URBAN VISUALISATION & MANAGEMENT GMBH

UVM SYSTEMS

MANUAL

Administrator

CityGRID® 2024

Content

Cover picture: Prague, Leonhard Niederwimmer, Pixabay

Note: This manual was produced by automatic translation. Strange expressions and sentence structure may therefore occur. In case of doubt, the German manual is to be used as a reference.

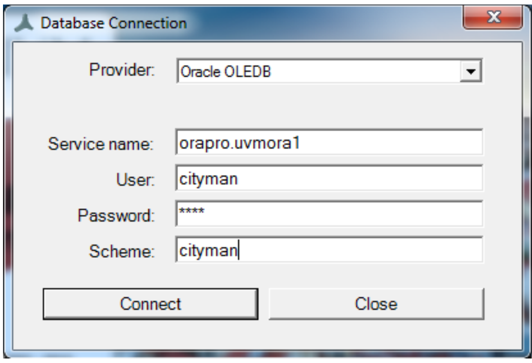
1 CityGRID® Administrator

Note: CityGRID® is available in three different variants: CityGRID® Inspector, CityGRID® Editor and CityGRID® Texture. This manual covers all three variants. For functions that require at least the Editor module are marked by the symbol E. Functions that can only be run with the Texture module are marked by symbol T. If no icon is present the function is available to all modules, (i.e. also Inspector)

The CityGRID® Administrator is the central tool for administration of CityGRID® data that is stored within the database. CityGRID® Administrator provides conversion routines from external data, import and export functions, and methods for maintenance and enhancement of the data.

1.1 *Starting CityGRID® Administrator*

1. Start CityGRID® Administrator by clicking **Windows Start > All Programs > CityGRID > Administrator**.
2. Open database connection by clicking **File > Connect Database** (request access data such as provider, server, database or service name, user name, password and database scheme name from your database administrator)



Database Connection

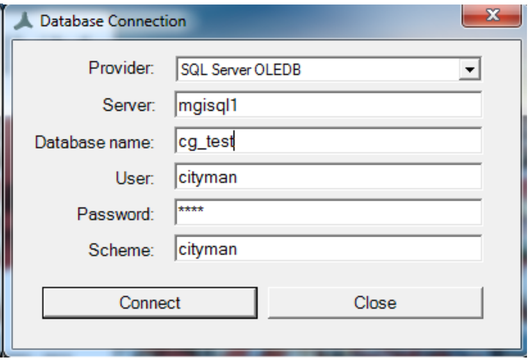
Provider: Oracle OLEDB

Service name: orapro.uvmora1

User: cityman

Password: ****

Scheme: cityman



Database Connection

Provider: SQL Server OLEDB

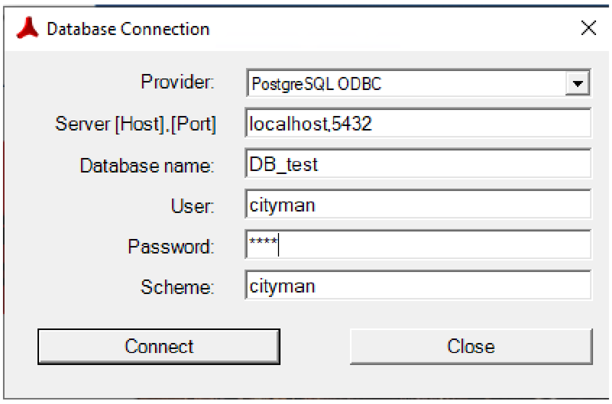
Server: mgisql1

Database name: cg_test

User: cityman

Password: ****

Scheme: cityman



Database Connection

Provider: PostgreSQL ODBC

Server [Host],[Port]: localhost,5432

Database name: DB_test

User: cityman

Password: ****

Scheme: cityman

For faster access to the database you can open a dialog box with previously completed fields via **File > Stored Database Connections**.

Note: Passwords are not stored within the database connection dialog window!

In addition to Oracle and MSSQL, PostgreSQL is also supported with version 18.0. Depending on the provider used, there are important differences in the database connection:

Oracle: Oracle establishes the connection via a configured Net Service.

A Net Service is set up on the client computer, in which all information is stored with the exception of the username and password, with which the user on the client computer can connect to the database

MSSQL Server and **PostgreSQL** each have an additional field for database connection: **Databasename**.

The field "**Server**": with **MSSQL** the server name (host name) is specified and, under certain conditions, requires the port number separated by ',' in order not to be blocked by the firewall on the client computer.

With PostgreSQL the server name and the port number must be specified, the default port is 5432.

3. Provide general parameters in the menu **Settings**:

Log Path: Path to all City**GRID**® log files. Use the button ... to specify a custom storage location. By default, Windows sets the *Log Path* to the user's profile folder.

Log file: Path to Administrator Log file, where all actions started from inside City**GRID**® Administrator are recorded.

Parameter: is used only for the conversion of terrain model data: TXT file which provides the interpretation of DTM basis data.

DTD: is used only for the export to XML: Path and file name of the „document type declaration" of exported XML files.

These three file names are specified during the installation. With the R Button (RESET) the contents of the log file can be deleted. With the Open Button the respective file is opened in an editor.

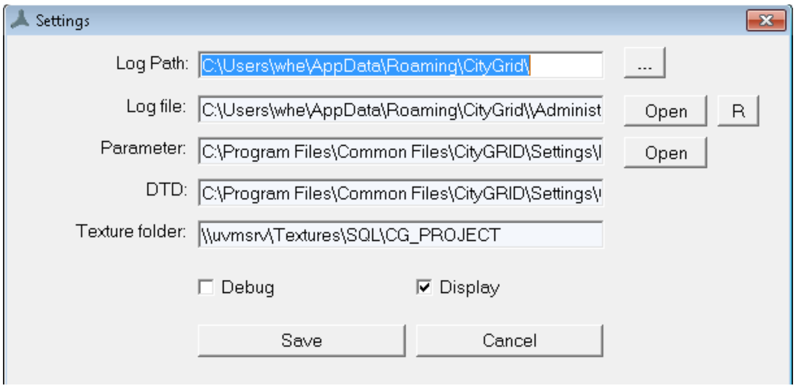
Texture folder: Directory for texture data (in the beginning create a new directory) If a database connection is given and the texture folder is stored in the database, it is written here and the field is set to non-editable).

<u>Note</u>: During installation of each data base service a separate directory must be chosen on a generally available (network) drive, in which the textures will be stored. <u>This directory is an integral component of the data base service</u>. Contents of this directory are administered by CityGRID® and must not be changed manually!

Debug: check this option only when searching for bugs; this option writes a comprehensive protocol which slows down the process.

Display: if activated, the protocol will be displayed additionally in a console window.

<u>Advice</u>: Display allows you to control the advancement of running processes. We recommend using this option.



Log Path: C:\Users\whe\AppData\Roaming\CityGrid\

Log file: C:\Users\whe\AppData\Roaming\CityGrid\Administ

Parameter: C:\Program Files\Common Files\CityGRID\Settings\I

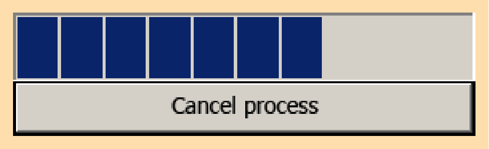
DTD: C:\Program Files\Common Files\CityGRID\Settings\

Texture folder: \\uvmsrv\Textures\SQL\CG_PROJECT

□ Debug ☑ Display

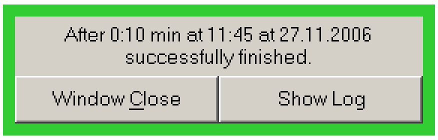
1.1.1 Process Control Window

Typically, actions initiated through Administrator are being applied to a large dataset and will require some time to complete. An activity bar will be shown to indicate a running process.



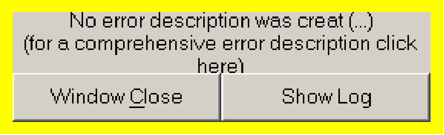
When the process has finished, the following window is shown:

a. with a green border (success)



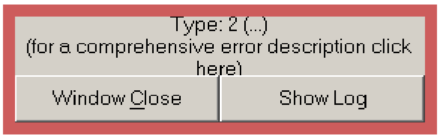
After 0:10 min at 11:45 at 27.11.2006
successfully finished.

b. with a yellow border (warnings)



No error description was creat (...)
(for a comprehensive error description click here)

c. with a red border (failure or cancelled)



Type: 2 (...)
(for a comprehensive error description click here)

If there are warnings or errors, click for a comprehensive error description (if available) and/or open the log file.

Advice: When checking the log file, look for the keyword "error" starting from the end of the file and reading back up to the start.

2 Conversion

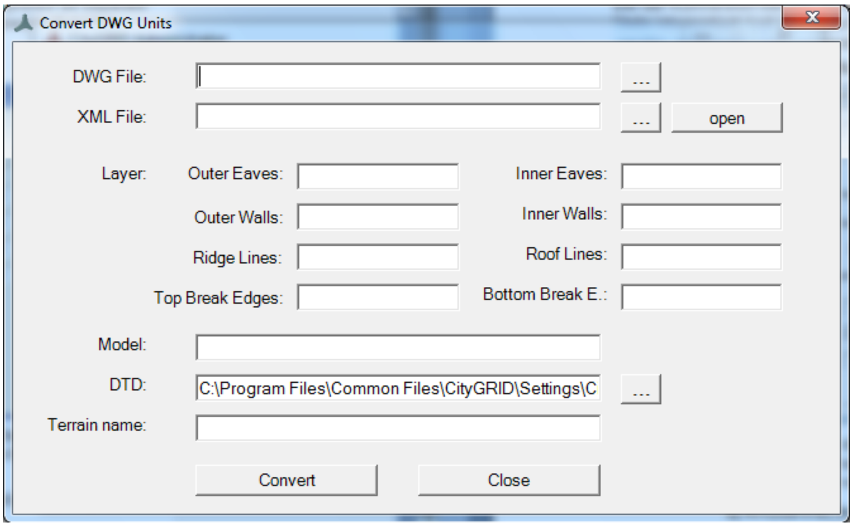
If the input data is not yet available in the XML format defined by City**GRID**®, you'll have to convert the data into this format.

2.1 *Units*

2.1.1 DXF and AutoCAD DWG

During the conversion, all closed polygons found in the outer eaves layer are interpreted as separate Units (see Manual City**GRID**® Basics). Polylines and lines in other layers are assigned to that Unit, inside which their middle point lies.

1. Open the menu **Conversion > Units > DWG**



DTD: C:\Program Files\Common Files\CityGRID\Settings\C

DWG-File: Name of the CAD file (DWG or DXF): The building lines must be prepared in CAD software. The following objects are necessary und should therefore be given in separate layers as 3D polylines (3D splines).

a) *Outer Eaves* (which enclose the object. Make sure to have closed polygons!)

b) *Inner Eaves* (courtyards; closed polygons as well)

c) *Outer Walls* and *Inner Walls* (if there is a protrusion of the roof; as closed polygons as well),

d) *Ridge Lines* and other *Roof Lines* (as polylines or lines).

e) If appropriate, also *break lines* can be given here (upper and lower break line)

XML-File: Name for the converted file.

Layer: The names of the layers in the CAD file must be known. For a layer which doesn't exist the keyword `NONE` must be given.

Model: All Units of the file are grouped in a Model. The name of that model can be given here (and will be written as XML tag "ModelID").

DTD: File name for the „document type declaration" of the converted XML file. It will be written to the header of the XML file.

Terrain name: Name of the corresponding terrain model (will be written to as XML tag "TerrainID").

*Note: We strongly recommend creating a precise terrain model before starting to model with City**GRID**®.*

2. By clicking on Convert the conversion process is started. See the section 0 for a description of the process control window.

2.1.2 Oracle Spatial

For converting „Spatial Data Objects“ (SDO) from Oracle a table/view in Oracle is necessary in which the following columns are available:

- a column with geometry data (SDO) for the building outlines as closed polygons. The geometry types “Polygon” and „Multipolygon” in 2D and 3D are used. Thus, SDO_GTYPE values of 2003, 3003 and 2007, 3007 are allowed. Polygons may also have inner (cut-out) polygons. However, they must not have compound geometry, but must consist of straight line segments (SDO_ETYPE 1003 or 2003 with SDO_INTERPRETATION 1, 2 or 3, where for Interpretation 2 the single arcs are replaced by straight lines). If geometry data have disallowed values, warnings and/or errors are written to the conversion protocol, which can be found by a search of the keywords „WARNING“ or „ERROR“.
- optional: a column with the IDs of the Units
- optional: a column with elevation values: If such a column is selected, the respective elevation value is used for all points of the polygon even if the SDO was already in 3D (in that case, a warning is written to the polygon).

1. Open menu Conversion >Units>Oracle SDO

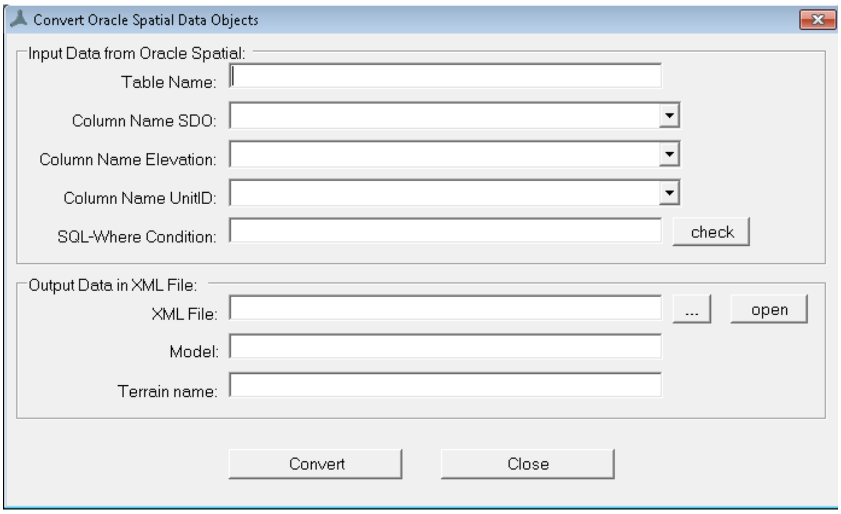


Table Name: Provide the name of the table/view in Oracle Spatial containing geometry, UnitID and other data. If the table is found, the fields for column selection are enabled.

Column Name SDO: Select the name of the column with geometry data (Spatial Data Objects - SDO). The available column names are shown in the drop-down list.

Column Name Elevation: This field is optional: If a column name is selected, the elevation value is used for all points of the respective polygon.

Column Name UnitID: This field is optional: If a column name is selected, the value is used for as UnitID.

SQL-Where Condition: This field is optional. A condition can restrict the lines to be converted. Provide a valid SQL syntax for a condition after the SQL keyword “where”, e.g. `UNITID like ’A1%’` converts all lines for which the string in the column UNITID starts with „A1“. The number of lines fulfilling the condition can be checked by clicking at the button “check”.

XML File: Name for the converted file.

Model: All Units of the file are grouped in a Model. The name of that model can be given here (and will be written as XML tag “ModelID”).

Terrain name: Name of the corresponding terrain model (will be written to as XML tag “TerrainID”).

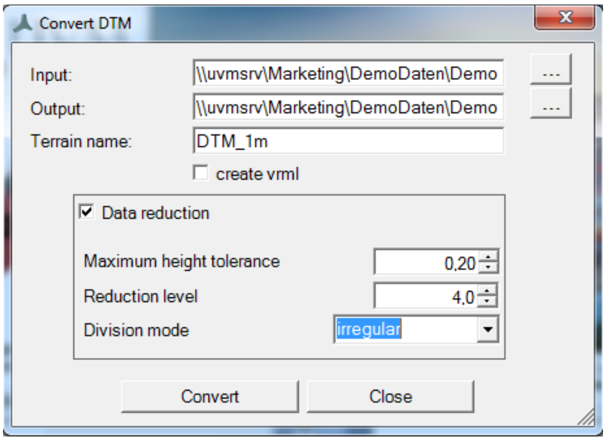
2. By clicking at Convert the conversion process is started. See the section 2 for a description of the process control window.

2.2 DTM

2.2.1 General Converter

The General Converter converts Raster- and Point terrain data into the City**GRID**® XML format.

