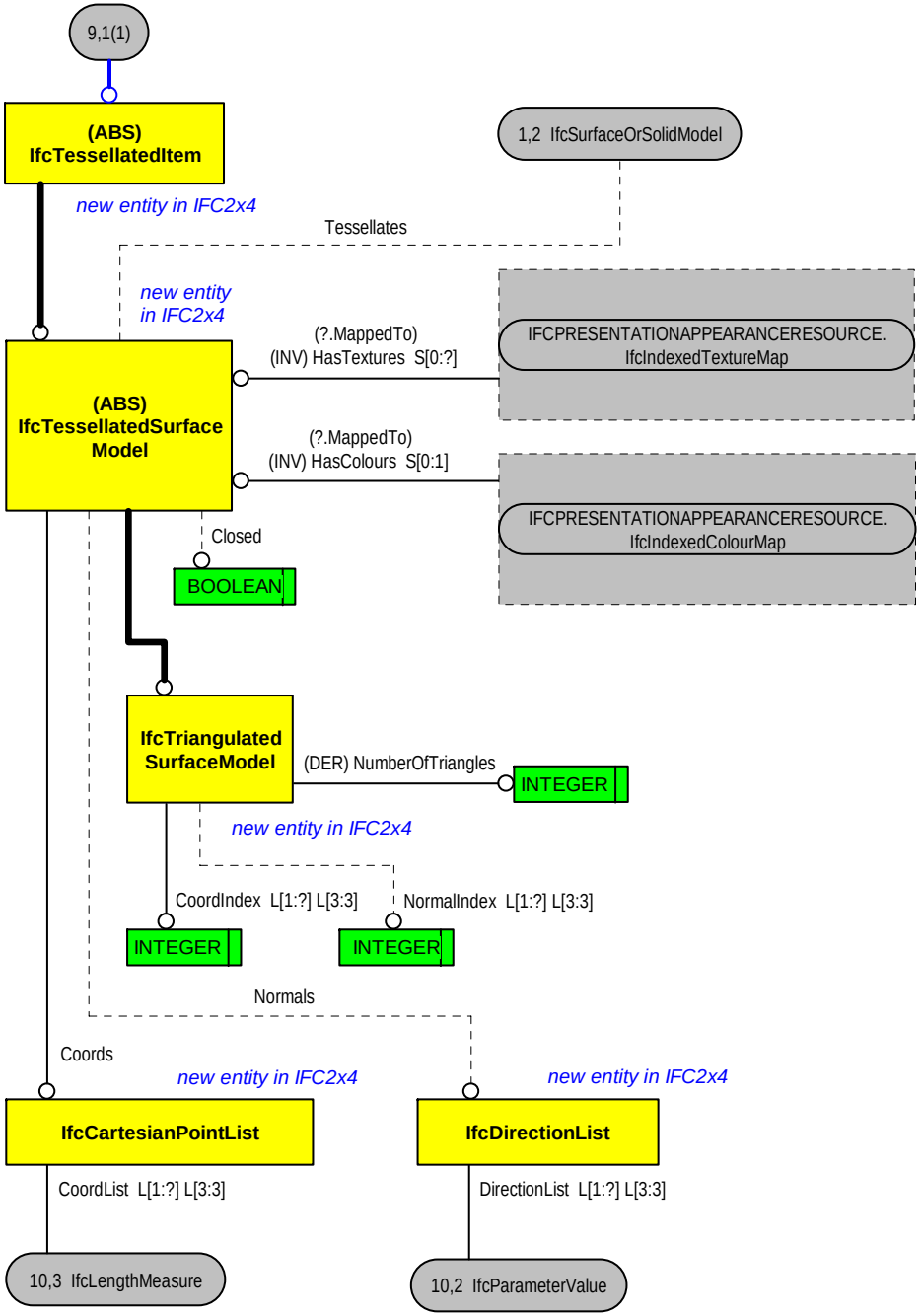
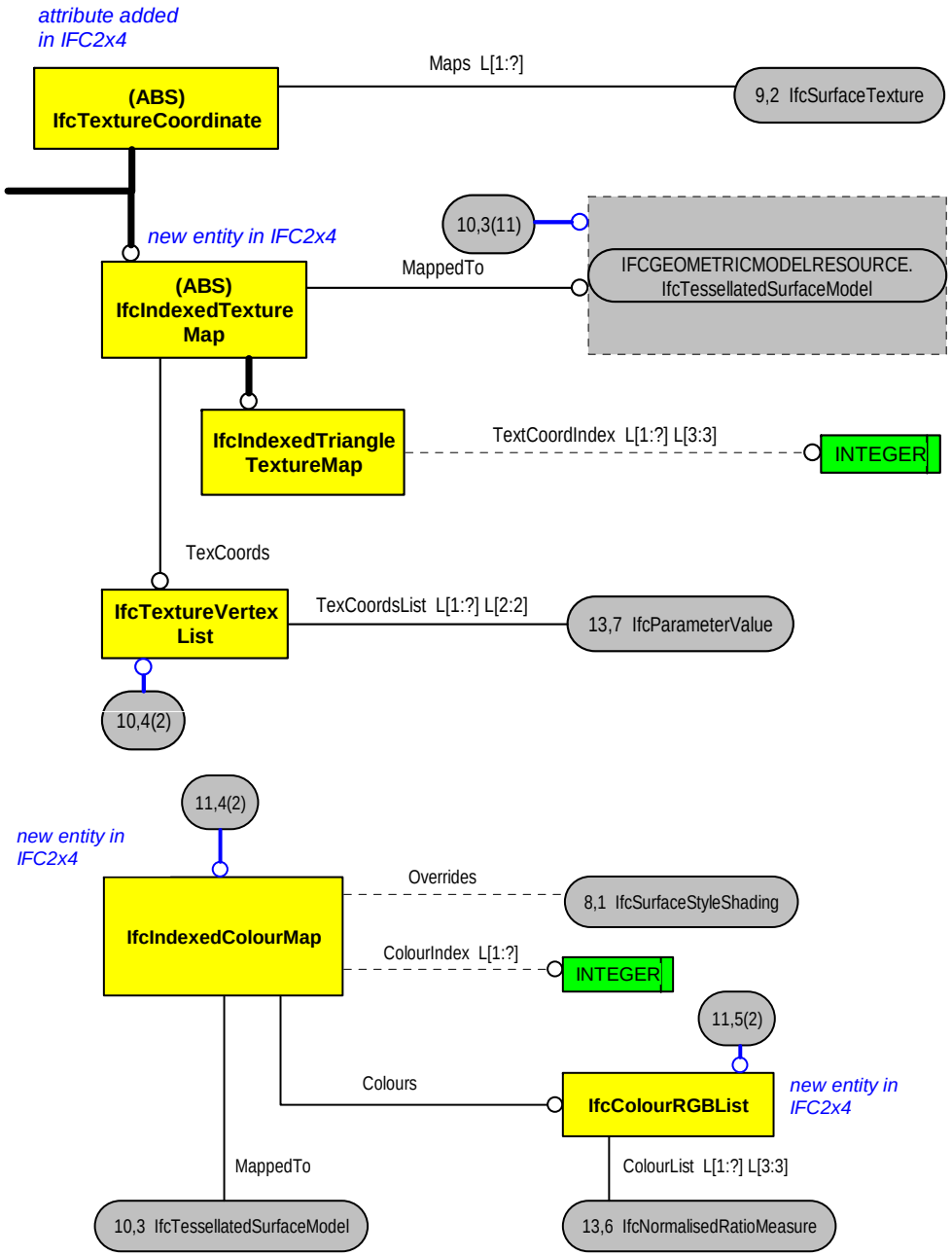
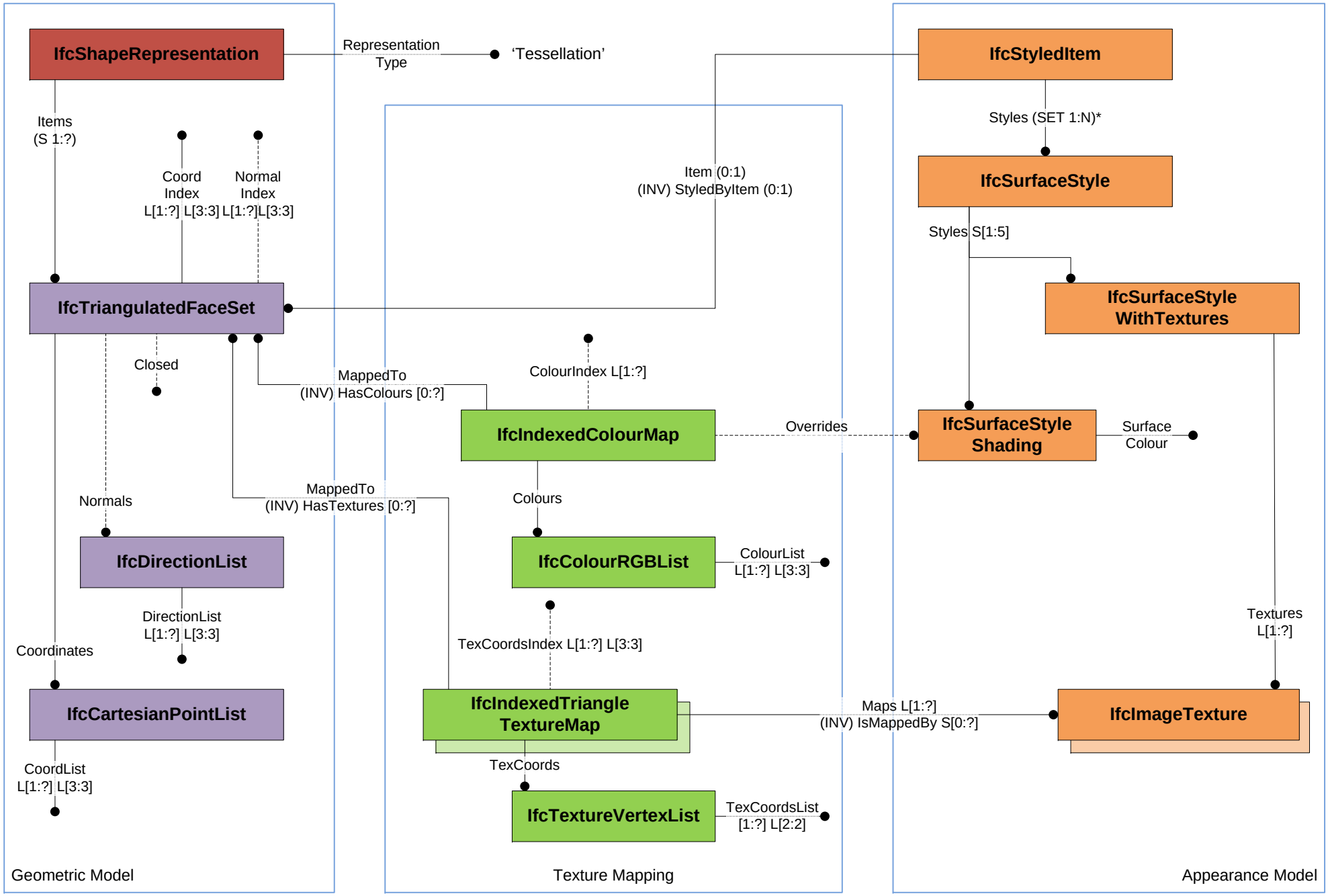
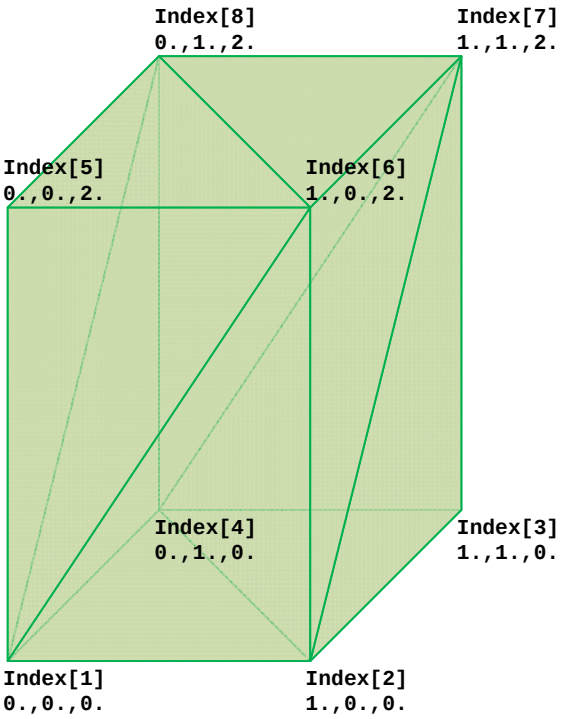

9,1(1)
(ABS) IfcTessellatedItem
new entity in IFC2x4
1,2 IfcSurfaceOrSolidModel
Tessellates
new entity in IFC2x4
(ABS) IfcTessellatedSurface Model
(?.MappedTo)
