CAD-BIM Manual - General Part

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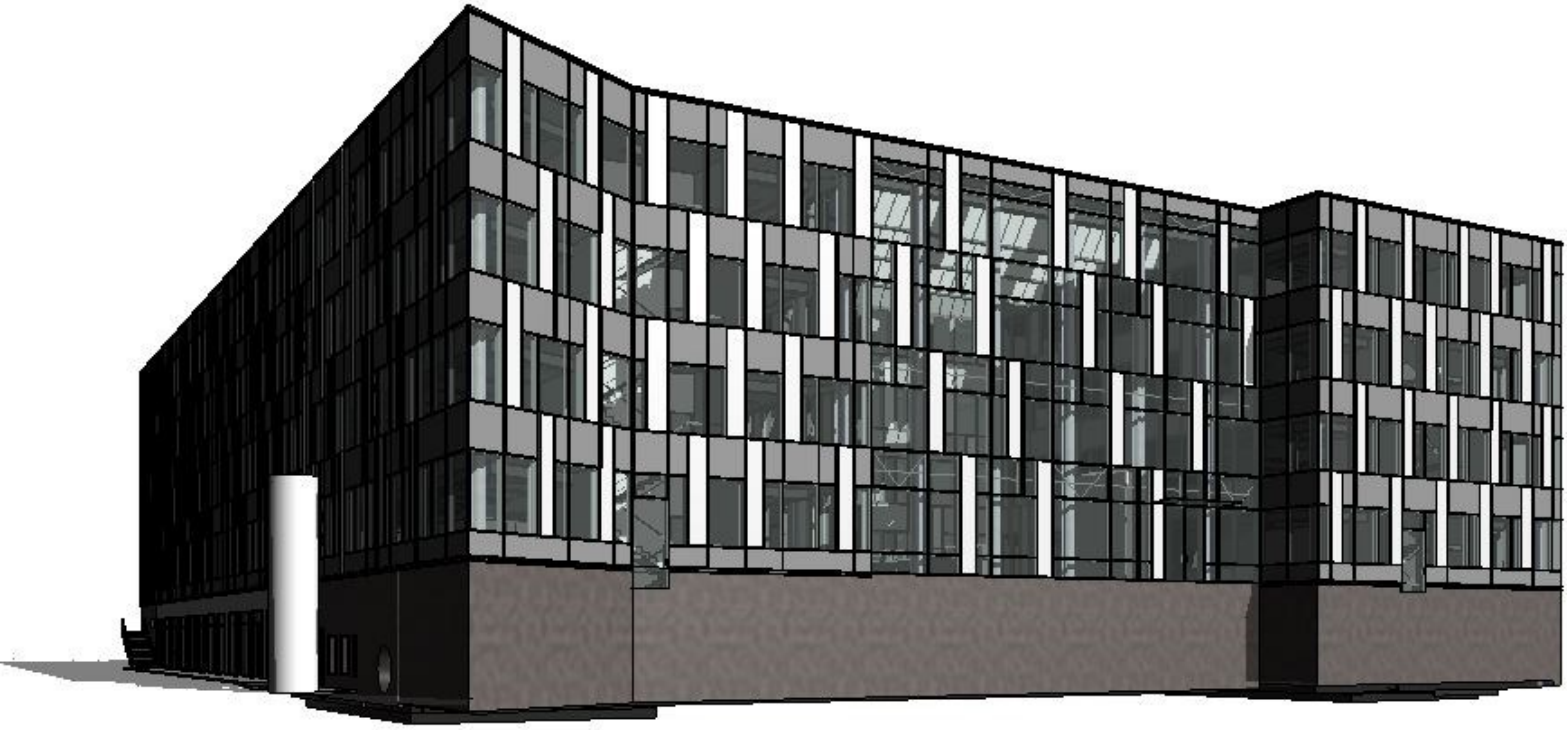

Architectural Model of KHV7

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Revisions

REV.	DATE	DESCRIPTION/CHANGES	PREPARED BY	REVIEWED BY	APPROVED BY
1	2013-12-21	First release	MWH, CHIA	JOLO	POL, NIK, MIR, TD, SJOH, HEE, RKM, SPEY, HSN.
2	2014-12-19	- Manual split-up in 2 parts. (General part and Structural) - General updates. (marked with a *) - Revit family chapter added.	MWH, JO-LO, CHIA		POL, DWP
3	2016-03-23	- MTH Code chapter is removed - Update frequency changed - Hatch / Filled regions types added - bips standard document link updated - BIM7AA classification added - IFC (export suggestions) added - Added chapter "How to update a discipline model using shared coordi-nates"	CHIA	JANC	MWH

1. CAD-BIM Manual reading guide *

This manual refers to the newest Revit release and will be updated if the software changes, some of the described chapters don't apply any more or new chapters need to be added.

Please contact itcad@mth.dk if you have any questions regarding next update or the content of the manual.

Chapters with updated content will be marked with a star in the header and in the Table of contents:

1.1 Introduction

This manual describes the way BIM models and drawings are constructed and handled in MT Højgaard. The procedures in this document are not intended as guidelines, but as a set of instructions that must be followed.

This manual will not act as a Program Manual for Revit. The document therefore requires a basic level of Revit knowledge.

Most of the topics will be supported with links to COBIM, YouTube videos and Revit Wikihelp.

Use this manual in your daily work and make sure you always use the correct naming and objects for the task you are performing.

If you find any of the subjects incomplete or not fully described, please send your question or comments to itcad@mth.dk.

1.2 General BIM definition

In MT Højgaard, the general definition of BIM, aside from being the acronym for *Building Information Modeling*, stands for the aggregation and systematic use of data - with emphasis on *the I* for the information that can be extracted and shared on the basis of these data.

BIM gets the right information to the right people at the right time.

1.3 Motivation to do BIM in MT Højgaard

BIM is part of making MT Højgaard, as a contractor, a pivot point of the design, bidding and construction processes we partake in over the coming years. Furthermore, standardisation and data collection provide a better administration of resources and competencies on current construction projects. Therefore, the use of BIM and Virtual Design and Construction (VDC) in MT Højgaard has matured over the last few years to become the central vehicle for knowledge generation, information exchange and quality assurance.

As such, BIM stands for effective collaboration and informed decision making within standardised methods, for all parties involved. The goal of these efforts, from the earliest phases of pro-

jects, is to achieve the best possible construction techniques, highest technical precision, most advantageous procurements and the coordination of stakeholders.

The models are used in many processes and should always reflect agreed project standard and the design rules defined by this manual. The final model should always be free from collisions of any kind. Working models are allowed to have momentary collisions, if the collisions not relay to what is being done on the construction site.

1.4 Revit in MT Højgaard

Consistent data maintenance, transparency as a driver of knowledge and resultant efficiency on site are clear benefits of modelling information digitally. However, the modelling must be carried out according to shared instructions. Therefore, the instructions in this manual are the basis for creating the information driven environment, which every project will operate in.

Autodesk Revit is the most widely adopted and used BIM application in Denmark and MT Højgaard, which is why this manual deals strictly with Autodesk Revit methodology.

2. Revit template

The template for Revit 2016 is a multidiscipline template. There will be one template that will be used for all our primary disciplines (Structure, Mechanical and Electrical). There are also a few setups for the Architect discipline, but Architecture is not one of our primary fields at the moment.

The big advances with one template are the ability to make quick changes to the template, and that the changes are the same for all disciplines immediately. There will be filters that make it possible to hide information from other disciplines.

The intention behind having just one template is not that there will only be one model file. There will still be discipline models.

2.1 Model-file naming (bips)

bips is the best known standard for Danish constructionprojects. Therefore, this is the naming standard that will be used if no other standard is demanded on the project.

Link to bips naming A 104 - page 96 to 97

Here is a list of model examples names for discipline models (general naming):

Structural model : <Project short name or number >_F_K_X_X_X_X_X.rvt
Mechanical model : <Project short name or number >_F_V_X_X_X_X_X.rvt
Electrical model : <Project short name or number >_F_E_X_X_X_X_X.rvt
Architect model : <Project short name or number> _F_A_X_X_X_X_X.rvt

Examples of a named Structural model:

12345_F_K_X_X_X_X_X.rvt
KHV7_F_K_X_X_X_X_X.rvt

It's not good practice to rename a Model-file in the middle of a project phase. Discipline models are linked into other models, and it could generate problems, if a model changes name!

2.2 Revit Project Browser

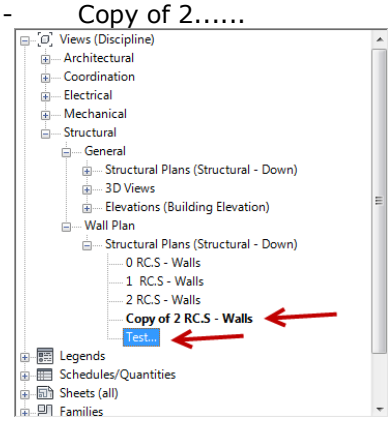
It's important to maintain a rigorous project browser structure throughout the project as a part of the "good modelling discipline".

The model responsible person is accountable for a well-structured model.

If the project includes an ICT agreement, the naming convention and structure of views and sheets could very well be listed there.

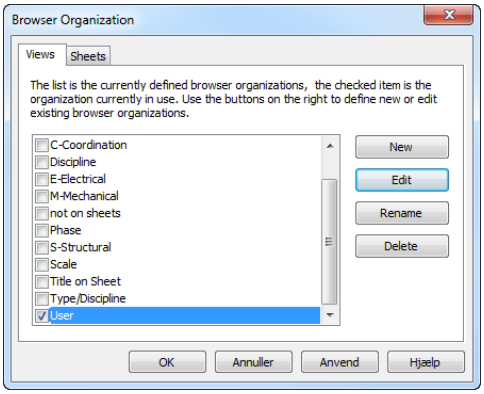
Examples of views with temporary purpose:

- Views with initials
- Views containing (Copy of)
- Copy of 2.....



The model responsible person is responsible for a clean-up plan. All designers have to make sure they don't have any working or finished views containing wrong naming.

Use the Browser Organization to find a user view (see also 2.2.3).

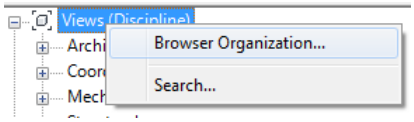


Use the checklist described in chapter 18.3 to ensure the discipline model always stays as agreed upon.

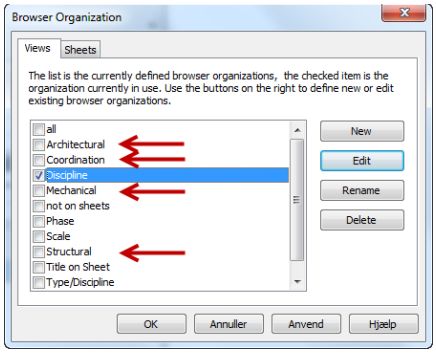
2.2.1 Project Browser filters

MTH (MT Højgaard) template contains all disciplines. Therefore it's necessary to filter the Project Browser, depending on the discipline and task, you are planning to work on.

Tip: Browser Organization can be found by right-clicking on Views in the Project Browser.



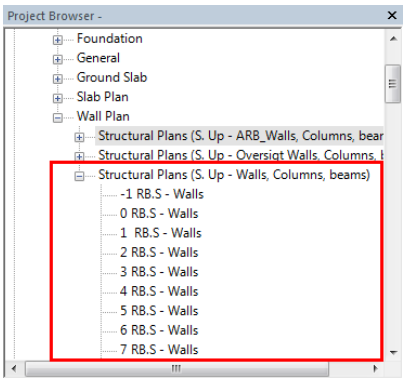
These filters (Architectural, Structural, Mechanical and Coordination) will only show the selected discipline.



Make sure you make your own Browser Organization, that's fits your way of work and also make sure that the name can be understood by the rest of the team.

2.2.2 Project Browser structure

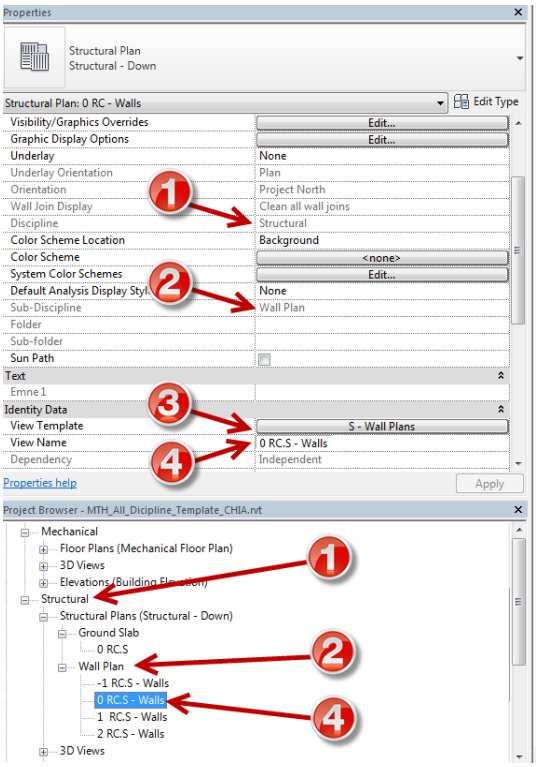
There are three predefined view types for each discipline in the template.
These views are made from the four predefined levels with a general cut plane at 1500mm and a view ranging from associated level to level above.



The structure of the Project Browser is defined by the View Template(4), which specify Discipline and sub discipline(2). These settings are made by the view template at the view's creation point.

2.2.3 View naming rule
All view names must have the following information.

<Building Story> <Reference Point>.<Discipline> - <Drawing subject>



Building Story
-1, 0, 1, 2, 3, 4, 5…..

Reference point

- RC = Rough Concrete
  Or DK: RB = "Råbeton"
- FF = Finish Floor
  Or DK: FG = "færdig gulv"

Discipline
A = Architectural
S = Structural/Construction
M = Mechanical
C = Coordination
E = Electrical
G = General

Drawing subject (examples)
Walls
Ground plan
Beams
Switches
Ducts
Hot Water
Slabs
Emergency lighting

Example: **0 RC.S - Walls**

2.2.4 View Filters

View filters are used all the time to manipulate views. The amount of view filters in a project can therefore easily end up in hundreds of views.

It is critical that a common naming rule is used. Be sure to name your views as described beneath.

This is an example of a general View filter, which can be applied to more views in the projects.