1. Open menu **Convert > DTM > General**
2. Click button ... to open a browser window. Select the file to be converted. The converter handles file types as specified below, select the desired type by selecting the file type in browser window



Input: \\uvmsrv\Marketing\DemoDaten\Demo

Output: \\uvmsrv\Marketing\DemoDaten\Demo

Terrain name: DTM_1m

☐ create vrml

☑ Data reduction

Maximum height tolerance 0,20

Reduction level 4,0

Division mode irregular

Valid ASCII file formats		Valid DTM-Raster file formats	
Format	Extension	Format	Extension
XYZ (continuous)	.xyz	ESRI ASCII Grid	.grd
Binary XYZ	.bxyz	RawBinary	.bil (=ESRI BIL)
ScopWinput	.wnp	SRTM	.hgt
Binary Winput	.bwnp	TIFF	.tif (Geo-Tiff or .tif + .tfw)
LAS	.las	JPEG	.jpg +.jgw
		DTED	.dt0, .dt1, .dt2
		USGS DEM	.dem
		USGS SDTS	*catd.ddf
		SCOP RDH	. dtm

Note: Break lines can be included in General Converter only if they are being pre-processed in Scop and saved in Scop RDH file format.

3. Specify the path to the converted XML File in field Output.
4. The terrain name is derived automatically from the file name specified under Output. This name can be changed individually if desired.

Advice: We strongly advise to use the same name for the file and the terrain name for easier data management in database.

5. Activate checkbox VRML to save the converted terrain data to a .wrl file. This can be useful for data checks.
6. Activate checkbox Data reduction to apply reduction algorithms on the input data to reduce data during the conversion. The reduction is controlled by the following three parameters:
   - *Maximum height tolerance:* Specify the maximum allowed vertical deviation between the original hybrid model and the approximated TIN.

- *Reduction level:* Specify the number of reduction levels to be considered during computation. The higher the value the more generalized the TIN will be.
- *Division mode:* Defines if a regular (identical grid spacing) or an irregular TIN is to be calculated.

7. Click Convert to start the conversion process. See the section 2 for a description of the process control window.

2.2.2 Formatting input data for Special Converter

*<u>Note</u>: The Special Converter is dedicated, as the name already suggests, for special data situations and should only be used if the General Converter fails to deal with the data situation. We strongly advise the use the General Converter as the Special Converter will be available in future versions of City***GRID®** *only for a small sample of data situations that can't be handled with the General converter.*

1. Grid data, where not every grid point must occur:

   a) point lists in a regular grid in the following ASCII format (one line per point):

   ```
   PointNumber   x-Coordinate   y-Coordinate   z-Coordinate
   ```

   b) point lists in WINPUT format (one line per point):

   ```
   ID            x-Coordinate   y-Coordinate   z-Coordinate
   ```

   Where only those points are considered which have an ID starting with 30.

   c) elevation list with header (ArcInfo Grid format): the file is in ASCII with the following header:

   Number of columns m

   Number of rows n

   X-Coordinate of the lower left corner

   Y-Coordinate of the lower left corner

   Grid width

   Value for "Unknown z-Coordinate"

   Afterwards n*m z-Coordinates follow

2. Break lines, which can be given additionally to grid points:

   a) break lines in the following ASCII format:

   ```
   L             maybe additional header values
   PointNumber   x-Coordinate   y-Coordinate   z-Coordinate
   PointNumber   x-Coordinate   y-Coordinate   z-Coordinate
   …
   ```

   A line in the file which starts with L indicates a new break line.

   <u>Note</u>: During the conversion from PHODAT files a file with the name `BK.txt` is generated in this format

   b) point lists in WINPUT format (one line per point):

   ```
   ID            x-Coordinate   y-Coordinate   z-Coordinate
   ```

   Where only those points are considered which have an ID starting with 40 or 50; all points with the same ID are assigned to one break line.

3. Triangle lists:

   a) triangle lists in the following ASCII format (one line per triangle):

   ```
   x1     y1     z1     x2     y2     z2     x3     y3     z3
   ```

b) triangle lists in WINPUT format:

```
51000000      x-Coordinate    y-Coordinate    z-Coordinate
51000000      x-Coordinate    y-Coordinate    z-Coordinate
51000000      x-Coordinate    y-Coordinate    z-Coordinate
51000001      x-Coordinate    y-Coordinate    z-Coordinate
51000001      x-Coordinate    y-Coordinate    z-Coordinate
51000001      x-Coordinate    y-Coordinate    z-Coordinate
…
```

with 3 lines each having a unique triangle ID and Winput Code 51

c) triangles in DXF/DWG (AutoCAD 2000 DWG/DXF): all faces as data type 3D Faces in the layer „TRIAN“.

2.2.3 Starting the conversion in Special Converter:

1. Choose the format in the parameter file (menu *Settings*):

   An arbitrary line of the file must begin with the character „`P`“. After a blank, a digit follows indicating the format:

   0 … grid data and break lines in ASCII (see 1a + 2a)

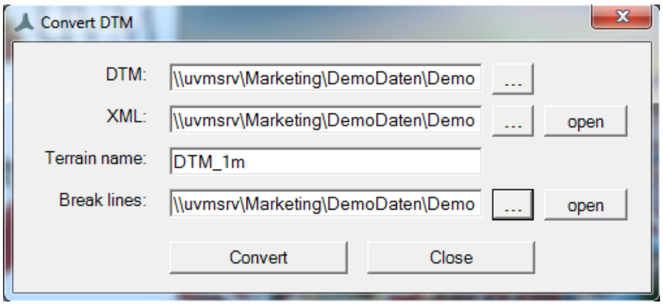
   1 … grid data + break lines or triangle lists in WINPUT (see 1b + 2b or 3b)

   2 … point list with header (see 1c, no break lines possible)

   3 … triangle list (see 3a, no break lines possible)

   4 … triangles in AutoCAD 2000 DWG/DXF (see 3c, no break lines possible)

2. Open the menu **Conversion > DTM > General**
3. Select the file names with path:



Convert DTM

DTM: \\uvmsrv\Marketing\DemoDaten\Demo ...

XML: \\uvmsrv\Marketing\DemoDaten\Demo ... open

Terrain name: DTM_1m

Break lines: \\uvmsrv\Marketing\DemoDaten\Demo ... open

Convert Close

   DTM: Name of file with grid data or triangle list

   XML: Name for the converted file

   Terrain name: Name of the terrain: it will be used for the XML tag „TerrainID“. After the import it will be the name of the terrain model in the database.

   Break lines: Name of file with break lines. If no break lines are given, fill out the key word `NONE`. In case of WINPUT the break lines can also be given in the same file as the point data (see 1b und 2b above).

4. Click Convert to start the conversion process. See the section 1.1.1 for a description of the process control window.

3 Import

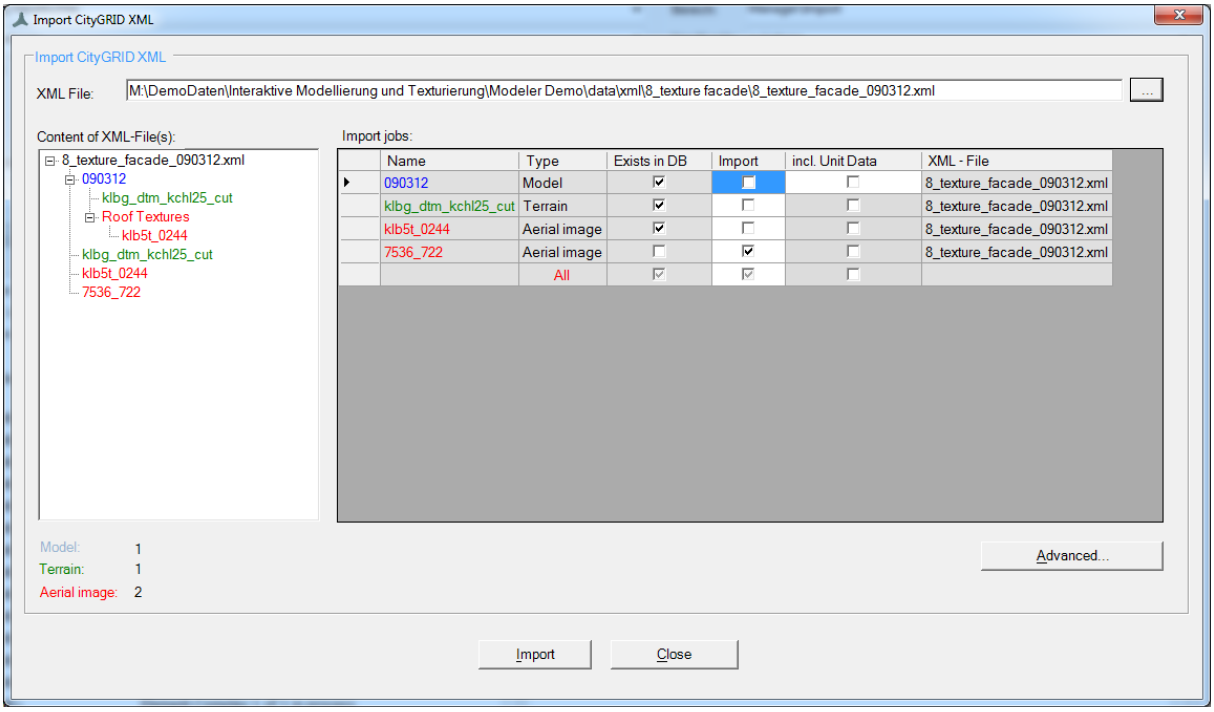
To administrate data with City**GRID**® Manager it needs to be converted to City**GRID**® XML schema and then imported into the City**GRID**® database. For this purpose, the Administrator has this functionality under **Import**.

3.1 CityGRID® XML

A single import dialog is available under **Import > CityGRID XML** for importing City**GRID**® XML data for both terrain models and building models as well as combinations.

1. Open the Menu **Import > CityGRID XML**
2. Click on the Button [...] to select XML-files.

Advice: Use standard Windows functions for multi selection in the browser window.



XML File: M:\DemoDaten\Interaktive Modellierung und Texturierung\Modeler Demo\data\xml\8_texture facade\8_texture_facade_090312.xml

Content of XML-File(s):

- 8_texture_facade_090312.xml
  - 090312
    - klbg_dtm_kchl25_cut
    - Roof Textures
      - klb5t_0244
  - klbg_dtm_kchl25_cut
  - klb5t_0244
  - 7536_722

Import jobs:

Name	Type	Exists in DB	Import	incl. Unit Data	XML - File
090312	Model	☑	□	□	8_texture_facade_090312.xml
klbg_dtm_kchl25_cut	Terrain	☑	□	□	8_texture_facade_090312.xml
klb5t_0244	Aerial image	☑	□	□	8_texture_facade_090312.xml
7536_722	Aerial image	□	☑	□	8_texture_facade_090312.xml
	All	☑	☑	□	

Model:	1
Terrain:	1
Aerial image:	2

The selected files will be read and the data structure will be displayed in the *Content of the XML-File(s)* windows. Models, terrains and aerial pictures (perspective aerial photos and ortho photos) are colour-coded and grouped.

The window *Import jobs* displays tabulated details of the datasets. Fields with white background can be modified by the user, and grey fields display unchangeable information.

Name: lists the name of the importing data set.

Note: Buildings ('Units') can be grouped to" Models". A Model will be stored in the database under the name, which is given in the XML tag "ModelID". To each Model a terrain model is assigned, which is given in the XML tag "TerrainID", e.g.:

```
<Model>
..
<ModelID>City</ModelID>
<TerrainID>CityDTM</TerrainID>
..
</Model>
```

The terrain itself is stored in the database under the name of its XML-tag 'TerrainID', e.g.:

```
<Terrain>
<TerrainID>CityDTM</TerrainID>
..
</Terrain>
```

Images in general are saved under their filename.

Type: states the kind of the importing data sets.

Exists in DB: During building the Import job the program checks the database for data with identical names. If true this checkbox is set.

Import: If set, the data will be imported. The checkbox is set by default if no data is found with identical names. If data with same name exists, this checkbox is deactivated by default but can be activated by the user.

Database import transfers the geometry data (units and terrains) as well as images into the database and links among themselves to models. If data already exists in the database a version will be created. Existing data are preserved in the database but loses the status 'current version'. The imported data will inherit this status. All models which refer to the data will be linked automatically to the version with the highest version number.

Models with same names can be imported arbitrarily into the database, terrains and images however will be checked for similarities. If an Import job finds identical names, only the first entry will be set to *Import* by default to avoid versioning within the import process.

Advice: A row with type 'All' can be found after each data group. By clicking on the checkbox in that column all superior import checkboxes can be activated or deactivated at once.

Incl. Unit Data: A special function while importing which allows importing of geometry and linked models. If this checkbox is deactivated the Import job will analyze the database for Units, terrains and images with identical names. If so the data of the database will be combined with the models identified in the XML parameters. Geometry data will only be imported if identical name does not exist in the database.

*Advice: Use this import variant for quick creation of Models without importing geometry data. Especially useful when combining with City**GRID**® Models coming from FME.*

XML-file: specifies the name of the XML-file and the physical location of the particular data.

3. Advanced... opens an advanced parameter window. Here you can specify whether Units shall be triangulated for generating faces during database import, and aerial images shall generate an image pyramid or not.

4. After clicking on Import the import process is started. This takes in general some minutes. See the section 1.1.1 for a description of the process control window.

Note: Marked files will be imported into the database by a batch process, but the process will abort if an error occurs.

3.2 *Ortho Image (Aerial Ortho photos)* T

*Note: Current version allows import of pictures via Administrator with world files only. Oriented (perspective) aerial images can be imported via City**GRID**® Modeler or City**GRID**® FME Writer. Please contact UVM Systems for further information.*

Ortho photos must have name-unique world files at the same folder.

1. Open the Menu **Import > Ortho image**
2. Click Button ... to load image(s)

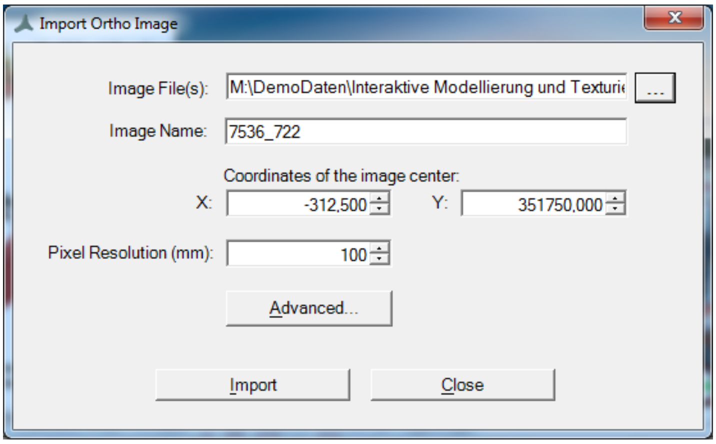


Image File(s): M:\DemoDaten\Interaktive Modellierung und Texturi

Image Name: 7536_722

Coordinates of the image center:

X: -312,500 Y: 351750,000

Pixel Resolution (mm): 100

If one ortho image is selected following parameters can be specified interactively:

- *Image File(s):*

  Is derived from file name by default, but may be changed if needed.

- *Coordinates of the image center:*

  Calculated automatically from corresponding world file

- *Pixel resolution (mm):*

  Calculated automatically from corresponding world file.

  At multi selection these parameters are derived automatically from world files and can't be changed before import.

  Note: Currently image formats .tif, .jpg, .png and .png with associated world files (e.g. .tfw, .jgw, or .wld) are supported. In case one image is selected and the world file can't be read 0/0 is set to coordinates of image centre and pixel resolution is 1. If multiple images should be imported at one time, all images must have world files.

3. Click Advanced... to open advanced options menu. Choose whether you want to have an image pyramid created for imported images and if images shall be copied to DB texture-folder, or not.

   Note: If images shall not be copied into DB Texture folder, images won't be copied into "images" folder during XML export. Instead every image will be referenced with its absolute path in XML file.

   Note: Image pyramids will always be created in DB texture folder.

4. Click Import to start.

3.3 Restore Archive

In section 4.1 it is mentioned how an archive from a database can be saved. By doing so, data from a database can be deleted. In this case the archive serves – together with the subdirectory "images" – as a backup file

For restoring deleted units (or deleted versions of the unit) the restore function of the administrator can be used. Original versions of units with their original data (version number, date, comment) can be restored.

1. Open the menu **Import > Restore Archive**
2. Click button ... to select archive-XML files.

   Advice: Use standard Windows functions for multi selection in the browser window.

