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

Part 522:

**Application interpreted construct:
Machining features**

*Systèmes d'automatisation industrielle et intégration — Représentation
et échange de données de produits —*

*Partie 522: Construction interprétée d'application: Caractéristiques
d'usinage*



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

This document is a preview generated by EVS

© ISO 2006

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

1 Scope.....	1
2 Normative references	1
3 Terms, definitions and abbreviations	2
3.1 Terms defined in ISO 10303-1	2
3.2 Other definitions	3
3.3 Abbreviations.....	3
4 EXPRESS short listing	3
4.1 Fundamental concepts and assumptions	5
4.2 AIC_machining_feature entity definitions	7
4.2.1 applied_area	7
4.2.2 boss.....	9
4.2.3 boss_top.....	14
4.2.4 chamfer.....	16
4.2.5 chamfer_offset.....	18
4.2.6 circular_pattern.....	20
4.2.7 circular_closed_profile.....	23
4.2.8 closed_path_profile.....	24
4.2.9 composite_hole.....	26
4.2.10 compound_feature	27
4.2.11 direction_shape_representation.....	29
4.2.12 edge_round	30
4.2.13 externally_defined_feature_definition.....	33
4.2.14 face_shape_representation.....	43
4.2.15 feature_component_definition.....	43
4.2.16 feature_component_relationship	44
4.2.17 feature_definition	45
4.2.18 feature_pattern.....	46
4.2.19 fillet	47
4.2.20 flat_face.....	50
4.2.21 gear	52
4.2.22 hole_bottom.....	58
4.2.23 instanced_feature.....	63
4.2.24 linear_profile	64
4.2.25 location_shape_representation	65
4.2.26 marking	66
4.2.27 modified_pattern	68
4.2.28 ngon_closed_profile	70
4.2.29 open_path_profile.....	72
4.2.30 outer_round	74
4.2.31 outside_profile.....	78
4.2.32 partial_circular_profile.....	84
4.2.33 path_feature_component	86
4.2.34 path_shape_representation	90
4.2.35 pattern_offset_membership.....	91
4.2.36 pattern_omit_membership.....	96
4.2.37 planar_shape_representation	100
4.2.38 pocket	100
4.2.39 pocket_bottom.....	107

4.2.40 profile_floor	110
4.2.41 protrusion	113
4.2.42 rectangular_closed_profile	114
4.2.43 rectangular_pattern	117
4.2.44 removal_volume	120
4.2.45 replicate_feature	121
4.2.46 revolved_profile	122
4.2.47 rib_top	126
4.2.48 rib_top_floor	127
4.2.49 round_hole	129
4.2.50 rounded_end	131
4.2.51 rounded_u_profile	133
4.2.52 shape_defining_relationship	135
4.2.53 shape_representation_with_parameters	136
4.2.54 spherical_cap	136
4.2.55 square_u_profile	138
4.2.56 step	142
4.2.57 slot	144
4.2.58 slot_end	148
4.2.59 taper	151
4.2.60 tee_profile	153
4.2.61 thread	158
4.2.62 thread_runout	163
4.2.63 transition_feature	165
4.2.64 turned_knurl	166
4.2.65 vee_profile	170
Annex A (normative) AIM short names	174
Annex B (normative) Information object registration	177
Annex C (informative) EXPRESS-G diagrams	178
Annex D (informative) Computer interpretable listings	189
Annex E (informative) Technical discussion	190
Bibliography	195
Index	196

Figures

Figure 1 — Pattern offset required instances	95
Figure 2 — Pattern omit required instances	99
Figure C.1 — EXPRESS-G diagram of the aic_machining_feature (1 of 10)	179
Figure C.2 — EXPRESS-G diagram of the aic_machining_feature (2 of 10)	180
Figure C.3 — EXPRESS-G diagram of the aic_machining_feature (3 of 10)	181
Figure C.4 — EXPRESS-G diagram of the aic_machining_feature (4 of 10)	182
Figure C.5 — EXPRESS-G diagram of the aic_machining_feature (5 of 10)	183
Figure C.6 — EXPRESS-G diagram of the aic_machining_feature (6 of 10)	184
Figure C.7 — EXPRESS-G diagram of the aic_machining_feature (7 of 10)	185
Figure C.8 — EXPRESS-G diagram of the aic_machining_feature (8 of 10)	186
Figure C.9 — EXPRESS-G diagram of the aic_machining_feature (9 of 10)	187
Figure C.10 — EXPRESS-G diagram of the aic_machining_feature (10 of 10)	188

Tables

Table A.1 — AIM short names of entities 174

This document is a preview generated by EVS

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10303-522 was prepared by Technical Committee ISO TC184/SC4, *Industrial automation systems and integration*, Subcommittee SC4 *Industrial data*.

This second edition of ISO 10303-522 cancels and replaces the first edition (ISO 10303-522:2003), of which it constitutes a technical revision.

ISO 10303 is organized as a series of parts, each published separately. The structure of ISO 10303 is described in ISO 10303-1.

Each part of ISO 10303 is a member of one of the following series: description methods, implementation methods, conformance testing methodology and framework, integrated generic resources, integrated application resources, application protocols, abstract test suites, application interpreted constructs, and application modules. This part of ISO 10303 is a member of the 500 series.