Filter naming rule
<Object filtered>_<Name>

Examples:

View Filter Name	Description
Section_Work*	Section with a section type name starting with Work.....
Wall_*200C*	Walls with 200 somewhere in the type name
Pipe_Water Cold	Pipes with object name Water Cold.

* is a joker character.
*Work** means the name starts with *Work* and everything following the star is not specified.

2.3 Materials

All materials with the trailing _MTH are made for MTH and generally based on the bips standard.

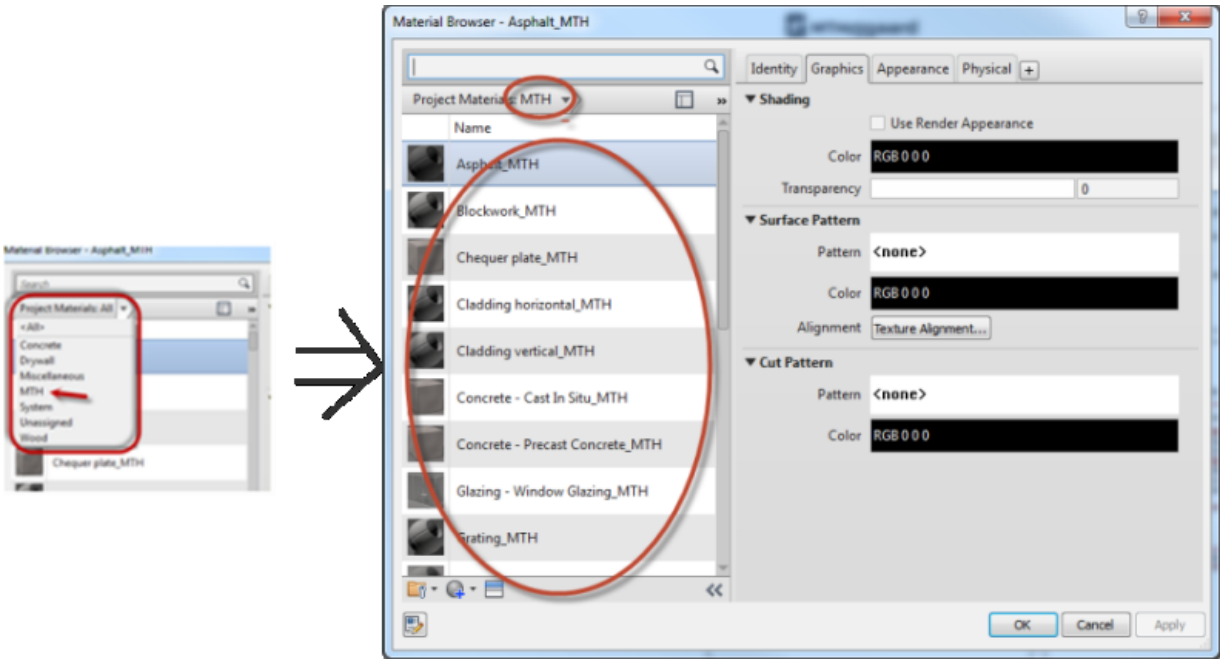
General naming rule for Materials

<Material type> - <material specification/usage>_MTH

Project specific materials

<Material type> - <material specification/usage>_<project short name>

NB. Use Project Materials filter to filter MTH Materials:

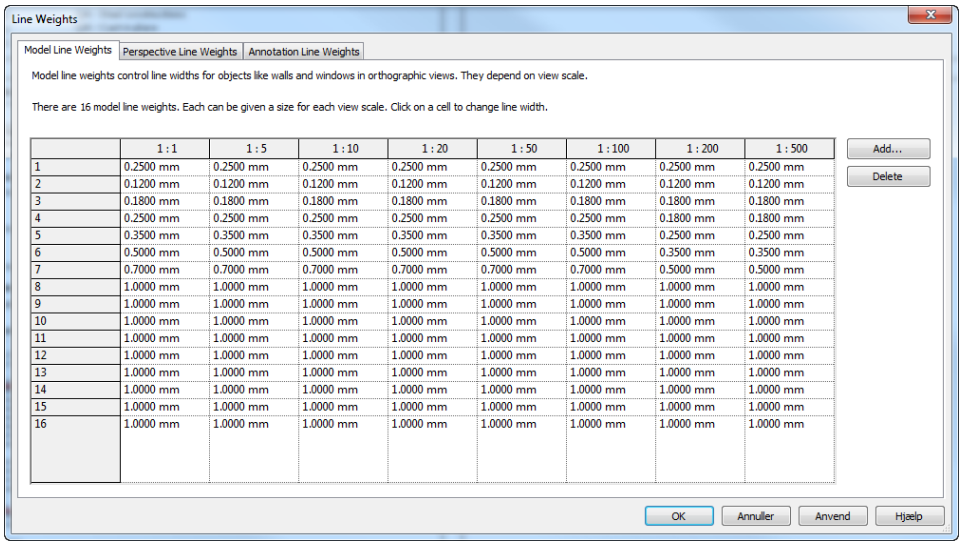


2.4 Line types and line weights

The Line Weight schema is made primarily from the bips standard. Line Weight 4 is the general line weight (0.25 mm). The other line weights above and below number 4 is the same as in the bips layer structure - page 17.

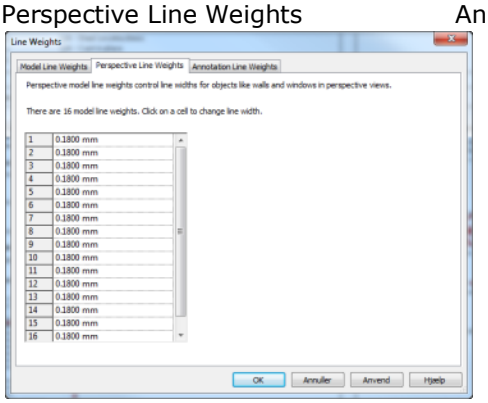
Line weight 1 is used for symbols and therefore the line weight will be 0.25 for all scales.

All line weights from scale 1 to 100 are the same. After that the line weight gets slightly smaller to match the need for more lines on a larger scale drawing. This is a normal practice for site plans and other plans in large scale.



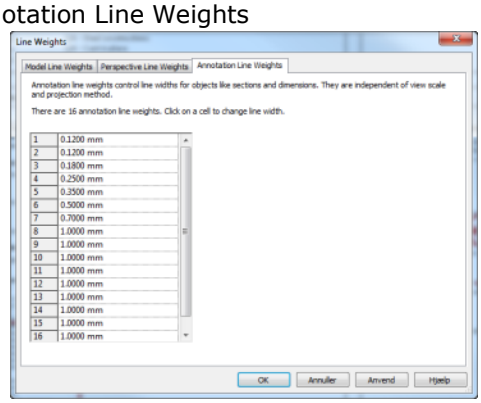
	1 : 1	1 : 5	1 : 10	1 : 20	1 : 50	1 : 100	1 : 200	1 : 500
1	0.2500 mm	0.2500 mm	0.2500 mm	0.2500 mm	0.2500 mm	0.2500 mm	0.2500 mm	0.2500 mm
2	0.1200 mm	0.1200 mm	0.1200 mm	0.1200 mm	0.1200 mm	0.1200 mm	0.1200 mm	0.1200 mm
3	0.1800 mm	0.1800 mm	0.1800 mm	0.1800 mm	0.1800 mm	0.1800 mm	0.1800 mm	0.1800 mm
4	0.2500 mm	0.2500 mm	0.2500 mm	0.2500 mm	0.2500 mm	0.2500 mm	0.1800 mm	0.1800 mm
5	0.3500 mm	0.3500 mm	0.3500 mm	0.3500 mm	0.3500 mm	0.3500 mm	0.2500 mm	0.2500 mm
6	0.5000 mm	0.5000 mm	0.5000 mm	0.5000 mm	0.5000 mm	0.5000 mm	0.3500 mm	0.3500 mm
7	0.7000 mm	0.7000 mm	0.7000 mm	0.7000 mm	0.7000 mm	0.7000 mm	0.5000 mm	0.5000 mm
8	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm
9	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm
10	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm
11	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm
12	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm
13	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm
14	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm
15	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm
16	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm	1.0000 mm

Perspective Line Weights



1	0.1800 mm
2	0.1800 mm
3	0.1800 mm
4	0.1800 mm
5	0.1800 mm
6	0.1800 mm
7	0.1800 mm
8	0.1800 mm
9	0.1800 mm
10	0.1800 mm
11	0.1800 mm
12	0.1800 mm
13	0.1800 mm
14	0.1800 mm
15	0.1800 mm
16	0.1800 mm

Annotation Line Weights



1	0.1200 mm
2	0.1200 mm
3	0.1800 mm
4	0.2500 mm
5	0.3500 mm
6	0.5000 mm
7	0.7000 mm
8	1.0000 mm
9	1.0000 mm
10	1.0000 mm
11	1.0000 mm
12	1.0000 mm
13	1.0000 mm
14	1.0000 mm
15	1.0000 mm
16	1.0000 mm

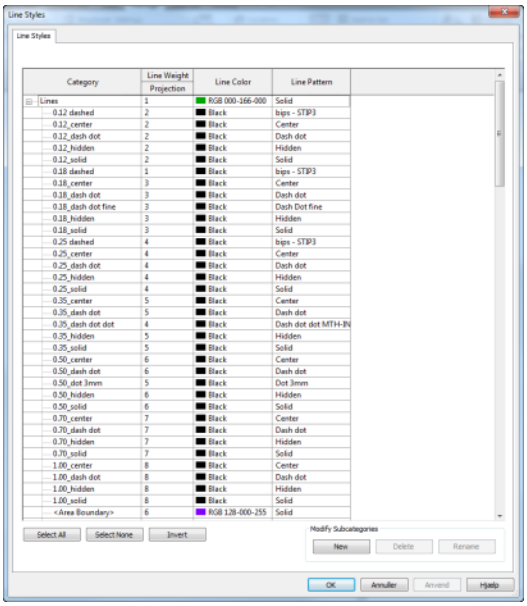
2.4.1 Line Styles

The template consists of seven predefined line widths with five different line types for each.

(1) If no specific project standard is presented, the general line style must be used regarding to the bips standard.

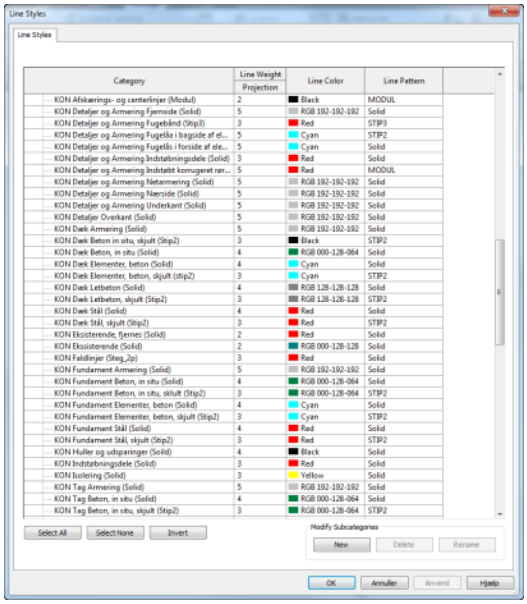
(2) These are examples of predefined linetype based on usage. These are right now only examples, but will be updated and defined to each discipline in a later template update.

MTH general line styles standards (1)



Category	Line Weight Projection	Line Color	Line Pattern
Lines	1	RGB 000-166-000	Solid
0.12_dashed	2	Black	bips - STIP3
0.12_center	2	Black	Center
0.12_dash dot	2	Black	Dash dot
0.12_hidden	2	Black	Hidden
0.12_solid	2	Black	Solid
0.18_dashed	1	Black	bips - STIP3
0.18_center	3	Black	Center
0.18_dash dot	3	Black	Dash dot
0.18_dash dot fine	3	Black	Dash Dot fine
0.18_hidden	3	Black	Hidden
0.18_solid	3	Black	Solid
0.25_dashed	4	Black	bips - STIP3
0.25_center	4	Black	Center
0.25_dash dot	4	Black	Dash dot
0.25_hidden	4	Black	Hidden
0.25_solid	4	Black	Solid
0.35_center	5	Black	Center
0.35_dash dot	5	Black	Dash dot
0.35_dash dot dot	4	Black	Dash dot dot MTH-IN
0.35_hidden	5	Black	Hidden
0.35_solid	5	Black	Solid
0.50_center	6	Black	Center
0.50_dash dot	6	Black	Dash dot
0.50_dot 3mm	5	Black	Dot 3mm
0.50_hidden	6	Black	Hidden
0.50_solid	6	Black	Solid
0.70_center	7	Black	Center
0.70_dash dot	7	Black	Dash dot
0.70_hidden	7	Black	Hidden
0.70_solid	7	Black	Solid
1.00_center	8	Black	Center
1.00_dash dot	8	Black	Dash dot
1.00_hidden	8	Black	Hidden
1.00_solid	8	Black	Solid
<Area Boundary>	6	RGB 128-000-255	Solid

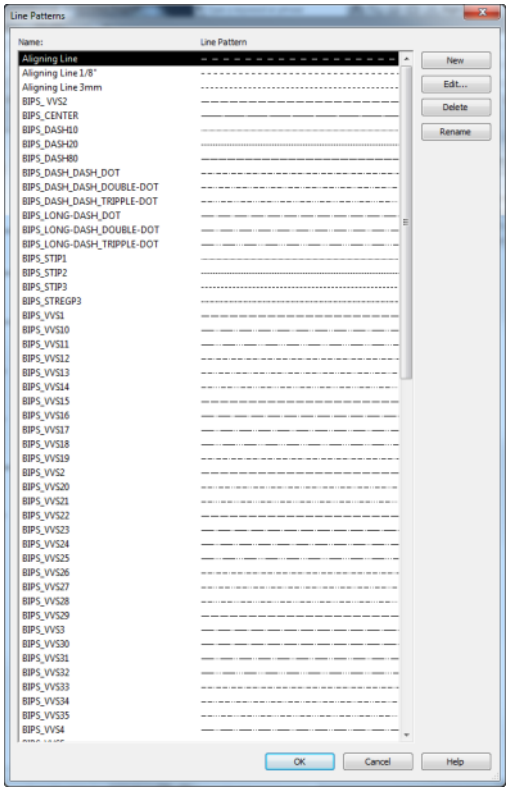
Line styles based on discipline (2)



