INTERNATIONAL STANDARD ISO 10303-111:2007
TECHNICAL CORRIGENDUM 2

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Industrial automation systems and integration — Product data representation and exchange —

Part 111:

Integrated generic resource:

Elements for the procedural modelling of solid shapes

TECHNICAL CORRIGENDUM 2

Systèmes d' automatisation industrielle et intégration – Représentation et échange de données de produits - Partie 111 Ressources génériques intégrées: Éléments pour la modélisation procédurale des forms solides RECTIFICATIF TECHNIQUE 2

Technical Corrigendum 2 to International Standard ISO 10303-111:2007 was prepared by Technical Committee ISO/TC 184, *Automation systems and integration,* Subcommittee SC 4, *Industrial data.*

This Technical Corrigendum is intended to be used in conjunction with ISO 10303-111:2007/Cor.1:2008. The purpose of the modifications to the text of ISO 10303-111:2007 is to make minor changes in the information model to avoid an implementation problem

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Modifications to the text of ISO 10303-111:2007

Clause 4.4.2, edge_blended_solid*, pp. 11 - 12*

Replace the EXPRESS code on p. 12 with the following, in which **solid_with_variable_radius_edge_blend** *has been removed from the SUPERTYPE OF list:*

EXPRESS specification:

```
*)
ENTITY edge_blended_solid
  ABSTRACT SUPERTYPE OF (track_blended_solid ANDOR (ONEOF
                          (solid_with_constant_radius_edge_blend,
                           solid_with_chamfered_edges)))
  SUBTYPE OF (modified_solid);
  blended_edges : LIST [1:?] OF UNIQUE edge_curve;
END_ENTITY;
(*
```

Clause 4.4.3, track_blended_solid*, pp. 12 - 13*

Replace the entire entity definition by the following, in which the EXPRESS code and the descriptive text have been amended:

A **track_blended_solid** is a type of **edge_blended_solid** in which the edges to be blended form a continuous open or closed track. A WHERE rule is imposed to ensure this condition.

NOTE 1 A track is related to a **path** as defined in ISO 10303-42 in that it consists of a list of distinct edges connected end to end so that it is possible to traverse all the edges in the list continuously from an initial vertex to a final vertex. The initial and final vertices may be the same in the case of a closed track. The difference is that a **path** consists of instances of **oriented_edge**, so that there is a sense associated with the path as a whole. A track, by contrast, is made up of unoriented edges.

NOTE 2 Where appropriate, this ABSTRACT entity may be instantiated as a complex instance with **solid_with_constant_radius_edge_blend** or **solid_with_chamfered_edges**.

NOTE 3 Figure 4 in clause 4.4.5 shows an example of a **track_blended_solid**, in which the blended track is a sequence of five edges of the volume created by extruding a rectangle with two rounded corners. Since the blend is a constant radius blend, this solid can be represented by a complex instance of **track_blended_solid** and **solid_with_constant_radius_edge_blend**.

EXPRESS specification:

```
*)
ENTITY track_blended_solid
  ABSTRACT SUPERTYPE
  SUBTYPE OF (edge_blended_solid);
WHERE
  WR1: check_continuous_edges(SELF\edge_blended_solid.blended_edges);
END_ENTITY;
(*
```


Formal propositions:

WR1: One vertex of each member of the list of **edge_curve** instances (except the last instance, in the case of an open track) shall be identical with one vertex of the following member.

Clause 4.4.6, solid_with_variable_radius_edge_blend*, pp. 17 - 19*

Replace the descriptive text and the EXPRESS code of this clause by the following, in which **edge_-blended_solid** *has been removed from the SUPERTYPE OF list in the EXPRESS code and the descriptive text has been amended accordingly:*

A **solid_with_variable_radius_edge_blend** is a type of **track_blended_solid** in which different radius values are specified at selected points of each of the edges concerned, and a specified interpolation method is used to compute blend radius values at intermediate points.

As stated in clause 4.4.5, the geometry of the transferred blend is assumed to be of the rolling ball type, though in this case the radius of the ball varies during its motion.