The selected files will be read and the data structure will be displayed in the *Content of the XML-File(s)* windows. Models, terrains and aerial pictures (perspective aerial photos and ortho photos) are colour-coded and grouped.

The window *Import jobs* displays tabulated details of the datasets. Fields with white background can be modified by the user, and grey fields display unchangeable information.

See section City**GRID**® XML (see 3.1) for detailed explanation of listed rows.

3. By clicking Start the restore process will be started. A description of the process-navigation window can be found in section2.

*Note: An XML archive is not meant for modelling purposes and can't be loaded in City**GRID**® Modeler.*

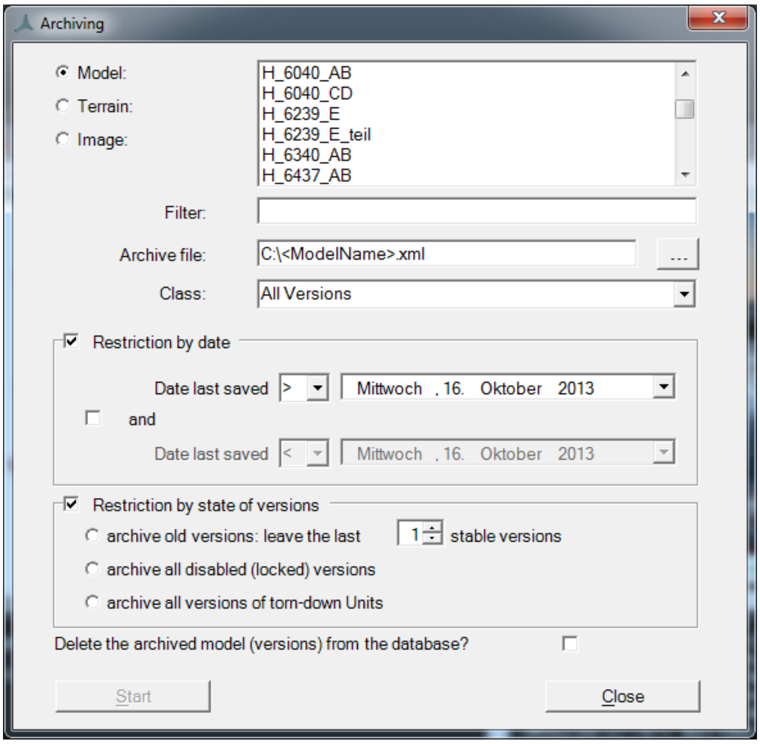
Archived terrain models and model images, by contrast, act like conventional XML files and can also be processed in the same way as these files. It is not possible to restore version histories of terrain models and model images automatically.

4 Export

Data, managed by City**GRID**® Manager can be exported to the formats VRML, City**GRID**® XML and CityGML via the City**GRID**® Administrator interface. Besides functions for archiving models, terrain models and model images as well as creation of surface models are also available.

4.1 Archive

The archive operation exports models, including all textures, as well as terrain models and model textures from the database to standalone files which can then be used as backups. It is possible to perform both full and partial archiving (with date restriction and/or restriction based on version properties). In the latter case, all the versions whose date/properties and class correspond to the restriction are exported. This data can also be deleted from the database during the same operation in order to reduce database space requirements. Archive files can subsequently be imported into the same or another database.



Archiving

● Model:
○ Terrain:
○ Image:

H_6040_AB
H_6040_CD
H_6239_E
H_6239_E_teil
H_6340_AB
H_6437_AB

Filter:

Archive file: C:\<ModelName>.xml

Class: All Versions

☑ Restriction by date

Date last saved > Mittwoch , 16. Oktober 2013

□ and

Date last saved < Mittwoch , 16. Oktober 2013

☑ Restriction by state of versions

○ archive old versions: leave the last 1 stable versions

○ archive all disabled (locked) versions

○ archive all versions of torn-down Units

Delete the archived model (versions) from the database? □

1. Open the menu **Export > Archive**

   Model, Terrain, Image: Select a data type to be archived and use the drop-down list to choose the associated data sets in the database. You can also use the Windows standard selection mechanisms to select multiple entries.

   Filter: You can specify a string to restrict the number of entries in the list. The "%" symbol can be used as a placeholder (or wildcard) for strings of any length and "_“ as a wildcard representing a single-character string.

   Archive file: Specify a path for the archive that is to be created. In the case of a model, the filename is derived from the model name of the archived model. In the case of terrains and images, the name of the terrain model or the image name followed by the version designation in the database is set. (e.g. DTM_v0.xml)

   Class: Specifies which version classes are to be used during archiving. Versions can belong to the classes "processing version" and "historic version". (see City**GRID**® Basics Manual). This setting is only available when archiving models.

   Restriction by date: If a restriction is set then only those versions whose date satisfies the restriction will be archived. The restriction can be specified by means of both a start and end date.

Note: Processing versions are always assigned to a fixed time whereas historic versions are assigned to a time period.

Restriction by state of versions: if activated, one of the three alternatives can be chosen:

- *archive older versions*: Settings can be made that the latest (most current) x stable versions cannot be archived. Stable versions are all versions which are not checked out or not locked (therefore also torn down versions, cf. 6.5)
- *archive all locked (invalid) versions (*Models only)
- *archive all versions of torn down units*: In this case all units are archived in which the latest version has the status torn down.

Delete the archived model from the database: If activated, those versions of the relevant units, terrain models or model images that have been written to the archive are deleted from the database.

If all the versions of a unit have been archived then the entire unit is deleted. If all the versions of all the units of a model have been archived then the model is also deleted.

If all the versions of a terrain model are removed then the reference to this model is also removed from models which previously referenced it. If the last terrain model is deleted from a model then the DEFAULT terrain model is assigned in its place.

References to deleted images are automatically removed from models

Note: CityGRID® needs for each Unit at least one stable (not disabled and not checked-out) version. In order to fulfil this requirement, it may happen, that the process does not delete some versions although requested. In that case a warning is written to the log file

2. By clicking at Start the conversion process is started. See section 0 for a description of the process control window.
3. The indicated archive file can be saved together with the subdirectory “images”.

   In the case of model images, an XML file containing the orientation parameters is created for each image and the image itself is saved in the "images" folder. These XML files can be used subsequently to re-import the images into the database. (see 3.1)

4.2 VRML, DXF, XML, CityGML and KMZ

To export to one of the formats select the appropriate entry in Export menu. An export window pops up where the export parameters must be specified. By default, the export operation always accesses the last stable version of a unit provided that no historic version with a specific date is requested.

The VRML export creates a .wrl file from the selected model in VRML 97 standard. Eventually existing textures are stored in the folder “images” at the same path as the .wrl-file.

The DXF export creates files in AutoCAD 2000/2000 LT DXF format. During export all lines and faces of the Unit will be separated on layers. Textures are not considered.

The City**GRID**® XML export creates an .xml-file in proprietary City**GRID**® XML format.

The CityGML export creates an OGC-conformal .gml file, containing all available line, face and texture information of the model and the hierarchical building structure. Terrain data is stored as LoD 2 TIN.

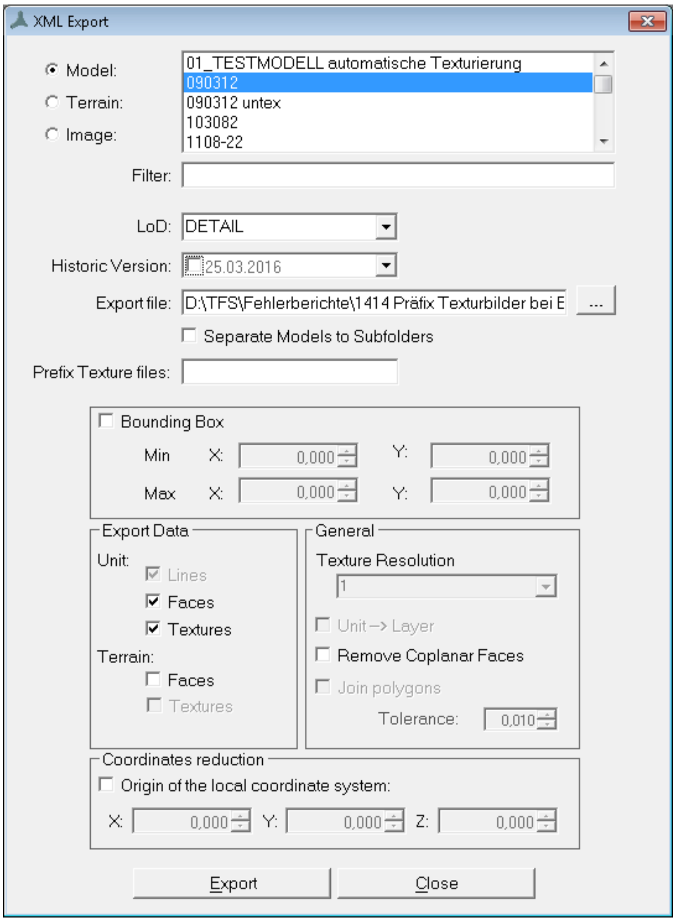
Note: Currently only images with world file can be exported as terrain texture in CityGRID® CityGML export.

The KML export creates a kml file together with a “link” folder. Every unit is saved as kmz-file (packed collada file and images folder) in this directory.

Note: Multiple model export to same location will lead to combined usage of link folder.

4.2.1 General Export Settings

1. Open the menu **Export** and select the desired export format.



XML Export

● Model:
○ Terrain:
○ Image:

01_TESTMODELL automatische Texturierung
090312
090312 untex
103082
1108-22

Filter:

LoD: DETAIL

Historic Version: □ 25.03.2016

Export file: D:\TFS\Fehlerberichte\1414 Präfix Texturbilder bei E ...

□ Separate Models to Subfolders

Prefix Texture files:

□ Bounding Box
Min X: 0,000 Y: 0,000
Max X: 0,000 Y: 0,000

Export Data
Unit:
☑ Lines
☑ Faces
☑ Textures
Terrain:
□ Faces
□ Textures

General
Texture Resolution
1
□ Unit --> Layer
□ Remove Coplanar Faces
□ Join polygons
Tolerance: 0,010

Coordinates reduction
□ Origin of the local coordinate system:
X: 0,000 Y: 0,000 Z: 0,000

Model / Terrain / Image: Select the name of the Model to be exported.

If *Model* is selected, buildings as well as terrains and model images are exported, if they are assigned to the model.

Terrain exports the geometry of a database-saved DTM.

If *Image* is selected, an ortho photo out of the database is saved in the folder “images” at the storage location. Additionally, the ortho photo gets its appropriate World-file plus an XML-file with orientation parameters for re-import into a City**GRID**® database

Advice: Use standard Windows functions for multi selection.

Note: Image export is available only for XML export.

Filter: Specify a string to restrict the number of entries in the list of model/terrain/image names. The "%" symbol can be used as a placeholder (or wildcard) for strings of any length and "_“ as a wildcard representing a single-character string.

LoD: Specify the generalization of the buildings to be exported. DETAIL (LoD 3) is the highest possible level, BLOCK (LoD 1) represents the lowest. (see Manual City**GRID**® Basics)

Historic version: Specifies whether the export is to be performed for historic versions. If this option is selected then data corresponding to the specified time is exported from the database irrespective of whether the version corresponding to the specified export date is the most recent version or not.

Export file: Define the path for export folder. Optionally you can navigate to the folder graphically by clicking the nearby button. File name is derived from model name.

The checkbox *Separate Models to Subfolders* writes each model in its own subdirectory of the export path. The directory name is derived from the model name.

Advice: This option should be used with textured models when the texture images should remain individually addressable per model.

Prefix Texture Files: Sets the input string before the texture name of the exported texture images. If no value is specified, images will receive the images names allocated by the database.

Note: The use of the prefix is necessary when using multiple databases, if exports are to be merged from these databases in another database (e. g. CityDB).

Format: Choose the export format between DXF and DXF (binary) (only active in DXF export)

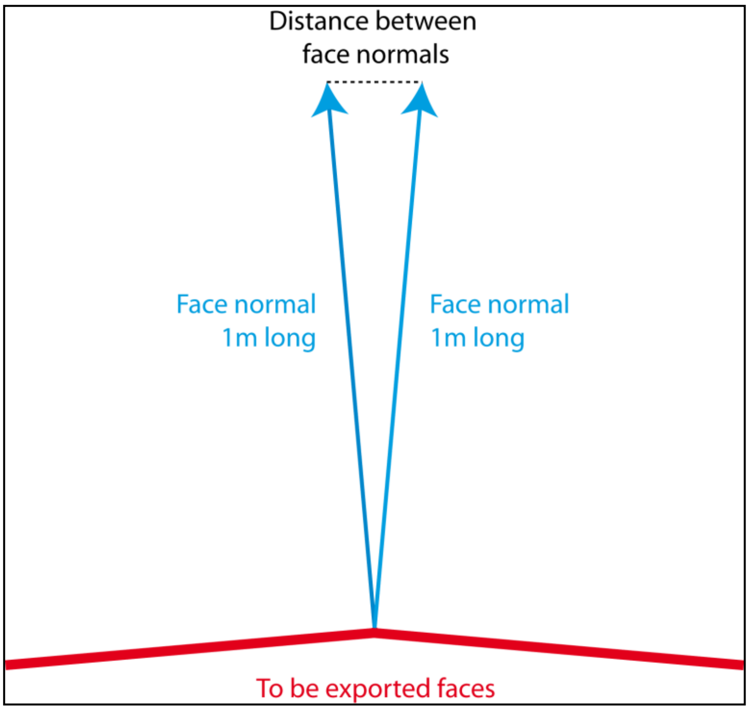
Bounding Box: Optionally define a rectangular export region by specifying minimum/maximum X and Y values in the defined coordinate system of the data. Units partially covered by this bounding box will be exported too.

Export Data: Depending on the export format Lines, Faces and Textures can be exported for Units and Faces and Textures can be exported for TINs

General:

- Define here the *texture resolution* given in mm per pixel. The value represents the dimension of one pixel in realty in mm.
- *Unit→ Layer* exports all Units to an individual Layer with the Unit name as layer name (DXF export only).
- *Remove Coplanar Faces* eliminates all congruent lying cladding faces inside a unit. Thereby buildings are generated with coherent interior space without any partition, independent of the quantity of complexes which the units are composed of in City**GRID**®.
- *Join Polygons* controls up to which cant the polygons can be seen as planar and can be exported as a single polygon The user defined value (radian measure) sets the minimum allowed difference in distance between the bases of imaginary (1 meter high) poles placed on the adjoining faces, perpendicular to the surface, and the top of the poles (see figure). The initial default value is 1 cm, which means the distance between the bases cannot be less than 1cm different to the distance between the top of the poles.

Example: A value of 0,01 corresponds with an aberration of 1cm of a one meter long surface normal and respectively an angel of 0.01 π. Converted to degree the value would be 0.8°.



Coordination Reduction: Origin of the local coordinate system defines the zero-point of the used coordinate system for export. If the checkbox is ticked, the input coordinate system is used, otherwise it the local coordinate system is used.

Advice: This option allows you to produce reduced coordinate values which is especially useful for exporting to VRML files as most VRML viewers have difficulty working smoothly with national-coordinate systems.

If using an alternative coordinate origin, it is recommended to add the offset value to the file name.

