Madaster IFC import proces

Explanation on the process of the IFC import within Madaster

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Introduction

This document provides an explanation of the treatment process of the IFC files within Madaster. This includes, among other things, how geometric properties, classification codes, construction phases and material use are identified.
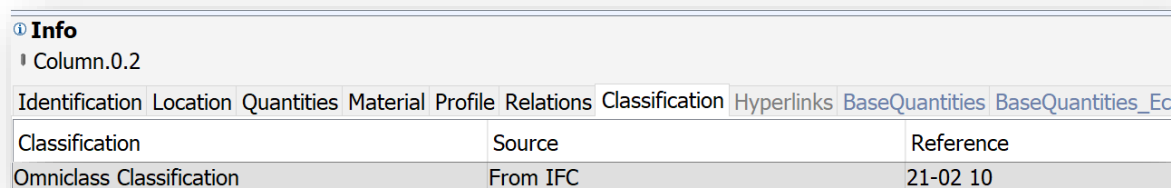
Classification

Madaster aims/attempts to trace the "Omniclass" classification structure for each element.
The Omniclass classification will be matched to a 6, 8 or 10 digit code and traced from the following fields:

First of all, there is a search for all references of the element to the type:
IfcClassificationReference or IfcExternalReference. When a property of this type has been found, the system tries to match the value of this property to the 6 digit and/or 8/10 digit Omniclass coding list.

ⓘ **Info**
Column.0.2

| Identification | Location | Quantities | Material | Profile | Relations | Classification | Hyperlinks | BaseQuantities | BaseQuantities_Ec |

Classification	Source	Reference
Omniclass Classification	From IFC	21-02 10

Fig: Example of a 6 digit Omniclass coding on an element
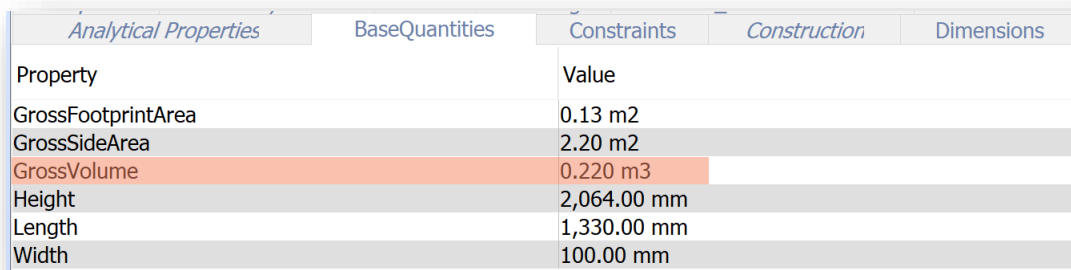
Geometric Properties

Volume

For each element, the first attempt is made to read out the IfcQuantityVolume with the name "NetVolume" from the collection of the type: IfcElementQuantity. If no value can be found for this, there will be a search within all property sets of the element to a property with the name: "NetVolume".

When there are multiple property sets of the type IfcElementQuantity or multiple properties with the name "NetVolume", the first property will be chosen. If there is no found property with this naming, the same process will be repeated for properties with the following naming and in the order as follows below until a value can be found:

- NetVolume
- Volume
- Grossvolume

Depending on the material composition, the volume will, in certain scenario's, be calculated by the use of material thickness * surface. For more information, read the section Material.

Analytical Properties	BaseQuantities	Constraints	Construction	Dimensions
Property		**Value**		
GrossFootprintArea		0.13 m2		
GrossSideArea		2.20 m2		
GrossVolume		0.220 m3		
Height		2,064.00 mm		
Length		1,330.00 mm		
Width		100.00 mm		

Fig: Example of a volume property within BaseQuantities property set.

Surface

Firstly, in order to find the surface for each element, an attempt is made to read out the IfcQuantityAreaproperty with the name "NetSideArea" from the collection of the type: IfcElementQuantity. If there is no found value, there will be a search in all property sets of the element to a property with the name: "NetSideArea".