Category	Line Weight Projection	Line Color	Line Pattern
KON Afskærings- og centerlinjer (Modul)	2	Black	MODUL
KON Detaljer og Armering Fjernside (Solid)	5	RGB 192-192-192	Solid
KON Detaljer og Armering Fugebånd (Stip3)	3	Red	STIP3
KON Detaljer og Armering Fugelås i bagside af el...	5	Cyan	STIP2
KON Detaljer og Armering Fugelås i forside af ele...	5	Cyan	Solid
KON Detaljer og Armering Indstøbningsdele (Solid)	3	Red	Solid
KON Detaljer og Armering Indstøbt korrugeret rør...	5	Red	MODUL
KON Detaljer og Armering Netarmering (Solid)	5	RGB 192-192-192	Solid
KON Detaljer og Armering Nærside (Solid)	5	RGB 192-192-192	Solid
KON Detaljer og Armering Underkant (Solid)	5	RGB 192-192-192	Solid
KON Detaljer Overkant (Solid)	5	RGB 192-192-192	Solid
KON Dæk Armering (Solid)	5	RGB 192-192-192	Solid
KON Dæk Beton in situ, skjult (Stip2)	3	Black	STIP2
KON Dæk Beton, in situ (Solid)	4	RGB 000-128-064	Solid
KON Dæk Elementer, beton (Solid)	4	Cyan	Solid
KON Dæk Elementer, beton, skjult (stip2)	3	Cyan	STIP2
KON Dæk Letbeton (Solid)	4	RGB 128-128-128	Solid
KON Dæk Letbeton, skjult (Stip2)	3	RGB 128-128-128	STIP2
KON Dæk Stål (Solid)	4	Red	Solid
KON Dæk Stål, skjult (Stip2)	3	Red	STIP2
KON Eksisterende, fjernes (Solid)	2	Red	Solid
KON Eksisterende (Solid)	2	RGB 000-128-128	Solid
KON Faldlinjer (Steg_2p)	3	Red	Solid
KON Fundament Armering (Solid)	5	RGB 192-192-192	Solid
KON Fundament Beton, in situ (Solid)	4	RGB 000-128-064	Solid
KON Fundament Beton, in situ, skjult (Stip2)	3	RGB 000-128-064	STIP2
KON Fundament Elementer, beton (Solid)	4	Cyan	Solid
KON Fundament Elementer, beton, skjult (Stip2)	3	Cyan	STIP2
KON Fundament Stål (Solid)	4	Red	Solid
KON Fundament Stål, skjult (Stip2)	3	Red	STIP2
KON Huller og udsparinger (Solid)	4	Black	Solid
KON Indstøbningsdele (Solid)	3	Red	Solid
KON Isolering (Solid)	3	Yellow	Solid
KON Tag Armering (Solid)	5	RGB 192-192-192	Solid
KON Tag Beton, in situ (Solid)	4	RGB 000-128-064	Solid
KON Tag Beton, in situ, skjult (Stip2)	3	RGB 000-128-064	STIP2

2.5 Line patterns

The general line patterns are based on the bips standard. If a special project standard is needed, it is critical to use the right naming for these.



General naming rule for line patterns
<discipline/standard> - <usage>

<u>Examples:</u>
Line patterns that are different from Revit standard have one of the following prefix:

bips_xxxxxx
Line patterns defined by the bips standard.

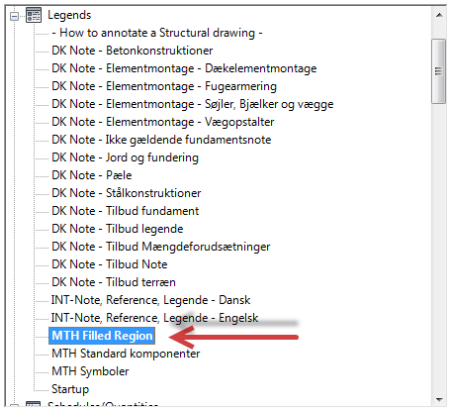
MTH_ xxxxxx
Line patterns often used by MTH. This is not part of the general bips standard.

S_xxxxxx
Indicates the line pattern is used in a special discipline.

<u>Discipline types</u>
A = Architectural
S = Structural/Construction
M = Mechanical
C = Coordination
E = Electrical
G = General

2.6 Hatches Filled Regions *

The filled regions in the template are based on the bips standard. All standard MTH defined hatches can be found under the legend MTH Filled Region.



MTH Filled Region legend.

3. CAD Standards

MTH are using the project standard specified by the ICT[1]/IKT[2] or a special project specified standard. If no standard is specified MTH is using standard defined by this manual.

It's important to look at any given standard with critical eyes to see if the standard is more complex or complicated than you can manage. Make sure the project-responsible person is aware of the extra complexity, and that the person has accepted the extra time there has to be added to the time schedule.

4. Bips Standard *

The bips standard is normally chosen when the project is Danish, has a Danish Owner and is constructed in Denmark.

The bips standard describes project communication and model workflow.

General Drawing Standard:
C213, Tegningsstandarder, Del 1, Generelt, 2012

Bips CAD layer standard 2015 (used for export to DWG):

Layer structure:
Lagstruktur 2015

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[1] **Information and Communications Technology**

[2] IKT is the Danish equivalent to ICT (IKT specification - www.bips.dk)

Layer structure paradigms:
Lagstruktur 2015, paradigme

4.1 Project Specific Standard *

A Project Specific Standard is often chosen by Project Owner, who often has some sort of local standard. US and New York standards are, for instance, used on projects on Thule Air Base, Greenland. The Project Specific Standards can be very detailed and specify information such Paper size for each sort of drawing, how the BIM model should look (e.g. LOD and as built), symbols, unique Classification Systems, exchange methods and demands regarding drawing/model format.

Read these standards carefully and make sure everyone in the design team is aware of the content of these manuals. Small overlooked details on the specifications could add extra costs/time to the project late in the design process.

5. Making a new discipline model *

This chapter describes the steps of making a new discipline model and linking all the necessary models to it. It is important to follow these steps every time a new discipline model is created to ensure a backwards traceable model structure.

This procedure is normally performed by the person responsible for the model on the project.

The following is a step-by-step description of creating a discipline model. Some of the steps require basic Revit knowledge and will be described superficially. Use the Revit Wikihelp for more information on basic Revit functionality.

This procedure can be used for all types of discipline models. In this case it describes the creation of a structural model.

Description of main steps:

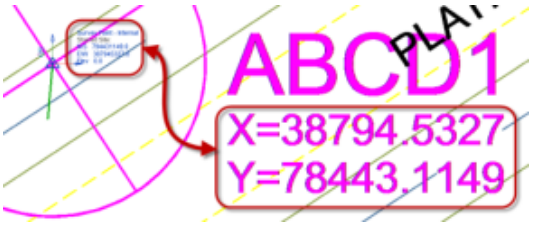
- File/project overview
- Creating discipline model from template
- Linking architect files/grids
- Shared coordinates/generate true coordinates

1. It is essential to get an overview of the project and files before starting the modelling. First of all, start finding all files for the project and organize the files in the right folders. Make sure you follow the structure described in the agreed project standard (e.g. ICT contract).

<u>Open the architect model and check for the following:</u>

a. **Survey point/base point**
You need a point referring to global coordinates.
The architect model should have a global shared coordinate or there should be a file with a site map, showing the global building coordinates.

Example: DWG-file with a defined global project point.

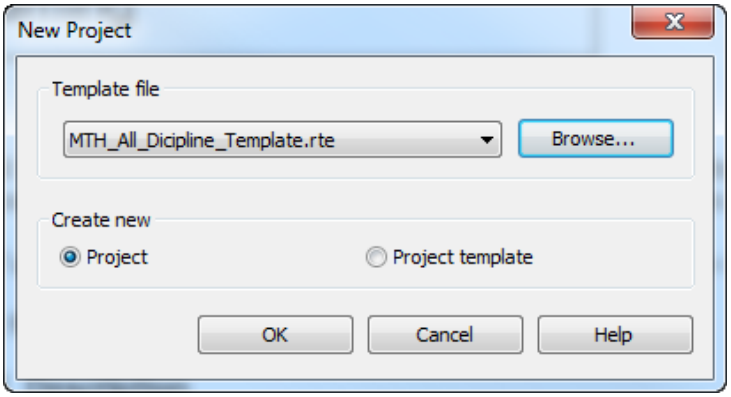


b. **Modeling technique**
Make sure the architect model is made properly without an unnecessary in-place model and with the correct use of the right building element type.
(e.g. walls are made as a wall object, with the use of the wall tool in Revit)

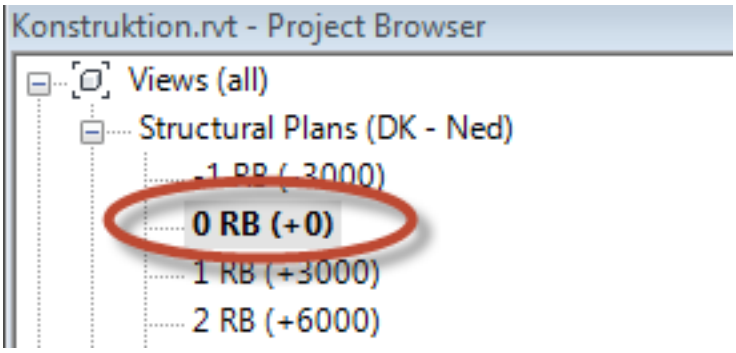
c. **Naming**
Check the general naming structure and make sure there will be no misunderstanding later on, regarding this structure.
(Check chapter 5 regarding naming structure)

2. Make a new Revit file from a template.

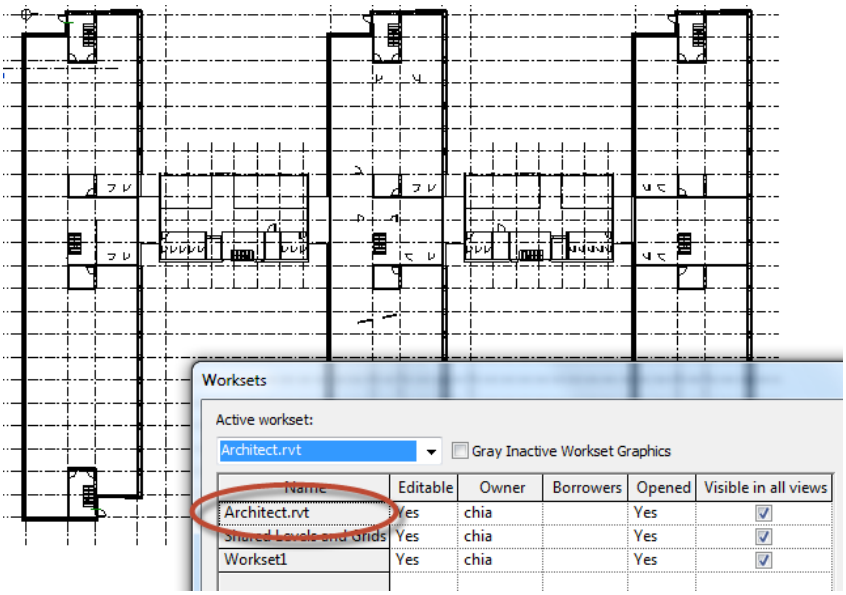
a. Chose: MTH_All_Discipline_Template.



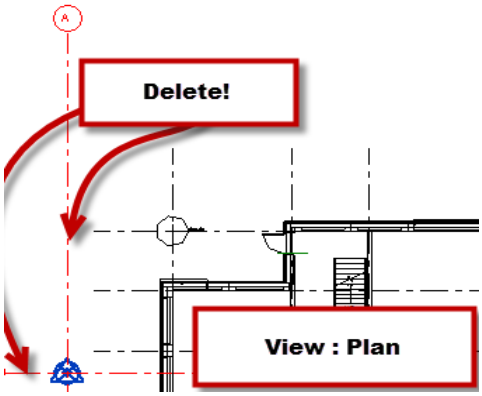
b. Select ground plan level

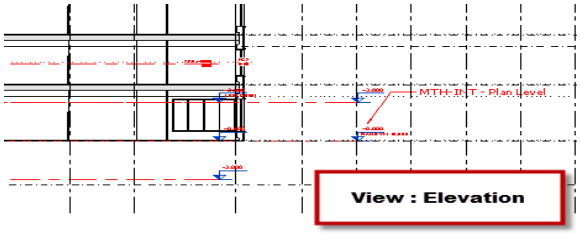


c. Start linking the architect model to the newly created structural model. Follow the procedure described in chapter 14.1.



3. Delete all existing grids and levels from the template.

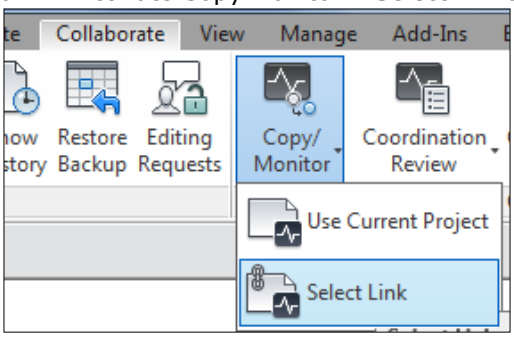




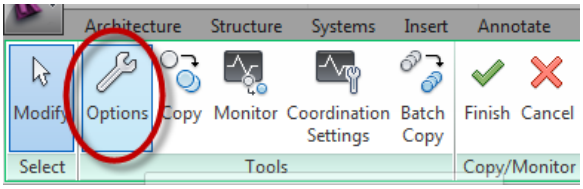
4. Use Copy Monitor to copy levels and grids from the architect model.

If you have never used this tool before, make sure you have read the pages regarding Copy Monitor from Revit Wikihelp - Link to Revit WikHelp.

a. Activate Copy Monitor – Select link and select your linked file.



b. In the Options tab define which levels/grids type you want to add to your project.

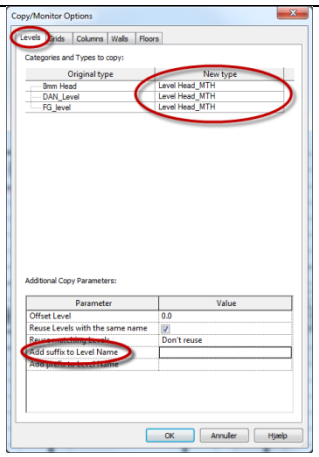


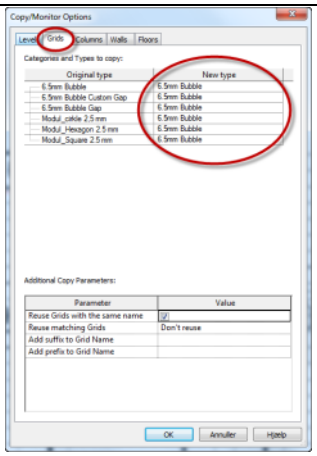
Make sure you have selected the right level/grids type.

