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

Part 209:

**Application protocol: Composite and
metallic structural analysis and related
design**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

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

[https://standards.iteh.ai/catalog/standards/sist/47694a59-ca8f-4aff-8838-](https://standards.iteh.ai/catalog/standards/sist/47694a59-ca8f-4aff-8838-22e4696c7136/iso-10303-209-2001)

*Partie 209: Protocole d'application: Analyse structurelle composite et
métallique et conception associée*



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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 10303-209:2001](#)

<https://standards.iteh.ai/catalog/standards/sist/47694a59-ea8f-4aff-8838-c29c4060e3ff/iso-10303-209-2001>

© ISO 2001

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.ch
Web www.iso.ch

Printed in Switzerland

Contents	Page
1 Scope	1
2 Normative references	3
3 Terms, definitions and abbreviations	5
3.1 Terms defined in ISO 10303-1	5
3.2 Terms defined in ISO 10303-11	6
3.3 Terms defined in ISO 10303-21	6
3.4 Terms defined in ISO 10303-31	7
3.5 Terms defined in ISO 10303-42	7
3.6 Terms defined in ISO 10303-44	8
3.7 Terms defined in ISO 10303-45	8
3.8 Terms defined in ISO 10303-104	8
3.9 Terms defined in ISO 10303-203	9
3.10 Other terms and definitions	9
3.11 Abbreviations	10
4 Information requirements	11
4.1 Units of functionality	11
4.1.1 activity_control	12
4.1.2 advanced_boundary_representation	13
4.1.3 analysis_report	13
4.1.4 assembly	13
4.1.5 authorization	14
4.1.6 composite_constituent_representation	14
4.1.7 effectivity	15
4.1.8 end_item_identification	16
4.1.9 faceted_boundary_representation	16
4.1.10 fe_analysis_control	16
4.1.11 fe_analysis_results	17
4.1.12 fea_model	18
4.1.13 manifold_surface_with_topology	20
4.1.14 material	20
4.1.15 non_topological_surface_and_wireframe	21
4.1.16 part_composite_constituents	22
4.1.17 part_identification	22
4.1.18 part_laminate_table	23
4.1.19 part_shape	24
4.1.20 wireframe_with_topology	24
4.1.21 zone_composite_constituents_and_their_representation	24
4.2 Application objects	26
4.3 Application assertions	117
5 Application interpreted model	151
5.1 Mapping table	151

ISO 10303-209:2001(E)

5.2 AIM EXPRESS short listing	352
6 Conformance Requirements	445
Annex A (normative) AIM EXPRESS expanded listing	448
Annex B (normative) AIM short names	640
Annex C (normative) Implementation method specific requirements	659
Annex D (normative) Protocol Implementation Conformance Statement (PICS) proforma	660
Annex E (normative) Information object registration	662
E.1 Document identification	662
E.2 Schema identification	662
Annex F (informative) Application activity model	663
F.1 Application activity model background	663
F.2 Information exchange scenario	664
F.3 Application activity model abbreviations	666
F.4 Application activity model definitions	667
F.5 Application activity model diagrams	702
Annex G (informative) Application reference model	747
Annex H (informative) AIM EXPRESS-G	763
Annex J (informative) Computer-interpretable listings	858
Annex K (informative) ARM EXPRESS listing	859
Bibliography	879
Index	880
Figures	
Figure 1 - Data planning model	xii
Figure 2 - Composite_assembly_table	39
Figure 3 - Discontinuous_fiber_assembly	46
Figure 4 - Filament_assembly	60
Figure 5 - Filament_laminate	61
Figure 6 - Flat_pattern_ply_shape	63
Figure 7 - Laid_ply_shape	68
Figure 8 - Ply	86
Figure 9 - Ply_laminate	87
Figure 10 - Ply_laminate_table	89

