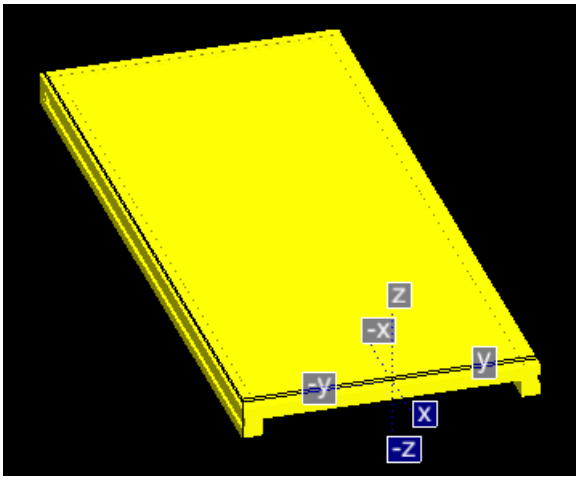
The same configuration is also applied to templates where the template primitives are arranged to provide the same basic orientation.

## 3.3 Furniture, Fixtures and Fittings Catalogue Items

As with doors and windows catalogue items the furniture, fittings and fixtures part of the Room Design application will accept SFIT and TMPL elements as valid geometrical representations of the relevant modelled item.

In order to work correctly with the furniture, fixings and fixtures part of the Room Design application, the component orientation needs to be correctly aligned with any wall faces that it is to be placed on and in the case of an element such as a table this needs to be relative to the floor level that it will sit at.

The convention for these items is that the facing direction of any wall component is defined as being in the positive Z direction and subsequently the default rotational orientation of the component is such that its X direction maps along the wall.




The origin for any wall component represents the position on the wall face that the fitting will placed at when the fitting is created.

Room element fittings behave in much the same way as wall fittings except that the Z direction of the component maps onto the Z direction of the room element at which the component is placed, therefore to have a furniture item that sits at floor level it must be defined such that all geometry begins at the origin and is subsequently defined outwards in the positive Z direction.

The same configuration is also applied to templates where the template primitives are arranged to provide the same basic orientation.

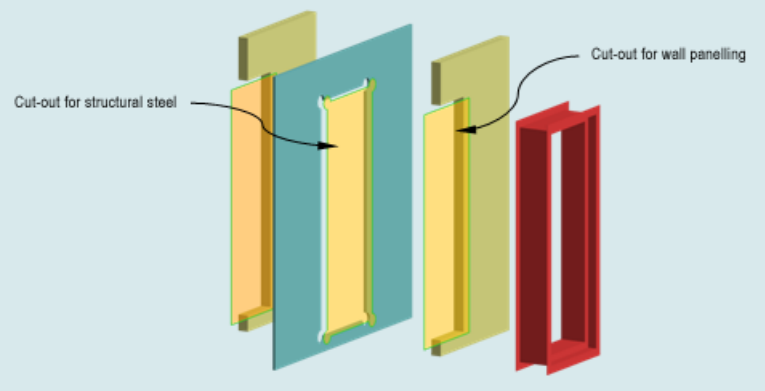
## 3.4 Window and Door Penetrations

The application for Room Design is assumed to be able to modify doors and windows in Room Design elements, but it is not expected to directly modify the hull. To create holes in hull panels requires approval in the hole management system and a penetration will only be made after approval. The shape of wall and hull penetrations is defined by extra primitives identified by their purpose attribute as described below:

For catalogue items, these need to be a SLOOP element belonging to an NSEX element in a negative geometry set. In order to differentiate penetration SLOOPS from conventional hole definitions, SLOOPS used for penetrating walls and other design items are identified by their purpose attribute as follows:

1. Items which penetrate a CTWALL have a purpose of OPGE (Outfitting Penetrating Geometry Element)
2. Items which do not penetrate CTWALLS but do penetrate hull plates or panels have a purpose of HPGE (Hull Penetrating Geometry Element)

This designation allows for differently shaped holes where hull steel cut out may be a different shaped hole to a hole in the wall panelling either side.




Where a penetrating element is the same shape whatever it is penetrating, there still needs to be two penetrating loops with different purposes even though they are identical.

## 3.5 Configuring Template Doors and Windows for Use with the Hole Management System

The GPART mechanism allows doors and windows to be defined as SFITs in the catalogue or as template (TMPL) elements in the Outfitting Design database. From the point of view of the room designer, using templates or SFIT or a combination of elements is purely down to convenience as both should work equally well.

Template (TMPL) penetrations require specific elements to be created within the template hierarchy to represent the holes that are required when a template item penetrates a panel or CTWALL. These penetrations are represented by extrusion elements (EXTR or NXTR) stored in the template hierarchy. These elements will each contain a loop element (LOOP) and vertices (VERT elements) to define the shape of the hole required. These are called penetration profiles.