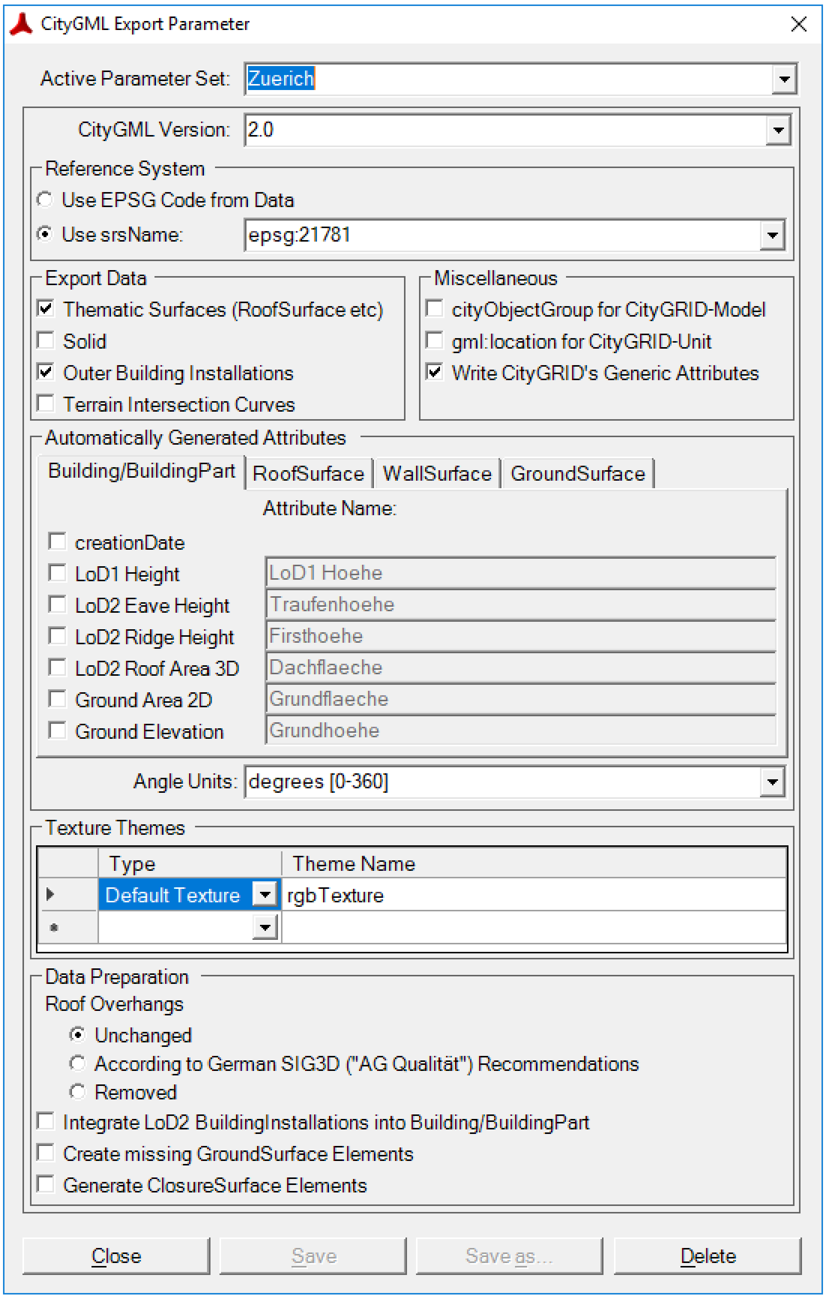
2. By clicking Start the conversion process is started. The button becomes active once all mandatory parameters have been specified. See section 1.1.1 for a description of the process control window.

4.2.2 Advanced CityGML export settings

As an interchange format for city model data CityGML offers over VRML and DXF a set of individual specifications during export. Parameters such as CityGML version, attribute integration to semantic transformations in the buildings to be exported can be defined in its own settings window.

In the export window for CityGML the button Advanced... is available to open the window for the export parameters.

With each City**GRID**® installation a standard set of parameters is supplied, named DEFAULT. Changes to the default parameter set are not possible. Changes at the default export parameters must be saved to a new parameter set when you exit the window. In addition to the default set of parameters an arbitrary number of additional export settings can be stored.



CityGML Export Parameter

Active Parameter Set: Zuerich

CityGML Version: 2.0

Reference System

○ Use EPSG Code from Data

● Use srsName: epsg:21781

Export Data

☑ Thematic Surfaces (RoofSurface etc)

☐ Solid

☑ Outer Building Installations

☐ Terrain Intersection Curves

Miscellaneous

☐ cityObjectGroup for CityGRID-Model

☐ gml:location for CityGRID-Unit

☑ Write CityGRID's Generic Attributes

Automatically Generated Attributes

	Attribute Name:
☐ creationDate	
☐ LoD1 Height	LoD1 Hoehe
☐ LoD2 Eave Height	Traufenhoehe
☐ LoD2 Ridge Height	Firsthoehe
☐ LoD2 Roof Area 3D	Dachflaeche
☐ Ground Area 2D	Grundflaeche
☐ Ground Elevation	Grundhoehe

Angle Units: degrees [0-360]

Texture Themes

	Type	Theme Name
▶	Default Texture	rgbTexture
*		

Data Preparation

Roof Overhangs

● Unchanged

○ According to German SIG3D ("AG Qualität") Recommendations

○ Removed

☐ Integrate LoD2 BuildingInstallations into Building/BuildingPart

☐ Create missing GroundSurface Elements

☐ Generate ClosureSurface Elements

*Note: All parameter sets are stored in the file citygmlexport.ini in the log directory of City**GRID**®. Please provide this file to UVM Systems when you need support with CityGML export.*

- *Active Parameter Set:*

  Invokes the saved export settings. After initial installation, only the default parameter set is available.

- *CityGML Version*:

  Defines which version of CityGML standards shall be written.

- *Reference System:*

  specifies the information about the underlying coordinate system of the dataset.

  - *Use EPSG Code from Data*:

    accesses the stored EPSG code from model (see. 5.1). If no EPSG code was assigned srsName “unknown" will be written to CityGML file.

  - *Use srsName*:

Provides the ability to specify an EPSG code directly. Set EPSG codes at model are ignored thereby. The allowable spellings are listed in the dropdown list. The "#" characters are to be replaced by the user.

- *Export Data*:

  regulates which geometry objects are written at export.

  - *Thematic Surfaces:*

    creates thematic surfaces of the CityGRID® elements for each building. (Roof to RoofSurface, facade to Wall Surface etc.)

  - *Solid*:

    combines all City**GRID**® Elements of one building to one Solid.

  - *Outer Building Installations*:

    exports City**GRID**® Detail Element Complexes.

  - *Terrain Intersection Curves*:

    writes the intersection curve of the buildings.

Note: To see the building data in CityGML export, either Thematic Surface or Solid has to be checked.

- *Miscellaneous:*

  groups parameters not assigned to groups explicitly.

  - *cityObjectGroup for CityGRID Model:*

    generates an independent CityObject group for every exported City**GRID**® Model

  - *gml:location for CityGRID Units:*

    writes a representative insert point of the Unit in CityGML file.

  - *Write CityGRIDs Generic Attributes*:

    exports all existing attributes from City**GRID**® data set.

    *Note: Attributes for Models, Units, Objects, Element Complexes and Elements can be managed by City**GRID**® (see 5.2)*

- *Automatically generated Attributes*

  offers the possibility of certain attributes of the geometry data to be deduced. The attributes are added to the specified complexes. All calculated values, with the exception of basic level (NN) are given in relative height of the building. The attribute name can be defined by the user. Attributes that do not appear useful for certain complexes are grayed out by default.

  - *Creation Date*:

    writes the current date when exporting to the CityGML file.

    Note: Creation date therefore relates to the creation time of the GML file and not the generation of the model itself.

  - *LoD1 Height*:

    calculates the mean of the highest and lowest point of the eave polygon.

  - *LoD2 Eave Height*:

    is the lowest point of the eave polygon.

    Note: If the parameter "Roof overhangs according to German SIG3D ("AG Quality") Recommendations" is set the lowest point of the upper facade polygon is used.

  - *LoD2 Ridge Height:*

    delivers the highest building point as an attribute value

  - *LoD2 Roof Area 3D*:

delivers for each building or each Building Part the sum of the individual roof areas in square meters.

*Note: The calculation uses each LoD2 area. Thus, an area is included under roof details when the surface form was not adjusted accordingly in City**GRID**® (extrusion type "Extrude to parent with holes", or on the penetration analysis, see manual City**GRID**® Modeler)*

- *Ground area 2D*:

  indicates the constructed area of the building in square meters. If floor polygons are present, the area is calculated. Otherwise, the upper edge of the facade polygon serves as a reference. Possibly present courtyards are included in the calculation. If no upper facade line is available, any upward facing surface is used.

- *Ground Elevation:*

  is the lowest point of the building at sea level (based on the used coordinate system).

- *Steepness*:

  defines the slope angle for every polygon. This parameter is only useful at Roof Surfaces.

- *Exposition*:

  indicates rotation of areas towards north direction. Positive values rotate from north through east to south, negative over west. Horizontal surfaces doesn't have set exposition values.

- *Angle Units*:

  determines whether Steepness and Exposition are given in degrees (0-360) or grads (0-400)

  Advice: If generic attributes also have angle values, it is advisable to choose the same angle units for the automatically generated attributes.

- *Texture Themes*

  allows to determine which topics are written to the CityGML file. (c.f. 5.2)

  - *Type*

    offers a choice between the standard color, standard texture and any other texture themes. Standard colors are the set City**GRID**® surface colors (*see* Manual City**GRID**® Modeler), standard texture all previously applied textures and Named Theme is a user defined texture theme (e.g. solar potential)

    Note: At option standard texture standard colors will be used, for untextured areas.

    *Note: Named Texture Themes are currently not supported by City**GRID**®.*

  - *Theme Name*

    specifies the texture theme that was given during automatic texturing.

Data Preparation

offers the possibility models to influence geometry or semantics of the building, before they pass through the CityGML Export.

*Note: Each option of data preprocessing modifies the geometry of the building during the export process, which on the one hand leads to the result being (significantly) different from the City**GRID**® dataset and on the other hand increasing the susceptibility to geometrical errors that can arise from fully automatic processing. The options should therefore be activated only when needed.*

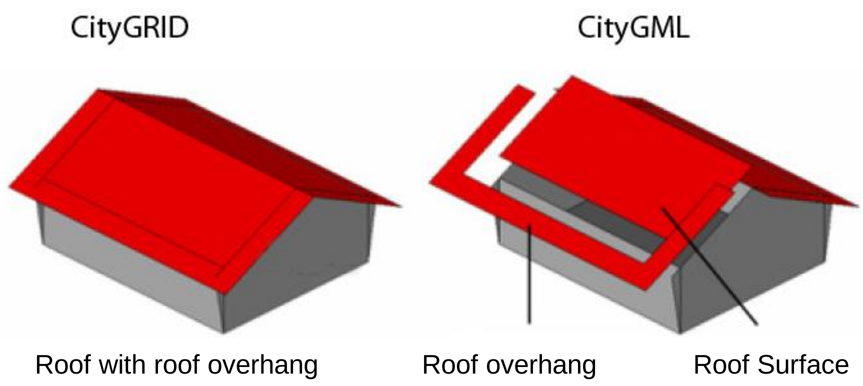
- *Roof overhangs*

  - *Unchanged*

    leaves the roof overhang analogous to the situation in City**GRID**®. The roof areas remain geometrically identical to the original data set (possibly grouped together as coplanar polygons, if the corresponding general export option has been set, see 4.2.1). The roof overhang element of the City**GRID**® dataset, however, remains unconsidered because there is no equivalent in the CityGML data model.

- *according to German SIG ("AG Qualität"):*

  Recommendations modifies existing roof overhangs such that they are becoming independent BuildingParts. City**GRID**® roof overhang elements are dissolved and areas facing towards ground are. Building roof is trimmed to intersection of upper facade polygon and roof faces. The roof overhang fits directly to the so-formed roof element, but forms an independent structure.



- *Removed*

  Modifies existing roof surfaces such that only those parts of the roof are preserved, which can lie within the facade polygons. Roof surfaces and façade surfaces are flush with each other.

- *Integrate LoD2 BuildingInstallations into Building/BuildingPart:*

  checks all Detail Element Complexes for their set LoD. At LoD2 City**GRID**® roof details are converted to individual CityGML Building Parts and crops roof faces underneath the roof details and modifies building semantics accordingly. Thus in CityGML former roof details will appear as part of the main roof.

- *Create missing GroundSurface-Elements:*

  City**GRID**® complexes typically have no floor surface when the facades are extruded to the terrain model. But if floor surfaces (Ground Surfaces) are desired they can be generated during export via this parameter.

- *Generate ClosureSurface Elements:*

  In coplanar surfaces CityGML provides the opportunity to introduce so-called closure surfaces. The coplanar surfaces are dissolved out of the thematic surfaces and stored as separate objects. If necessary, they can be displayed or deliberately omitted. By Closure Surfaces internal surfaces can identified and building with maximum interior room can be produced.

If parameters are changed, al modifications must be stored to active parameter set (button Save) or a new parameter set has to be created (button Save As). During export the most recent parameter set is used. It does not matter whether you exported from City**GRID**® Administrator or Modeler.

4.2.3 Advanced KMZ export settings

In KMZ export window the button Advanced... is available to open the window for the export parameters. The height reference, as well as the underlying coordinate system of the dataset can be defined therein.

Altitude mode

defines placement of Units on Google Earth terrain model.

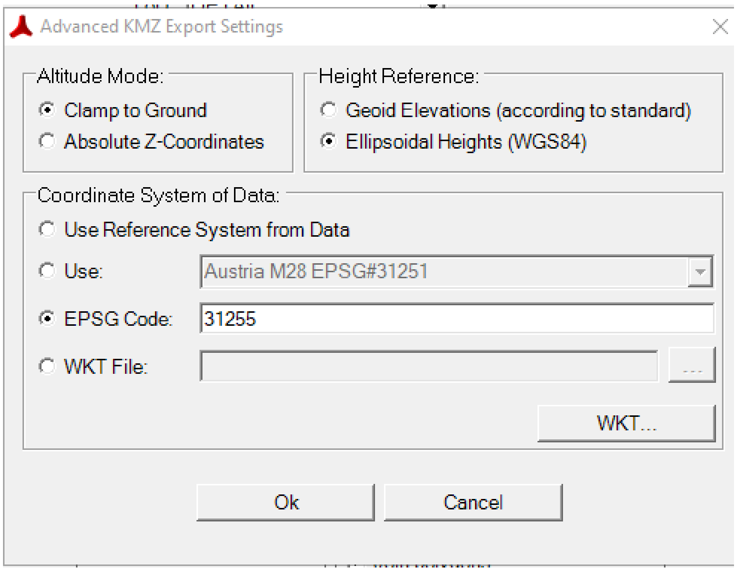
- *Clamp to Ground:*
  Places the units via a central insertion point at the Google Earth terrain model. This will ensure that the building does not float above the ground. The z-coordinate of the insertion point stored in the .kml is ignored.
- *Absolute Z-Coordinates*:
  Uses the existing height values of the Unit to convert it into the coordinate system of Google Earth. Thus, the buildings retain their actual 3D position and altitude accuracy. If the generalized terrain model from Google Earth deviates too much from the used City**GRID**® model, there is a risk that units float, or plunge into the terrain.

Height reference

controls whether the geoid or the reference ellipsoid of WGS84 should be used as elevation reference.

Geoid heights (default): Recommended setting. The WGS 84 geoid is used as an elevation reference.

Ellipsoid heights (WGS84): In rare cases, the WGS 84 reference ellipsoid is used instead of the geoid to translate the elevation values.


Advanced KMZ Export Settings

Altitude Mode:
● Clamp to Ground
○ Absolute Z-Coordinates

Height Reference:
○ Geoid Elevations (according to standard)
● Ellipsoidal Heights (WGS84)

Coordinate System of Data:
○ Use Reference System from Data
○ Use: Austria M28 EPSG#31251
● EPSG Code: 31255
○ WKT File:

Coordinate System of Data

determines which coordinate system is used for translation into geographic coordinate system of Google Earth. (Target coordinate system is always WGS 84)

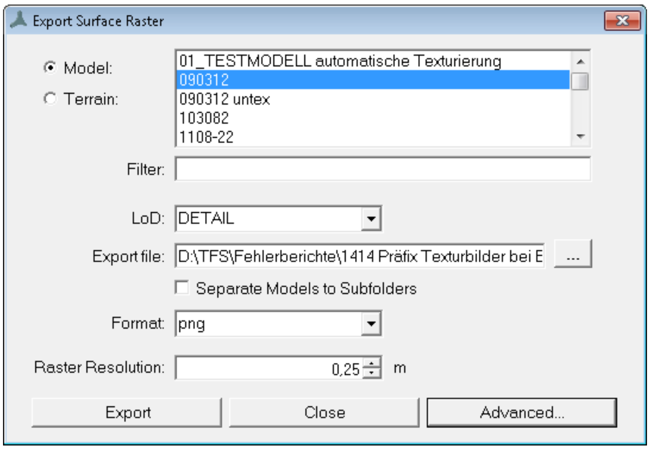
- *Use Reference System from Data:* Uses the information of the coordinate system of the model (c.f. 5.1). If a model coordinate system not set, this method can't be applied.
- *Use:*
  provides a list of currently implemented coordinate systems, from which a suitable system should be chosen.
- *EPSG Code:*
  Allows you to enter a valid EPSG code (http://www.epsg-registry.org/) to define the coordinate system. As input only, the code number is expected.
- *WKT File:*
  Provides the ability to make a coordinate system via a Well Known Text (WKT) file available. The structure of the WKT file can be obtained by selecting a predefined coordinate system (see *Use*).