(INV) HasTextures S[0:?]
IFCPRESENTATIONAPPEARANCERESOURCE. IfcIndexedTextureMap
(?.MappedTo)
(INV) HasColours S[0:1]
IFCPRESENTATIONAPPEARANCERESOURCE. IfcIndexedColourMap
Closed
BOOLEAN
IfcTriangulated SurfaceModel
(DER) NumberOfTriangles
INTEGER
new entity in IFC2x4
CoordIndex L[1:?] L[3:3]
NormalIndex L[1:?] L[3:3]
INTEGER
INTEGER
Normals
Coords
new entity in IFC2x4
new entity in IFC2x4
IfcCartesianPointList
IfcDirectionList
CoordList L[1:?] L[3:3]
DirectionList L[1:?] L[3:3]
10,3 IfcLengthMeasure
10,2 IfcParameterValue

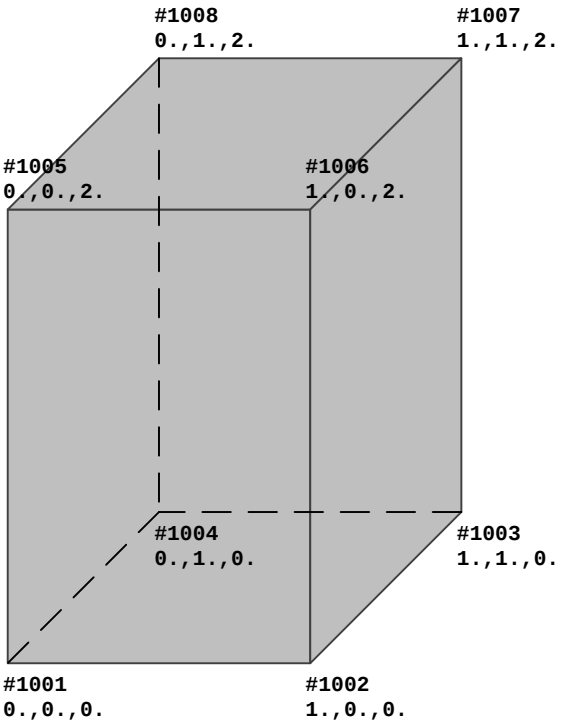

attribute added in IFC2x4
(ABS) IfcTextureCoordinate
Maps L[1:?]