Like the catalogue items, different shaped penetrations may be defined for penetrating CTWALLs or PANELS, but the identification mechanism is slightly different. For templates, a Port Set (PORS) element is created below the template with a port (PORI) element below. The PORI element has a reference attribute tarf which is used to reference the LOOP element to be used as a penetration.

To differentiate between a hole for Room Design and a hole for hull or panels, the purpose OPGE and HPGE are used in the same way as catalogue components but this time applied to the Port set elements.

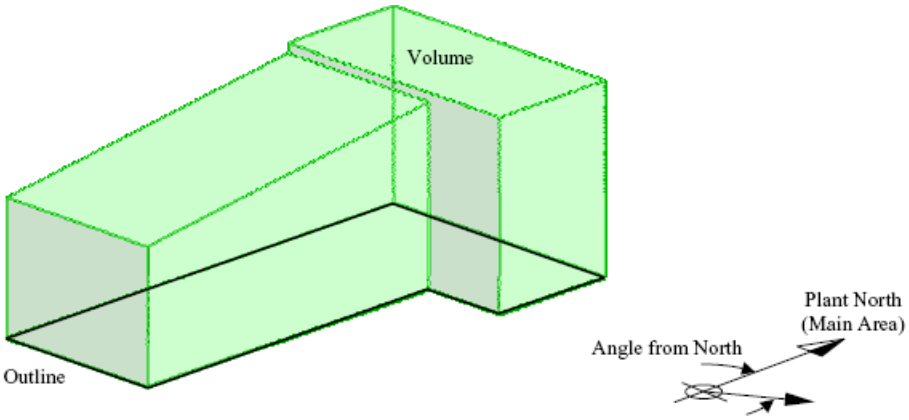
## 3.6 Furniture, Fixture and Fittings Penetrations

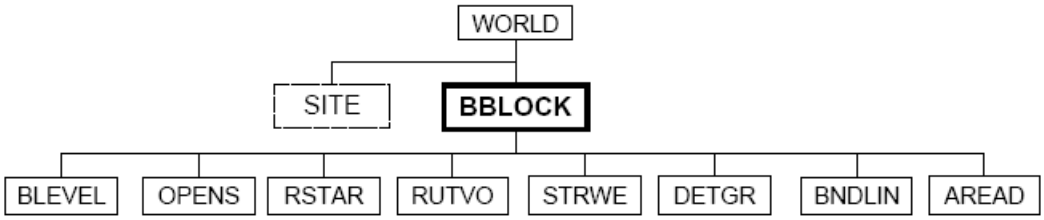
The same mechanism as doors and windows is used for creating penetrations for the furniture, fixture and fittings part of the application.

# 4 Building Block (BBLOCK)

## 4.1 BBLOCK Database Hierarchy

The Building Block (**BBLOCK**) element is the main administrative element for the Room Design application and is analogous to the **SITE** element in its function, it is an offspring of the World and provides a grouping mechanism for all architectural and Room Design elements for example a building Level, zone, block as indicated below in the hierarchy tree.



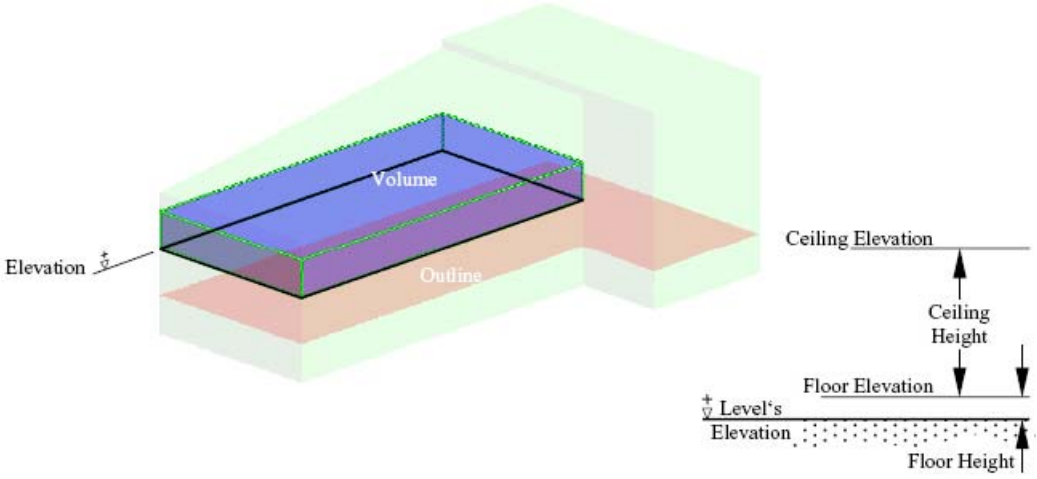




## 4.2 Description of BBLOCK Elements

### 4.2.1 Building Level (BLEVEL)

The Building Level element is used to represent the major elevations within the 3D model environment.