Note: With the WKT file you can define any coordinate system, regardless of whether there is a valid EPSG code or not. In particular, local offset values can be considered this way.

4.3 Export Raster

The Export Raster function is used for generation of greyscale terrain and surface models from vectoral City**GRID**® data.

1. Open the menu Export and select Raster



Export Surface Raster

● Model:
○ Terrain:

01_TESTMODELL automatische Texturierung
090312
090312 untex
103082
1108-22

Filter:

LoD: DETAIL

Export file: D:\TFS\Fehlerberichte\1414 Präfix Texturbilder bei E

☐ Separate Models to Subfolders

Format: png

Raster Resolution: 0,25 m

2. Select desired export settings.
   - *Model*:

     produces a raster surface model of buildings and terrain data assigned to the selected model.
   - *Terrain:*

     creates a raster terrain model from selected TINs.

     Advice: Use Windows standard mechanisms for multi selection
   - *Filter:*

     Specify a string to restrict the number of entries in the list of model/terrain/image names. The "%" symbol can be used as a placeholder (or wildcard) for strings of any length and "_" as a wildcard representing a single-character string.
   - *LoD:*

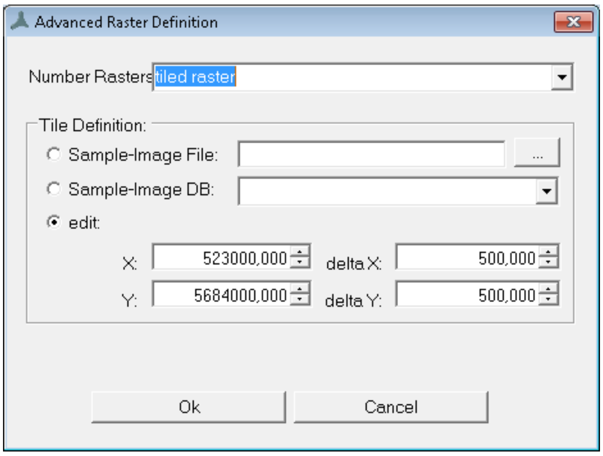
     Specify the generalization of the buildings to be exported. DETAIL (LoD 3) is the highest possible level, BLOCK (LoD 1) represents the lowest. (see Manual City**GRID**® Basics)
   - *Export file:*

     Path for export file. File name is derived automatically from model or terrain name.
   - *Separate Models to Subfolders:*

     writes each model in its own subdirectory of the export path. The directory name is derived from the model name.
   - *Format:*

     Definition of export file format. Currently jpg, png, tif and asc format is supported.
   - *Raster Resolution*:

     Cell size in meter of created raster model.
3. The button Advanced... opens the extended dialogue. Definition of division of surface raster can be made here.



Advanced Raster Definition

Number Rasters: tiled raster

Tile Definition:

○ Sample-Image File:

○ Sample-Image DB:

● edit:

X:	523000,000	delta X:	500,000
Y:	5684000,000	delta Y:	500,000

- *Number Rasters:*

  Determines whether all selected (terrain) models should be combined to one surface raster or tiling shall be applied. If tiled raster is selected, the Tile definition section will be activated.

- *Sample-Image File*:

  offers the possibility to define tile based on an image file with world file. The button ... opens a file browser in which a corresponding file can be selected.

- *Sample-Image DB:*

  lists all Ortho images in the database. Based upon selection the clipping tiles are defined.

- *Edit:*

  displays the clipping grid parameters (seed coordinate and cell size), If required, these parameters can be changed by the user.

Clicking OK the export takes over the entered settings and returns to the general export mask.

! *<u>Note</u>: The tiles formed bear the name of the (terrain) model followed by consecutive numbers. The first number represents the line number, the second the column number.*

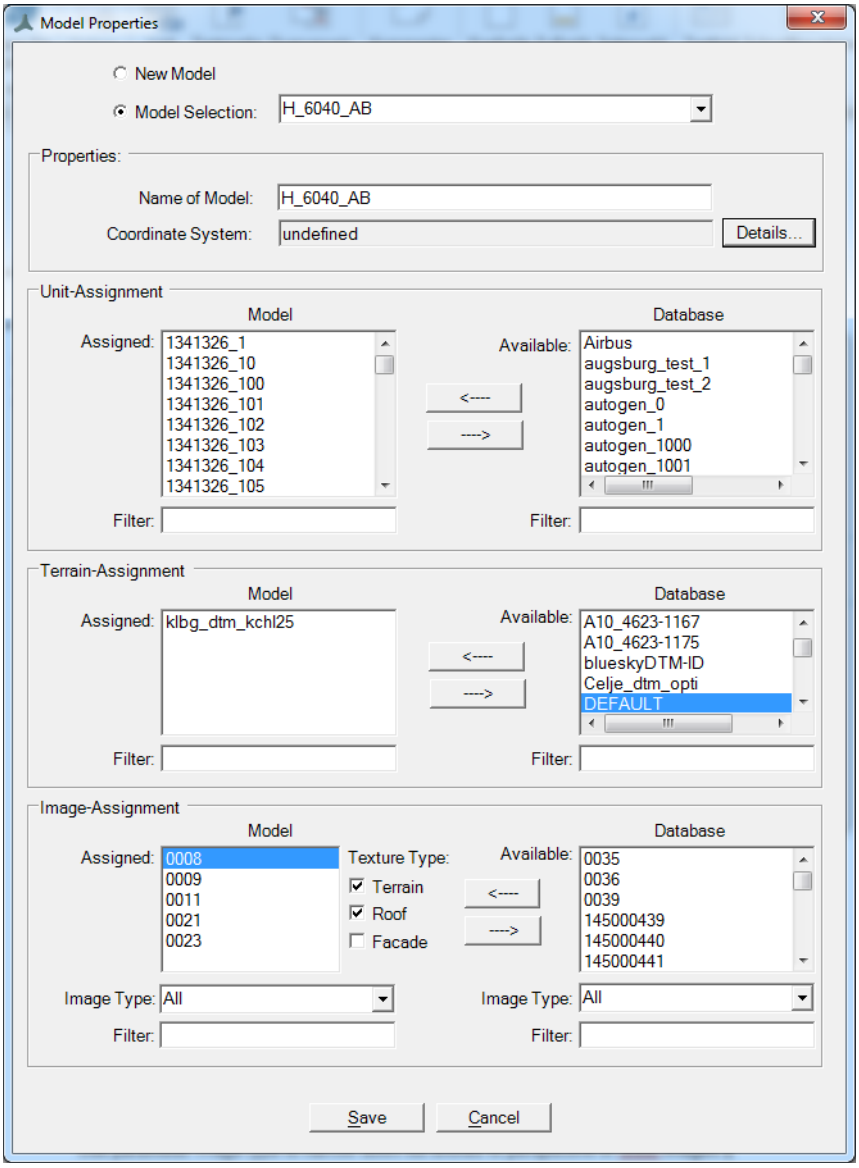
4. By clicking Export the conversion process is started. The button becomes active once all mandatory parameters have been specified. See section 1.1.1 for a description of the process control window.

5 Administration

5.1 Model Properties

Use the **Model Properties** dialog window for configuration of existing models or assembly of new models in the database. The individual sections for the three (optional) components (units, terrain models and model images) of a model are available for detailed configuration.

1. Open the menu **Administration > Model Properties**.



Model Properties

○ New Model

● Model Selection: H_6040_AB

Properties:

Name of Model: H_6040_AB

Coordinate System: undefined

Unit-Assignment

Model – Assigned: 1341326_1, 1341326_10, 1341326_100, 1341326_101, 1341326_102, 1341326_103, 1341326_104, 1341326_105

Database – Available: Airbus, augsburg_test_1, augsburg_test_2, autogen_0, autogen_1, autogen_1000, autogen_1001

Terrain-Assignment

Model – Assigned: klbg_dtm_kchl25

Database – Available: A10_4623-1167, A10_4623-1175, blueskyDTM-ID, Celje_dtm_opti, DEFAULT

Image-Assignment

Model – Assigned: 0008, 0009, 0011, 0021, 0023

Texture Type: ☑ Terrain ☑ Roof ☐ Facade

Database – Available: 0035, 0036, 0039, 145000439, 145000440, 145000441

Image Type: All

Image Type: All

2. Choose whether you want to alter an existing model or generate a *New Model*. In cases where an existing model is to be altered, choose the desired model from drop down list beneath *Model Selection*.
3. In the properties, it is possible to modify the *Name* of the loaded model and specify an EPSG code for the employed horizontal/vertical *Coordinate System*. The code specified here is taken into account when writing a CityGML data set.

Advice: You can find information on EPSG codes at http://www.epsg-registry.org/, for example.

4. Continue with allocation of units, terrain models and model images or rename an existing model. Refer to list *Model* for a full listing of all assigned Units, DTMs and images to the selected model.

   To assign new components to a model create a selection in list *Database* and press [←] button. The selected entries will be transferred from *Database* to *Model* list, symbolizing that the assignment has be carried out.

   Analogous components from a model can be removed by making a selection in *Model* list and hitting button [→]. The selected entries will be transferred back to list *Database*.

   Use *Filter* field to constrict list entries to a given string. Type in any desired string, the entries in list will be filtered to only those components who have the given string somewhere in the name.

   Advice: Lists accept windows standard multi selection methods. In field Filter wildcards can be used for unknown or uncertain spelling of entries names. For example, "_" replaces one character, whereas "%" substitutes an arbitrary number of characters. Using wildcards allows fast discovery of models with slightly different or uncertain spellings.

   For every assigned image the *Texture Type* must be set. Currently *Roof*, *Terrain* and *Facade* are available types. Depending from the set type the image will be treated differently at **Automatic Texturizing** (see 5.2)

   Advice: After assignment of new Images to a model, the images will remain selected in model list for quick setting of Texture type.

   Use parameter *Image type* to narrow down list entries to perspective or ortho images.

   Note: Image type and Filter work in conjunction with each other. Thus, if both parameters are set only those entries will be shown in lists that fulfil both specifications.

5. Press [Save] button to store the model configuration in database.

5.2 Attribute Management

5.2.1 Attribute Table

Besides building semantics and geometry attributes can also be managed with City**GRID**®. These attributes can be assigned to each hierarchical level. In order to set and inspect the attributes an attribute table can be opened, from the City**GRID**® Administrator and City**GRID**® Modeler (see manual City**GRID**® Modeler).

Via attribute table attributes can be set, inspected, altered and deleted. New attribute columns can also be created and existing deleted. Depending on hierarchy level displayed content of attribute table may vary, but basic functionality remains always the same.

The attribute list is made up of the following components:

- *Model:*

  Selection of all existing models in the data source. One entry of the model list can be selected. Immediately after selecting a model, the associated units appear in the Unit list.

- *Units:*

  Displays all the Units from selected model. To view the Unit attributes perform a selection by standard Windows methods.

  Note: The unit list is not available for model attributes.

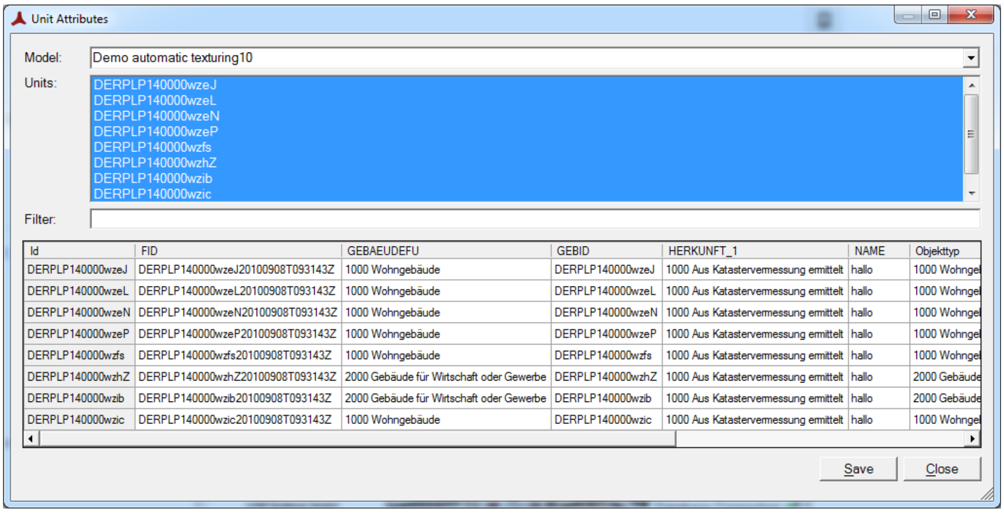
- *Filter:*

  You can specify a string to restrict the number of entries in the list. The "%" symbol can be used as a placeholder (or wildcard) for strings of any length and "_" as a wildcard representing a single-character string.

- *Attribute table*:

  Displays the attributes of the selected complexes (model - element complex) and allows you to change and to create new or delete existing attributes.

The button Save establishes incurred changes, Close terminates the attribute overview.



Unit Attributes

Model: Demo automatic texturing10

Units: DERPLP140000wzeJ
DERPLP140000wzeL
DERPLP140000wzeN
DERPLP140000wzeP
DERPLP140000wzfs
DERPLP140000wzhZ
DERPLP140000wzib
DERPLP140000wzic

Filter:

Id	FID	GEBAEUDEFU	GEBID	HERKUNFT_1	NAME	Objekttyp
DERPLP140000wzeJ	DERPLP140000wzeJ20100908T093143Z	1000 Wohngebäude	DERPLP140000wzeJ	1000 Aus Katastervermessung ermittelt	hallo	1000 Wohngel
DERPLP140000wzeL	DERPLP140000wzeL20100908T093143Z	1000 Wohngebäude	DERPLP140000wzeL	1000 Aus Katastervermessung ermittelt	hallo	1000 Wohngel
DERPLP140000wzeN	DERPLP140000wzeN20100908T093143Z	1000 Wohngebäude	DERPLP140000wzeN	1000 Aus Katastervermessung ermittelt	hallo	1000 Wohngel
DERPLP140000wzeP	DERPLP140000wzeP20100908T093143Z	1000 Wohngebäude	DERPLP140000wzeP	1000 Aus Katastervermessung ermittelt	hallo	1000 Wohngel
DERPLP140000wzfs	DERPLP140000wzfs20100908T093143Z	1000 Wohngebäude	DERPLP140000wzfs	1000 Aus Katastervermessung ermittelt	hallo	1000 Wohngel
DERPLP140000wzhZ	DERPLP140000wzhZ20100908T093143Z	2000 Gebäude für Wirtschaft oder Gewerbe	DERPLP140000wzhZ	1000 Aus Katastervermessung ermittelt	hallo	2000 Gebäude
DERPLP140000wzib	DERPLP140000wzib20100908T093143Z	2000 Gebäude für Wirtschaft oder Gewerbe	DERPLP140000wzib	1000 Aus Katastervermessung ermittelt	hallo	2000 Gebäude
DERPLP140000wzic	DERPLP140000wzic20100908T093143Z	1000 Wohngebäude	DERPLP140000wzic	1000 Aus Katastervermessung ermittelt	hallo	1000 Wohngel

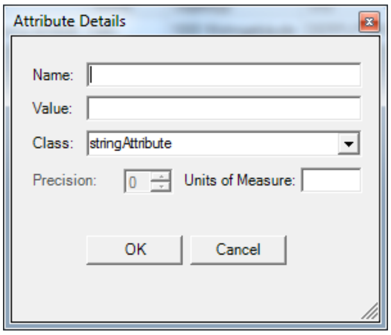
*Note: For automated filling of attributes from external data the FME City**GRID**® Writer can be used. In order to develop a customized solution, please contact your advisor at UVM Systems Contact.*

5.2.2 Create new attribute column

1. Select Model and eventually Unit selection.
2. In the attribute table right-click an existing column header (z. B. ID) and select *New Column*.
3. Define *Column name* and *data class* in Attribute Details window. Available classes:
   a. *String*: arbitrary text strings
   b. *Date*: Date in all common spellings
   c. *Double*: Point numbers, the number of decimal places can be defined under *Accuracy*.
   d. *Integer*: integer values
   e. *Boolean*: True (1) / False (0)
   f. *List*: Attribute, which in turn contains a list of the attributes listed above.

   Define *Units of Measure* (UOM) for all numeric attributes.