Figure 11 - Processed_core	94
Figure 12 - Projection_method	98
Figure 13 - Surface_ply_shape	109
Figure 14 - View_ply_shape	113
Figure F.1 - PAS-C Suite Concept	664
Figure F.2 - AP209 scenario from a structural designer's viewpoint	665
Figure F.3 - AP209 scenario from an analysis viewpoint	667
Figure F.4 - A-0 Develop, procure, build, use and maintain an SP	703
Figure F.5 - A0 Develop, procure, build, use and maintain an SP	704
Figure F.6 - A2 manage, design, build, and support an SP	705
Figure F.7 - A22 design and analyze an SP	706
Figure F.8 - A223 perform structural part detail design and analysis	707
Figure F.9 - A2232 create detail structural part design	708
Figure F.10 - A22323 prepare SP models and drawing	709
Figure F.11 - A223232 create SP geometry layouts and models	710
Figure F.12 - A2232321 receive and review SP geometry data	711
Figure F.13 - A2232322 build SP layouts and models	712
Figure F.14 - A223233 create SP drawing data	713
Figure F.15 - A2232332 prepare detail SP item drawings	714
Figure F.16 - A22323322 prepare SP details	715
Figure F.17 - A2232332233 create SP data	716
Figure F.18 - A2232332231 prepare SP composite detail	717
Figure F.19 - A22323322316 produce CSP ply stackup	718
Figure F.20 - A223233223162 create CSP ply tables	719
Figure F.21 - A2232332232 prepare CSP core details	720
Figure F.22 - A22323322322 develop CSP core periphery	721
Figure F.23 - A22323322323 Design CPS core thickness, density, and material features	722
Figure F.24 - A2233 conduct detail SP analysis	723
Figure F.25 - A22335 conduct SP static stress analysis	724
Figure F.26 - A223352 conduct SP finite element analysis	725
Figure F.27 - A2233521 generate SP finite element models	726
Figure F.28 - A22335211 generate SP node geometry	727
Figure F.29 - A22335213 generate and assign SP element attributes	728
Figure F.30 - A223352131 generate SP geometric attributes	729
Figure F.31 - A2233521311 generate beam geometric attributes	730
Figure F.32 - A2233521312 generate contoured panel geometric attributes	731
Figure F.33 - A2233521313 generate core stiffened panel geometric attributes	732
Figure F.34 - A223352133 generate/import SP material properties	733
Figure F.35 - A2233521334 input SP anisotropic material property matrices	734
Figure F.36 - A22335213341 input beam anisotropic material property	735
Figure F.37 - A22335213342 input contoured panels anisotropic material property	736
Figure F.38 - A22335213343 input core stiffened panel anisotropic material property	737
Figure F.39 - A2233522 generate SP FE analysis environment and controls	738
Figure F.40 - A2233523 perform SP mechanical and thermo-mechanical analysis	739
Figure F.41 - A2233524 create/document SP internal loads/stress data	740
Figure F.42 - A223353 conduct SP detail stress analyses	741
Figure F.43 - A2233531 conduct SP static strength analyses	742
Figure F.44 - A22335311 conduct beam static strength analysis	743

ISO 10303-209:2001(E)

Figure F.45 - A22335312 conduct panel static strength analysis	744
Figure F.46 - A2233532 conduct SP fine grid finite element analysis	745
Figure F.47 - A4 develop and provide SP materials	746
Figure G.1 - ARM EXPRESS-G diagram 1 of 15	748
Figure G.2 - ARM EXPRESS-G diagram 2 of 15	749
Figure G.3 - ARM EXPRESS-G diagram 3 of 15	750
Figure G.4 - ARM EXPRESS-G diagram 4 of 15	751
Figure G.5 - ARM EXPRESS-G diagram 5 of 15	752
Figure G.6 - ARM EXPRESS-G diagram 6 of 15	753
Figure G.7 - ARM EXPRESS-G diagram 7 of 15	754
Figure G.8 - ARM EXPRESS-G diagram 8 of 15	755
Figure G.9 - ARM EXPRESS-G diagram 9 of 15	756
Figure G.10 - ARM EXPRESS-G diagram 10 of 15	757
Figure G.11 - ARM EXPRESS-G diagram 11 of 15	758
Figure G.12 - ARM EXPRESS-G diagram 12 of 15	759
Figure G.13 - ARM EXPRESS-G diagram 13 of 15	760
Figure G.14 - ARM EXPRESS-G diagram 14 of 15	761
Figure G.15 - ARM EXPRESS-G diagram 15 of 15	762
Figure H.1 - AIM EXPRESS-G diagram 1 of 94	764
Figure H.2 - AIM EXPRESS-G diagram 2 of 94	765
Figure H.3 - AIM EXPRESS-G diagram 3 of 94	766
Figure H.4 - AIM EXPRESS-G diagram 4 of 94	767
Figure H.5 - AIM EXPRESS-G diagram 5 of 94	768
Figure H.6 - AIM EXPRESS-G diagram 6 of 94	769
Figure H.7 - AIM EXPRESS-G diagram 7 of 94	770
Figure H.8 - AIM EXPRESS-G diagram 8 of 94	771
Figure H.9 - AIM EXPRESS-G diagram 9 of 94	772
Figure H.10 - AIM EXPRESS-G diagram 10 of 94	773
Figure H.11 - AIM EXPRESS-G diagram 11 of 94	774
Figure H.12 - AIM EXPRESS-G diagram 12 of 94	775
Figure H.13 - AIM EXPRESS-G diagram 13 of 94	776
Figure H.14 - AIM EXPRESS-G diagram 14 of 94	777
Figure H.15 - AIM EXPRESS-G diagram 15 of 94	778
Figure H.16 - AIM EXPRESS-G diagram 16 of 94	779
Figure H.17 - AIM EXPRESS-G diagram 17 of 94	780
Figure H.18 - AIM EXPRESS-G diagram 18 of 94	781
Figure H.19 - AIM EXPRESS-G diagram 19 of 94	782
Figure H.20 - AIM EXPRESS-G diagram 20 of 94	783
Figure H.21 - AIM EXPRESS-G diagram 21 of 94	784
Figure H.22 - AIM EXPRESS-G diagram 22 of 94	785
Figure H.23 - AIM EXPRESS-G diagram 23 of 94	786
Figure H.24 - AIM EXPRESS-G diagram 24 of 94	787
Figure H.25 - AIM EXPRESS-G diagram 25 of 94	788
Figure H.26 - AIM EXPRESS-G diagram 26 of 94	789
Figure H.27 - AIM EXPRESS-G diagram 27 of 94	790
Figure H.28 - AIM EXPRESS-G diagram 28 of 94	791
Figure H.29 - AIM EXPRESS-G diagram 29 of 94	792
Figure H.30 - AIM EXPRESS-G diagram 30 of 94	793