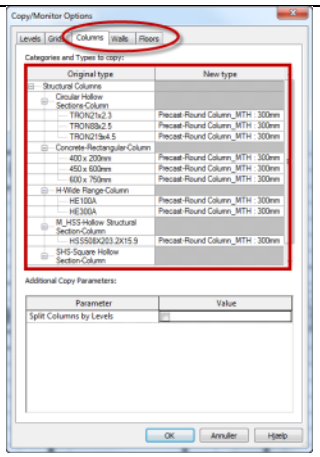
If you are planning to add a lot of self-defined levels/grids, you can add a suffix to the level name.

Add columns, walls and floors as needed.

Make sure you have loaded/created all the necessary families for Copy/Monitor in the dialogue box.

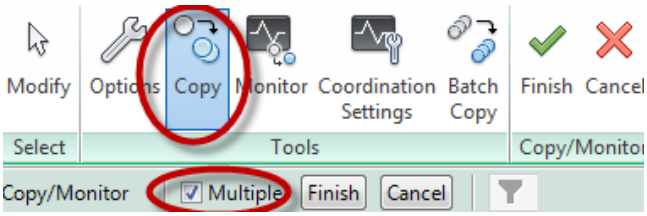




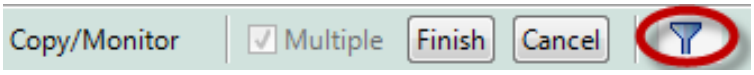


Select OK to close the dialogue box.

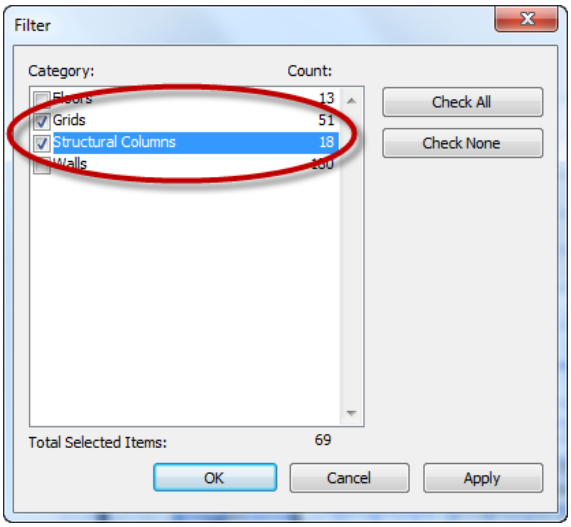
c. Activate - Copy
(add the checkmark to the multiple option)



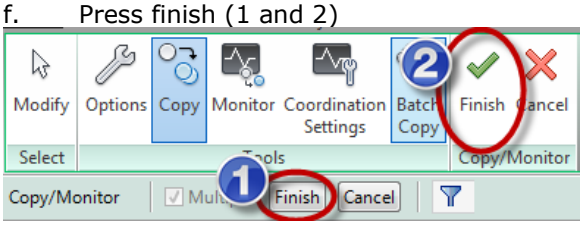
d. Select all objects in the model and activate the filter function.



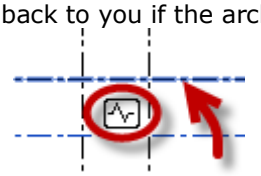
e. Select the object you want to copy to your project.
(To copy levels you have to do the same again in a section view)



f. Press finish (1 and 2)



g. When you select at grid line an icon will tell you that the grid is monitored and will report back to you if the architect make any changes to the grid line.



..

5. Make new structural floors from the newly created levels.
Use the naming rule as described below.

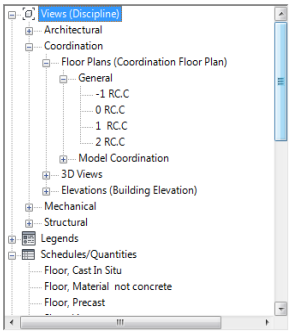
0 RB.C	Rough Concrete, Coordination

Danish project (typically bips Standard)
<Level> <Reference Point>.<Discipline> - <Drawing description>

Here are some examples of levels defined for use with different disciplines. See the template file and chapter 2.2.2 to learn more.

Name	Description
-1 RB.S	Rough Concrete, Structural
0 RB.C	Rough Concrete, Coordination
1 RB.A	Rough Concrete, Architectural
1 FG.M	Finish Floor, (1. floor), Mechanical
1 FG.E	Finish Floor, (1. floor), Electrical

Examples from the Template file



See more examples of levels in a different discipline in chapter 2.3

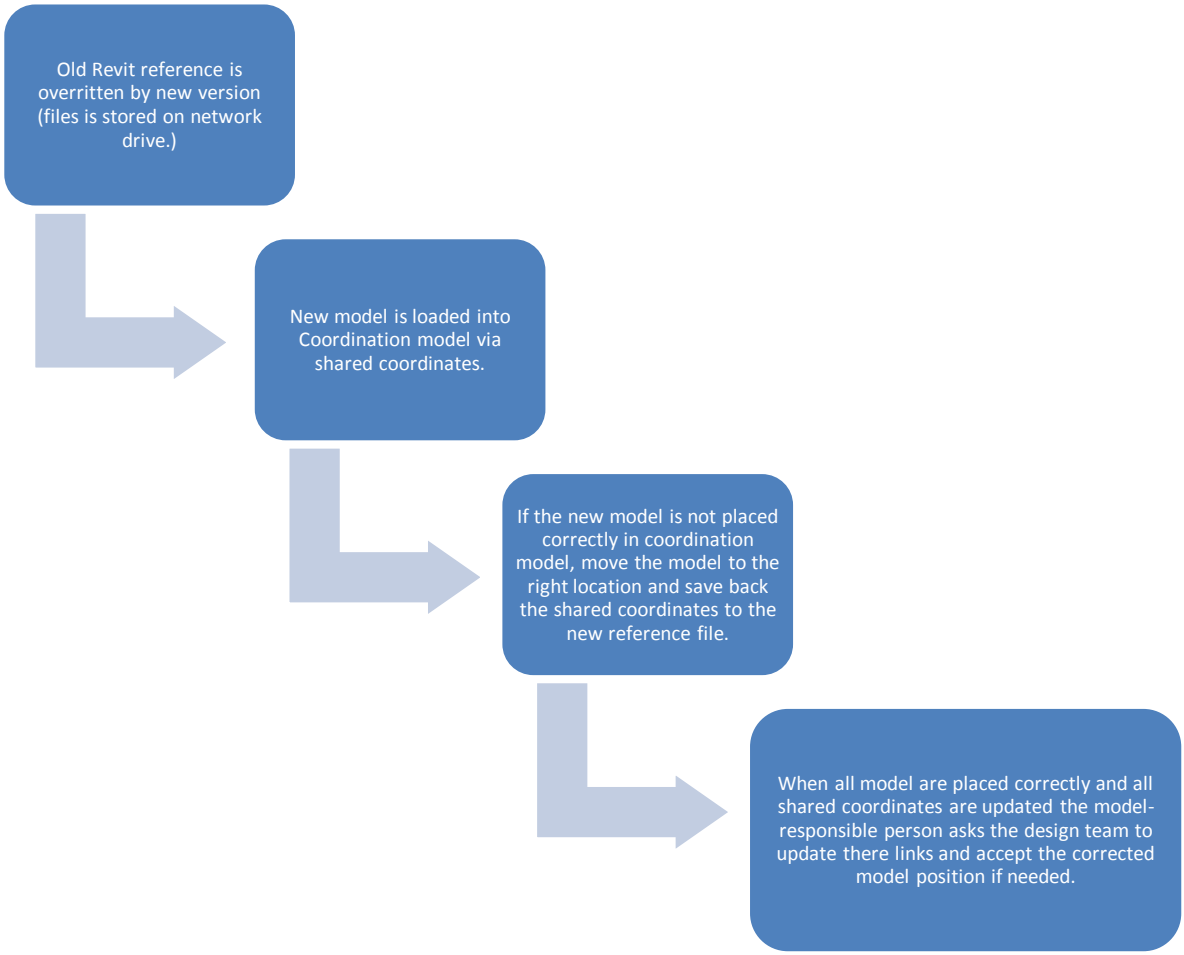
6. Shared Coordinates *

Your model should always consist of the global coordinates and use shared coordinates for better model coordination. Shared coordinates will always warn you, if a model is moved.

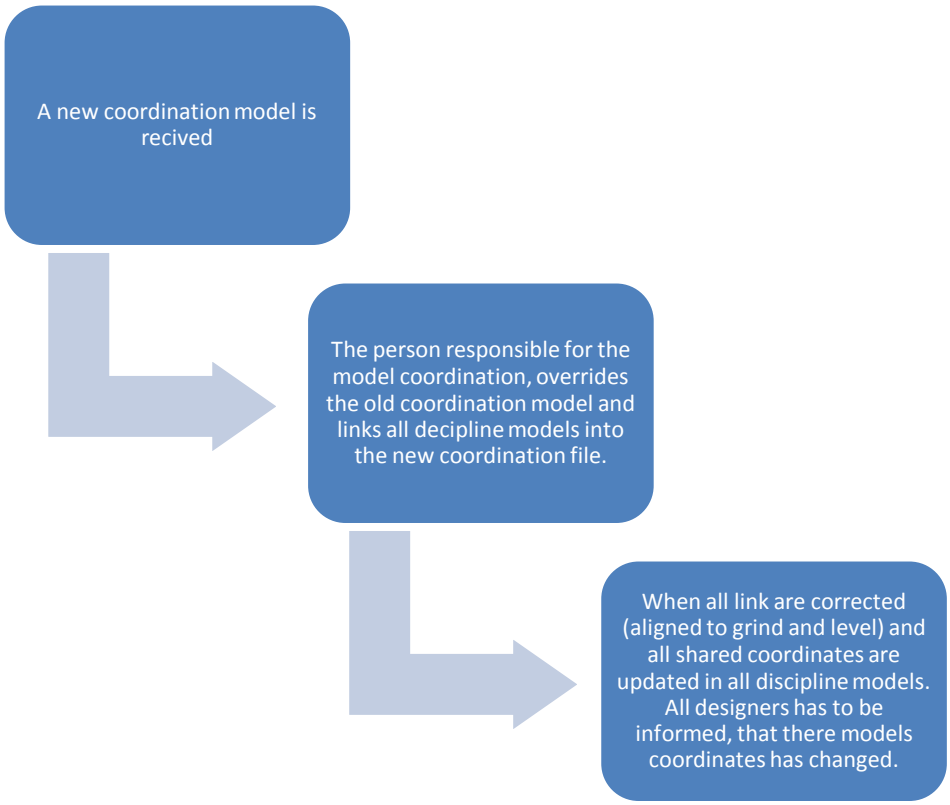
6.1 How to update a discipline model using shared coordinates and coordination model *

Always use "shared coordinates" when working with more discipline models. Shared coordinates will warn you if a model has moved. Shared coordinates will always help the model responsible person to correct any wrongly placed discipline models.

Updating existing discipline model on a project.



6.1.1 New coordination model is received



6.1.2 How to update Shared coordinates in Revit *

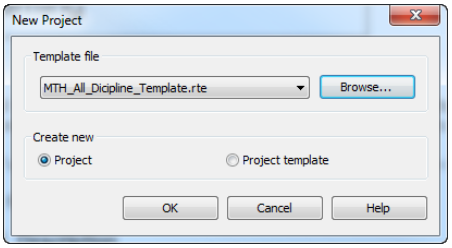
The main process could be explained as these 3 steps:

- Make a new coordination model
- Link site plan, architect, structural and other project models to the coordination model
- Update shared coordinates back to all the discipline models

The steps below, describes how to use shared coordinates in Revit.

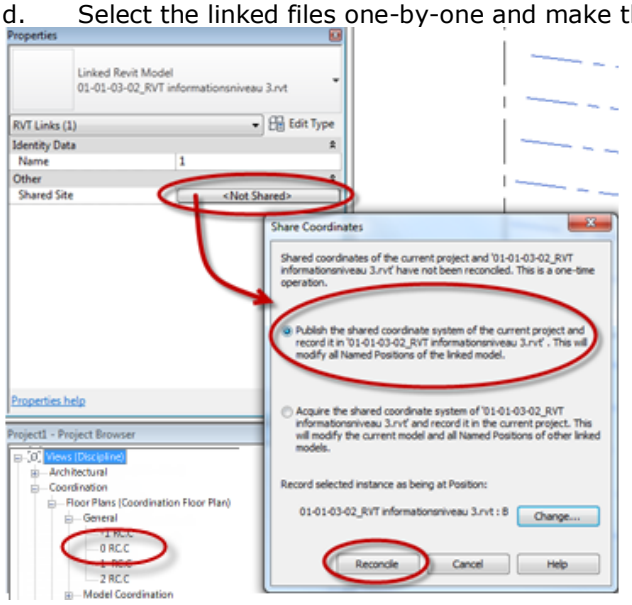
a. Make a new coordination model

MTH_All_Discipline_Template.

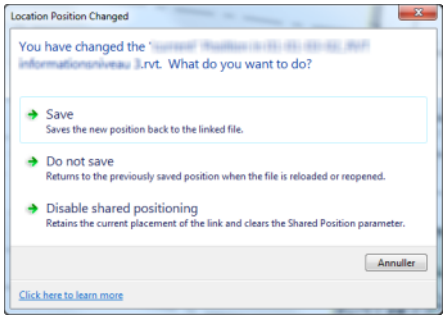


b. Link the site plan (DWG or RVT) with centre to centre or via shared coordinates if the site plan is a Revit model.
Remember to follow the procedure for linking files described in chapter 0.
c. Align all discipline models to the site plan and make sure all the coordinates are correct. Follow the procedure described in 0.

d. Select the linked files one-by-one and make them use shared coordinates.



e. Save the coordination model and accept to save the shared coordination information back to all the discipline models.



All your models are now updated and can be used with shared coordinates. If you need the architectural model in the MEP model, you can import it using shared coordinates.

Always remember to update the coordination model when you receive new discipline models. This way you will always be sure that the models are in the right position in all models. This task should be performed by the person responsible for modelling the project.

NB! If you have used Copy Monitor with Walls you will probably have to change the wall type to Structure in Properties.