   Specify *Value* at column definition if applicable. This value will spread over all selected list entries.
4. Click OK for creation of column, or Cancel to discard changes.



Attribute Details

Name:

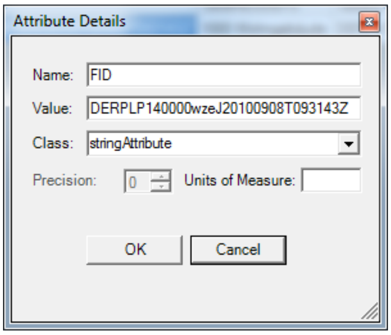
Value:

Class: stringAttribute

Precision: 0 Units of Measure:

5.2.3 Modify existing attribute column

1. Select Model and eventually Unit selection.
2. Right click an existing column header, besides ID, and select *Edit*.
3. The changes can now be made.



Attribute Details

Name: FID

Value: DERPLP140000wzeJ20100908T093143Z

Class: stringAttribute

Precision: 0 Units of Measure:

Note: Changes to the data class are allowed only if existing values don't interfere with new data class.

4. Click OK to confirm, or Cancel to discard changes.

5.2.4 Delete existing attribute column

1. Select Model and eventually Unit selection.
2. Right click an existing column header, besides ID, and select *delete column*.

5.2.5 Select (and modify) column entries

1. Select Model and eventually Unit selection.
2. Right click an existing column header, besides ID, and select *select column*. All fields are highlighted by this action.
3. Right click a selected field and chose *edit* to alter value or *delete* to empty selected fields.
4. In case of *edit* click OK to confirm new values, or Cancel to discard changes.

Advice: Cells can be selected / deselected via standard Windows mechanisms.

5.2.6 Sorting columns

1. Select Model and eventually Unit selection.
2. Left click an existing column header. A small triangle is showing up, indicating that sorting is based upon this column now. Displays the tip upwards there is a rising order. Clicking again on the same column header will change the sort order to descending order.

5.2.7 Model Attributes

This menu item allows the attributes of a selected model to adapt.

1. Click menu **Administration>Attributes>Model Attributes**.
2. Select desired model from list.
3. Perform changes (see 5.2.1 - 5.2.5)

5.2.8 Unit Attributes

This menu item allows the attributes of selected units of a selected model to adapt.

4. Click menu **Administration>Attributes>Model Attributes**.
5. Select desired model from list.
6. Select Units from list for attributes modification.
7. Perform changes (see 5.2.1 - 5.2.5)

Note: Unit list contains all Units of a model, regardless of its current status in database. Thus, torn down and disabled Units will also show up in Unit list.

Note: Unit attributes affect the entire Unit *and are therefore of the Unit versions independently. When creating a new Unit, the Unit attributes therefore do not change.*

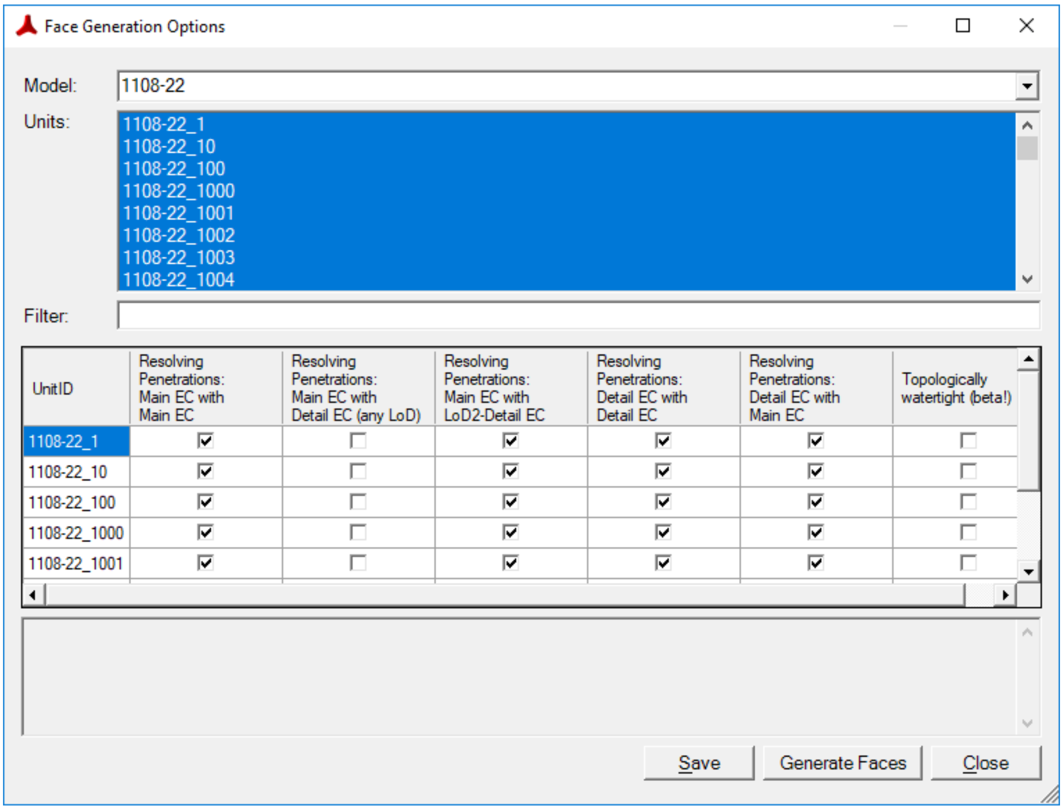
Note: In the attribute list all attribute columns of occurring Units are always displayed, regardless of whether each Unit does or does not support this column.

Analog is true if different attribute definitions (class accuracy, units) occur within a column selection. In the properties window value shows „different“ if a new value is entered, this value will replace all existing values.

5.3 Face generation options of Penetration Analysis

CityGRID® derives faces by default from the line structure of the building models (see. Manual CityGRID® Basics). Depending on the accuracy of restitution buildings can thus overlap and form surfaces inside of another structural body. To remove these commonly unwanted faces, Penetration Analysis is available. It is an extension of the triangulation algorithm, for detection and removal of interior face sections. Penetration analysis affects element complexes, the face generation options of surface manipulation (see. Manual CityGRID® Basics) can be adjusted individually.

The face generation options window consists of the following components:



Face Generation Options

Model: 1108-22

Units:
1108-22_1
1108-22_10
1108-22_100
1108-22_1000
1108-22_1001
1108-22_1002
1108-22_1003
1108-22_1004

Filter:

UnitID	Resolving Penetrations: Main EC with Main EC	Resolving Penetrations: Main EC with Detail EC (any LoD)	Resolving Penetrations: Main EC with LoD2-Detail EC	Resolving Penetrations: Detail EC with Detail EC	Resolving Penetrations: Detail EC with Main EC	Topologically watertight (beta!)
1108-22_1	☑	□	☑	☑	☑	□
1108-22_10	☑	□	☑	☑	☑	□
1108-22_100	☑	□	☑	☑	☑	□
1108-22_1000	☑	□	☑	☑	☑	□
1108-22_1001	☑	□	☑	☑	☑	□

Model: Selection of all existing models in the data source. One entry of the model list can be selected. Immediately after selecting a model, the associated units appear in the Unit list.

Units: Displays all the Units from selected model. To view the Unit attributes perform a selection by standard Windows methods.

Filter: You can specify a string to restrict the number of entries in the list. The "%" symbol can be used as a placeholder (or wildcard) for strings of any length and "_" as a wildcard representing a single-character string.

Face generation options: Shows options of Penetration Analysis of selected Units.

Note: See Manual CityGRID® Basics for explanation of available face generation options together with sample figures.

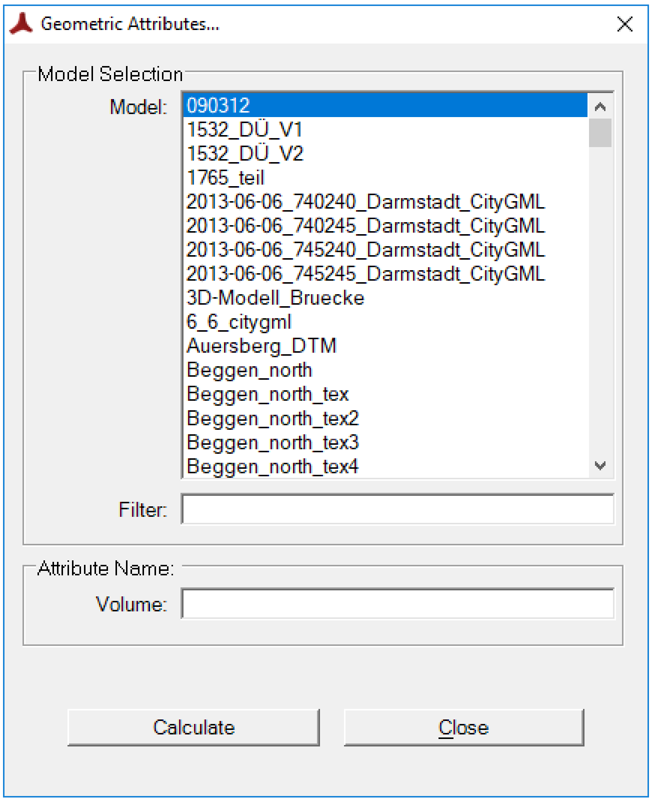
Advice: Click column header to set option for all listed Units.

Button Save stores changed options, Generate Faces saves the changes and immediately triangulates all changed units in the database. Close quits window face generation options.

Note: During the action Generate Faces *the existing version of the unit is changed, but no new version is created.*

5.4 Geometric Attributes

From City**GRID**® buildings geometric attributes can be calculated and saved as independent Units attributes. These attributes are created by a stand-alone process and establish a new Unit version in database. In case of geometric changes of the Unit, for example in City**GRID**® Modeler, no new derivation of the values takes place. Only by executing the function again geometric attributes will be updated.



Model:
090312
1532_DÜ_V1
1532_DÜ_V2
1765_teil
2013-06-06_740240_Darmstadt_CityGML
2013-06-06_740245_Darmstadt_CityGML
2013-06-06_745240_Darmstadt_CityGML
2013-06-06_745245_Darmstadt_CityGML
3D-Modell_Bruecke
6_6_citygml
Auersberg_DTM
Beggen_north
Beggen_north_tex
Beggen_north_tex2
Beggen_north_tex3
Beggen_north_tex4

1. Make a Model selection:

   Model: Selection of all existing models in the data source. Windows selection methods can be used to make multiple selections.

   Filter: Provides the ability to filter models by strings to make selection easier. Inputs are evaluated immediately.

2. Assign attribute name:

   Volumen: Defines the attribute name for the calculated volume value of the Unit in m^3. When calculating the volume, the following parameters must be considered:

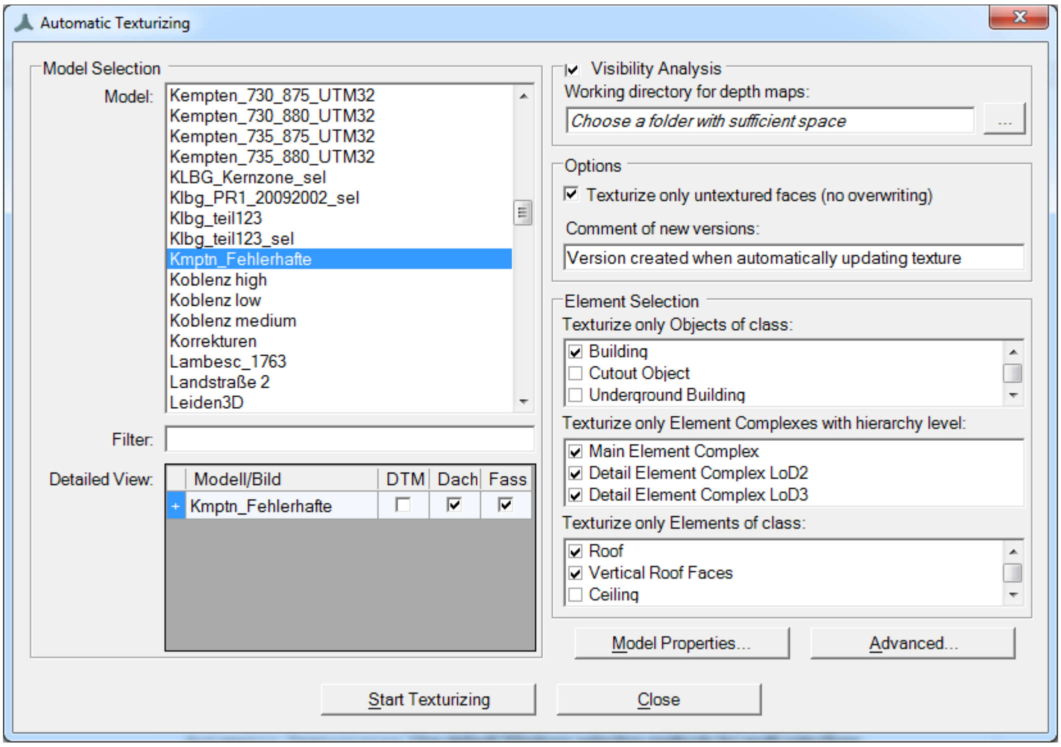
   - All surfaces used enclose one (or several non-penetrating) bodies. Each surface may occur exactly once and must have a correct surface normal. Internal surfaces or holes are not allowed. Coincident surfaces with the same surface normal have no influence on the result.
   - Roof details that do not cut a hole in the parental roof are not considered. However, if they cut a hole in the parental roof (extrusion type parent element with hole, or face generation option Main EC with Detail EC (all LoD) or Main EC with LoD2 Detail EC, see 5.3), they will take on the volume calculation part.
   - Element complexes that have no floor are then calculated correctly when their facade surfaces are extruded to the lowest possible height. Thus, if the terrain is not horizontal and there are multiple ECs, a slightly corrupted value may arise.

3. Click Calculate to start the process. The geometric attributes are now determined Unit by Unit and stored in the City**GRID**® database. In this context, a new version is created for each Unit.

5.5 Automatic Texturizing

If new model images are assigned to a model, no changes are made to the units of the model. To texture the units from the model images, the process `Automatic Texturizing` must be carried out. During this process, every unit will be checked out from database, the corresponding texture is derived by re-projection of the geometry into the image, and finally the unit is saved and checked in again (if desired).

1. Open the menu **Administration > Automatic Texturizing**.
2. Define Model Selection:
   - In list *Model* all available models in the database are shown, that can be processed by Start Texturizing. Use default Windows selection methods for multi selections in this list. Start Texturizing will be applied to all selected entries.
   - Field *Filter* offers the possibility to narrow down list to a given string.
   - *Detailed View* shows for a selected model (or if more than one is selected, the first model will be displayed here) the assigned model images and the set Texture Type. Press "+" symbol in front of the model name to open detailed view on the model images. For changes to the assigned images press Model Properties... button to open **Model Properties** window. (see 5.1)



Model:
- Kempten_730_875_UTM32
- Kempten_730_880_UTM32
- Kempten_735_875_UTM32
- Kempten_735_880_UTM32
- KLBG_Kernzone_sel
- Klbg_PR1_20092002_sel
- Klbg_teil123
- Klbg_teil123_sel
- Kmptn_Fehlerhafte
- Koblenz high
- Koblenz low
- Koblenz medium
- Korrekturen
- Lambesc_1763
- Landstraße 2
- Leiden3D

Detailed View:

Modell/Bild	DTM	Dach	Fass
+ Kmptn_Fehlerhafte	□	☑	☑

☑ Visibility Analysis

Working directory for depth maps: *Choose a folder with sufficient space* ...

Options

☑ Texturize only untextured faces (no overwriting)

Comment of new versions: Version created when automatically updating texture

Element Selection

Texturize only Objects of class:
- ☑ Building
- □ Cutout Object
- □ Underground Building

Texturize only Element Complexes with hierarchy level:
- ☑ Main Element Complex
- ☑ Detail Element Complex LoD2
- ☑ Detail Element Complex LoD3

Texturize only Elements of class:
- ☑ Roof
- ☑ Vertical Roof Faces
- □ Ceiling

3. Visibility Analysis

   By request a visibility analysis can be performed prior to an automatic texturizing. During this process all hidden areas in model images by objects in database are identified. Visibility analysis can improve visual results of automatic texturizing significantly, especially in combination with oblique images, by avoiding mapping of neighbouring buildings parts to façade areas.