9,2 IfcSurfaceTexture
new entity in IFC2x4
10,3(11)
IFCGEOMETRICMODELRESOURCE. IfcTessellatedSurfaceModel
MappedTo
(ABS) IfcIndexedTexture Map
IfcIndexedTriangle TextureMap
TextCoordIndex L[1:?] L[3:3]
INTEGER
TexCoords
IfcTextureVertex List
TexCoordsList L[1:?] L[2:2]
13,7 IfcParameterValue
10,4(2)
11,4(2)
new entity in IFC2x4
IfcIndexedColourMap
Overrides
8,1 IfcSurfaceStyleShading
ColourIndex L[1:?]
INTEGER
11,5(2)
Colours
IfcColourRGBList
new entity in IFC2x4
MappedTo
ColourList L[1:?] L[3:3]
10,3 IfcTessellatedSurfaceModel
13,6 IfcNormalisedRatioMeasure


IfcShapeRepresentation
Representation Type
'Tessellation'
IfcStyledItem
Items (S 1:?)
Coord Index L[1:?] L[3:3]
Normal Index L[1:?]L[3:3]
Item (0:1)
(INV) StyledByItem (0:1)
Styles (SET 1:N)*
IfcSurfaceStyle
Styles S[1:5]
IfcTriangulatedFaceSet
IfcSurfaceStyle WithTextures
Closed
MappedTo
(INV) HasColours [0:?]
ColourIndex L[1:?]
IfcIndexedColourMap
Overrides
IfcSurfaceStyle Shading
Surface Colour
Normals
MappedTo
(INV) HasTextures [0:?]
Colours
IfcDirectionList
IfcColourRGBList
ColourList L[1:?] L[3:3]
DirectionList L[1:?] L[3:3]
Textures L[1:?]
TexCoordsIndex L[1:?] L[3:3]
Coordinates
IfcIndexedTriangle TextureMap
Maps L[1:?]
(INV) IsMappedBy S[0:?]
IfcImageTexture
IfcCartesianPointList
TexCoords
CoordList L[1:?] L[3:3]
IfcTextureVertexList
TexCoordsList [1:?] L[2:2]
Geometric Model
Texture Mapping
Appearance Model

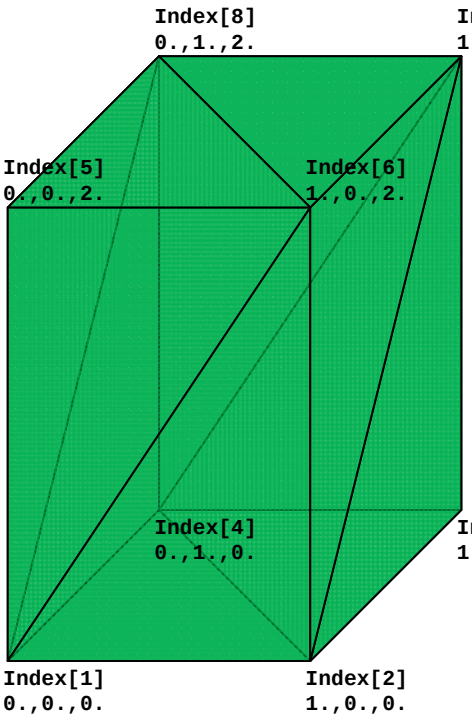



```
/* tessellated geometry */
/* no normals, no appearance – minimal usage */

#10= IFCSHAPEREPRESENTATION (#100, 'Body', 'Tesselation', (#20));
#20= IFCTRIANGULATEDFACESET (#30, $, .T., ((1,6,5), (1,2,6),
     (6,2,7), (7,2,3), (7,8,6), (6,8,5), (5,8,1), (1,8,4), (4,2,1),
     (2,4,3), (4,8,7), (7,3,4)), $);
#30= IFCCARTESIANPOINTLIST (((0.,0.,0.), (1.,0.,0.), (1.,1.,0.),
     (0.,1.,0.), (0.,0.,2.), (1.,0.,2.), (1.,1.,2.), (0.,1.,2.)));
```

```
<!-- example in X3D (or VRML)
     no normals, no appearance – minimal usage  -->

<Shape>
  <IndexedTriangleSet index='0 5 4 0 1 5 5 1 6 6 1 2 6 7 5 5 7 4
    4 7 0 0 7 3 3 1 0 1 3 2 3 7 6 6 2 3'>
    <Coordinate point='0 0 0 1 0 0 1 1 0 0 1 0 0 0 2 1 0 2 1 1 2