7. General modelling Techniques

The general quality of the model depends on the consistency of the objects in the model. Therefore, it is critical that the Families and Functions are used correctly in the Design Program. It is essential that the right object type is used. It is forbidden to use a wall as a beam or an in-place model where a normal family type could have been used. Remember that the model is used for multiple purposes, and that the work you do in the model is affecting future uses of the model.

Always make sure your part of the model is correct regarding naming and use of objects and structure. It is also your responsibility to report any errors found in the model to the person responsible for the model.

Be ambassador for good quality and make sure always to help your colleague do the same. BIM models are "made of teamwork", and the whole team is responsible for the final product.

COBIM will provide you with a thorough understanding of the process and point out critical areas in the process. It is critical that you at least read the following quotes from "COBIM Series 1 - General Part". We strongly recommend that you read the full "COBIM Series 1 – General Part".

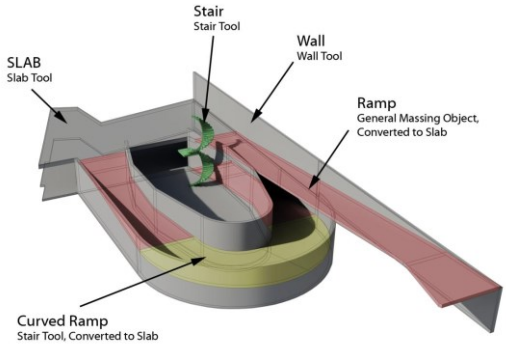
Remember COBIM is not a MTH standard, but a well-written guide of good BIM practice. It is not allowed to reference directly to COBIM. The ICT agreement and the text in this manual are the only defined MTH standards.

Link: COBIM Series 1 – General Part

3.5 Modeling Tools

All model elements should be modeled using the intended components and tools, i.e. walls are modeled with wall tools, slabs with slab tool etc. If the specific tool is not available or it is otherwise not suitable, the component will be modeled using a suitable work-around method which is documented in the Models Description Document.

More detailed instructions are presented in the discipline-specific BIM requirements.



An example of a curve shaped ramp that has been modeled by applying the suitable tools of the BIM software.

Source: COBIM Series 1 - General Part

8. Primary building parts *

In this section we will describe the general naming rule and modelling technique. Use this chapter when creating new components or when performing quality assurance of the BIM model. The general naming structure is based on BIM7AA combined with general Revit naming rules.

Materials and classification code used with Primary Building Parts
For better understanding of naming standard, this section will show the basic rules for object naming in Revit.

Materials
This chapter describes the use of letters describing the building materials:

C = Concrete cast-in place
M = Brickwork/Masonry
I = Insulation
L = Lightweight Concrete
E = Concrete Elements
O = Plaster Walls
X = Undefined

9. Classification (BIM7AA) *

BIM7AA is our main classification system. The first three digits in Revit family names will be defined by the BIM7AA classification. It is therefore essential to have a thorough knowledge of the classification system to be able to recognise objects and name them correctly.

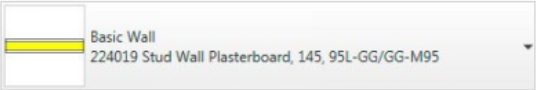
BIM7AA is based on the classification code SfB and made more detailed and usable for modern BIM projects.

For more use the document beneath:
BIM7AA_Typekodning_V2.1_20150709_UK
BIM7AA_Typekodning_V2.1_20150709_DK

Main page for BIM7AA
www.bim7aa.dk

Wall Classification example from"BIM7AA_Typekodning_V2.1_20150709_UK".

EXAMPLE OF A BUILDING COMPONENT CODE



Breakdown:
224019 Stud Wall, Plasterboard, 145, 95L-GG/GG-M95

The building component code tells us:
- That it is an building component in Type Code 224 (Interior frame structure walls)
- That it is a type number 019 under the type-coding category.
- That the type text systematically describe the accosted building component type

The building element consists of three constituent element:
TYPE CODE: 224
The operational grouping of the building component type – always the first three numbers.

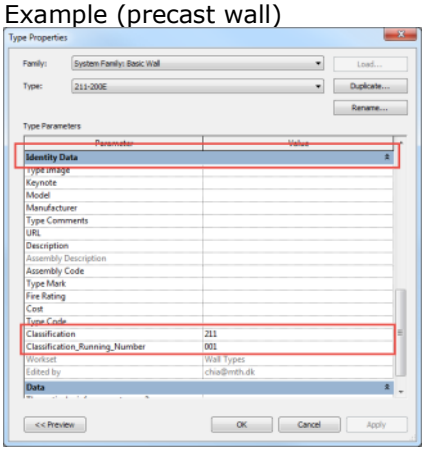
THE TYPE NUMBER: 019
The unique building component type number under the associated building component type group – number of digits depends on the discipline.

TYPE TEXT: Stud Wall, Plasterboard, 145, 95L-GG/GG-M95
The exploratory and descriptive text addresses the unique building. Only the Type Code is defined in the BIM7AA Type Code. The type number and type text is defined in the company and / or project strategy.

Please refer to the graphic examples illustrated in this booklet and in the spreadsheet on www.BIM7AA.com

10. Mandatory properties for classifications *

All projects must have these two general project classification properties:

Type parameter that needs to be added to the Revit Project Parameters: **Classification** **Classification_Running_Number** If no other classification properties are specified by the project, use these classification properties for the Classification value.	Example (precast wall) 

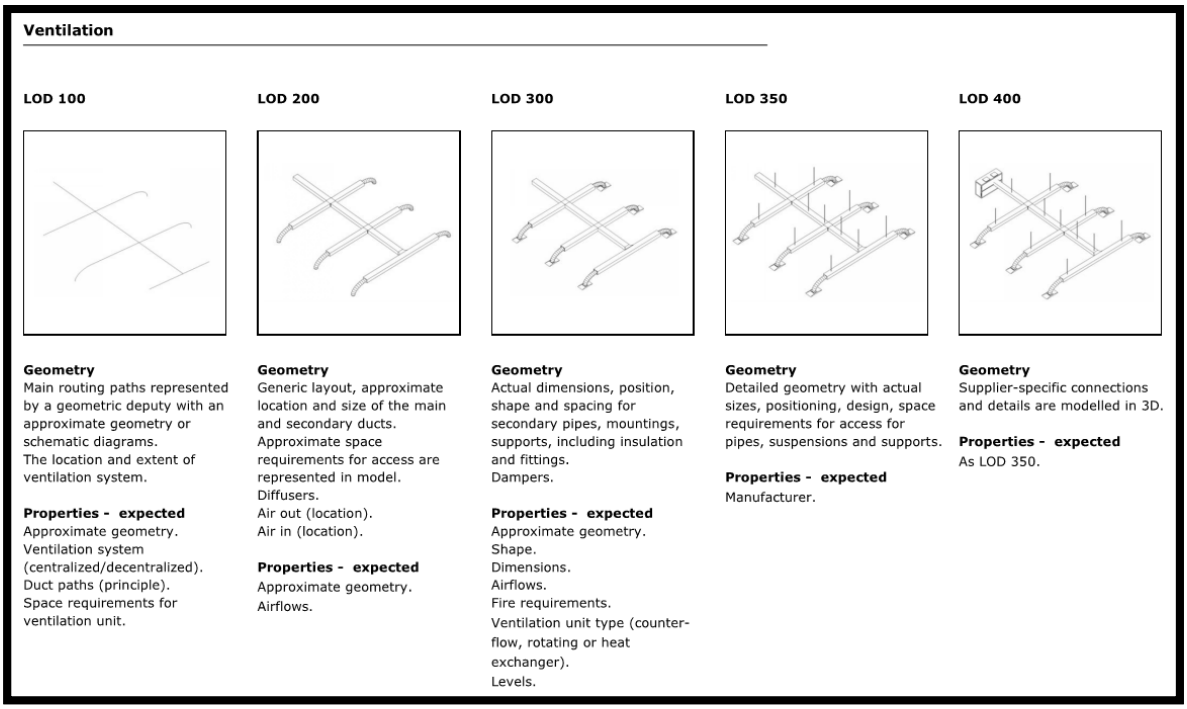
10.1 LOD (Level of development) *

This building component catalogue describes how MT Højgaard defines information levels (LOD) for the selected building parts and specifies minimum requirements for properties of them individually. There are initially 19 representative building parts. More can be added as needed or each building is the inspiration for another.

This building component catalogue is a reference book that can be used when developing an information delivery schedule (Model Progression Specification (MPS)) in relation to milestones (e.g. preliminary, main project, as built).

Use this link to the latest version of MTH LOD description. Link

Here is an example of a slab in different LOD levels.



Ventilation

LOD 100	LOD 200	LOD 300	LOD 350	LOD 400
Geometry Main routing paths represented by a geometric deputy with an approximate geometry or schematic diagrams. The location and extent of ventilation system. **Properties - expected** Approximate geometry. Ventilation system (centralized/decentralized). Duct paths (principle). Space requirements for ventilation unit.	**Geometry** Generic layout, approximate location and size of the main and secondary ducts. Approximate space requirements for access are represented in model. Diffusers. Air out (location). Air in (location). **Properties - expected** Approximate geometry. Airflows.	**Geometry** Actual dimensions, position, shape and spacing for secondary pipes, mountings, supports, including insulation and fittings. Dampers. **Properties - expected** Approximate geometry. Shape. Dimensions. Airflows. Fire requirements. Ventilation unit type (counter-flow, rotating or heat exchanger). Levels.	**Geometry** Detailed geometry with actual sizes, positioning, design, space requirements for access for pipes, suspensions and supports. **Properties - expected** Manufacturer.	**Geometry** Supplier-specific connections and details are modelled in 3D. **Properties - expected** As LOD 350.

LOD is increasing where LOD100 represents the lowest level and LOD500 represents the highest level.

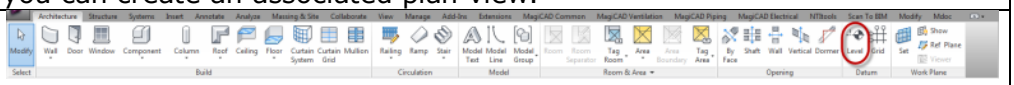
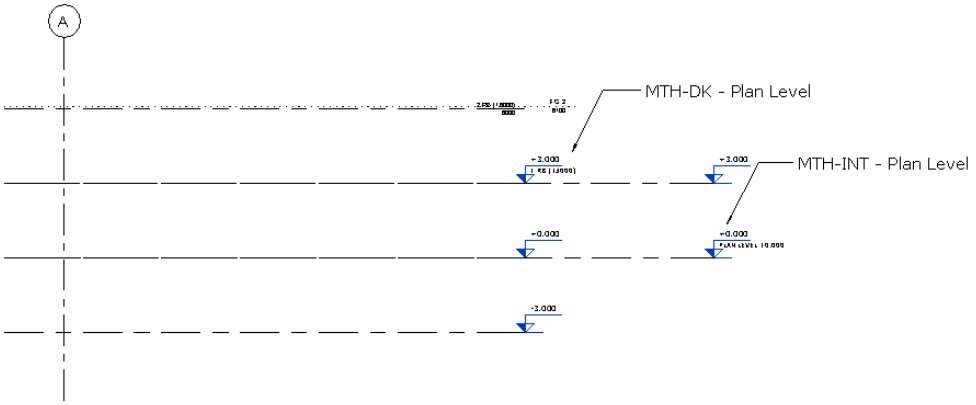
Each level of information relates to three aspects of a given part of building:

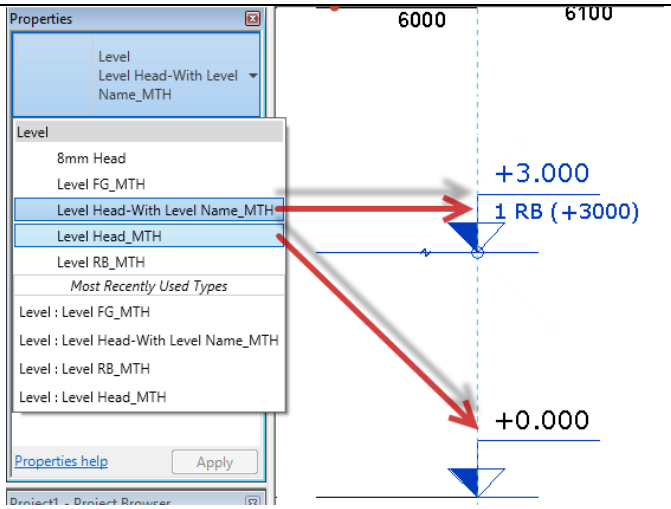
Sketch: Displays the guiding geometry of the object at a given level of information.

Geometry: Describes the geometry in words.

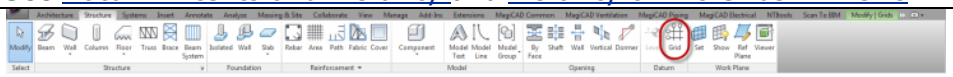
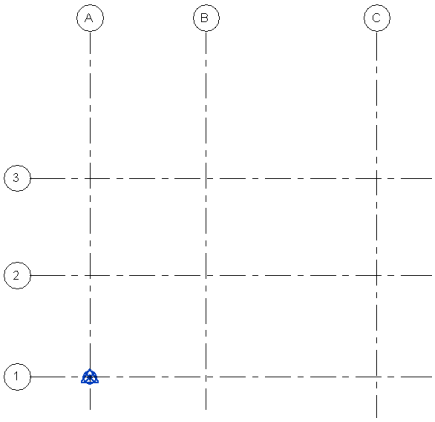
Features: Describes the properties that an object has at a given LOD. Properties of a part in a given LOD are the described characteristics in addition to properties from the previous LOD.

11. Levels

Description	Use the level tool to define a vertical height within a building. You create a level for each known story or other needed reference of the building (for example, first floor, top of wall, or bottom of foundation). To add levels you must be in a section or elevation view. When you add levels you can create an associated plan view.
Command	
Usage	In the standard MTH project there are some examples of levels. These levels are linked to plan views and can be used directly. However, we recommend the creation of new plan views.  There are two types of Level Heads in our template. A Danish template (Level Head-With Level Name_MTH) and one for international projects (Level Head_MTH).