   For every building in database the hidden sections in model images are marked and stored as so-called depths maps. The user has to specify the working directory for these depths maps.

   Once derived depths maps can be reused as long as the creation date of the maps is younger than the creation date of the image and der used unit versions.

   Note: Depth maps require large quantities of free space on disk. Take care when specifying the working directory that enough free disk space is available. Activation of visibility analysis extends time consumption of automatic texturizing process significantly.

Note: Deph maps must be recreated under one of the following conditions:

- If new units have been created in the database
- If the search tree has been rebuilt in City**GRID**® Administrator
- If the model selection of the visibility analysis in the extended window has been changed.

4. Define *Options*:

- *Texturize only untextured faces (no overwriting)* prevents already textured faces from being textured again during Automatic Texturizing. If checked, only those faces will be treated during Automatic Texturizing that don't carry texture information.

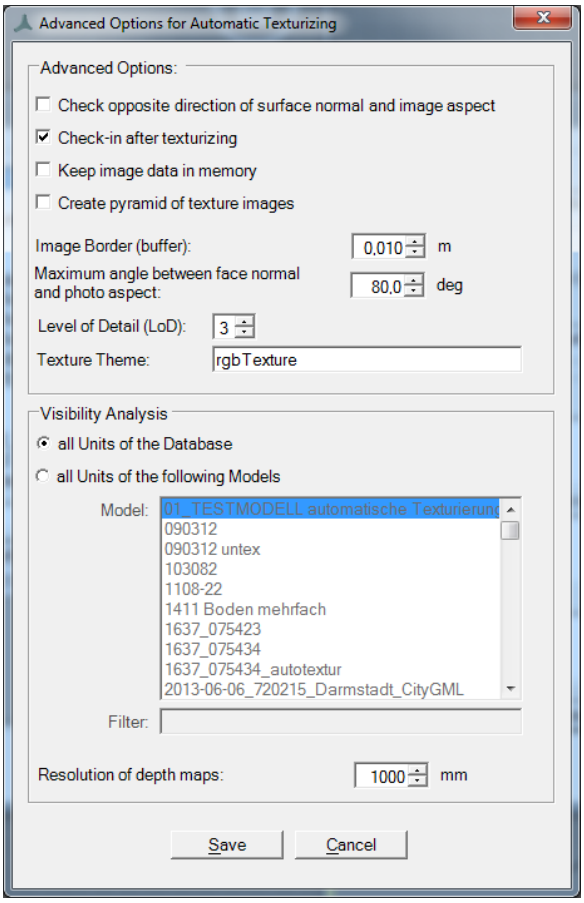
  Note: Interactively applied textures are always excluded from this setting and are never modified by automatic texturizing. As a result, it is possible to automatically texturize all the untextured faces of interactively texturized models or to subsequently modify the automatically texturized faces without losing the interactively applied textures.

- *Comment of new versions* defines which comment text will be written back as the textured units are checked in into the database.

5. Define Element Selection

- *Texture only Objects of class* specifies on which City**GRID**® Object Classes (see Manual City**GRID**® Basics) Automatic Texturizing will have an impact. Typically "Building" is checked here.
- *Texturize only Elements of class* narrows down Automatic Texturizing on the selected City**GRID**® Elements (see Manual City**GRID**® Basics)

6. Optionally press [Advanced...] button for additional parameter settings. Options set here will be saved and reused at every restart of Automatic Texturizing, until they are redefined by the user.



Advanced Options for Automatic Texturizing

Advanced Options:

☐ Check opposite direction of surface normal and image aspect

☑ Check-in after texturizing

☐ Keep image data in memory

☐ Create pyramid of texture images

Image Border (buffer): 0,010 m

Maximum angle between face normal and photo aspect: 80,0 deg

Level of Detail (LoD): 3

Texture Theme: rgbTexture

Visibility Analysis

● all Units of the Database

○ all Units of the following Models

Model:
01_TESTMODELL automatische Texturierung
090312
090312 untex
103082
1108-22
1411 Boden mehrfach
1637_075423
1637_075434
1637_075434_autotextur
2013-06-06_720215_Darmstadt_CityGML

Filter:

Resolution of depth maps: 1000 mm

- *Check opposite direction of surface normal and image aspect*: If this parameter is set, only those faces will be textured where the face normals and image aspect have different orientations.

  Advice: Uncheck this parameter if protrusion faces are to be textured from model images during Automatic Texturizing.

- *Check-in after texturizing*: defines if processes units shall be checked in into database again.
- *Keep image data in memory*: If set, all model images will be loaded into memory of your computer at full resolution. By doing so a significant improvement of performance can be realized, as multiple units, covered by one image will not need to reload the image at run time. If not set, each unit must load its corresponding image, calculate the needed section for texturizing and unload the image from RAM.

  Note: Select this parameter for models with a small number of assigned model images. If the image data can't be stored in RAM, Windows will swap data into virtual memory, which will eliminate the speed advantage completely.

- *Image Border (buffer):* Defines the additional border of the cut texture image. The smaller the value is, the more accurate CityGRID® cuts the texture images, which reduces data consumption. At the same time, the scope for subsequent changes to the geometry decreases, without losing texture.

  Note: The edge should not be less than 0.01 m to ensure that the texture image is always greater than the surface to be textured.

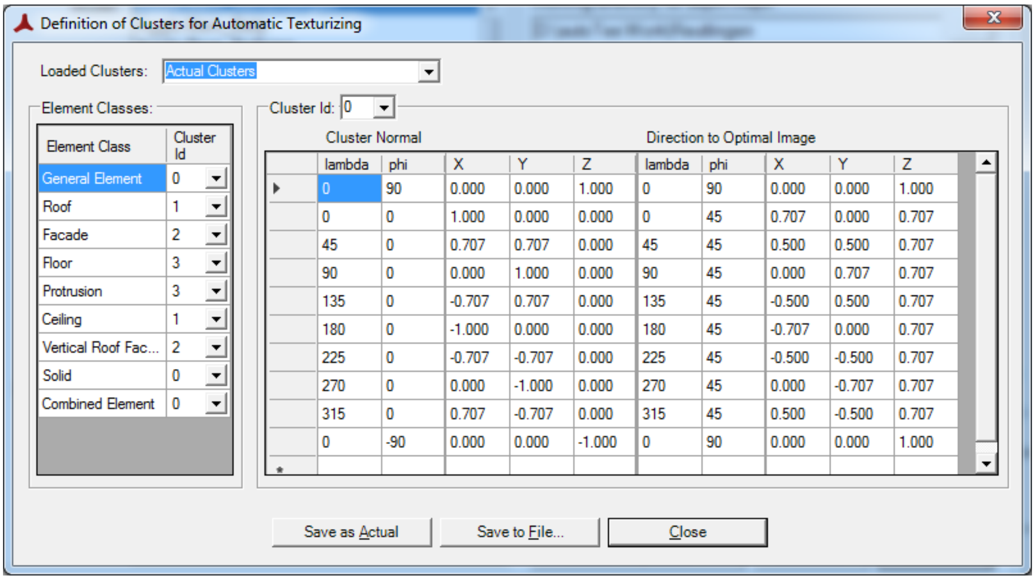
- *Maximum angle between face normal and photo aspect*: defines the largest allowed angle between the face normal and the image aspect to be accepted for automatic texturizing. The smaller the value is the smaller are the distortion effects of the applied texture. However this increases the chance that no suitable image can be found.
- *Level of Detail:* controls the maximum level of detail of buildings, the texturing is carried out.
- *Texture Theme*: Provides the ability to give a name attribute to applied texture. Every Unit can have assigned multiple textures themes. During export the desired theme can be specified

  *Note: Texture Themes are currently not supported by City**GRID**®.*

- *Visibility Analysis*: Define the models the analysis should be applied to.
- *Resolution of visibility maps*: specify the pixel size of the depths maps. This value corresponds to the smallest parts that will be considered during visibility analysis.

  Note: the smallest meaningful value should not be lower than the average pixel size of the model images

7. The button Cluster... opens a window in which the desired directions of the surface clusters can be determined. During automatic texturing surfaces are grouped based upon the direction of their surface normal and assigned to the surface clusters. By doing so the optimal geometric aerial image can be computed. In order to take account of camera configurations of aerial surveying adaptation of the cluster sometimes might become necessary, especially when oblique aerial photos exist without nadir images.



Definition of Clusters for Automatic Texturizing

Loaded Clusters: Actual Clusters

Element Classes:

Element Class	Cluster Id
General Element	0
Roof	1
Facade	2
Floor	3
Protrusion	3
Ceiling	1
Vertical Roof Fac...	2
Solid	0
Combined Element	0

Cluster Id: 0

Cluster Normal					Direction to Optimal Image				
lambda	phi	X	Y	Z	lambda	phi	X	Y	Z
0	90	0.000	0.000	1.000	0	90	0.000	0.000	1.000
0	0	1.000	0.000	0.000	0	45	0.707	0.000	0.707
45	0	0.707	0.707	0.000	45	45	0.500	0.500	0.707
90	0	0.000	1.000	0.000	90	45	0.000	0.707	0.707
135	0	-0.707	0.707	0.000	135	45	-0.500	0.500	0.707
180	0	-1.000	0.000	0.000	180	45	-0.707	0.000	0.707
225	0	-0.707	-0.707	0.000	225	45	-0.500	-0.500	0.707
270	0	0.000	-1.000	0.000	270	45	0.000	-0.707	0.707
315	0	0.707	-0.707	0.000	315	45	0.500	-0.500	0.707
0	-90	0.000	0.000	-1.000	0	90	0.000	0.000	1.000

- *Loaded Clusters* offers a choice of preset cluster definitions, and the definition currently in use. From the list, select the appropriate default cluster definition that corresponds to the present camera configuration. Optional use menu entry *Load clusters from file* to import an individual parameter set.
- *Element Classes:* lists all available feature classes with the assigned cluster ID. By selecting an element class cluster definition appears in the right pane. If needed, the cluster ID can be changed.
- *Cluster Id:* displays the specification of the selected cluster. Each cluster is divided into parameters of *Cluster Normal*, and the *Direction to Optimal Image*. Both sets of parameters include the orientation in the XY plane (lambda) as the angle value of N by O to S, as well as the elevation angle (phi) and additionally the normal vector (X / Y / Z). These parameters are used to determine the geometrically optimal image for automatic texturing.
- Save as Actual transmits the parameter set displayed into the CityGRID.ini file.

  Note: The displayed parameter set is only applied if Button "Save as Actual" is hit. The selection of the charged cluster alone is not sufficient to change the parameter set for automatic texturing.

  For safety reasons make sure changes have been applied to the ini file by switching to “Actual Cluster” at Loaded Clusters selection.
- Save to File... provides the ability to write the parameter set displayed on a file. Such generated files can be uploaded in the cluster list by selecting "Load cluster from file".

8. Press Start Texturizing to initialize the texture process. The message window appears if specified in Settings menu (see 1.1) Keep in mind that Automatic Texturizing can take from a few minutes up to several hours, depending on the unit count.

Note: Updating the roof texture can include several roof texture images and therefore texture large parts of urban area at once. If several texture images are assigned to a model, the following rules should be kept in mind:

- Perspective images are used prior to ortho photos for calculating the roof texture.
- If perspective aerial images are used, a 5% band will be removed to ensure that the fiducial marks are excluded from the texture.
- The image will be chosen, so that the parallax effect is minimal. (The Images will be sorted ascending by the angle between the element centre point beam to the projection centre of the picture and the extrusion direction of the elements.

Note: If during `Automatic Texturizing` an error appears (e.g. because the roof lies outside of the texture image), an error message is written to the Administrator log file and the affected unit remains untouched.

Note: If several models were selected for automatic texturing, each model is processed by itself in a separate process. In case of problems with a model the remaining models are not affected.

5.6 Delete

5.6.1 Delete Model

Via **Administration > Delete Model** existing models in database can be deleted. In list *Model* all available models in database are listed. All selected entries will be deleted by clicking at the button n Delete .The field *Filter* offers the possibility to narrow down list to a given string chain.

Advice: Lists accept windows standard multi selection methods. In field Filter wildcards can be used for unknown or uncertain spelling of entries names. For example, "_" replaces one character, whereas "%" substitutes an arbitrary number of characters. Using wildcards allows fast discovery of models with slightly different or uncertain spellings.

Note: When deleting models in a database using this function only the assignment of units, terrain models and model images are actually deleted. The data itself is not affected by this operation! There are different functions available for deleting data itself.

5.6.2 Delete DTM

By choosing **Administration >Delete > Delete DTM**, a menu can be opened in which all terrain models, which are present in the database, are displayed. By selecting a DTM, it can be seen in the status bar by how many and which models the terrain model is being used by. Terrain models, which are not assigned to a model can be deleted. Additionally, for every terrain model the available versions are displayed. Use the checkboxes prior to the version to remove them from delete state. The assignment of terrain models to models takes place in Model Properties window (see 5.1) or in City**GRID**® Modeler.

5.6.3 Delete Images T

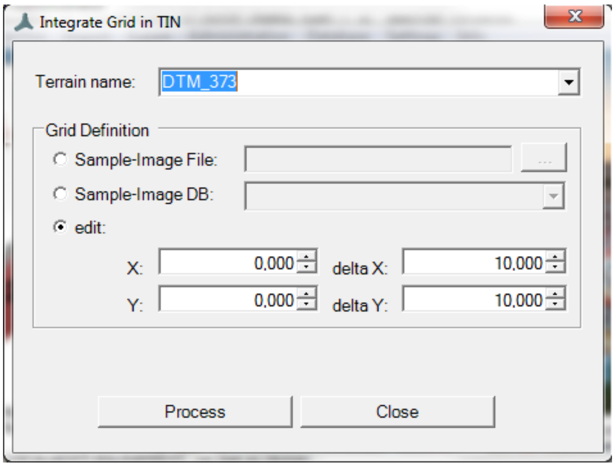
By choosing **Administration >Delete > Delete Image** a menu can be opened in which all aerial images (perspective images and ortho photos), which are present in the database, are displayed. By selecting an aerial image, it can be seen in the status bar by how many and which models the image is being used. Aerial images which are not assigned to a model can be deleted. Additionally, for every aerial image the available versions are displayed. Use the checkboxes prior to the version to remove them from delete state. The assignment of aerial models to models takes place in Model Properties window (see 5.1) or in City**GRID**® Modeler.

5.7 Edit DTM

A function for the manipulation of stored terrain models in the database.

5.7.1 Integrate GRID in TIN E

The function *Integrate Grid in TIN* allows you to integrate a continuous grid data set (i.e. aerial image extents) into a database stored terrain model. Because only one image can be assigned to any TIN triangle, it is necessary to split triangles where multiple texture images are required.



Integrate Grid in TIN

Terrain name: DTM_373

Grid Definition

○ Sample-Image File:

○ Sample-Image DB:

● edit:

X: 0,000 delta X: 10,000

Y: 0,000 delta Y: 10,000

1. Open menu **Administration > Edit DTM > Integrate Grid in TIN**

   Terrain name: Choose an already imported terrain model from database (see 3.1)

   Grid Definition: Define the grid that should be computed by selecting an ortho photo with corresponding (name-unique) world file or by specifying X/Y coordinates of intersection point and delta X/delta Y. Use the same unit scale like the imported terrain model.

   Note: Based on the intersection point an infinite grid is computed and mapped to the terrain model. By doing so it is irrelevant if the intersection point is lying within the terrain model.

   When utilizing a sample image, in general an ortho photo in format .tif or .jpg is used, it is also irrelevant if the image is lying over the terrain model.

2. Click Process to start.

   A new version from the selected terrain model with the integrated grid lines is created and saved to the database. Terrain name remains the same and all models that use this terrain model are updated to the latest version.

   *Advice: Depending on the terrain model size integration of grid into TIN can take some time. During the operation the database can be used for other City**GRID** applications.*

5.7.2 Synchronise TIN E

Use this function to correct different heights along a shared border between two adjacent terrain models that is identical in 2D, but not 3D.

Note: This function only corrects inhomogeneous Z-coordinates but doesn't change anything at the X/Y position if the TINs. All input data must therefore have 2D identical boarder lines.