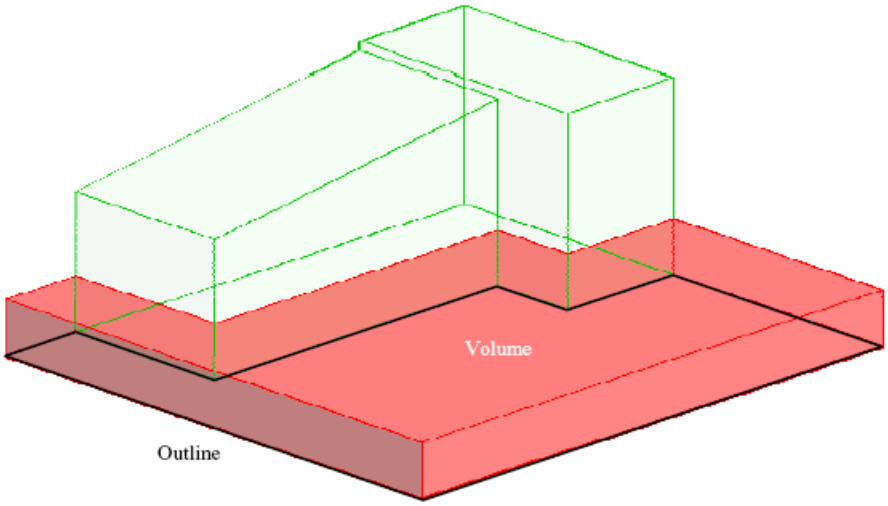
The attribute set contained within it is used as reference for the placement, grouping relative to the Building Level and collection of model data within the system.




### 4.2.2 Open Space (OPENSP)

In general an open space is an area definition as indicated in the image below. An Open Space is defined as a boundary that is not fully enclosed by other boundary elements. The attributes of the Open Space element allow for environmental type information to be stored against it and typical examples include ambient temperatures and occupancy levels.

An example of where an Open Space would be used is



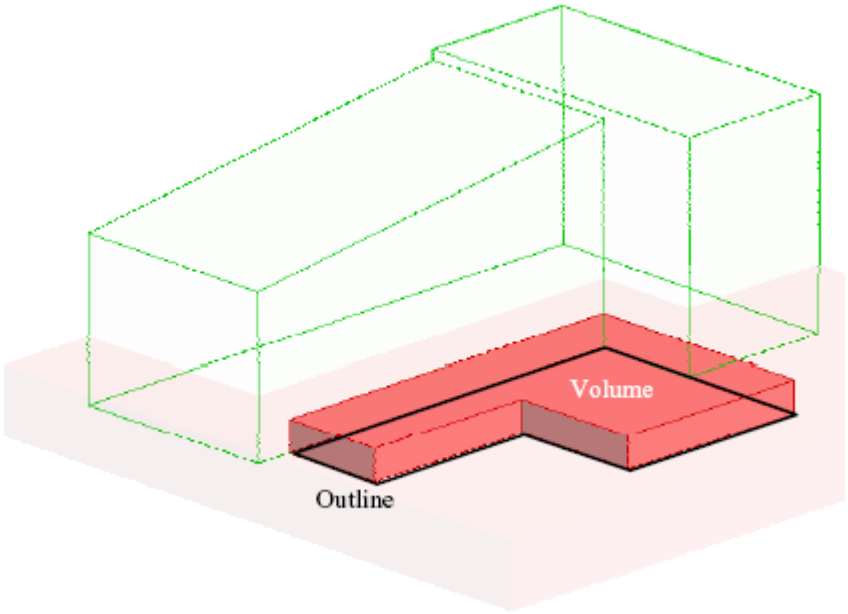

### 4.2.3 Restricted Area (RSTARE)

A Restricted Area is an unbounded area (volume) in which elements of a specific type may or may not be positioned in; this is determined by the application.

Restricted areas could exist within any other space such as an area within a room that items should not be placed in for safety purposes.

The element could be either administrative, in that it owns elements that define the volume and area of restriction or it could describe the volume itself, i.e. this could be a variant on an

extrusion element. The difference being that the element holds the criteria of what is permissible within the area.