Figure H.31 - AIM EXPRESS-G diagram 31 of 94	794
Figure H.32 - AIM EXPRESS-G diagram 32 of 94	795
Figure H.33 - AIM EXPRESS-G diagram 33 of 94	796
Figure H.34 - AIM EXPRESS-G diagram 34 of 94	797
Figure H.35 - AIM EXPRESS-G diagram 35 of 94	798
Figure H.36 - AIM EXPRESS-G diagram 36 of 94	799
Figure H.37 - AIM EXPRESS-G diagram 37 of 94	800
Figure H.38 - AIM EXPRESS-G diagram 38 of 94	801
Figure H.39 - AIM EXPRESS-G diagram 39 of 94	802
Figure H.40 - AIM EXPRESS-G diagram 40 of 94	803
Figure H.41 - AIM EXPRESS-G diagram 41 of 94	804
Figure H.42 - AIM EXPRESS-G diagram 42 of 94	805
Figure H.43 - AIM EXPRESS-G diagram 43 of 94	806
Figure H.44 - AIM EXPRESS-G diagram 44 of 94	807
Figure H.45 - AIM EXPRESS-G diagram 45 of 94	808
Figure H.46 - AIM EXPRESS-G diagram 46 of 94	809
Figure H.47 - AIM EXPRESS-G diagram 47 of 94	810
Figure H.48 - AIM EXPRESS-G diagram 48 of 94	811
Figure H.49 - AIM EXPRESS-G diagram 49 of 94	812
Figure H.50 - AIM EXPRESS-G diagram 50 of 94	813
Figure H.51 - AIM EXPRESS-G diagram 51 of 94	814
Figure H.52 - AIM EXPRESS-G diagram 52 of 94	815
Figure H.53 - AIM EXPRESS-G diagram 53 of 94	816
Figure H.54 - AIM EXPRESS-G diagram 54 of 94	817
Figure H.55 - AIM EXPRESS-G diagram 55 of 94	818
Figure H.56 - AIM EXPRESS-G diagram 56 of 94	819
Figure H.57 - AIM EXPRESS-G diagram 57 of 94	820
Figure H.58 - AIM EXPRESS-G diagram 58 of 94	821
Figure H.59 - AIM EXPRESS-G diagram 59 of 94	822
Figure H.60 - AIM EXPRESS-G diagram 60 of 94	823
Figure H.61 - AIM EXPRESS-G diagram 61 of 94	824
Figure H.62 - AIM EXPRESS-G diagram 62 of 94	825
Figure H.63 - AIM EXPRESS-G diagram 63 of 94	826
Figure H.64 - AIM EXPRESS-G diagram 64 of 94	827
Figure H.65 - AIM EXPRESS-G diagram 65 of 94	828
Figure H.66 - AIM EXPRESS-G diagram 66 of 94	829
Figure H.67 - AIM EXPRESS-G diagram 67 of 94	830
Figure H.68 - AIM EXPRESS-G diagram 68 of 94	831
Figure H.69 - AIM EXPRESS-G diagram 69 of 94	832
Figure H.70 - AIM EXPRESS-G diagram 70 of 94	833
Figure H.71 - AIM EXPRESS-G diagram 71 of 94	834
Figure H.72 - AIM EXPRESS-G diagram 72 of 94	835
Figure H.73 - AIM EXPRESS-G diagram 73 of 94	836
Figure H.74 - AIM EXPRESS-G diagram 74 of 91	837
Figure H.75 - AIM EXPRESS-G diagram 75 of 94	838
Figure H.76 - AIM EXPRESS-G diagram 76 of 94	839
Figure H.77 - AIM EXPRESS-G diagram 77 of 94	840
Figure H.78 - AIM EXPRESS-G diagram 78 of 94	841