When there are multiple property sets of the type IfcElementQuantity or multiple properties with the name "NetSideArea", the first property will be chosen. If there is no found property with this naming, the same process will be repeated for properties with the following naming and in the order as follows below until a value can be found:

- NetSideArea
- GrossSideArea
- TotalSurfaceArea
- GrossSurfaceArea
- OuterSurfaceArea
- CrossSectionArea
- NetFootprintArea
- GrossFootprintArea
- GrossArea
- Area

Length

Firstly, in order to find the <u>Length</u> for each element, an attempt is made to read out the IfcQuantityLength with the name "Length" from the collection of the type: IfcElementQuantity. If there is no found value, there will be a search in all property sets of the element to a property with the name: "Length".

When there are multiple property sets of the type IfcElementQuantity or multiple properties with the name "Length", the first property will be chosen.

Width

Firstly, in order to find the <u>Width</u> for each element, an attempt is made to read out the IfcQuantityLength with the name "Width" from the collection of the type: IfcElementQuantity. If there is no found value, there will be a search in all property sets of the element to a property with the name: "Width".

When there are multiple property sets of the type IfcElementQuantity or multiple properties with the name "Width", the first property will be chosen.

Height

Firstly, in order to find the <u>Height</u> for each element, an attempt is made to read out the IfcQuantityLength with the name "Height" from the collection of the type: IfcElementQuantity. If there is no found value, there will be a search in all property sets of the element to a property with the name: "Height".

When there are multiple property sets of the type IfcElementQuantity or multiple properties with the name "Height", the first property will be chosen.

Depth

Firstly, in order to find the <u>Depth</u> for each element, an attempt is made to read out the IfcQuantityLength with the name "Depth" from the collection of the type: IfcElementQuantity. If there is no found value, there will be a search in all property sets of the element to a property with the name: "Depth".

When there are multiple property sets of the type IfcElementQuantity or multiple properties with the name "Depth", the first property will be chosen.

Weight

Firstly, in order to find the <u>Weight</u> for each element, an attempt is made to read out the IfcQuantityWeight from the collection of the type: IfcElementQuantity.

When there are multiple property sets of the type IfcElementQuantity or multiple properties of the type "IfcQuantityWeight", the first property will be chosen.

Material

For each element, the material is retrieved via the IfcMaterialSelect relationship/connection. And depending on the characterization of the related material property, different scenarios are handled for the following characterizations:

IfcMaterialLayerSetUsage

If the material property is of the type "IfcMaterialLayerSetUsage", an attempt is made to retrieve IfcMaterialLayerSet. And this checks whether this list contains multiple elements and whether the thickness of the property has been filled in. If this is the case and the value of the property Thickness is greater than 0 mm, the element will be divided into the amount of materials that the layer set knows.

Identification	Location	Quantities	Material
Name		Thickness	
Concrete		200.00 mm	
Glas wool		40.00 mm	
Plywood		60.00 mm	

Fig: Example of a material specification with layer set

The volume of these materials will be calculated using the following method:
Volume = Surface * Thickness

If the property Thickness is 0 or has not been filled in, multiple materials will be specified to the element and the volume derived from the volume properties as specified above will remain.

The NAME field of the property is used for the naming of the material.

IfcMaterialLayerSet

If the material property is of the type "IfcMaterialLayerSet", it is checked whether the list contains multiple layers, and whether the Thickness is filled in. If this is the case and the value of the property Thickness is greater than 0 mm, the element will be divided into the amount of materials that the layer set knows.

The volume of these materials will be calculated using the following method:
Volume = Surface * Thickness

If the property Thickness is 0 or has not been filled in, multiple materials will be specified to the element and the volume derived from the volume properties as specified above will remain.
The name field of the property is used for the naming of the material.

IfcMaterialList

If the material property is of the type "IfcMaterialList", multiple materials will be specified to the element and the volume derived from the volume properties as specified above will remain. The name field of the property is used for the naming of the material.

IfcMaterial

If the material property is of the type "IfcMaterial", the property will be removed from the Name Field of the property.

Fig: Example of a material specification without layer set.

Construction phase

For each element, the construction phase is retrieved from the property using one of the following naming (case sensitive):

- Phase Created
- Renovation Status
- Phase

AC_Pset_RenovationAndPhasing	ArchiCADProperties	ArchiCADQuantities	BaseQuantities
Property	Value		
Renovation Status	Existing		

Fig: Example of phasing within Archicad

Phasing	Pset_BuildingElementProxyCommon
Property	Value
Phase Created	Existing

Fig: Example of phasing within Revit

Next, the values from the properties will be matched as follows:

- Demolition
  - Demolition
  - To be demolished

- New
  - New

- Casco
  - Casco
  - Existing

Matching is carried out on the whole sentence/word and is not case sensitive. If no matching has taken place with the categories above, the element will be mapped to Casco.