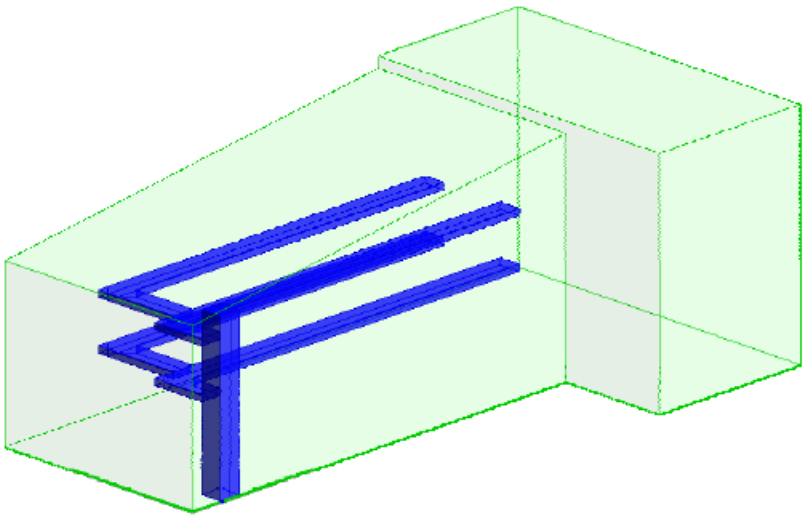



### 4.2.4 Route Volume (RUTVOL)

The routing volume element allows the user to define the main corridors along which items can be routed, either manually or automatically.

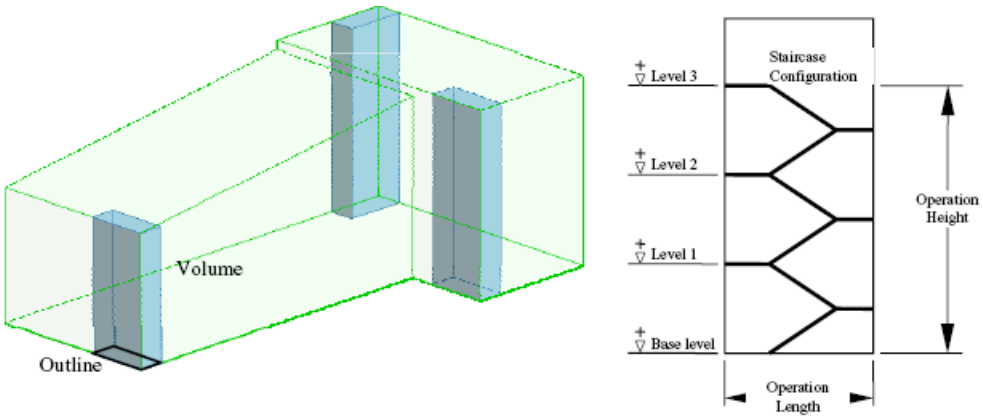
Routing volumes can be referenced from or to other spaces and routing volumes to define a network of interconnected corridors and spaces.

The routing volume should be considered as the base class of specific instances of the routing volumes used by other disciplines, e.g. cable ways for the electrical discipline as indicated below another example would be to represent escape routes.



### 4.2.5 Stair Well (STRWEL)

The Stair Well defines the volume and design criteria within the Room Design hierarchy as the encapsulation for stair flights/stair cases and stair landings and stores environmental information relating to the humidity, ambient temperature and lighting requirements.



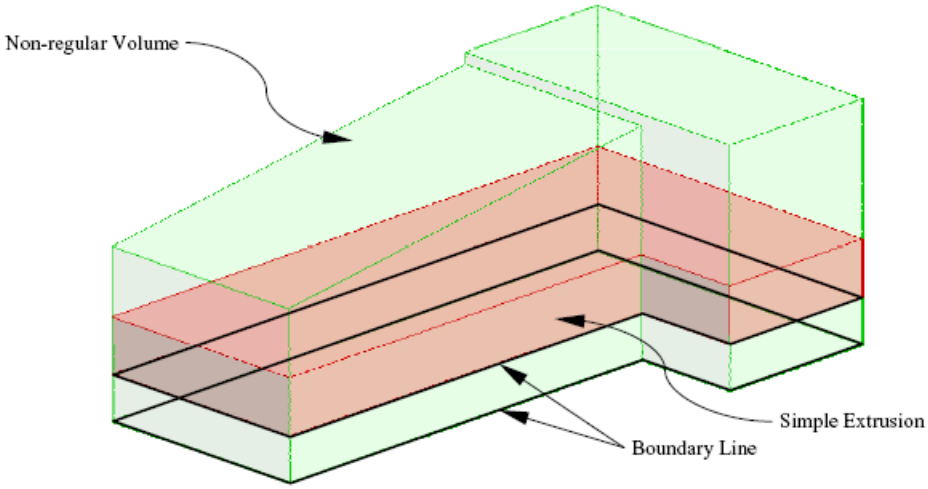

### 4.2.6 Detail Group (DETGRP)

The Detail Group is an administrative element used for grouping the physical representation of similar items such as Floor Coverings, Doors, Windows and Walls for a level in the same DETGRP. For further information refer to *Detail Group (DETGRP)*.

### 4.2.7 Boundary Line (BNDLIN)

In most instances architectural components within the system have the concept of a 2D footprint or Boundary Line together with an associated volume that the architectural component encapsulates.