ISO 10303-209:2001(E)

Figure H.79 - AIM EXPRESS-G diagram 79 of 94	842
Figure H.80 - AIM EXPRESS-G diagram 80 of 94	843
Figure H.81 - AIM EXPRESS-G diagram 81 of 94	844
Figure H.82 - AIM EXPRESS-G diagram 82 of 94	845
Figure H.83 - AIM EXPRESS-G diagram 83 of 94	846
Figure H.84 - AIM EXPRESS-G diagram 84 of 94	847
Figure H.85 - AIM EXPRESS-G diagram 85 of 94	848
Figure H.86 - AIM EXPRESS-G diagram 86 of 94	849
Figure H.87 - AIM EXPRESS-G diagram 87 of 94	850
Figure H.88 - AIM EXPRESS-G diagram 88 of 94	851
Figure H.89 - AIM EXPRESS-G diagram 89 of 94	852
Figure H.90 - AIM EXPRESS-G diagram 90 of 94	853
Figure H.91 - AIM EXPRESS-G diagram 91 of 94	854
Figure H.92 - AIM EXPRESS-G diagram 92 of 94	855
Figure H.93 - AIM EXPRESS-G diagram 93 of 94	856
Figure H.94 - AIM EXPRESS-G diagram 94 of 94	857

Tables

Table 1 - Mapping table for activity_control UoF	153
Table 2 - Mapping table for advanced_boundary_representation UoF	161
Table 3 - Mapping table for analysis_report UoF	162
Table 4 - Mapping table for analysis_report UoF	165
Table 5 - Mapping table for authorization UoF	177
Table 6 - Mapping table for composite_constituent_representation UoF	182
Table 7 - Mapping table for effectivity UoF	201
Table 8 - Mapping table for end_item_identification UoF	211
Table 9 - Mapping table for faceted_boundary_representation UoF	212
Table 10 - Mapping table for fe_analysis_control UoF	213
Table 11 - Mapping table for fe_analysis_results UoF	232
Table 12 - Mapping table for fea_model UoF	251
Table 13 - Mapping table for manifold_surface_with_topology UoF	280
Table 14 - Mapping table for material UoF	281
Table 15 - Mapping table for non_topological_surface_and_wireframe UoF	288
Table 16 - Mapping table for part_composite_constituents UoF	289
Table 17 - Mapping table for part_identification UoF	316
Table 18 - Mapping table for part_laminate_table UoF	327
Table 19 - Mapping table for part_shape UoF	333
Table 20 - Mapping table for wireframe_with_topology UoF	338
Table 21 - Mapping table for zone_composite_constituents_and_their_representation UoF	339
Table 22 - Conformance Classes	447
Table B.1 - AIM short names of entities	640

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 3.

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 part of ISO 10303 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 10303-209 was prepared by Technical Committee ISO/TC 184, *Industrial automation systems and integration*, Subcommittee SC 4, *Industrial data*.

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

Each part of this International Standard is a member of one of the following series: description methods, implementation methods, conformance testing methodology and framework, integrated generic resources, integration application resources, application protocols, abstract tests suites, application interpreted constructs, and application modules.

This part is a member of the application protocol series.

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

<http://www.nist.gov/sc4/editing/step/titles/>.

Annexes A, B, C, D, and E form a normative part of this part of ISO 10303. Annexes F, G, H, J, and K are for information only.