A complete list of parts of ISO 10303 is available from the Internet:

<<http://www.tc184-sc4.org/titles/>>

Introduction

ISO 10303 is an International Standard for the computer-interpretable representation of product information and for the exchange of product data. The objective is to provide a neutral mechanism capable of describing products throughout their life cycle. This mechanism is suitable not only for neutral file exchange, but also as a basis for implementing and sharing product databases, and as a basis for archiving.

This part of ISO 10303 is a member of the application interpreted construct series. An application interpreted construct (AIC) provides a logical grouping of interpreted constructs that supports a specific functionality for the usage of product data across multiple application contexts. An interpreted construct is a common interpretation of the integrated resources that supports shared information requirements among application protocols.

This document specifies the application interpreted construct for that identifies specific characteristics of part shape used in manufacturing. These characteristics are used to define manufacturing features. These shapes can be represented either by machining features defined in this application interpreted constructs, or by a boundary representation solid model, shared by other application protocols and used as application interpreted constructs in application protocols. The purpose of manufacturing features is to facilitate the identification of manufacturing shapes that are human and computer interpretable.

This edition of this part of ISO 10303 incorporates modifications that are upwardly compatible with the previous edition, and modifications that are not upwardly compatible with the previous edition. Modifications to EXPRESS specifications are upwardly compatible if:

- the modifications do not result in changes to instances that are encoded according to ISO 10303-21; such instances conform to both the unmodified and modified EXPRESS specifications;
- the modifications do not result in changes to software that conforms to ISO 10303-22 with respect to access to the data content of data structures;
- the modifications do not invalidate mappings to the previous edition of this part of ISO 10303 that are specified in the mapping table of an ISO 10303 application protocol.

The second edition of this part of ISO 10303 (ISO 10303-522:2006) includes the modifications to ISO 10303-522:2003 listed below. These modifications are categorized as follows: changes to the EXPRESS declarations, new EXPRESS declarations, and changes to definitions of EXPRESS entity data types.

The following EXPRESS declarations have been modified:

- chamfer;
- edge_round;
- externally_defined_feature_definition;
- feature_definition;
- flat_face;

ISO 10303-522:2006(E)

- outer_round;
- outside_profile;
- pocket;
- protrusion;
- revolved_profile;
- rib_top;
- rounded_end;
- rounded_u_profile;
- square_u_profile;
- step;
- slot_end;
- thread;
- vee_profile;
- vee_profile.

The following EXPRESS declarations have been added:

- gear;
- thread_runout.

The expanded listing contains the EXPRESS for the entities defined in ISO 10303-522 and the integrated resource entities used by these entities is given in Annex D. A graphical representation of the expanded EXPRESS is given in Annex C. The short names of entities specified in ISO 10303-522 is given in Annex A. Requirements on the use of the short names are found in the implementation methods included in ISO 10303. A technical discussion on the usage of entities is given in the technical discussion found in Annex E. Annex B defines the information object identifier for the part as specified by ISO/IEC 8824-1.

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

Part 522:

Application interpreted construct: Machining features

1 Scope

This part of ISO 10303 specifies the interpretation of the integrated resources to satisfy requirements for machining feature use across a range of application protocols. The product data is based on existing part designs that have their shapes represented by machining features. This part of ISO 10303 supports digital representation for computer integrated manufacturing.

The following are within the scope of this part of ISO 10303:

- features that are to be manufactured by either milling or turning processes;
 - machining features for defining shapes necessary for manufacturing;
- NOTE The machining feature set is defined in ISO 10303-224.
- machining feature definition elements necessary for creating machining features;
 - shape representations necessary for creating machining features;
 - features that can be replicated in patterns;
 - implicit representation of machining features through selection of standard parameters.

The following are outside the scope of this part of ISO 10303:

- feature order or sequence;
- design features of a part.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 8824-1, *Information Technology — Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO 10303-522:2006(E)

ISO 10303-1, *Industrial automation systems and integration — Product data representation and exchange -- Part 1: Overview and fundamental principles*

ISO 10303-41, *Industrial automation systems and integration — Product data representation and exchange — Part 41: Integrated generic resource: Fundamentals of product description and support*

ISO 10303-42, *Industrial automation systems and integration — Product data representation and exchange — Part 42: Integrated generic resource: Geometric and topological representation*

ISO 10303-45, *Industrial automation systems and integration — Product data representation and exchange — Part 45: Integrated generic resource: Materials*

ISO 10303-47, *Industrial automation systems and integration — Product data representation and exchange — Part 47: Integrated generic resource: Shape variation tolerances*

ISO 10303-224:2006, *Industrial automation systems and integration — Product data representation and exchange — Part 224: Application protocol: Mechanical product definition for process planning using machining features*

3 Terms, definitions and abbreviations

3.1 Terms defined in ISO 10303-1

For the purpose of this part of ISO 10303, the following terms defined in ISO 10303-1 apply.

- application;
- application activity model (AAM);
- application interpreted model (AIM);
- application object;
- application protocol (AP);
- application reference model (ARM);
- implementation method;
- integrated resource;
- model;
- product;