In practice the shape of the outline and volume will be the same, however, the way in which the volume is defined may be different. For certain elements the volume will be a simple extrusion of the outline, whereas, in some cases the volume is a non-regular shape based on the outline, as indicated in the image below.



The Boundary Line element defines the footprint or boundary of an architectural component; it is used for quick visualisation in both 2D and 3D views to show the extents of the major architectural component.

Ideally the outline element should be directly owned by the major architectural component it relates too; in this way it can directly inherit any related information from its parent.

The element should always be mapped to the horizontal plane of the major architectural component, i.e. the Z direction of the outline and its parent will be the same, as will be the Z positions of the element and it's parent.

The benefit of the outline will be that in both 2D and 3D views it will allow the extents of the major component and components within it, to be visualised without being obscured by the volume itself.

As the main purpose of the element is to aid in visualisation, it should have relevant visualisation properties that the user can set to help in the purpose, i.e. line style and colour. This information can then be directly used when the element is added into the view.

### 4.2.8 Area Definition (AREADE)

The Area Definition element is effectively a 3D volume that defines the 3D extents of a major architectural component; this may not be the same as the volume that encapsulates the elements within the major component.

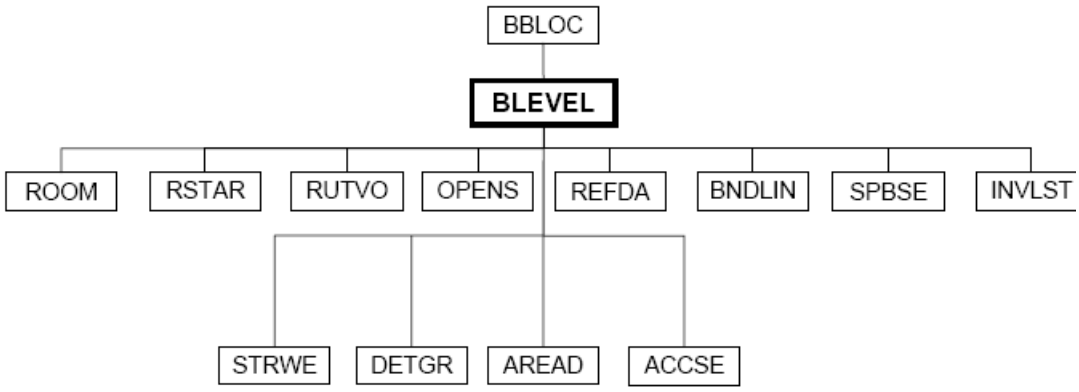
The Area Definition can be used in several ways both by the user and the system. One of the primary functions of the Area Definition will be to identify which model elements are within the volume; this can then be used in a multitude of ways, from defining what elements are required in a view (2D or 3D) to producing inventories of rooms.

Ideally like the Boundary Line the volume should be directly owned by the major architectural component it relates too.

# 5 Building Level (BLEVEL)

## 5.1 BLEVEL Database Hierarchy

The Building Level element is used to represent the major elevations within the 3D model environment and is the main administrative owner for the elements indicated in the hierarchy tree below.




## 5.2 Description of BLEVEL Elements

Some of the BLEVEL offspring shown above are also offspring of the BBLOCK element and have been described in *Building Block (BBLOCK)*.

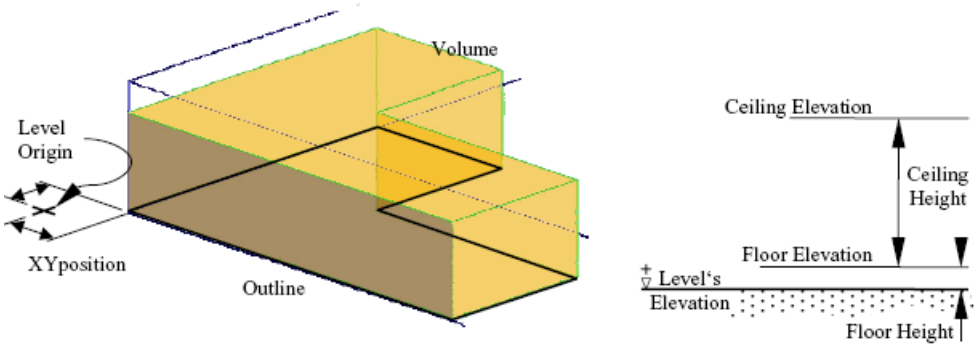
### 5.2.1 Room (ROOM)

The Room element is an enclosed internal space enclosed by walls, floors and ceilings and has one or more doors allowing access to adjoining space. The walls may have windows in them or there may be holes in the walls that allow equipment, pipes, cables or ducting to pass from adjoining spaces.