      0 1 2'/>
  </IndexedTriangleSet>
</Shape>

<!-- OR -->

<Shape>
  <IndexedFaceSet coordIndex='0 5 4 -1 0 1 5 -1 5 1 6 -1 6 1 2 -1 6 7
    5 -1 5 7 4 -1 4 7 0 -1 0 7 3 -1 3 1 0 -1 1 3 2 -1 3 7 6 -1 6 2 3'>
    <Coordinate point='0 0 0 1 0 0 1 1 0 0 1 0 0 0 2 1 0 2 1 1 2
      0 1 2'/>
  </IndexedFaceSet>
</Shape>
```

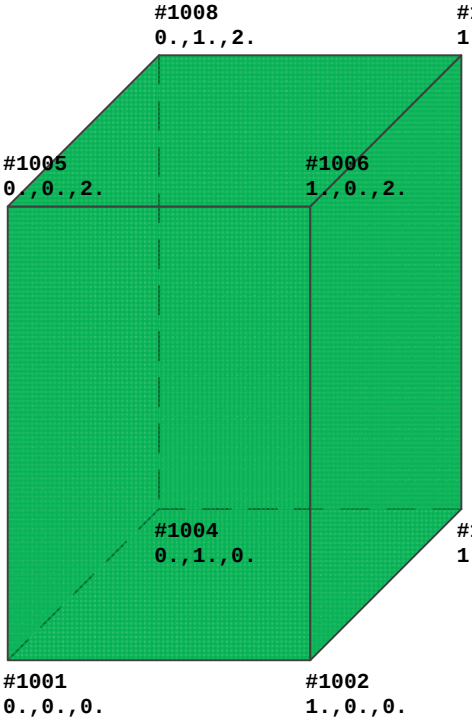



```
/* b-rep geometry */
/* no appearance – minimal usage */

#10= IFCSHAPEREPRESENTATION (#100, 'Body', 'Brep', (#20));
#20= IFCFACETEDBREP (#30);
#30= IFCCLOSEDSHELL ((#110, #120, #130, #140, #150, #160));
#110= IFCFACE((#111));
#111= IFCFACEOUTERBOUND(#112,.T.);
#112= IFCPOLYLOOP((#1001,#1002,#1003,#1004));
#120= IFCFACE((#121));
#121= IFCFACEOUTERBOUND(#122,.T.);
#122= IFCPOLYLOOP((#1006,#1002,#1003,#1007));
#130= IFCFACE((#131));
#131= IFCFACEOUTERBOUND(#132,.T.);
#132= IFCPOLYLOOP((#1007,#1003,#1004,#1008));
#140= IFCFACE((#141));
#141= IFCFACEOUTERBOUND(#142,.T.);
#142= IFCPOLYLOOP((#1008,#1004,#1001,#1005));
#150= IFCFACE((#151));
#151= IFCFACEOUTERBOUND(#152,.T.);
#152= IFCPOLYLOOP((#1001,#1004,#1003,#1002));
#160= IFCFACE((#161));
#161= IFCFACEOUTERBOUND(#162,.T.);
#162= IFCPOLYLOOP((#1006,#1007,#1008,#1005));
#1001= IFCCARTESIANPOINT((0.,0.,0.));
#1002= IFCCARTESIANPOINT((1.,0.,0.));
#1003= IFCCARTESIANPOINT((1.,1.,0.));
#1004= IFCCARTESIANPOINT((0.,1.,0.));
#1005= IFCCARTESIANPOINT((0.,0.,2.));
#1006= IFCCARTESIANPOINT((1.,0.,2.));
#1007= IFCCARTESIANPOINT((1.,1.,2.));
#1008= IFCCARTESIANPOINT((0.,1.,2.));
```

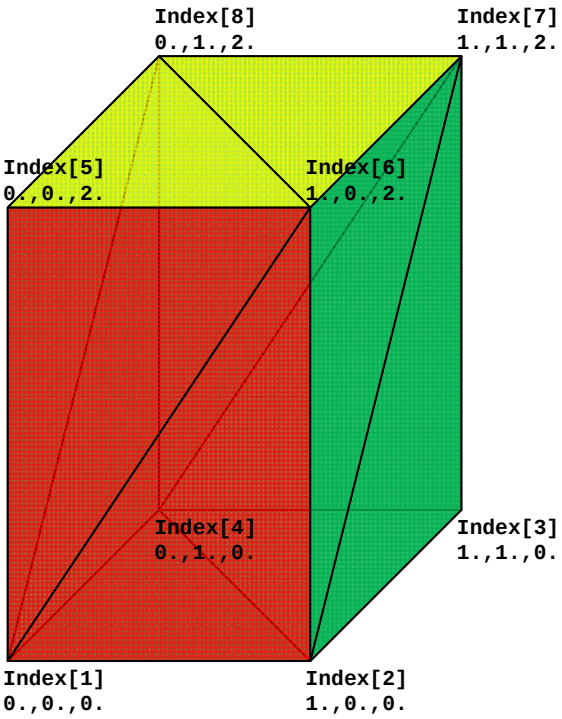



```
/* tessellated geometry */
/* no normals, single default color */

#10= IFCSHAPEREPRESENTATION (#100, 'Body', 'Tesselation', (#20));
#20= IFCTRIANGULATEDSURFACEMODEL ($, #30, $, $, ((1,6,5), (1,2,6),
     (6,2,7), (7,2,3), (7,8,6), (6,8,5), (5,8,1), (1,8,4), (4,2,1),
     (2,4,3), (4,8,7), (7,3,4)), .T.);
#30= IFCCARTESIANPOINTLIST ((0.,0.,0.), (1.,0.,0.), (1.,1.,0.),
     (0.,1.,0.), (0.,0.,2.), (1.,0.,2.), (1.,1.,2.), (0.,1.,2.));
#10000= IFCSTYLEDITEM(#20, #10010, $);
#10010= IFCSURFACESTYLE(.BOTH., #10011);
#10011= IFCSURFACESTYLESHADING(#10012);
#10012= IFCCOLOURRGB($, 0.,1.,0.);
```

