

IFC Release Specific Concept Description (IFC 2x3)

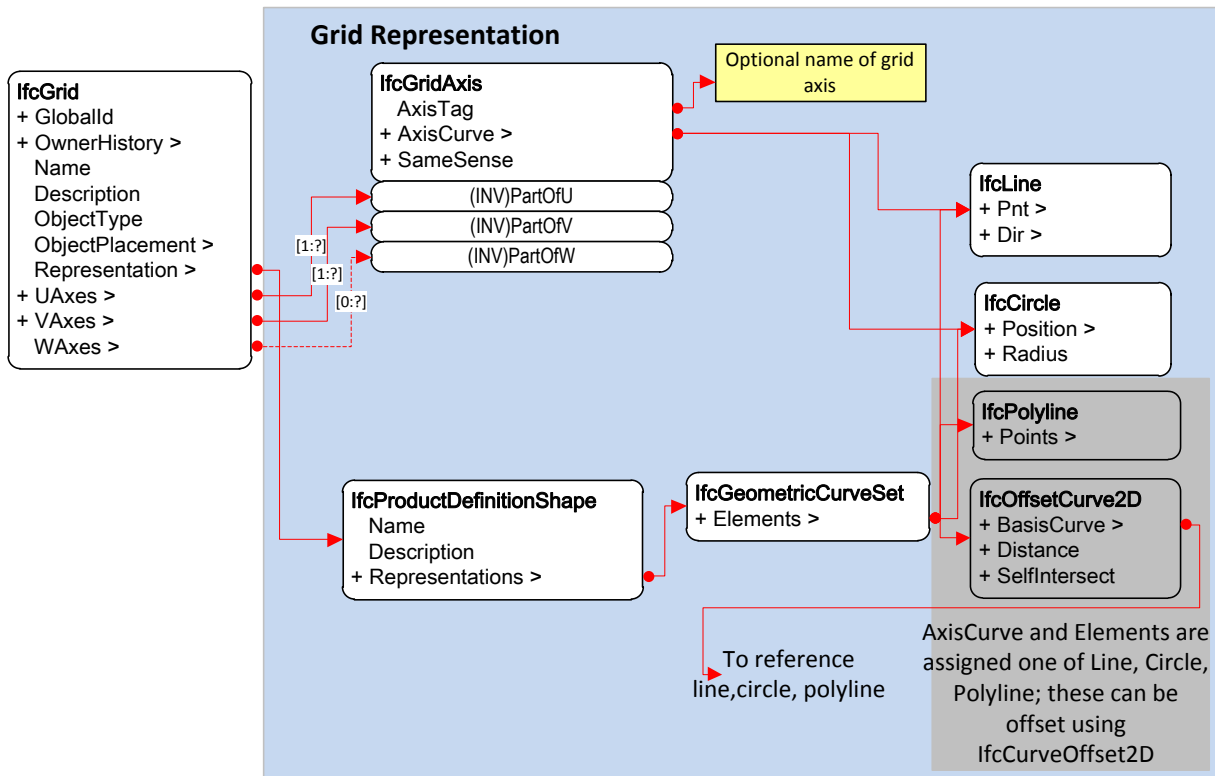
Grid Representation

Reference	PCI-048	Version	1.1	Status	Draft
Relationships	PCI-049, PCI-050				
History	Revised Nov 13, 2012				
Authors	Manu Venugopal				
Document Owner	GA Tech and Technion Precast NBIMS Team				

Usage in view definition diagram



Instantiation diagram



Implementation agreements

Grid Representation

Attribute	Implementation agreements
<i>IfcGeometricCurveSet</i>	The <i>IfcGeometricCurveSet</i> shall be an (and the only) <i>Item</i> of the <i>IfcShapeRepresentation</i> . It should contain an <i>IfcGeometricCurveSet</i> containing subtypes of <i>IfcCurve</i> , each representing a grid axis.

IfcCurve	Applicable subtypes of <i>IfcCurve</i> are: <i>IfcPolyline</i> , <i>IfcCircle</i> , <i>IfcTrimmedCurve</i> (based on <i>BaseCurve</i> referencing <i>IfcLine</i> or <i>IfcCircle</i>).
IfcGridAxis	AxisCurve is the underlying curve which provides the geometry for this grid axis. Each instance of IfcGridAxis refers to the same instance of IfcCurve that is contained within the IfcGeometricCurveSet that represents the IfcGrid.