Although some spaces are completely enclosed by the walls etc., others may not be, for example, two spaces may be partially separated by a wall containing openings with no physical separator. The two spaces could be considered to be a single room with internal dividers or two separate spaces depending on how the designer wants them to be handled.

The data model describes both the physical aspects of an enclose space along with requirements on that space; the later can be used as checks against the definition or the help in the design of the enclosed space.

The Room element is positioned relative to the elevation component of the Building Level element and has an XY position on the plane of the elevation, its angular offset or rotation is taken about the Z axis of orientation as indicated in the image below.




### 5.2.2 Reference Data (REFDAT)

This is the data structure responsible for the storage of DRAWI elements and/or other REFDAT elements. This allows DRAWI elements to be grouped in a logical manner which can be used for the 3D representation of reference drawing data and is stored local to the main Room Design element to which they relate.

### 5.2.3 Access Set (ACCSET)

This is an administrative element responsible for the storage of access points (ACCPNT) which are used to create the logical connections between the space that contain the ACCSET and another Room Design space.

### 5.2.4 Spatial Boundary Reference Set (SPBSET)

This is an administrative element which hold spatial boundary references (SPBOU) used to reference the elements that define the physical boundaries of the space that contain the SPBSET.

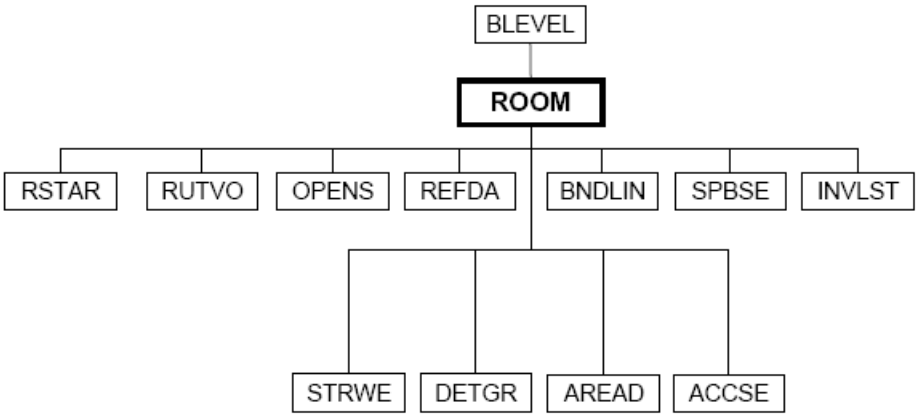
### 5.2.5 Inventory List (INVLST)

This is an administrative element responsible for managing the inventory references (INVELE), which are elements that can have a reference relating to the Room Design space containing the INVLST, but are not stored within the Room Design element, e.g. EQUIP, contained within the existing SITE hierarchy structure.

# 6 Room (ROOM)

## 6.1 ROOM Database Hierarchy

Text to be supplied.



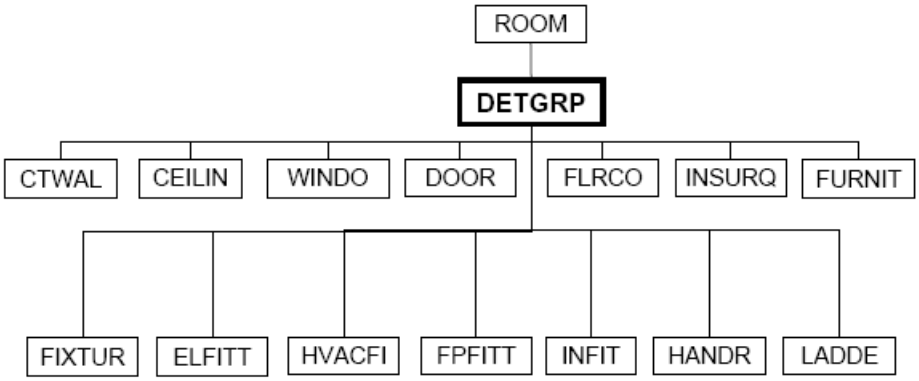

## 6.2 Description of ROOM Elements

Refer to *Building Level (BLEVEL)* for descriptions of the ROOM elements

# 7 Detail Group (DETGRP)

## 7.1 Detail Group Database Hierarchy

The Detail Group is an administrative element used for grouping the physical representation of similar items such as Floor Coverings, Doors, Windows and Walls.