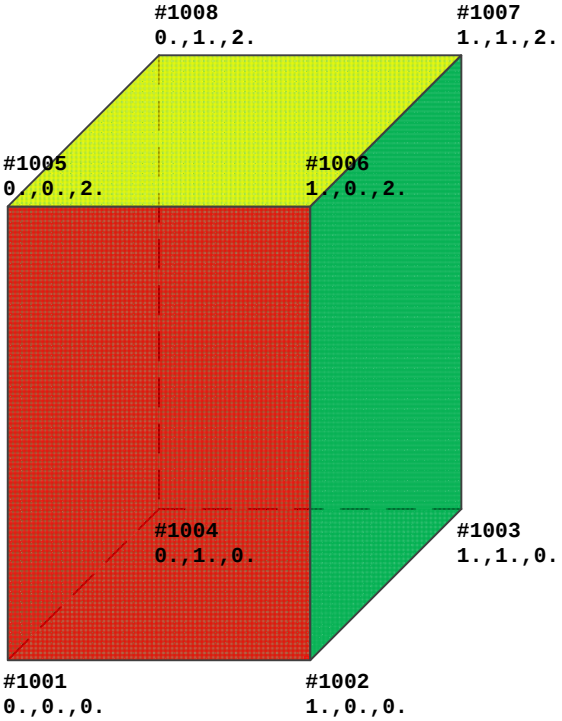
```
<!-- example in X3D (or VRML)
     no normals, appearance default material  -->

<Shape>
  <Appearance>
    <Material diffuseColor='0 1 0'/>
  </Appearance>
  <IndexedTriangleSet index='0 5 4 0 1 5 5 1 6 6 1 2 6 7 5 5 7 4
    4 7 0 0 7 3 3 1 0 1 3 2 3 7 6 6 2 3'>
    <Coordinate point='0 0 0 1 0 0 1 1 0 0 1 0 0 0 2 1 0 2 1 1 2
      0 1 2'/>
  </IndexedTriangleSet>
</Shape>
```



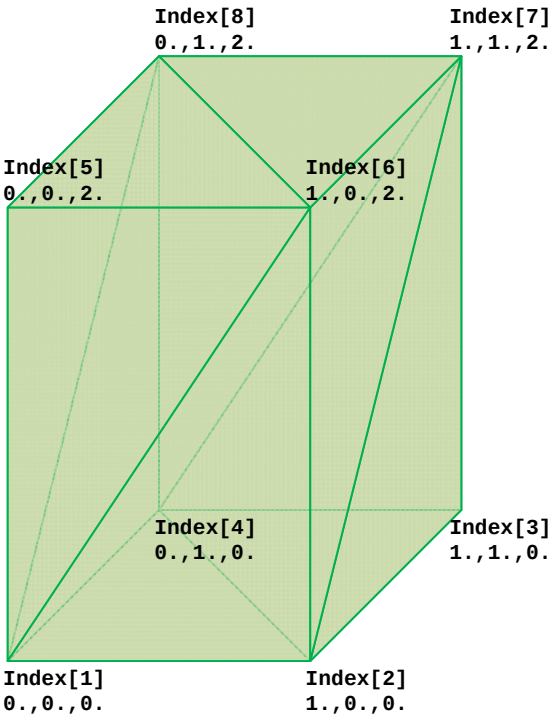

```
/* b-rep geometry */
/* single default color */

#10= IFCSHAPEREPRESENTATION (#100, 'Body', 'Brep', (#20));
#20= IFCFACETEDBREP (#30);
#30= IFCCLOSEDSHELL ((#110, #120, #130, #140, #150, #160));
#110= IFCFACE((#111));
#111= IFCFACEOUTERBOUND(#112,.T.);
#112= IFCPOLYLOOP((#1001,#1002,#1003,#1004));
#120= IFCFACE((#121));
#121= IFCFACEOUTERBOUND(#122,.T.);
#122= IFCPOLYLOOP((#1006,#1002,#1003,#1007));
#130= IFCFACE((#131));
#131= IFCFACEOUTERBOUND(#132,.T.);
#132= IFCPOLYLOOP((#1007,#1003,#1004,#1008));
#140= IFCFACE((#141));
#141= IFCFACEOUTERBOUND(#142,.T.);
#142= IFCPOLYLOOP((#1008,#1004,#1001,#1005));
#150= IFCFACE((#151));
#151= IFCFACEOUTERBOUND(#152,.T.);
#152= IFCPOLYLOOP((#1001,#1004,#1003,#1002));
#160= IFCFACE((#161));
#161= IFCFACEOUTERBOUND(#162,.T.);
#162= IFCPOLYLOOP((#1006,#1007,#1008,#1005));
#1001= IFCCARTESIANPOINT((0.,0.,0.));
#1002= IFCCARTESIANPOINT((1.,0.,0.));
#1003= IFCCARTESIANPOINT((1.,1.,0.));
#1004= IFCCARTESIANPOINT((0.,1.,0.));
#1005= IFCCARTESIANPOINT((0.,0.,2.));
#1006= IFCCARTESIANPOINT((1.,0.,2.));
#1007= IFCCARTESIANPOINT((1.,1.,2.));
#1008= IFCCARTESIANPOINT((0.,1.,2.));
#10000= IFCSTYLEDITEM(#20, #10010, $);
#10010= IFCSURFACESTYLE(.BOTH., #10011);
#10011= IFCSURFACESTYLESHADING(#10012);
#10012= IFCCOLOURRGB($, 0.,1.,0.);
```



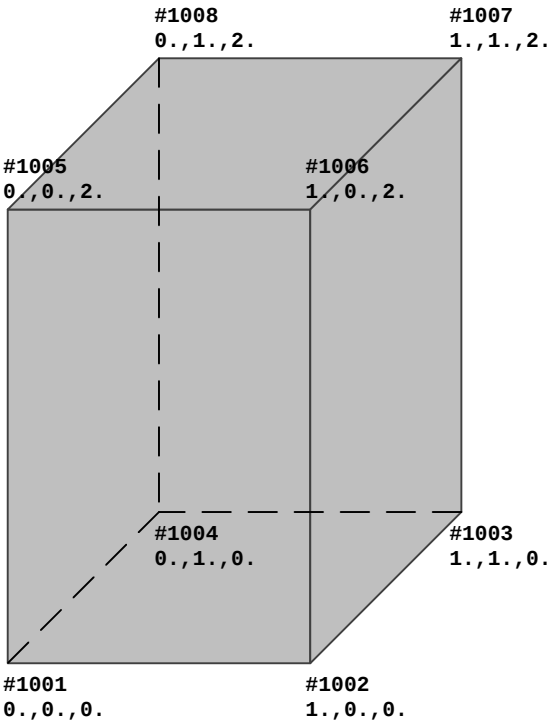

```
/* tessellated geometry */
/* no normals, one face red, one face yellow, others green */

#10= IFCSHAPEREPRESENTATION (#100, 'Body', 'Tesselation', (#20));
#20= IFCTRIANGULATEDFACESET (#30, $, .T., ((1,6,5), (1,2,6),
     (6,2,7), (7,2,3), (7,8,6), (6,8,5), (5,8,1), (1,8,4), (4,2,1),
     (2,4,3), (4,8,7), (7,3,4)), .T.);
#30= IFCCARTESIANPOINTLIST ((0.,0.,0.), (1.,0.,0.), (1.,1.,0.),