Informal Proposition

1. Grid axes, which are referenced in different lists of axes (UAxes, VAxes, WAxes) shall not be parallel.
2. Grid axes should be defined such as there are no two grid axes which intersect twice.

IfcGrid:

Attribute	Implementation agreements
GlobalId	Must be provided
OwnerHistory	Must be provided, but may contain dummy data
Name	Space.Name should be assigned.
Description	<Open>
ObjectType	Optional
ObjectPlacement	Optional
Representation	Is a subtype of IfcProductRepresentation
UAxes	LIST [1:?] OF UNIQUE IfcGridAxis . (List of grid axes defining the first row of grid lines)
VAxes	LIST [1:?] OF UNIQUE IfcGridAxis . (List of grid axes defining the second row of grid lines.)
Waxes	OPTIONAL LIST [1:?] OF UNIQUE IfcGridAxis . (List of grid axes defining the third row of grid lines. It may be given in the case of a triangular grid.)

IfcGridAxis

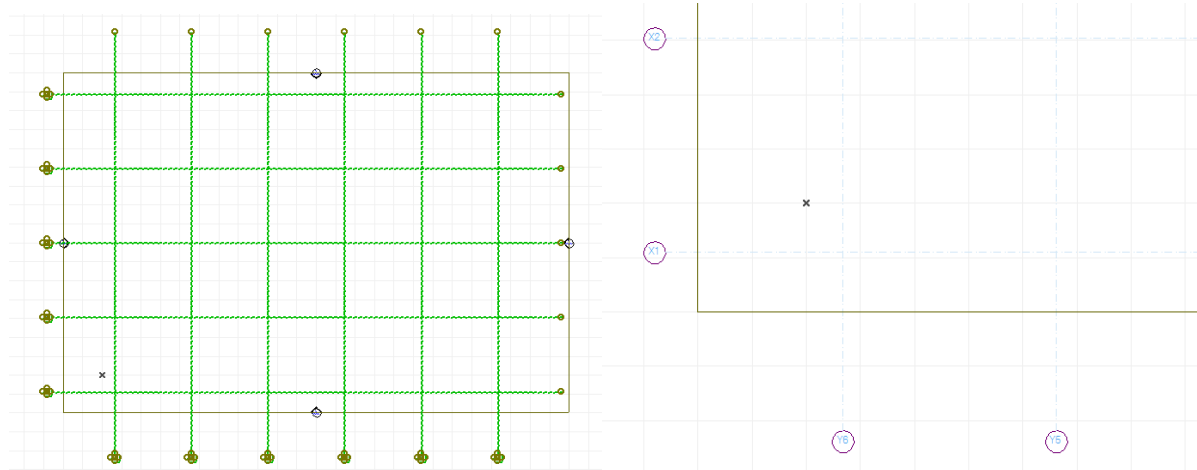
Attribute	Implementation agreements
AxisTag	OPTIONAL. Tag name for this grid axis
AxisCurve	Underlying curve which provides the geometry for this grid axis. Should be a subtype of IfcCurve .
SameSense	Defines whether the original sense of curve is used or whether it is reversed in the context of the grid axis. IfcBoolean entity.

Formal Proposition:

1. The dimensionality of the grid axis is 2.
2. Each of the three attributes of IfcGrid (UAxes, VAxes, WAxes) should refer to a new IfcGridAxis (Unique).