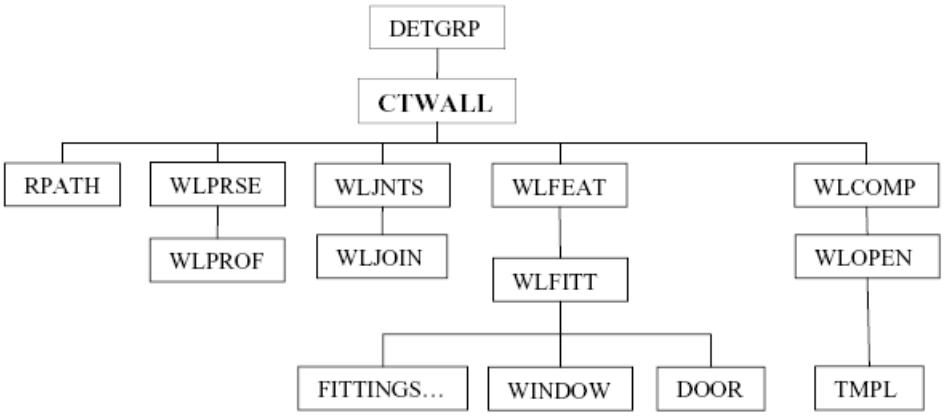



## 7.2 Description of Detail Group Elements

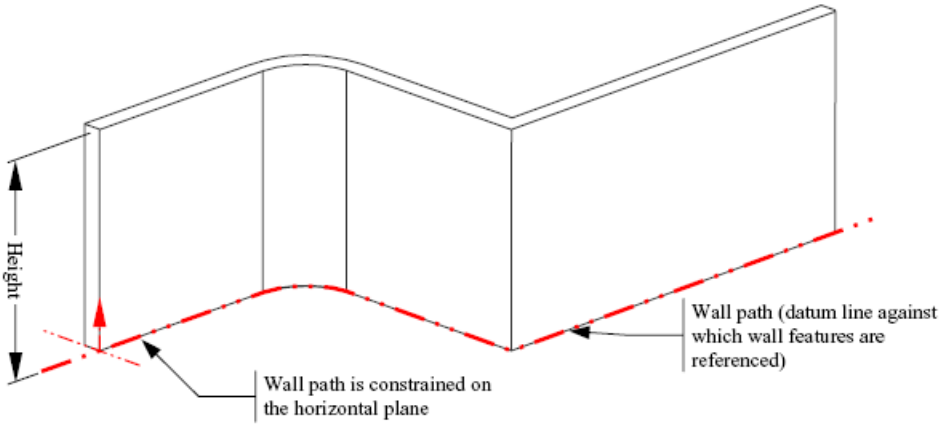
### 7.2.1 Constant Thickness Wall (CTWALL)

The Constant Thickness Wall element defines the path along which the wall runs and which a constant thickness rectangular cross-section can be extruded. The CTWALL element also owns the wall features, such as doors, window, etc. along with the detail that makes a composite wall using wall panels and structural elements.

The wall definition can be broken down in to several main parts: the path of the wall; the features of the wall; door, windows, etc; and where applicable the component elements that make up a composite wall, (see the hierarchy tree below).

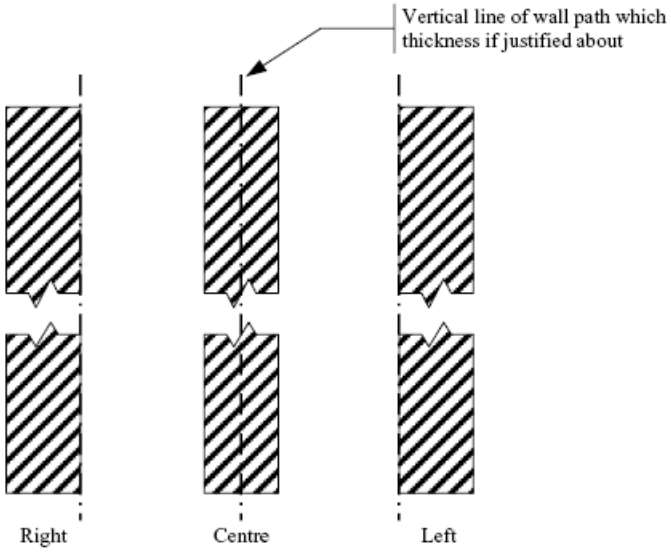



The path of the wall defines the route along which a constant thickness rectangular cross-section is extruded, and this can contain straight and curve segments. The path is similar in concept to the general section (GENSEC) available within the system; however, the extruded cross-section for the wall is not catalogued.