NOTE 1 The note in clause 4.4.5 concerning differences in the geometric interpretation of rolling ball edge blends applies for this entity also.

Since this entity is a subtype of **track_blended_solid**, the edges blended are required to be joined end-to-end in an open or closed track. The correct correspondence of the specified radius-defining points with the edges concerned may therefore be ensured (see the formal and informal propositions applying to this entity). If specialized end conditions are imposed on the blend, the entity shall be instantiated as a complex instance with **track_blended_solid_with_end_conditions**. If any edge is required to have a constant radius blend, even though the track blend as a whole has a variable radius, then that edge shall be treated as an edge with linear variation of blend radius, with the same radius value being specified at each of its end points.

NOTE 2 Figure 6 shows a variable radius track blend with one constant radius blend segment.

In general, the positions of terminal vertices of edges in the list may or may not be used as radius-defining points. If **track_blended_solid_with_end_conditions** is not instantiated, the positions of the start vertex of the first edge of the list and the end vertex of the last edge of the list shall always be defined as selected points.

NOTE 3 A single connected track of edges can be blended by an instance of this entity. The variable radius blending of more general networks of edges will require the use of successive multiple instances.

In any interval whose radius-defining function is **cubic**, the actual function is determined using Hermite interpolation, in terms of the radii at each end point of the interval and values of the first derivatives of the radius variation function at those end points.

NOTE 4 Appropriate values of the required derivatives can be determined from the radius values at the end-points using standard methods for the computation of natural cubic spline functions [5]. The details differ slightly for the cases of open and closed edge tracks.

NOTE 5 In any interval for which the value of the radius-defining function is **unspecified** it is recommended that linear interpretation is used initially in the receiving system but that the user is warned that some other native blending capability of that system may be more appropriate.

NOTE 6 Figure 5 shows the L-shaped block of Figure 2 after creation of a variable radius blend on its concave edge. In this example the blend radius varies linearly along the length of the edge concerned.

NOTE 7 Figure 6 shows an example of a **track_blended_solid_with_end_conditions** as defined in clause 4.4.4, in which the blended track is a sequence of five edges of a volume created by extruding a rectangle with two rounded corners. The blend is a variable radius blend. This solid can be represented by a complex instance of **solid_with_variable_radius_edge_blend** and **track_blended_solid_with_end_conditions**.

EXPRESS specification:

```
*)
ENTITY solid_with_variable_radius_edge_blend
  SUBTYPE OF (track_blended_solid);
  point_list         : LIST[2:?] OF point;
  radius_list        : LIST[2:?] OF positive_length_measure;
  edge_function_list : LIST[1:?] OF blend_radius_variation_type;
WHERE
  WR1: SIZEOF(point_list) = SIZEOF(radius_list);
  WR2: SIZEOF(edge_function_list) = SIZEOF(radius_list) - 1;
  WR3: NOT((point_list[1] = point_list[HIINDEX(point_list)]) AND NOT
         (radius_list[1] = radius_list[HIINDEX(radius_list)]));
END_ENTITY;
(*
```

Annex B, p. 77

The changes made in this Technical Corrigendum require the object identifiers in Annex B to be updated. Replace the content of clause B.1 with the following:

To provide for unambiguous identification of an information object in an open system, the object identifier

```
iso standard 10303 part(111) version(3)
```

is assigned to this part of ISO 10303. The meaning of this value is defined in ISO/IEC 8824-1, and is described in ISO 10303-1.

Replace the content of clause B.2 with the following:

To provide for unambiguous identification of the solid-shape-element-schema in an open information system, the object identifier

```
iso standard 10303 part(111) version(3) schema(1)
          solid-shape-element-schema(1)
```

is assigned to the **solid_shape_element_schema** (see clause 1). The meaning of this value is defined in ISO/IEC 8824-1, and is described in ISO 10303-1.