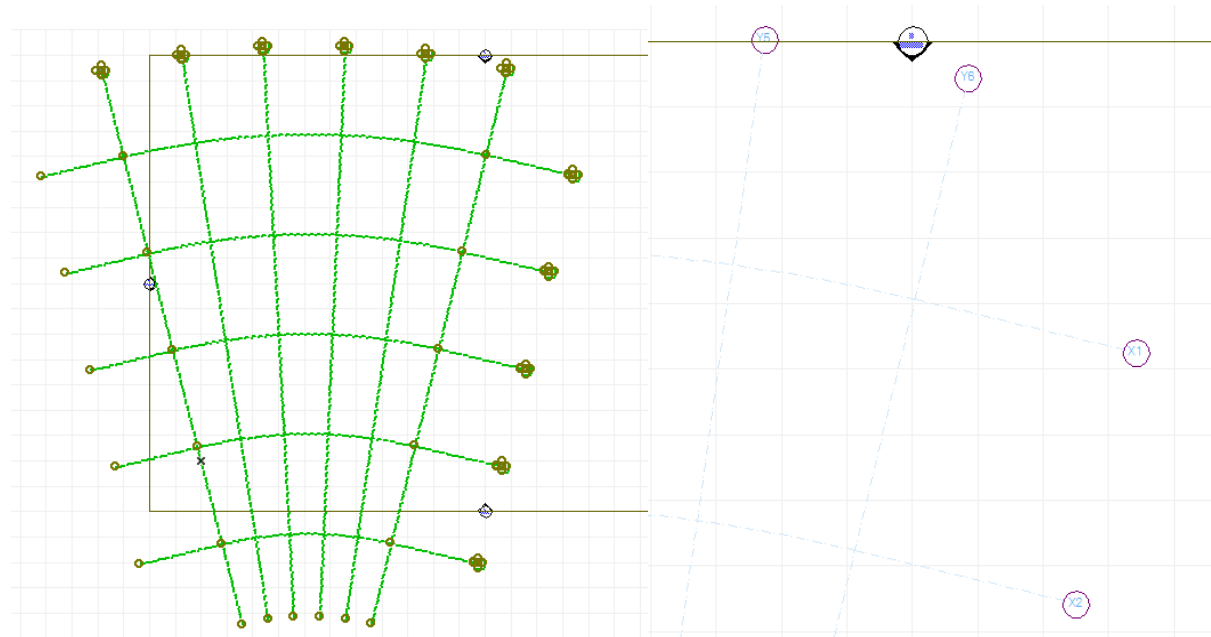
Example: Part21 file

a) Orthogonal Grids: As shown in Figure, the orthogonal grid is represented by poly-lines.



```
#15=IFCBUILDING('3CXhjzWsj71PpgLNK2bFjs',#114,'StWGridPlacement_', 'StWGridPlacement_', $, #16, $, $, .ELEMENT, ., 0., 0., $);
#16=IFCLOCALPLACEMENT(#9, #6);
#18=IFCRELAGGREGATES('1$113Cr7H34ekJnEVzD2qx', #114, 'BuildingContainedinSite', $, #13, (#15));
#19=IFCGRID('377y2whmj83waAdwq0y8Ug', #114, 'Grid-1-FF0', 'Default', 'STWPC_ENTITY_GENERIC_GRID', #22, $, (#28, #32, #36), (#38, #40, #42, #44), $);
#20=IFCCARTESIANPOINT((0., -0.0254, 0.));
#21=IFCAXIS2PLACEMENT3D(#20, #4, #5);
#22=IFCLOCALPLACEMENT(#16, #21);
#24=IFCRELCONTAINEDINSPATIALSTRUCTURE('0Cd6loZNDDdQ4KDSRT_ZPL', #114, $, $, (#19, #45, #57, #69), #15);
#25=IFCCARTESIANPOINT((0., 0.));
#26=IFCCARTESIANPOINT((9.144, 0.));
#27=IFCPOLYLINE((#25, #26));
#28=IFCGRIDAXIS('A-1', #27, .T.);
#29=IFCCARTESIANPOINT((0., 9.144));
#30=IFCCARTESIANPOINT((9.144, 9.144));
#31=IFCPOLYLINE((#29, #30));
#32=IFCGRIDAXIS('A-2', #31, .T.);
#33=IFCCARTESIANPOINT((0., 18.288));
#34=IFCCARTESIANPOINT((9.144, 18.288));
#35=IFCPOLYLINE((#33, #34));
#36=IFCGRIDAXIS('A-3', #35, .T.);
#37=IFCPOLYLINE((#25, #29));
#38=IFCGRIDAXIS('A-1', #37, .T.);
#39=IFCPOLYLINE((#29, #33));
#40=IFCGRIDAXIS('A-2', #39, .T.);
#41=IFCPOLYLINE((#26, #30));
#42=IFCGRIDAXIS('B-1', #41, .T.);
#43=IFCPOLYLINE((#30, #34));
#44=IFCGRIDAXIS('B-2', #43, .T.);
```

b) Polar Grid: The polar grid is represented by trimmed curve (circle) and poly-lines. In this example, X-axis used circles and Y-axis used poly-lines.