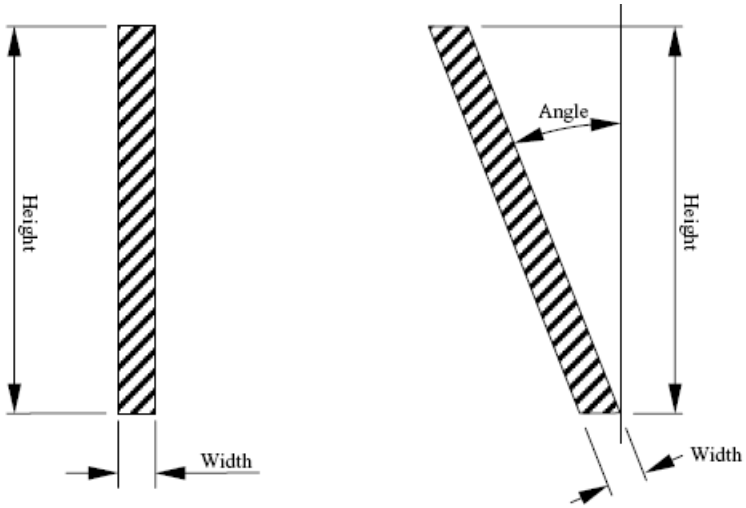



**Constant Thickness Cross-Section**

The cross-section of the wall is a constant thickness that is extruded along the path of the wall, between the upper and lower trim lines. The Wall's cross-section can be offset about the centre or either of the outer surfaces of the cross section.




The height of the wall is measured in the vertical; however, it is possible to define an offset angle from the vertical for the wall and the wall thickness is always the distance between the two outer surfaces of the wall, regardless of the angle of the wall.

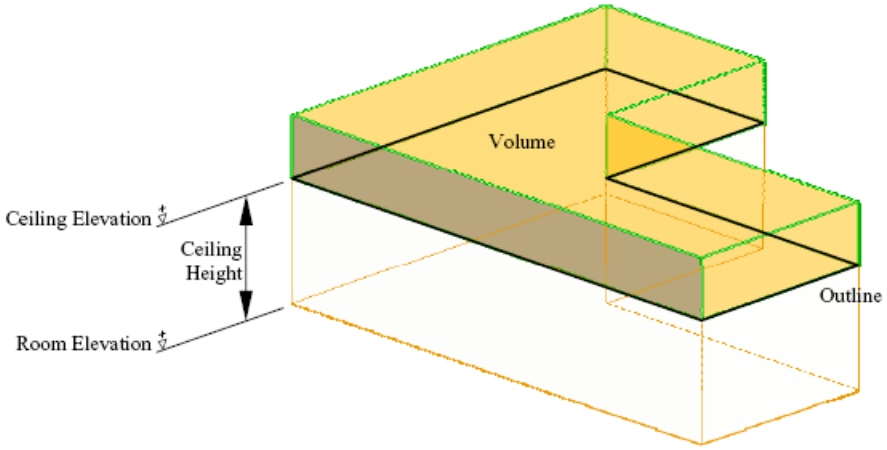



### 7.2.2 Ceiling (CEILIN)

The ceiling element is mainly administrative and used to define the basic definition and design criteria for suspended ceilings. The ceiling's detail is held by the ceiling grid element, of which it can have one or more where the ceiling has different tiling patterns or multiple planes.

The boundary of the ceiling defines the extents of the components that the component parts of the sub-ceiling parts should not exceed.

In addition to the boundary of the ceiling, the ceiling will contain the volume of the ceiling; this defines the void in which the services for the room are usually routed.

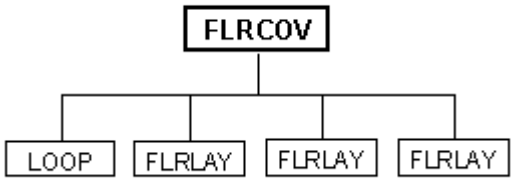



### 7.2.3 Floor Covering (FLRCOV)

Floor coverings will be applied to a user-defined area. The user will identify the covering boundary and select a floor covering type to apply. It will be possible to define multiple floor coverings that will be built up as layers.

The floor covering element defines the boundary and composition of a covering that is applied to a horizontal surface.

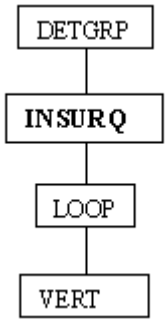
The element will allow the definition of a boundary which describes the extents of the covering and hold the key information that describes the composition of the covering. It should be possible to define composite floor covers which comprise of multiple layer (all layers will be assumed to share the same boundary).




The system will allow the user to extract the relevant MTO of each of the levels, however, only one visual representation will be used, this will be the top floor covering.

### 7.2.4 Insulation Requirement (INSURQ)

The Insulation Requirement (INSURQ) element allows the definition of the insulation requirements to be defined, i.e. the area that insulation is to be applied. The data structure will allow the insulation requirement to be defined against the database object and this then can be used to determine the actual insulation elements/attributes that are to be set by the relevant discipline.




The system will allow certain information to be extracted from the insulation requirement element which can be used either on the drawing or extracted for basic MTO information.

### 7.2.5 Hand Rail (HANDRA)

Refer to the *Access Platforms, Stairs And Ladders User Guide and application*.

### 7.2.6 Ladder (LADDER)

Refer to the *Access Platforms, Stairs And Ladders User Guide and application*.

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