1. Open menu **Administration > Edit DTM >**and select **Synchronise TIN** for **two** or **more TINs**

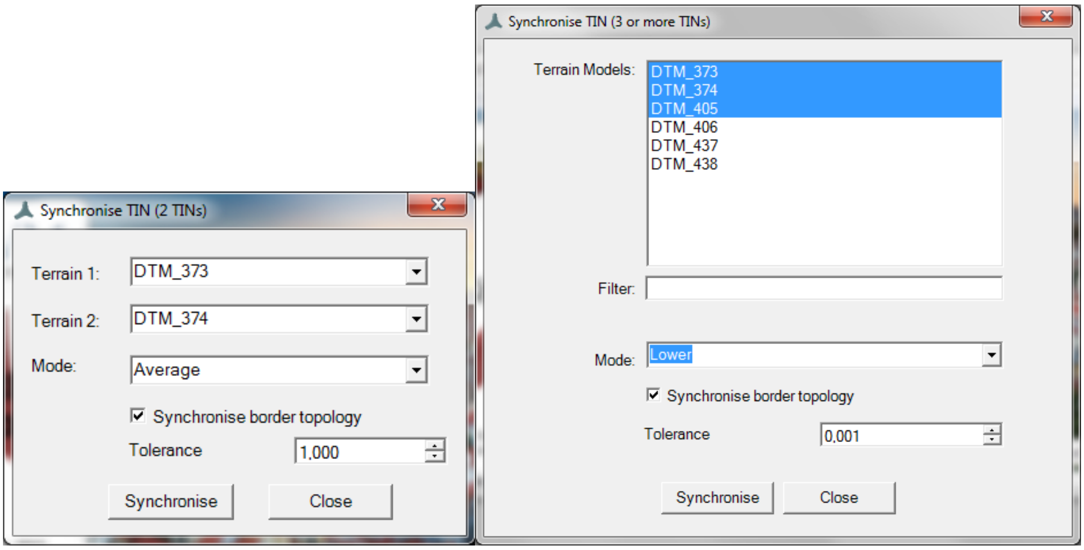
   Terrain 1 and *2* or *Terrain Models*: Select a previously imported terrain model from the database (see 4) for height correction.

   Mode: Defines how the height correction should be applied to each border line vertex. These methods are available:

   - *Lower*: Takes the smallest found height value for both TINs.
   - *Upper*: Takes the largest found height value for both TINs.
   - *Average*: Calculates the average height from both Z-coordinates.
   - *Terrain 1/2*: Takes the heights from the specified TIN. (only for two TINs available)

   Synchronise border topology: Adjusts the terrain models at the border line and takes care that border line vertices are synchronized in effected terrain models.

Tolerance: Defines the accuracy of *synchronise border topology*. Define this value upon the accuracy of your terrain models.



Synchronise TIN (2 TINs)

Terrain 1: DTM_373

Terrain 2: DTM_374

Mode: Average

☑ Synchronise border topology

Tolerance 1,000

Synchronise TIN (3 or more TINs)

Terrain Models: DTM_373, DTM_374, DTM_405 (selected); DTM_406, DTM_437, DTM_438

Filter:

Mode: Lower

☑ Synchronise border topology

Tolerance 0,001

Note: In case the tolerance value was set too high, the algorithm will post a warning and automatically calculates the highest possible value. You can accept this value and continue with the synchronisation or exit the process.

2. By clicking at Synchronise the conversion process is started. See section 1.1.1 for a description of the process control window

Note: Every processed terrain model will be versioned in database. Models using these terrain models are updated automatically and will always use the most actual version of the terrain model found in database.

5.8 Historic Versions

To make it possible to map building histories, certain unit versions in the database can be assigned the version class "historic version". Unlike the processing versions, which are used primarily for intermediate backups of progressive modelling states, historic versions can be used to construct chronologies. This makes it possible to map changes to the construction situation over certain periods. Historic versions are characterized by the fact that they can have a start and end date. (*see City**GRID**® Basics Manual*)

Initially, every newly created unit version in the database is a processing version which can be converted into a historic version using the dialog box described here. It is also possible to convert a historic version back to a state in which it can be processed in this dialog box.

1. To do this, open the menu **Administration > Historic Versions ...**.

Model: Select a model from the list. The last valid version of each unit in this model is assigned the selected version class. By contrast, older versions of a unit remain unchanged. You can also use the Windows standard selection mechanisms to select multiple model names.

Filter: You can specify a string to restrict the number of entries in the list of model names. The "%" symbol can be used as a placeholder (or wildcard) for strings of any length and "_“ as a wildcard representing a single-character string.

Set last valid version: Specifies how these versions are to be administered in the future in the CityGRID® database.

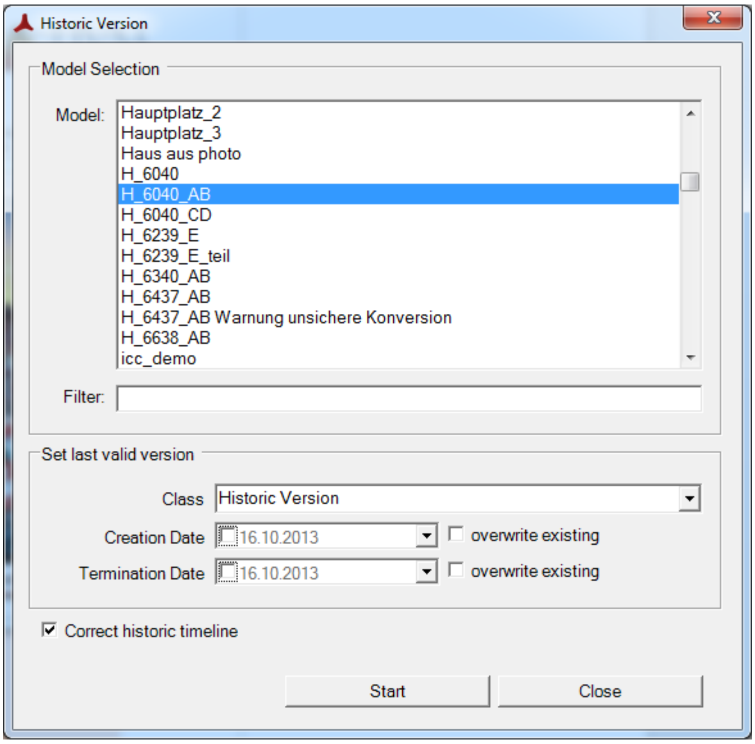
- *Class:* Specifies the version class to which the last valid version is to be assigned. Versions can belong to the classes "processing version" and "historic version" (see CityGRID® Basics Manual).

- *Creation date:* Specifies the date of construction of the building. If no creation date is specified, this means that "the building has always been there".
- *Termination date:* Specifies the tear-down date or the end of validity of the unit version. If no termination date is specified, this means that "the building will be there forever".

Note: If the last valid version is already a historic version then it is excluded from any renewed class conversion operations. In particular, this prevents changes to existing creation and termination dates. If, however, it is necessary to change these dates, this can be forced by checking the box "overwrite existing"

Note: When defining creation and termination dates it is necessary to specify chronologically correct sequences. You cannot set a creation date that is more recent than the termination date and any attempt to do so results in a corresponding error message. However, specifying only one date is not contradictory and is accepted by the system.

Correct historic chronology: If multiple historic versions occur in units then the sequence of creation and termination dates can be corrected using this function. If the times of the termination and creation dates overlap then this causes inconsistencies in the chronology. The correction operation then sets the end date of older historic versions to the start date of the following historic version.


Historic Version

Model Selection

Model:
Hauptplatz_2
Hauptplatz_3
Haus aus photo
H_6040
H_6040_AB
H_6040_CD
H_6239_E
H_6239_E_teil
H_6340_AB
H_6437_AB
H_6437_AB Warnung unsichere Konversion
H_6638_AB
icc_demo

Filter:

Set last valid version

Class: Historic Version

Creation Date: □ 16.10.2013 □ overwrite existing

Termination Date: □ 16.10.2013 □ overwrite existing

☑ Correct historic timeline

6 Database

Among the entry **Database** you can find additional database-administration tools or maintenance of City**GRID**® databases.

6.1 *Rebuild Search Tree*

With this function all units of the database with their rectangular bounding will be sorted into a tree, which allows quick query of units via a coordinate window and linking to external datasets (see Manual City**GRID**® Modeler). In general, this tree will be newly built after the import of units (see 3.1). Via this menu item the tree can be refreshed as well.

6.2 *Join Addresses*

If a link to an external address database is established, a link to all its addresses can be established via this item for all units. For a connection to an external address database, please contact UVM Systems GmbH.

6.3 *Database Optimization*

6.3.1 Recreate Materialized Views

For improved performance City**GRID**® utilizes Materialized Views in Oracle databases or the corresponding construct in MSSQL databases. By using Materialized Views loading time of large models can be decreased. From time to time, it can be necessary to refresh the Materialized Views by using this function.

Note: You can detect deprecated Materials Views if the statement „… lines of MV_LAST_VALID_UNITVERSION are not actual! Materialized views won't be used“ is written to the Administrator.log log file

6.3.2 Conversion to Object-Relational DB Scheme

City**GRID**® used a relational database schema up to version 11.00 to manage units in a City**GRID**® database. To enable faster access to the data and thus shorter loading times, version 11.0 (City**GRID**® 2017) was used to switch to an object-relational schema. The geometry is now stored binary in the database (BLOB) and can therefore be loaded faster.

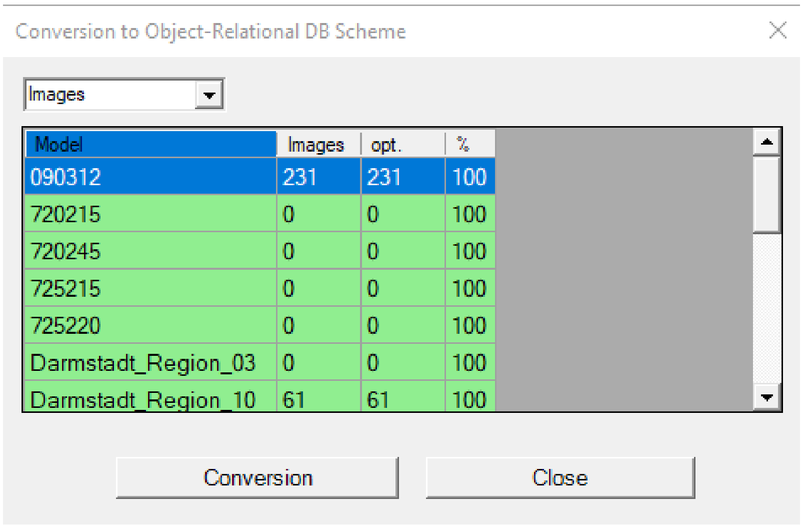
For this change to take effect, units in the database must be transferred to the new schema. Specifically, each unit is loaded and saved as a new version. To be able to control this, sometimes time-consuming process, the Administrator offers a conversion routine by means of which models can be transferred to the new schema. Thus, a temporal control of the conversion work, about overnight or over the weekend is possible.

With version 18.00 (City**GRID** 2024), the database schema for orientation parameters was changed from a relational schema to an object-relational schema to improve performance. As a result, an acceleration of around 25% can be achieved for textured buildings.

Note: Data in old database schema can be used without any restriction. Units can be loaded and exported without restriction, of course, but without being able to use the speed advantage. If a save operation occurs during processing, a version is automatically created in the new schema.

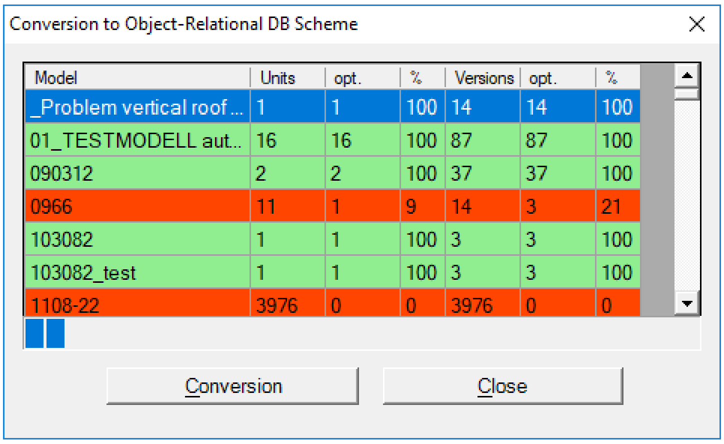
1. Open Menu **Database > Database Optimization > Conversion to Object-Relational DB Scheme**

   The conversion for ***images*** or ***units*** can be selected in the window that appears. All models that can be found in the database are listed. Depending on whether units or images have been selected, the number of units/images, the number of already optimized units/images, the conversion rate derived from this and the same key figures for all versions of the units are included for each model:



Model	Images	opt.	%
090312	231	231	100
720215	0	0	100
720245	0	0	100
725215	0	0	100
725220	0	0	100
Darmstadt_Region_03	0	0	100
Darmstadt_Region_10	61	61	100

Note: Computation of key figures is done at runtime and therefore takes some time. In order to convert a certain model, it is not necessary to wait for completion of calculation, the process can be started at any time.



Model	Units	opt.	%	Versions	opt.	%
_Problem vertical roof ...	1	1	100	14	14	100
01_TESTMODELL aut...	16	16	100	87	87	100
090312	2	2	100	37	37	100
0966	11	1	9	14	3	21
103082	1	1	100	3	3	100
103082_test	1	1	100	3	3	100
1108-22	3976	0	0	3976	0	0

2. In model list, the models to be converted can be selected (multiple selection is possible via standard Windows methods) and the conversion can be started by clicking on the Conversion button.

Note: A running conversion can be easily cancelled without affecting the integrity of the data. If the process is resumed later, CityGRID® automatically recognizes which Units already exist in the new schema and excludes them from conversion.

Note: Converted units cannot be restored to their former state and can no longer be viewed with any older CityGRID® version.

3. Close window after completion of conversion

6.4 Image Database

6.4.1 Image Database rebuild

For all texture images of a model the image pyramid can be derived. This procedure is recommended if the texture images have to be retouched.

6.4.2 Image Database compress

The texture directory of the database is cleaned, so that only those image files will remain which have in fact a reference in the database. The following steps will be performed during runtime:

1. Remove invalid images:

   Images that can't be loaded in highest resolution (*_orig.png in database texture folder cf. 1.1) will be deleted.

2. Identify unreferenced images:

   All original images in database (*_orig.png) are crosschecked against their use in database. If images are found that are not in use, they will be moved to folder "invalid" in the database texture folder (see 1.1), and the derived pictures of image pyramid (*.jpg) are deleted.

3. Identity Images without corresponding Element:

   For all texture images without corresponding Element (see Manual City**GRID**® Basics) the image reference in database will be removed, the images are moved to folder "invalid" and the derives pictures of image pyramid (*.jpg) are deleted. Aerial Images which are assigned to Models as roof textures as well as terrain textures are not affected by this function.

The "invalid" folder can be deleted in database texture folder by the user if desired.

7 Error Reporting

The City**GRID**® software is developed, tested and used internally by UVM Systems GmbH, and strive for an error-free product. Nevertheless we cannot guarantee that errors will not occur while your work with it.

The data base concept and the version management however ensure that data cannot be lost. Should, due to software error, the edited version become corrupt, there is always the last stable version stored, in which nothing has changed. In important cases corrupt versions can usually still be repaired if the error is found.

Through experience we are aware that the following errors may occur:

1. Autodesk 3D Studio MAX crashes without prior warning/message: The reasons for such fatal errors are usually problems of 3DS itself and are beyond our control.
2. If you get a City**GRID**® Error messages it is typically because of corrupt data. Usually, continuing to work is possible.
3. Script-Errors: The reasons for these are often mistakes in operating with the software. In most cases continuing working is possible. If further problems occur, we recommend exiting the Plug-in City**GRID**® and starting it again.

If you want to send an error report, please enclose the following information/data:

- Verbal description of the actions which produced the error
- Log file: You can find the protocol in your profile under: \AppData\Roaming\CityGRID\Administrator.log. Find the log files also in the specified place if you've set the Log Path in Settings menu of Administrator

Note: Please backup this file immediately after a crash, because the renewed starting of the software may cause the file to be overwritten.

Advice: In Administrator, it is possible to open the list of log files directly by choosing "Open" in the Settings menu.

If the bug can be reproduced, we ask you for the additional information:

1. Re-create all actions to the point before the error occurs
2. Switch on *Use Comprehensive Logging* via the menu *Settings* (note: this slows down the software significantly)
3. Execute the action which produced the error.
4. Save the log file (see step 2 above)
5. Switch off again the comprehensive logging command

Please send error reports to support@uvmsystems.com

8 Contact

UVM Systems GmbH

www.citygrid.at

www.uvmsystems.com