     (0.,1.,0.), (0.,0.,2.), (1.,0.,2.), (1.,1.,2.), (0.,1.,2.));
#40= IFCINDEXEDCOLOURMAP(#20, #10011, #50, (1, 1, 2, 2, 3, 3, 1, 1,
     1, 1, 1, 1, ));
#50= IFCCOLOURRGBLIST(((1.,0.,0.), (0.,1.,0.), (1.,1.,0.)));
#10000= IFCSTYLEDITEM(#20, #10010, $);
#10010= IFCSURFACESTYLE(.BOTH., #10011);
#10011= IFCSURFACESTYLESHADING(#10012);
#10012= IFCCOLOURRGB($, 0.,1.,0.);


<!-- example in X3D (or VRML)
     no normals, appearance default material  -->

<Shape>
  <IndexedFaceSet coordIndex='0 5 4 -1 0 1 5 -1 5 1 6 -1 6 1 2 -1 6 7
    5 -1 5 7 4 -1 4 7 0 -1 0 7 3 -1 3 1 0 -1 1 3 2 -1 3 7 6 -1 6 2 3'
    colorPerVertex='false' normalPerVertex='false'>
    <Coordinate point='0 0 0 1 0 0 1 1 0 0 1 0 0 0 2 1 0 2 1 1 2
      0 1 2'/>
    <Color color='1 0 0 1 0 0 0 1 0 0 1 0 1 1 0 1 1 0 0 1 0 0 1 0
      0 1 0 0 1 0 0 1 0 0 1 0'/>
  </IndexedFaceSet>
</Shape>
```

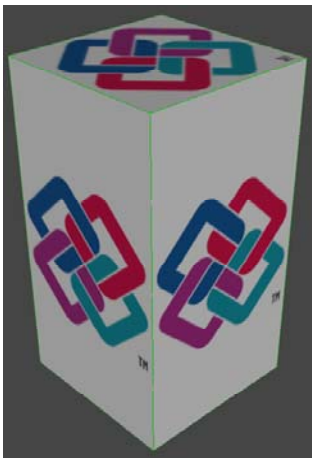



```
/* b-rep geometry */
/* one face red, one face yellow, others green */

#10= IFCSHAPEREPRESENTATION (#100, 'Body', 'Brep', (#20));
#20= IFCFACETEDBREP (#30);
#30= IFCCLOSEDSHELL ((#110, #120, #130, #140, #150, #160));
#110= IFCFACE((#111));
#111= IFCFACEOUTERBOUND(#112,.T.);
#112= IFCPOLYLOOP((#1001,#1002,#1003,#1004));
#120= IFCFACE((#121));
#121= IFCFACEOUTERBOUND(#122,.T.);
#122= IFCPOLYLOOP((#1006,#1002,#1003,#1007));
#130= IFCFACE((#131));
#131= IFCFACEOUTERBOUND(#132,.T.);
#132= IFCPOLYLOOP((#1007,#1003,#1004,#1008));
#140= IFCFACE((#141));
#141= IFCFACEOUTERBOUND(#142,.T.);
#142= IFCPOLYLOOP((#1008,#1004,#1001,#1005));
#150= IFCFACE((#151));
#151= IFCFACEOUTERBOUND(#152,.T.);
#152= IFCPOLYLOOP((#1001,#1004,#1003,#1002));
#160= IFCFACE((#161));
#161= IFCFACEOUTERBOUND(#162,.T.);
#162= IFCPOLYLOOP((#1006,#1007,#1008,#1005));
#1001= IFCCARTESIANPOINT((0.,0.,0.));
#1002= IFCCARTESIANPOINT((1.,0.,0.));
#1003= IFCCARTESIANPOINT((1.,1.,0.));
#1004= IFCCARTESIANPOINT((0.,1.,0.));
#1005= IFCCARTESIANPOINT((0.,0.,2.));
#1006= IFCCARTESIANPOINT((1.,0.,2.));
#1007= IFCCARTESIANPOINT((1.,1.,2.));
#1008= IFCCARTESIANPOINT((0.,1.,2.));
#10000= IFCSTYLEDITEM(#20, #10010, $);
#10010= IFCSURFACESTYLE(.BOTH., #10011);