<table>
<tr><td></td><td colspan="3"> 
</td></tr>
<tr><td rowspan="3">Naming</td><td>Type</td><td colspan="2">Instance</td></tr>
<tr><td></td><td colspan="2"></td></tr>
<tr><td></td><td colspan="2"></td></tr>
<tr><td>Mandatory Properties</td><td colspan="3"></td></tr>
<tr><td>QA reference</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Reference</td><td>COBIM</td><td>YouTube</td><td>Revit Wikihelp</td></tr>
<tr><td></td><td>Working with Grids and Levels</td><td>Levels</td></tr>
</table>

12. Grids

Description	Use the Grid tool to place column grid lines in the building design. You can then add columns along the column grid lines. Grid lines are finite planes. You can drag their extents in elevation views so that they do not intersect level lines. This allows you to determine whether grid lines appear in each new plan view that you create for a project. See Datum Extents and Visibility and Visibility of Arc Grids in Views.		
Command			
Usage	We typically use letters vertical Grid lines and numbers horizontal Grid lines.  Tip: Make the first gridline and then copy the rest of Gridlines in the same direction.		
Naming	**Type**	**Instance**	
Mandatory Properties			
QA reference			
Reference	**COBIM**	**YouTube**	**Revit Wikihelp**
		Adding Grid lines	Grids

Not all commands are covered by this chapter. The commands left out do not have any critical naming structure or special usage. Please e-mail itcad@mth.dk, if you have any questions or wishes to the text in chapter 5.

13. Model Coordination

Model coordination describes the way models are handled and which tools are used for this process. It is essential that all the linked models are of a high quality. The models should be in native Revit format or in a quality-assured IFC model before linking external models to our model.

Make sure the models are approved in relation to MT Højgaards requirements to model quality. Also read COBIM 1 for better understanding of BIM-model collaboration.

It is mandatory to read all quotes beneath. MTH's general procedure for linking files will be described later in this chapter.

3 General Technical Requirements for BIM

3.1 Software

In public projects, all software that has a minimum of IFC 2x3 certification may be used for modeling. This requirement can be overridden with project requirements. Designers need to specify all the BIM software and their versions, and what version of IFC they support in the tender documents.
The project participants shall mutually agree on all version or software changes during the project. A testing phase must be carried out before the final decision of adaption to new versions. The use of non-IFC certified file formats at the official decision points of the project must be accepted by the project management. Simultaneously, all mutually agreed data exchange methods and formats may be used in the daily work.

Guideline
In some cases, the Client can specify the software used in the project. For example, construction companies are developing their own BIM processes around specific design software solutions and they may require the use of these design tools. Moreover, the Client may have specific software demands if the project has exceptional modeling requirements or there is for example process development in parallel to the project.

Source: COBIM Series 1 - General Part

Release of the BIM

All models are released during the project in the IFC format. In addition, a native file format model may be required simultaneously. Methods of distribution will be agreed upon for each project. At the end of the project all the designs and electronic documents including IFC and native format BIMs will be delivered to the Client as described in the contracts. The Client is entitled to use the models according to the same terms as traditional project documents.

Prior to release of the BIM and sharing it to other disciplines at official release points, all parts and modeling components that are not relevant to the design must be removed from the model. This also includes all referenced models from other disciplines. Each model must contain modeling elements that are created or added only by the releasing discipline.
The Inventory Model makes an exception to this requirement. In renovation projects, the Inventory Model should be used a base model for the Architectural BIM. However, the initial Inventory Model has to be archived separately in order to be used for checking or historical documentation.

Guideline
The IFC files should be compressed (e.g. zipped) when they are shared within the project. This operation can reduce the file size by up to 80%. Even smaller file sizes can be achieved by using an IFC file optimization program in addition to the file compression utility. This is recommended in especially large projects. Native format model files may be compressed as well, but in most

Source: COBIM Series 1 - General Part

3.3 Coordinates and Units

It is recommended that the coordination base of the project is determined such that the entire modeling area is on the positive side of the XY-axis and the origin of coordinates is located near the drawing area.
The coordinates are typically determined by the architect.

Guideline
It is not recommended to use the municipality or state coordinate system since a base point that is located far away from the modeling area causes problems for most design software.
Negative coordinates are no longer a technical problem. Nevertheless, in order to avoid human errors, it is recommended to avoid them. Negative coordinates in particular, may also cause unnecessary difficulties on the construction site.
Another option to define the XY-origin point is to set it at a certain distance from building gridlines. This option is justified in cases when the building's location may change during the design. Even in this case, it is important to document the position of the origin and the x-axis direction with respect to the map coordinates.
The base location of the project coordinate system is documented by using at least two known points. The X and Y coordinates for each documented point is presented in both source and target systems.

Another option is to identify a single-point and the rotation angle. However, it is noted that especially at larger distances the rotation angle will always lead to inaccuracies, which may have an effect in the construction phase.

Guideline
When needed, the transformation from the source to target coordinate system can be made using the Helmert transformation process.
The Z position of the BIM is the same as the actual elevation of building. The unit of measurement used
in BIM is millimeters. Rotation angles are always documented with at least two decimal places.

Guideline
Each building on the plot is modeled into same XY coordinate system. Building elevations are determined in absolute elevations in the source coordinate system, but it is possible to agree otherwise if it better serves the project needs. The coordinate system will be agreed upon and documented at the beginning of the project and cannot be modified during the project without a sufficient reason. Any changes must be approved by all parties as well as the project manager.
The site model is created using the same coordinate system as the buildings. The site model includes the site environment, vegetation, traffic areas and site structures. This requirement may, however, differ in projects that involve large-scale infrastructure.
Once the coordination system has been agreed, the Inventory Model(s) and reference material (for example, laser scanning) must be changed into the same coordinate system. It is possible and reasonable
to agree that the coordinate system used in the inventory BIM will be used for the design models as well.

After the definition of the coordinate system, it is mandatory to test the compatibility between the disciplines. For this test, one can use a simple doghouse-type model in which all the design disci-

Source: COBIM Series 1 - General Part

3.4 BIM Accuracy

Before the detailed Building Element BIM phase, the model can be created using nominal dimensions for model components. For example, the doors and windows in the Architectural BIM may be modeled without the necessary installation gaps, which could be added in later phases of the project. Nevertheless, it is essential that the modeling principles used are carried out consistently. In the detailed Building Element BIM all components will be modeled with real dimensions.

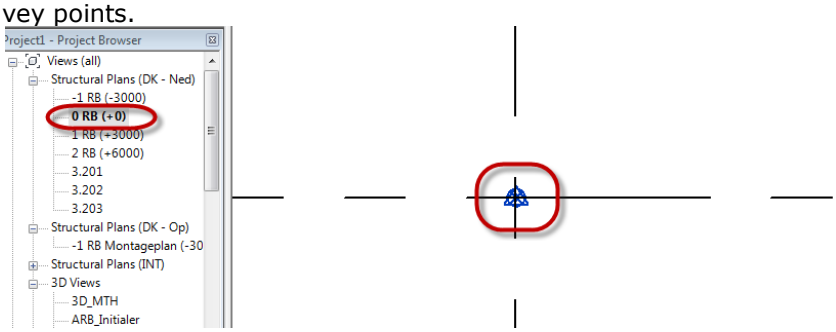
All models from Site Models to As-Built Models are made with highest reasonable level of accuracy. For example, in Inventory Models, absolute accuracy (e.g. small slant of walls, inclinations and changes of thickness) might make the models difficult to use, and therefore tolerances that are acceptable for the construction are also allowed in the models.

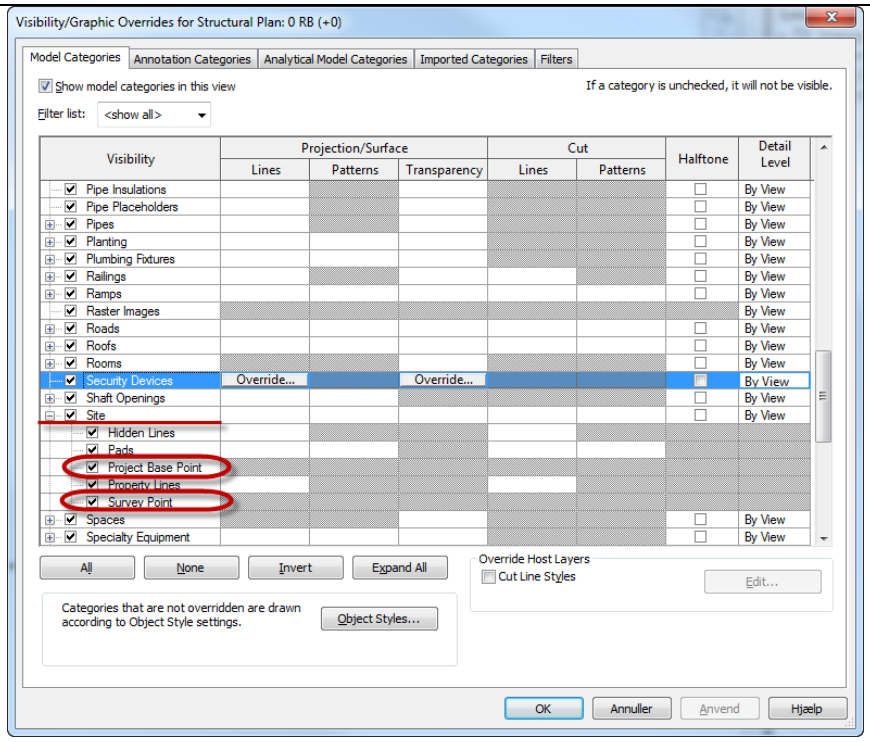
Guideline

The accuracy of the models follows the principle of expediency. In Spatial Models the dimensional accuracy can be the same as in traditional drafting. Since the actual form and size of the building may still be unclear, a 100-200 mm grid may be an appropriate level of accuracy. The selected measurement system must be used consistently. It is also worth noting that the more accurate the original model, the easier it is to continue to work with it throughout the project.
The dimension accuracy of building elements may also be associated with the model's intended use. For example, if the Architectural BIM is used for thermal analyses, the walls must connect to each other at the corners, since even a small gap can significantly interfere with the simulation. Accuracy requirements should be mutually agreed and all disciplines must comply with the agreed practice.

Source: COBIM Series 1 - General Part

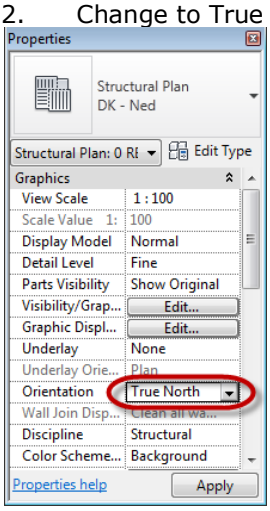
13.1 Project Base Points and Survey Points

Description	Every project has a project base point ⊗ and a survey point △ although they might not be visible in all views because of visibility settings and view clippings. They cannot be deleted. The project base point defines the origin (0,0,0) of the project coordinate system. It can also be used to position the building on the site and for locating the design elements of a building during construction. Spot coordinates and spot elevations that refer to the project coordinate system are displayed relative to this point. The survey point represents a known point in the physical world, such as a geodetic survey marker. The survey point is used to correctly orient and place the building geometry in another coordinate system, such as the coordinate system used in a civil engineering application. **Follow this procedure to define the global coordinates in the site Plan.** The site plan should consist of global coordinates, where the discipline model should use local coordinates. The discipline model is afterwards linked to the site plan with the use of shared coordinates.
Command	
Usage	1. In the standard structural template It is possible to see base and survey points.  2. Turn on base and survey point, use the Visibility/Graphic dialog box. Turn on the checkmark for Project Base Point and Survey Point under Site.



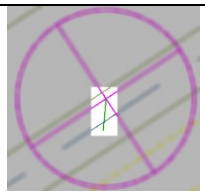
Follow the procedure to ensure that project points are defined correctly.

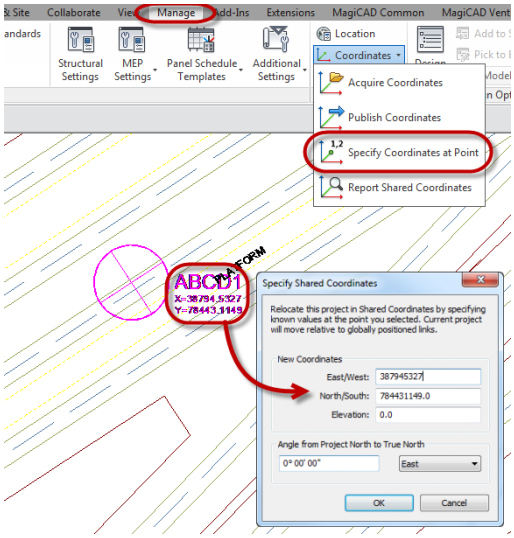
1. Import a grid plane or define grid lines directly in Revit.
2. Change to True North in properties.



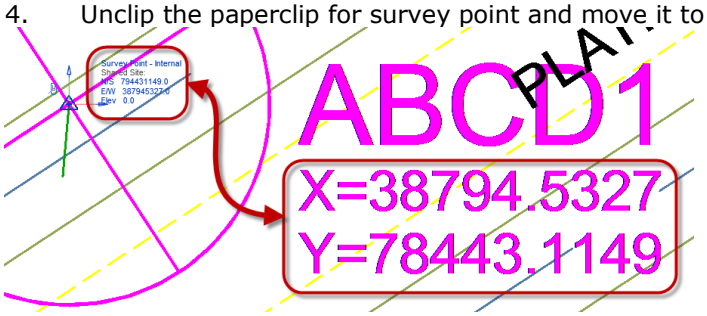
3. Use Specify Coordinates at Point.

Tip: Draw a detail line to the centre of the X in the point. Then you will be able to select the intersection.



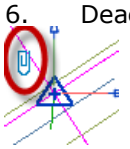


4. Unclip the paperclip for survey point and move it to the project point.



5. Verify that the survey point and the given project point are the same coordinate.

6. Deactivate the paperclip on the survey mark.



Important!

If the survey point/base point with the paperclip activated is moved, the project will be relocated afterwards!

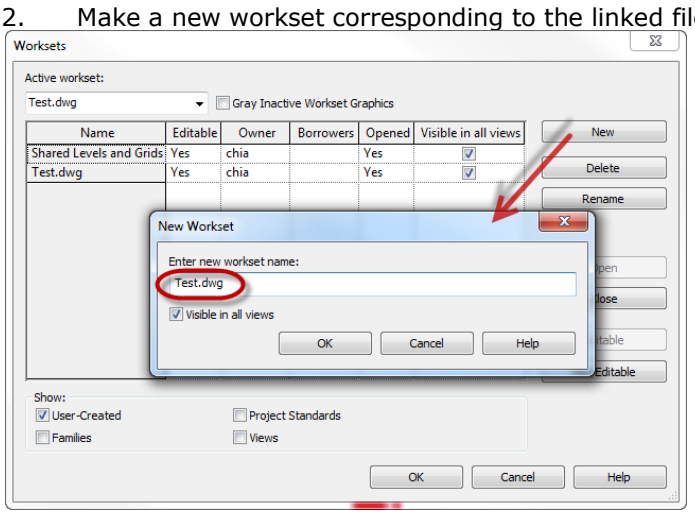
Therefore it is important always to pin the survey and base point after they have been edited.

