Representing simple doors in IFC R2.0

DRAFT 1 – 20.12.1999

There is often a discrepancy between good modelling practices and the needs of real life implementations; the representation of simple doors is one example of this. While it is good and necessary to break up doors into components it also makes life unnecessary complicated where such detailed representation is not needed.

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Learning from history

In R1.5.1 doors were not divided into components, information about the details of the door was stored in PropertySets. The implementers thought this was too cumbersome and requested that doors would be divided into real components. In R2.0 this was done and the door components IfcDoorLining and IfcDoorPanel were introduced.

At the same time the R1.5.1 implementers made two agreements about the door. According to these agreements the IfcDoor instance did not have any representation of its own, the representation of IfcOpeningElement was used instead. As a result of this each door has its own opening element, although the model would allow placing more than one door or window in each opening element.

It is my understanding that these agreements were made to make implementations easier. As the IFC model evolves it necessarily becomes more complicated and we as the implementers of the next IFC generation are obliged to provide more information. However, we should also see what is sensible to our implementations and not follow the IFC specifications blindly.

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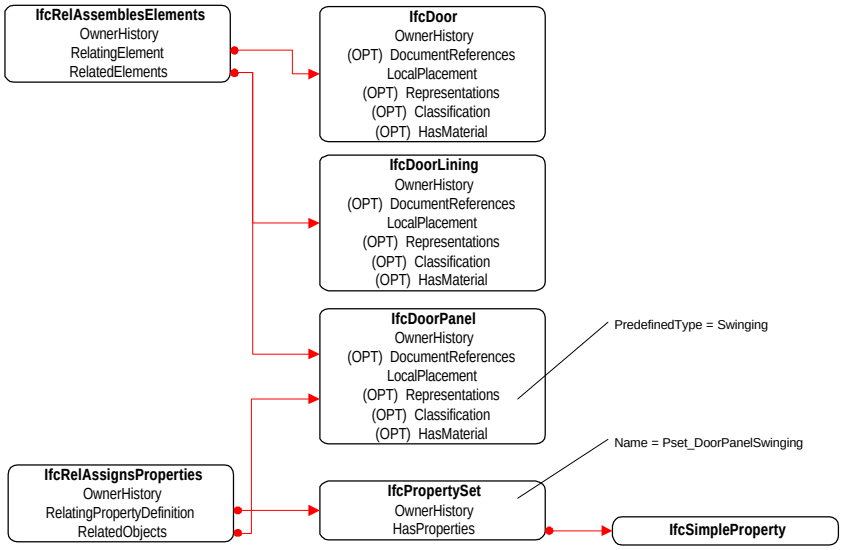
The main problem

In my opinion the main problem is that any information about the door type can only be found in IfcDoorPanel. The specifications do not define a way to tell that a door is of type 'single swing' without including IfcDoorPanel – the attribute `PredefinedType` was removed from IfcDoor



In the case of a 'single swing' door the IfcDoorPanel would have the predefined type `Swinging` and there would be a PropertySet called `Pset_DoorPanelSwinging` attached to IfcDoorPanel.

In the case of a double swing door the IfcDoor would have two IfcDoorPanel instances, both having the predefined type `Swinging`, and both referencing a PropertySet called `Pset_DoorPanelSwinging`

As long as IfcDoorPanel does not have its own meaningful geometry and no special attached properties IfcDoorPanel does not provide any added value. In the case of more complex doors like non-symmetric double swing doors (one panel wider than the other) modelling door panels separately can make sense. Modelling the door lining separately makes sense if the profile of the lining geometry is defined in greater detail.

Having separate geometry for door panels and door lining would also benefit visualization applications that don't necessarily even know the concept of a door and thus can't use the parameters defined in the PropertySets to create the representation.

Proposed solution

There is no point in taking steps backwards – and we also have to consider compatibility with the next IFC releases. This is why the proposed solution tries to be as close to the intentions behind R2.0 as possible, although this can make things a bit more complex.

The solution has two main points

1. Attach IfcDoorPanel PropertySets directly to IfcDoor
2. Use the `UserDefinedType` attribute on IfcDoor to specify the type of the door

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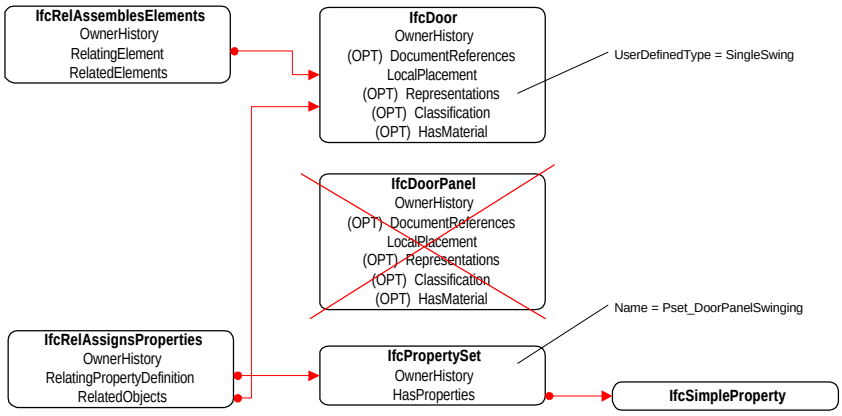

If IfcDoorPanel is modelled, the exactly same PropertySet and properties are used with IfcDoorPanel.

All PropertySets are attached directly to IfcDoor trough IfcRelAssignsProperties, the specified PropertySet nesting is not used, i.e. Pset_xyzType does not reference Pset_xyzCommon.

Single swing doors

`IfcDoor.UserDefinedType` = `SingleSwing`
Attached PropertySet = `Pset_DoorPanelSwingning`
Attached PropertySet = `Pset_DoorPanelCommon` *(if needed)*
Attached PropertySet = `Pset_DoorCommon` *(if needed)*
Attached PropertySet = `Pset_HardwareGroup` *(if needed)*
Attached PropertySet = `Pset_DoorLiningCommon` *(if needed)*

Double swing doors (symmetric)

`IfcDoor.UserDefinedType` = `DoubleSwing`
Attached PropertySet = `Pset_DoorPanelSwingning`
Attached PropertySet = `Pset_DoorPanelCommon` *(if needed)*
Attached PropertySet = `Pset_DoorCommon` *(if needed)*
Attached PropertySet = `Pset_HardwareGroup` *(if needed)*
Attached PropertySet = `Pset_DoorLiningCommon` *(if needed)*

All other doors

The single swing / double swing doors are special cases, because they are specializations of the type `Swinging` defined in the specifications for IfcDoorPanel. For all other cases the rule could be simple.

If `IfcDoor.UserDefinedType` is unset ($) the door components are modelled and information about the door type can be found in IfcDoorPanel.

If the value of `IfcDoor.UserDefinedType` is one of the predefined types originally defined for IfcDoorPanel then the door components are not modelled and the PropertySets originally designed for IfcDoorPanel may be attached directly to

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IfcDoor. The type `Swinging` should not be used in this context, `SingleSwing` and `DoubleSwing` should be used instead.

PropertySets for IfcDoorLining can be attached directly to IfcDoor in all cases where IfcDoorLining is not modelled.

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