The construction phase, current and definitive, will be calculated from the phase above according to the following calculation:
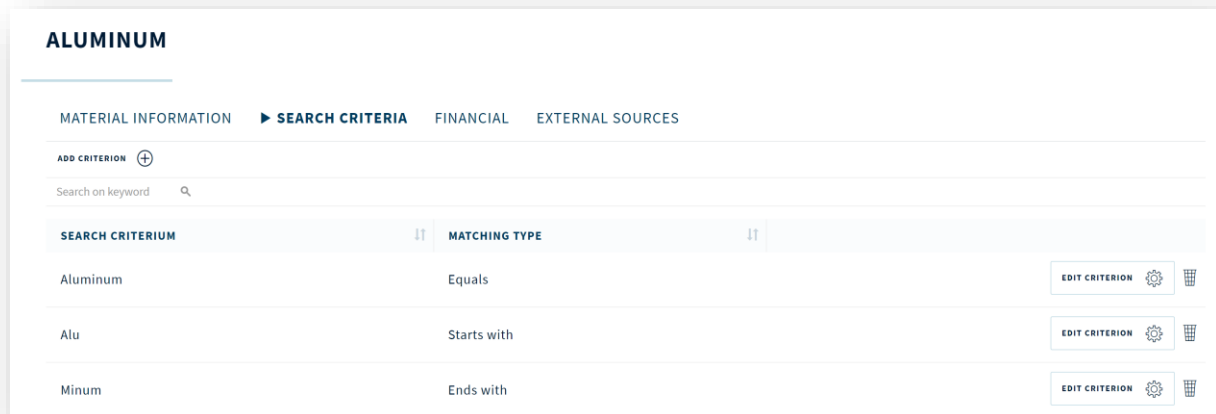
- Current = Demolition + Casco
- Definitive = Casco + New

Matching

As soon as the materials per element are known, they will be matched against the materials and products that are known within the Madaster database. These can be found in the Materials & Products overview under the Administration tab:

https://platform.madaster.com/#/admin/tab_materialsproducts

Each material and/or product can be provided with search criteria.

When importing an IFC file, the materials of each element are matched against these search criteria. This checks whether the material of an element matches one of the search criteria on product/material level.

A search criterion on product/material level can be configured in different ways:

- Contains the search criterion
- Equals the search criterion
- Begins with the search criterion
- Ends with the search criterion

If there are multiple matches found, the largest match (largest amount of similar characters) will be used.

When several materials are specified on an IFC element without a thickness, then these elements will be skipped in matching, because it is impossible to relate this element to 1 material or product.

If no products and/or materials are linked, they can be linked to the element via the ENRICHMENT screen of the file itself. Furthermore, via this method, possible new materials and/or products can be created.

Matching with EAN/G-TIN standard product code.

If the productcode has been filled in on the product:

Then the material on the element will also be matched against this code and if an exact match is found it will be used rather than the previous matches.

Madaster Propertyset

If a property set with the name: Pset_Madaster is present on an IFC element and within this dataset the following properties are filled in, then the values of the properties will be used within Madaster, and the properties above will be disregarded.

The following fields will be recognized within the Madaster property set :
- MaterialOrProductId
    - Identifier of the material or product within Madaster.
- MaterialOrProductName
    - Name of the Material used by Madaster for mapping.

In terms of matching, the Id property of the Material and/or product always takes precedence over the Name property.

The remaining fields are:
- Volume (property type: IfcVolumeMeasure)
- Area (property type: IfcAreaMeasure)
- Length (property type: IfcLengthMeasure)
- Width (property type: IfcLengthMeasure)
- Height (property type: IfcLengthMeasure)
- Depth (property type: IfcLengthMeasure)
- Weight (property type: IfcMassMeasure)
- Classification (property type: IfcText)
    - Omniclass could be used here
- Phase (property type: IfcText)
    - Construction phase