Naming	**Type**		**Instance**
Mandatory Properties			
QA reference			
Reference	**COBIM**	**YouTube**	**Revit Wikihelp**
		Revit Adjusting Project Coordinates	Project Base Points and Survey Points

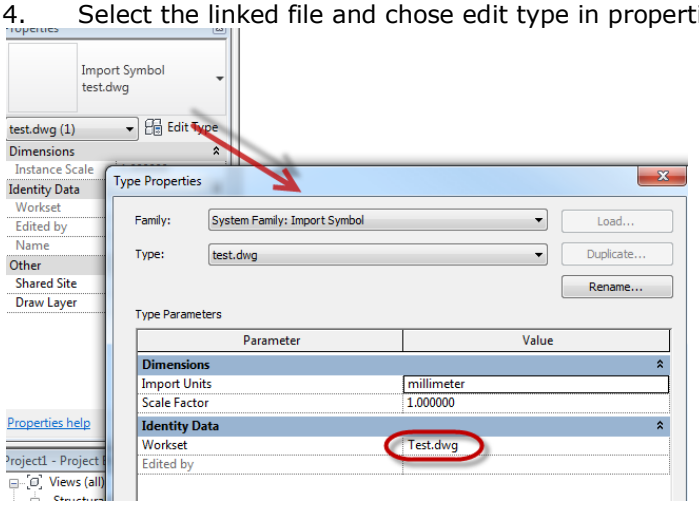
14. Worksets

Worksets can be used to divide large models into parts more suitable for handling on a normal PC.

14.1 Linking files on Worksets

Description	The use of the worksets for linked files in Revit has many advantages. • Improved load performance • Added layer of visibility control • Added layer of "locking" (check out that workset) • Easier and better managed than unloading links Worksets do not show up in the temporary visibility, as links do. If files are linked to the model the normal way they will still be part of the view, even when they are turned off in "VG". This can cause problems when you are trying to select geometry beneath the linked model. **All references files have to be placed on a workset with the same name as the corresponding linked file.**
Command	Use on the collaborate tab for creating new worksets. 
Usage	**Create new linked file on a new workset** 1. Start 2. Make a new workset corresponding to the linked filename  3. Use Link CAD Files to link files the usually way.

4. Select the linked file and chose edit type in properties.



5. Change the workset to the new workset that corresponds to the file-name.

6. The linked file is now part of the test.dwg workset and can be turned on/off in the workset dialogue in the bottom of the screen.

Naming	**Type**	**Instance**
		Make new workset with the same name as the linked file.

Mandatory Properties			
QA reference			
Reference	**COBIM**	**YouTube**	**Revit Wikihelp**
	COBIM 1 general requirements	Linked Files & Workset Visibility	Workset

15. How to create a new Revit family

When creating a Revit family, the intended use of the family in a project environment determines the extent to which it is designed. You can design all families to include a number of representations for use in different project views and project phases.

The more detailed a family is, the larger its file size will be. The larger the file size, the slower t he performance, loading and regeneration time of the family will be. When considering the design intent of a family, use the following guidelines:

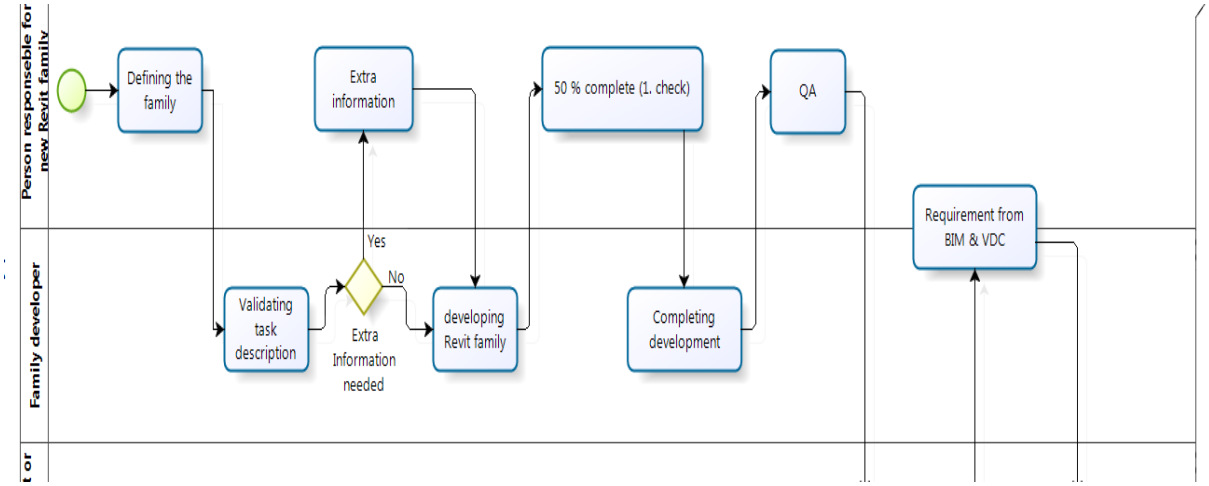
- For larger commercial or institutional projects, in which hundreds of elements may be crated with a single family, design the family to be as small as possible to minimise project size and performance impact.
- For smaller residential projects, where elements created with a single family are not used ubiquitously, and where the overall project size is smaller, design the family to include more detail.

Revit family for MTH projects are always made in compliance with this chapter, Autodesk "Revit Model Content Style Guide" and the workflow process described in section 0.

Link to Autodesk "Revit Model Content Style Guide": Link

15.1 Workflow (process)

Use the process described below to ensure Revit families are made correctly and in compliance with the MTH standard for Revit families.



15.2 Roles and responsibility

The person responsible for the Revit family development and the person who is demanding the creation of the family have to follow and agree on the design rules defined by this chapter.

General Guidelines

Use these general guidelines and make sure always to ask the VDC department if you are missing information or guidelines regarding family creation.

- Do not include the family name or category in the type name.
- Type names should mirror actual usage.
- Type names should indicate the key differences between types (size, count, material) and, when applicable, reflect standard sizes.
- In some cases, you may base names on size difference, but use common terms rather than numbers.
- When types are named by size, use dimensions only.
  Avoid the use of characters or words (h, w, d, or height, width, depth).
- Type names should include units or capacity and a unit indicator, unless they represent nom inal sizes.
- Metric types should reflect the local unit standard, unless the types are intended to be generic.
- Keep type names as short as possible.
- Type names must display in dialogs and in the Type Selector.

15.3 **Naming**

Object naming is a critical part of a high quality BIM-model. Consistent and correct naming is necessary for the ability to use the model for quantity take off, visualisation and the ability to use the BIM-model on construction site or within other BIM workflow.

Always use defined object-naming convention described in the CAD-BIM manual for Structural and MEP.

If the family is not described in the manuals for Structural and MEP then, use this general rule:
<Functional Type> - <Subtype> - <Manufacturer> - <Descriptor 1> - <Descriptor 2> - <2D if necessary>

Field/Component	Required or Optional	Description
Functional Type	Required	Names the element that the family creates (for example, Door or Window)
Subtype	As needed	Names the part type, for example, for a Window the subtype could be Casement.
Manufacturer/Generic	Optional	Manufacturer name, generic families may substitute the Manufacturer name with "Generic."
Descriptor	As needed	
2D	Required	Use only for 2D families

Source: Autodesk "Revit Model Content Style Guide": Link

Examples:

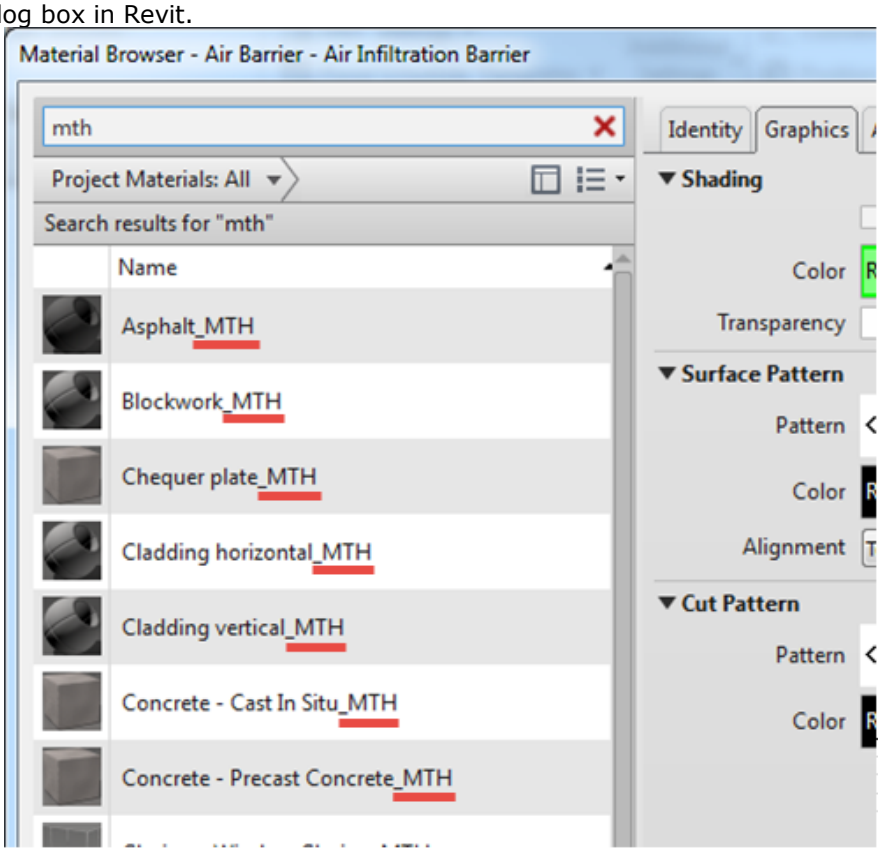
- Window–Double_Hung–Acme–Tilting_Sash–Clad.rfa
- Chiller–Air_Cooled– Acme– Low_Profile.rfa
- Fountain–Drinking–Acme–Polished_Chrome.rfa
- Window–Double_Hung–Generic–Wood.rfa
- Chiller-Air_Cooled-Acme-Scroll-(75-100_Ton)-Pkgd.rfa

All product information should be stored in properties. Family names should always be as short as possible.

15.4 **Materials**

Always use the material defined in the MTH template file and with the extension **_MTH** to the name. Always use the "MTH" material if the right material type is available in the template.

The picture below shows the "MTH" extension to the material name in the Material Browser dialog box in Revit.



15.5 **Properties ***

For each family created there are some mandatory fields that need to be applied to family used in MTH project.

General parameters that have to be applied to all Revit families:

Type:

- Family – Made by company (family parameter)
- Family – Made by Initials (family parameter)
- Family QA By (family parameter)
- Family QA Date (family parameter)
- Current LOD level (family parameter)
- Classification (family parameter)

Content examples:

- Family – Made by company (Company name) / (MT Hojgaard)
- Family – Made by Initials (family parameter) / (CAD – Carina Ditlevsen)
- Family QA By (initials – Name) / (PJ – Peter Jensen)
- Family QA Date (year-month-day) / (2014-12-31)
- Current LOD level (LOD Level) / (300)
- SfB / BIM7AA

(Use the classification described in chapter 9 if no other classification is defined by the project).

15.6 Revit Family location *

All general Revit families are synchronised via CAD Setup. If you do not have the standard content, please contact the VDC Department for further instruction.

Special project families are stored directly in the project folder in a folder called *Revit_families*. Example: "6 CAD\Revit_families\"

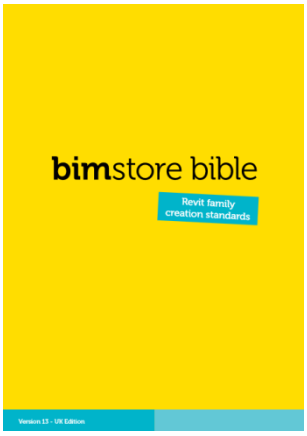
Standard Revit Content:
\\mth-file3\CAD_ProgramData\Autodesk\2016\Revit\Libraries

MTH made content:
\\mth-file3\CAD_ProgramData\Autodesk\2016\Revit\MTH

NB. It is not possible to upload content to these to folders above. Contact itcad@mth.dk for a copy of the content or if you have any content that needs to be accessible as general content.

Only approved families that have been created with the use of the process described in chapter 0 will be distributed through CAD Setup and synchronised to each computer containing Revit.

16. Other Family guides

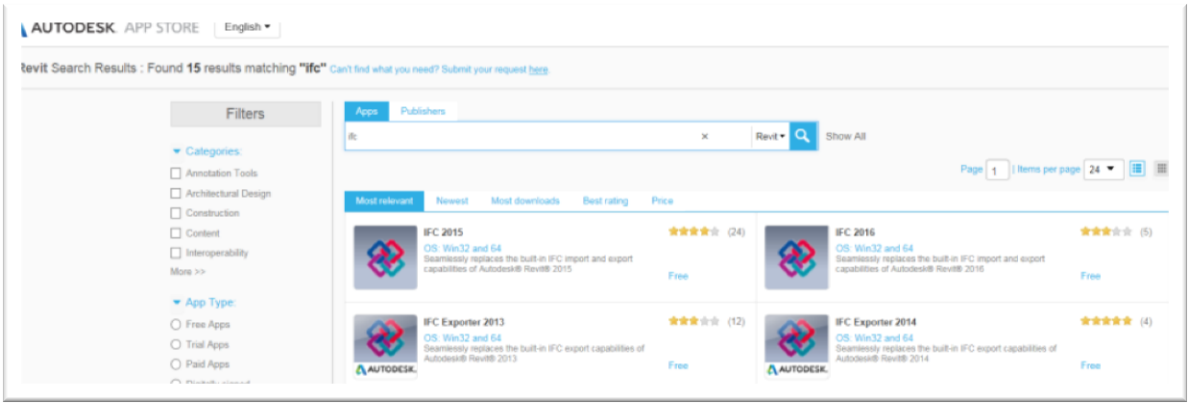
Site and link	Description
BIM store bible Link  	Use this "bible" for inspiration Use this guide to get an understanding of what to consider, when you need to make a new family or need to ask another person to make one.