#10011= IFCSURFACESTYLESHADING(#11000);
#10100= IFCSTYLEDITEM(#110, #10110, $);
#10110= IFCSURFACESTYLE(.BOTH., #10111);
#10111= IFCSURFACESTYLESHADING(#11001);
#10200= IFCSTYLEDITEM(#160, #10210, $);
#10210= IFCSURFACESTYLE(.BOTH., #10211);
#10211= IFCSURFACESTYLESHADING(#11002);
#11000= IFCCOLOURRGB($, 1.,0.,0.);
#11001= IFCCOLOURRGB($, 0.,1.,0.);
#11002= IFCCOLOURRGB($, 0.,0.,1.);
```




```
/* tessellated geometry */
/* no normals, texture map */

#10= IFCSHAPEREPRESENTATION (#100, 'Body', 'Tesselation', (#20));
#20= IFCTRIANGULATEDSURFACEMODEL ($, #30, $, $, ((1,6,5), (1,2,6),
     (6,2,7), (7,2,3), (7,8,6), (6,8,5), (5,8,1), (1,8,4), (4,2,1),
     (2,4,3), (4,8,7), (7,3,4)), .T.);
#30= IFCCARTESIANPOINTLIST ((0.,0.,0.), (1.,0.,0.), (1.,1.,0.),
     (0.,1.,0.), (0.,0.,2.), (1.,0.,2.), (1.,1.,2.), (0.,1.,2.));
#100= IFCINDEXEDTRIANGLETEXTUREMAP((#10021), #20, #110, ((1 4 3),
      (1 2 4), (3 1 4), (4 1 2), (8 7 6), (6 7 5), (4 3 2), (2 3 1),
      (5 8 7), (8 5 6), (2 4 3), (3 1 2)));
#110= IFCTEXTUREVERTEXLIST(((0. -0.5), (1. -0.5), (0. 1.5), (1. 1.5),
      (0. 0.), (0. 1.), (1. 0.), (1. 1.)));
#10000= IFCSTYLEDITEM(#20, #10010, $);
#10010= IFCSURFACESTYLE(.BOTH., #10020);
#10020= IFCSURFACESTYLEWITHTEXTURES((#10021));
#10021= IFCIMAGETEXTURE(.F., .F., $, $, $, 'buildingsmart_logo.png');
```




```
<!-- example in X3D (or VRML)
     no normals, texture map  -->

<Shape>
  <Appearance>
    <Material/>
    <ImageTexture url=' "buildingsmart_logo.png" '
      repeatS='false' repeatT='false'/>
  </Appearance>
  <IndexedFaceSet
    coordIndex   ='0 5 4 -1 0 1 5 -1 5 1 6 -1 6 1 2 -1 6 7 5 -1
      5 7 4 -1 4 7 0 -1 0 7 3 -1 3 1 0 -1 1 3 2 -1 3 7 6 -1 6 2 3'
    texCoordIndex='0 3 2 -1 0 1 3 -1 2 0 3 -1 3 0 1 -1 7 6 5 -1
      5 6 4 -1 3 2 1 -1 1 2 0 -1 4 7 6 -1 7 4 5 -1 1 3 2 -1 2 0 1'>
    <Coordinate point='0 0 0 1 0 0 1 1 0 0 1 0 0 0 2 1 0 2 1 1 2 0
      1 2'/>
    <TextureCoordinate point='0 -0.5 1 -0.5 0 1.5 1 1.5 0 0 0 1 1 0
      1 1'/>
  </IndexedFaceSet>
</Shape>
```

```
/* b-rep geometry */
/* no appearance – texture map */

not shown – as it would not fit on this page and the next page !!!
```