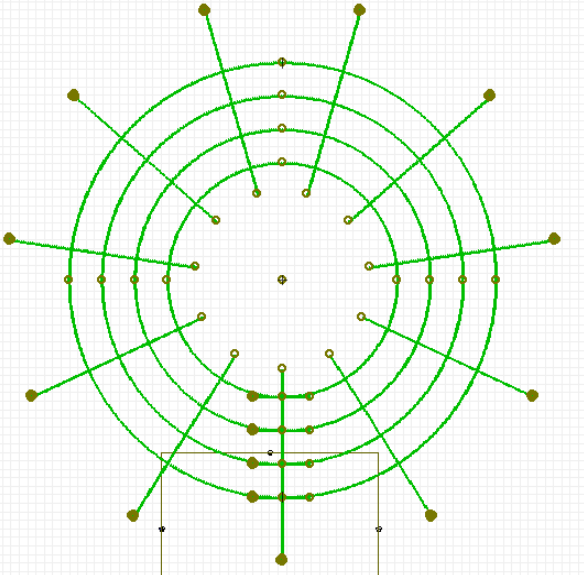


```

#13= IFCOWNERHISTORY(#12,#5,$,.NOCHANGE..,$,$,1242152327);
#103= IFCCARTESIANPOINT((0.,0.));
#107= IFCCARTESIANPOINT((16622.95,4067.61));
#123= IFCCIRCLE(#120,36000.);
#126=
IFCTRIMMEDCURVE(#123,(#103,IFCPARAMETERVALUE(0.)),(#107,IFCPARAMETERVALUE(27.5)),.T.,.CART
ESIAN.);
#131= IFCGRIDAXIS('X1',#126,.T.);
#163= IFCGRIDAXIS('X2',#158,.T.);
#195= IFCGRIDAXIS('X3',#190,.T.);
#227= IFCGRIDAXIS('X4',#222,.T.);
#260= IFCGRIDAXIS('X5',#255,.T.);
#265= IFCCARTESIANPOINT((0.,-4000.));
#269= IFCCARTESIANPOINT((1.7763568E-12,23200.));
#273= IFCPOLYLINE((#265,#269));
#277= IFCGRIDAXIS('Y6',#273,.T.);
#379= IFCLOCALPLACEMENT(#90,#376);
#382=
IFCGRID('3DHOF8hFr3WfbbbWIWu5zd',#13,$,$,$,#379,$,(#131,#163,#195,#227,#260),(#277,#294,#311,#328,#
345,#362),$);

```

c) Circular Grids: The circular grid is represented by poly-lines and circles.



```

#13= IFCOWNERHISTORY(#12,#5,$,.NOCHANGE.,$,,$,1242153669);
#112= IFCGRIDAXIS('X2',$,.T.);
#125= IFCGRIDAXIS('X3',$,.T.);
#138= IFCGRIDAXIS('X4',$,.T.);
#151= IFCGRIDAXIS('X5',$,.T.);
#156= IFCARTESIANPOINT((-40000.,31200.));
#160= IFCARTESIANPOINT((-12800.,31200.));
#164= IFCPOLYLINE((#156,#160));
#168= IFCGRIDAXIS('Y12',#164,.T.);
#185= IFCGRIDAXIS('Y11',#181,.T.);
#202= IFCGRIDAXIS('Y10',#198,.T.);
#219= IFCGRIDAXIS('Y9',#215,.T.);
#236= IFCGRIDAXIS('Y8',#232,.T.);
#254= IFCGRIDAXIS('Y7',#250,.T.);
#271= IFCGRIDAXIS('Y6',#267,.T.);
#288= IFCGRIDAXIS('Y5',#284,.T.);
#305= IFCGRIDAXIS('Y4',#301,.T.);
#322= IFCGRIDAXIS('Y3',#318,.T.);
#339= IFCGRIDAXIS('Y2',#335,.T.);
#356= IFCGRIDAXIS('Y1',#352,.T.);
#369= IFCLOCALPLACEMENT(#90,#366);
#372=
IFCGRID('3InRPKHIP4XPxAr9zRfzFp',#13,$,$,$,#369,$,(#112,#125,#138,#151),(#168,#185,#202,#219,#236,#254,#271,#288,#305,#322,#339,#356),$);

```