17. IFC (export options) *

IFC export settings can't be defined as a standard setup, but this chapter will show our general export suggestions along with a brief description.

NB. The IFC exporter version could be different from computer to computer. You therefore need to make sure you are using the project agreements version of the IFC exporter.

The newest version of the exporter is located on "Autodesk App Store": Link



17.1 Description of recommended export settings

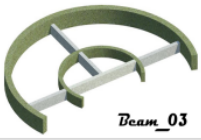
Recommended and deprecated options are described beneath. These are general recommendations and will not comply with every project.

BuildingSMART has a report for all IFC certified software. To ensure the quality of your export, it is highly recommended you check the status for at least the object you are responsible for.

Revit 2016 export: http://87.106.145.222/ords/ifc/certification/getCertificationReport/503
All IFC certified software: http://www.buildingsmart.org/compliance/certified-software/

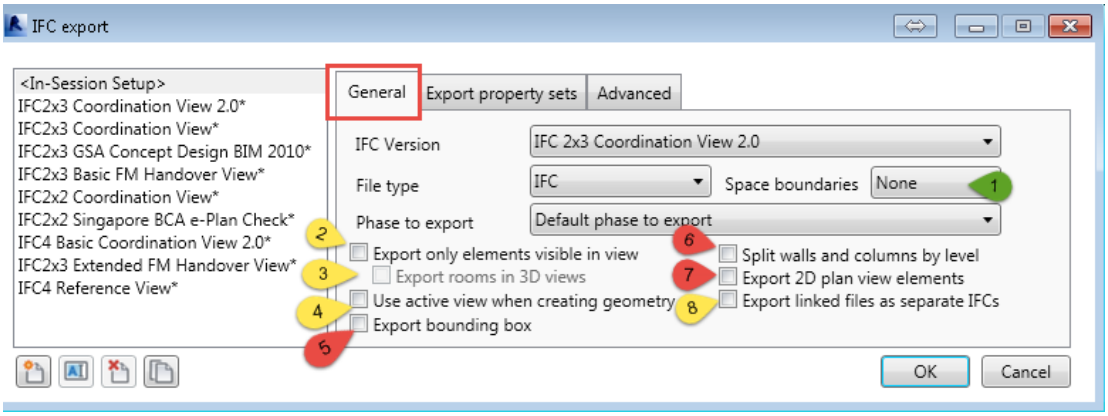
Example from report:

Beam_03 / 2x3



103 IfcBeam	company statement	Beam_03 / 2x3
030 Geometry		
030-1 Geometry Box	Revit does not currently import bounding box geometry if the body representation contains geometry.	
030-2 Geometry Axis	At the time of this test, Revit didn't create a beam axis on linking the IFC file.	
030-6 Geometry Body		
030-6-1 Geometry SweptSolid		
030-6-2 Geometry Clipping		
300 Type		
300-5 Type Property Set		
General	*company statement*	*Beam_03 / 2x3*
_G4 Remarks		

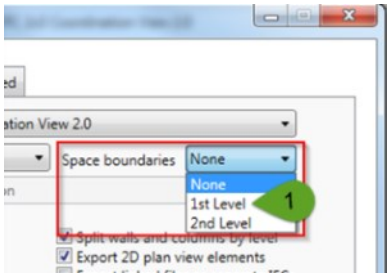
The symbols beneath are shoving the general recomendations. These will not fit every project. Always follow the project specified export options. If none are are specified on the project use the recommendations beneeth.		
1 General recommended.	1 Useful in some specific situations.	1 General not recommended.



(1) Space boundaries: The level of room/space

1st level (Recommended)
Boundaries are used for quantity take off / Facility management, as they define the general Room/space boundaries.

2nd level
Boundaries is reacting on the object defining the Room for example the wall defining the room and its net area. This is often used for analysis proposes.



For a detailed description read this document "IFC IMPLEMENTATION GUIDE SPACE BOUNDARIES FOR THERMAL ANALYSIS" link

(2) Export only elements visible in view

This option can be used if you want to define special export views in Revit. These views can define small parts of the model or a reduced model for the subcontractor.

(3) Export rooms in 3D views
Room element will be export as like-solid element.

(4) Export active view when creating geometry

This will, for instance, export detailed cable ladder geometry.

(5) Export bounding box

GSA file version to export bounding box representations for submitting files to the US Government Services Administration. Additional property sets will be included

(6) Split walls and columns by level

This can be used if, for instance, the architect walls are one wall from site to roof. Be careful with this. Always make sure the model is split up according to the project agreement. This function could create wrongly divided walls.

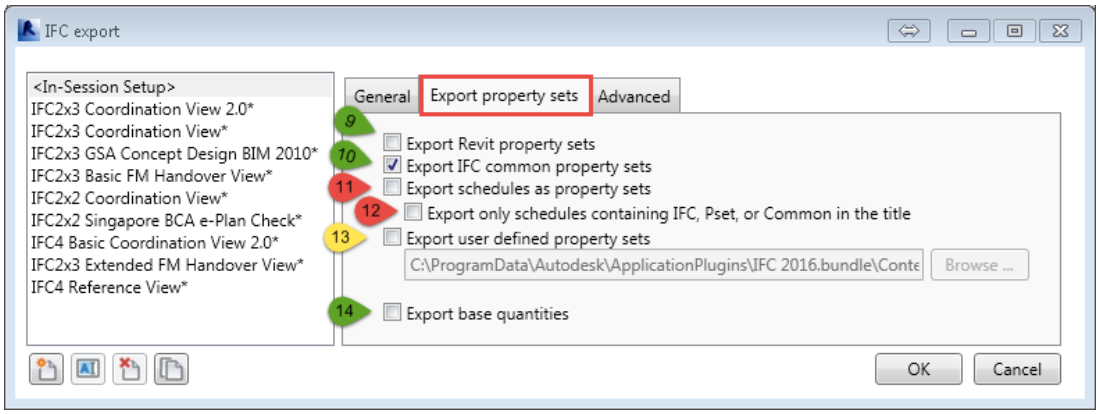
(7) Export 2D plan view elements

Include 2D elements supported by IFC export (e.g. notes and filled regions). Most IFC viewers do not support the 2D view plan elements (TeklaBimSight, Solibri, simpleBim).

(8) Export linked files as separate IFC's

Each reference file in the Revit project will be exported as a separate IFC file with the right positioning relative to the host file.

More instances of the same linked document will be exported as separate files with their corresponding position and orientation.



(9) Export Revit property sets

Revit-specific property is exported along with general IFC properties. If the model is not used for collision-/consistence control or the model is extremely large, this option is not recommended.

(10) Export IFC common property sets

Include the IFC common property sets.

There is a Feature Pset_Wallcommon for walls with a characteristic IsExternal.

(11) Export schedule as property sets

The name of the schedule is the property set name; the column names are the IFC pa-

rameter names.

(12) Export schedules as property sets

Export schedules as custom property sets. The name of the schedule is the property set name. This option is not supported for all Revit categories and all properties.

We are not recommending this option. Only consider this function if the project has a well-defined guideline for the use of schedules and its content.

(13) Export only schedules containing IFC, Pset, or Common in the title

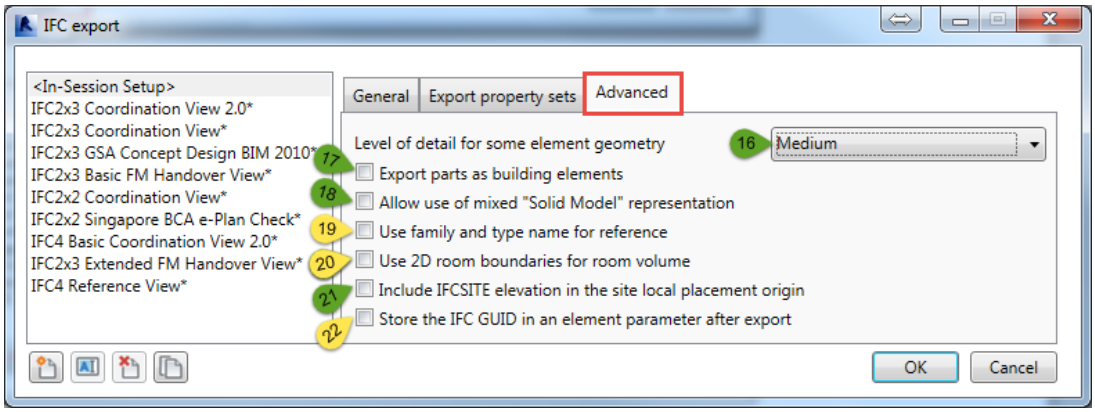
Only consider this function if the project has a well-defined guideline for the use of schedules and its content.

(14) Export user defined property sets

Export user-defined property set. User can specify the name of a text file that contains the property set definitions. This option is not supported for all Revit categories and all properties.

(15) Export base quantities

Include base quantities for model elements in the export data. Base quantities are generated from model geometry to reflect actual physical quantity values, independent of measurement rules or methods.



(16) Level of detail for some elements geometry

There is no concrete documentation and usable examples for this option. Our recommendation is to set it at medium detail. If some objects turn up at a lower detail level than expected, turn up the detail level.

(17) Export parts as building elements

This option will as an example allow mixing Breps extrusions for an entity. This can also result in smaller IFC files.

Export parts as standard IFC elements.

(18) Allow use of mixed "solid model" representation

This option is useful if there are no BIM objects in the model, such as AutoCAD solids. This

will ensure all object are exported.

(19) Use family and type name for reference

Could be useful in some cases. Check the project requirement before adding this option to your export.

(20) Use 2D room boundaries for room volume

Checked to use a simplified approach to calculation of room volumes (based on extrusion of 2D room boundaries). This is also the default when exporting to IFC 2x2. Unchecked to use the Revit calculated room geometry to represent the room volumes, which is the default when exporting to IFC 2x3.

(21) Include IFCSITE elevation in the site local placement origin

Always check this option. This will ensue the exported model has the correct z-coordinate corresponding to the shared coordinate in Revit.

(22) Store the IFC GUID (Global Unique ID) in an element parameter after export:

Storing the generated IFC GUIDs into the project file after export. This will add "IFC GUID" parameters to elements and their types, and Project Information for Project, Site and Building GUIDS.

18. Checklists

This chapter is a collection of checkliksts for designers and model responsible persons. If needed, print the checklists and save them to the project folder.

18.1 Making a new discipline model

This checklist must be used when making a new discipline model. A new discipline model has to be made or coordinated by the model responsible person. Print the form below as needed.

Responsible for the model : _____

Case name and number : _____

Date : _____

Check	Description	Chapter Link
	Make sure you have read all the CAD-BIM Manuals	
	Make sure you have the latest survey/coordination model and information regarding coordinate system.	5
	Make sure you know the Project CAD Manual, Standard etc.	3
	Name your model as defined by the project CAD description	2.1
	Follow the chapter "Making a new discipline model"	5
	Make sure to inform designers about the new model and regarding project material.	
	Make sure the model is made with worksets, and all reference models/drawings are laying on the proper workset.	14
	Make sure all designers have all necessary checklists available.	

18.2 **Model Clean up and optimizing plan**

Use this clean up and optimising plan to ensure the model quality follows the agreed standard. It is mandatory for the model responsible person to perform this task every second week.

Responsible for the model : _____

Case name and number : _____

Date : _____

Check interval : Calendar day 1 and 15 every month.

Check	**Description**	Chapter Link
	Check that all defined reference points have the right coordinate value.	
	Carry out a clash detection against all other discipline models to ensure this discipline model doesn't contain any unnecessary collisions. Make sure to inform the responsible persons, if any changes are needed!	
	Check for the right LOD level.	9
	Check for object defined with wrong object type or name. For instance, Walltype used as beam, wrongly used In-place models, incorrect naming.	8
	Project Browser structure Check naming and unused views.	2.2
	Remove any unnecessary 2D drawings and 3D models and make sure that all necessary reference drawing/models have their own workset.	14.1
	Compress the central file and make sure that all users are using a new copy of the central file.	
	Perform a purge and remove all unnecessary Revit families.	
	Inform the users of when the next clean-up will take place.	

18.3 Designers daily checklist

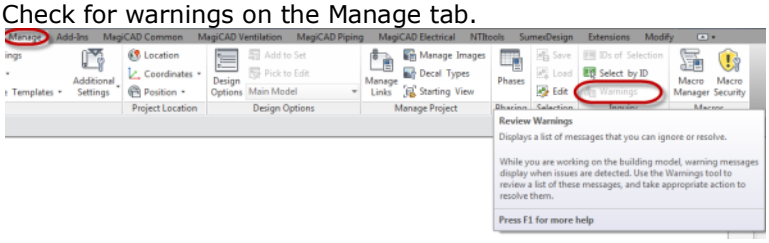
Use this checklist to ensure no data is lost and all necessary updates are made. If needed print this list and save it to the project.

Designer : _____

Case name and number : _____

Date : _____

Check interval : Every day

Check	Description	Chapter Link
In the morning		
	Take a new copy of the central model.	
	Ask the model responsible for any project changes, which will affect your work.	
	Read the model log and model start up page.	
	Check for warnings on the Manage tab. 	
In the evening		
	Save to central and release all borrowed object and worksets.	
	Update model log.	

18.4 New family checklist

Use this checklist to ensure correct creation of Revit families.

This checklist and its content define a minimum request for information and QA.

Family name : _____

Family requester : _____

Family creator : _____

Deadline for creation : _____

Approved by : Initials and date: _____

Check	Description	Chapter Link
Pre Family creation		
	Request all necessary product information.	
	Request a sketch of the final component design: • 2D design, Top, Front, (Left or Right) as minimum - Whether any special 2D lines not showed by the 3D geometry have to be applied. - Thickness of all lines in 2D • 3D - What has to be displayed in coarse, medium and fine? - Colour and/or material	
	Which special functions have to be applied to the family: • 2D - Is there any lines that have special functions? Ex. ON/OFF switches or array functions • 3D - Is there any switches or special functions? - Object ON/OFF switches - Special calculated functions	
Post Family creation		
	Does the family naming correspond to the naming rules?	15.3

	Has the mandatory properties been created?	15.5
	Is the classification value defined?	15.5
	Is there a risk of bad model performance if the component is heavily used in the Revit-model?	
	If the object should be a part of the MTH standard content the object must also be approved by the VDC Department.	