Appendix D, Figure D.3, p. 82

Replace the Figure by the one on the following page, which reflects the previously specified changes in the information model:

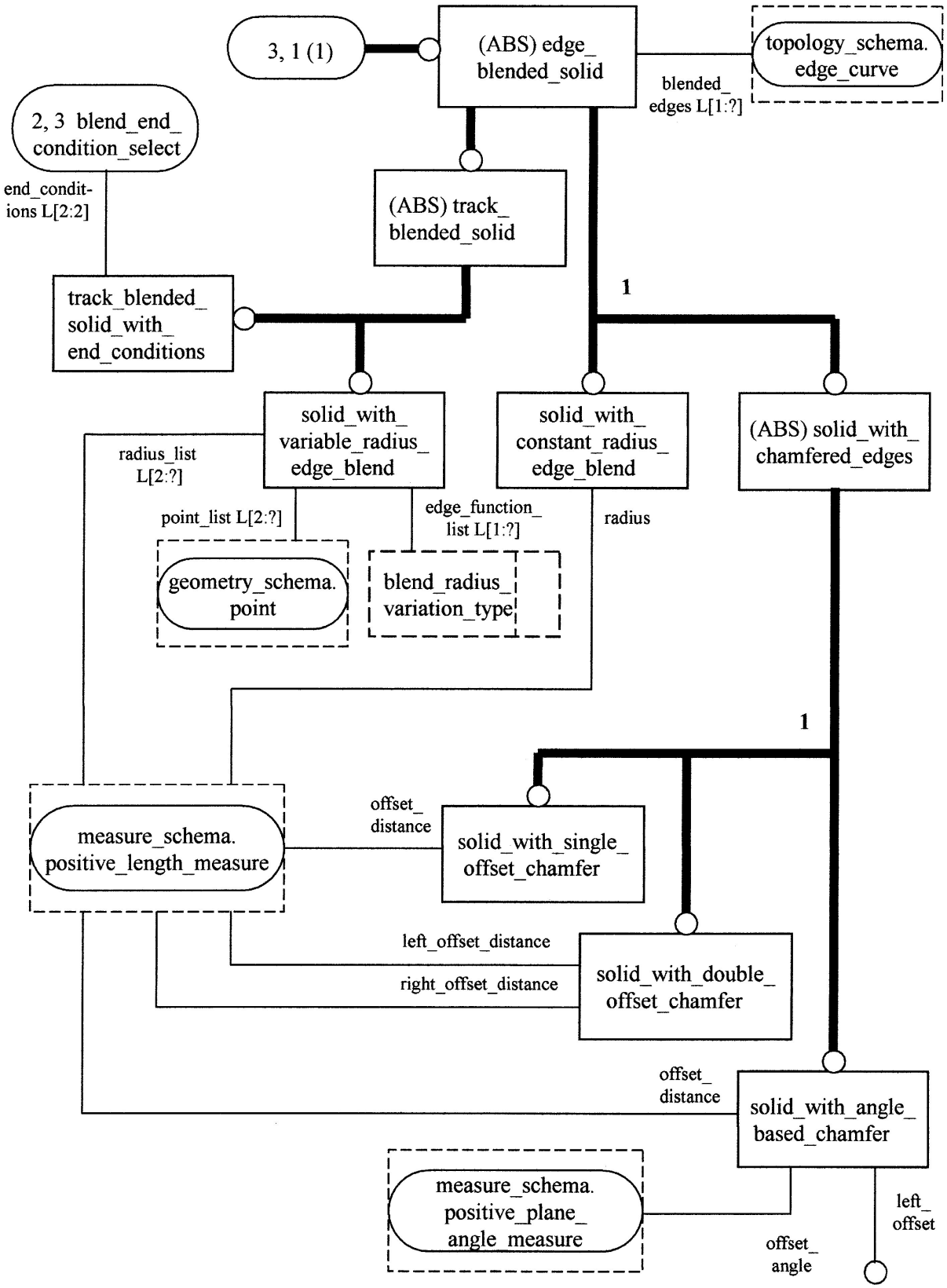

Figure D.3 – solid_shape_element_schema – EXPRESS-G diagram 3 of 11