Introduction

ISO 10303 is an International Standard for the computer-interpretable representation and exchange of product data. The objective is to provide a neutral mechanism capable of describing products throughout their life cycle. This mechanism makes it 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 protocol series. This part of ISO 10303 specifies an application protocol (AP) for the exchange of computer-interpretable composite and metallic structural product definitions, including product shape, associated finite element analysis (FEA) models and analysis results, and the material properties of these products.

The shape of a composite or metallic product definition includes the part and its constituents, including any ply shapes necessary for FEA node and mesh generation of boundary definitions. This information is suitable for the automated generation of composite material properties and geometric properties for finite elements. The shape definitions for design and analysis are each independently configuration controlled.

The finite element model idealizes a product or aspects of a product so that it may be analyzed to validate the structural performance and structural integrity of a product.

Finite elements of homogenous (isotropic) metallic and adhesive material properties are treated in this part of ISO 10303 as a subset of anisotropic composite material response. The differences between these two material response idealizations are: 1) a simplified material response, and 2) having no associated composite constituent information.

<https://standards.iteh.ai/catalog/standards/sist/47694a59-ea8f-4aff-8838-10303-209-2001>

Assembly information provides the relationships necessary to identify analysis boundary conditions, and when combined with part geometry, topology, and finite element analysis output, provides the input necessary for detail analyses such as those for fastened structural joints.

This part of ISO 10303 satisfies the need for exchange of information between the iterative design and analysis stages of the product life cycle. Product configuration information provides the audit trail necessary to control the designed shape, its associated finite element model, and any related analysis shape information during these iterative stages of the product life cycle.

This application protocol defines the context, scope, and information requirements for the exchange of the information necessary to perform the design through analysis stages of the life cycle of composite and metallic structural parts, and specifies the integrated resources necessary to satisfy these requirements.

Application protocols provide the basis for developing implementations of ISO 10303 and abstract test suites for the conformance testing of AP implementations.

Clause 1 defines the scope of the application protocol and summarizes the functionality and data covered by the AP. Clause 3 lists the words defined in this part of ISO 10303 and gives pointers to words defined elsewhere. An application activity model that is the basis for the definition of the scope is provided in

annex F. The information requirements of the application are specified in clause 4 using terminology appropriate to the application. A graphical representation of the information requirements, referred to as the application reference model, is given in annex G.

Resource constructs are interpreted to meet the information requirements. This interpretation produces the application interpreted model (AIM). This interpretation, given in 5.1, shows the correspondence between the information requirements and the AIM. The short listing of the AIM specifies the interface to the integrated resources and is given in 5.2. Note that the definitions and EXPRESS provided in the integrated resources for constructs used in the AIM may include select list items and subtypes which are not imported into the AIM. The expanded listing given in annex A contains the complete EXPRESS for the AIM without annotation. A graphical representation of the AIM is given in annex H. Additional requirements for specific implementation methods are given in annex C.

Additionally, this application protocol enumerates the conformance requirements which identify the implementation options for the abstract test suite. This application protocol may be implemented as a whole, or as one of the allowed conformance classes. These conformance classes state the implementation options for the representation of finite element analysis models, controls and results, analysis reports, geometric models, composite material constituents and their representations, materials, and configuration control.

A high level planning information model for this application protocol is shown in Figure 1. At this level, the product can be conceptualized as a part that has both design and analysis product definitions. Each definition has one or more shape representations. The analysis product definition has an associated finite element model, analysis controls, and analysis results in addition to its shape representations.

The three possible product shape representations in this application protocol include the nominal design shape, an idealized analysis shape, and a finite element model node shape. The nominal design shape includes geometry and topology for the part and its constituents, such as ply boundaries. The idealized analysis shape includes only the geometry and topology for mesh generation boundaries and associated node geometry. The node shape includes only the node geometry, with no association to design shape or to analysis idealized shape.

The five types of geometric and topological models that may be used to represent part shape in this application protocol are: wireframe and surface without topology, wireframe geometry with topology, manifold surfaces with topology, faceted boundary representation, and advanced boundary representation.

The finite element analysis model consists of nodes, elements, and the associated element properties. The finite element properties include shape aspects and material properties.

The finite element analysis material properties are specified with respect to an environment. The material response matrices of the material properties may have an associated laminate table. The laminate table specifies the constituents, such as plies in a laminate. Each constituent has a boundary, stock material, and specifications. A separate geometric representation is used for composite material constituent representations.

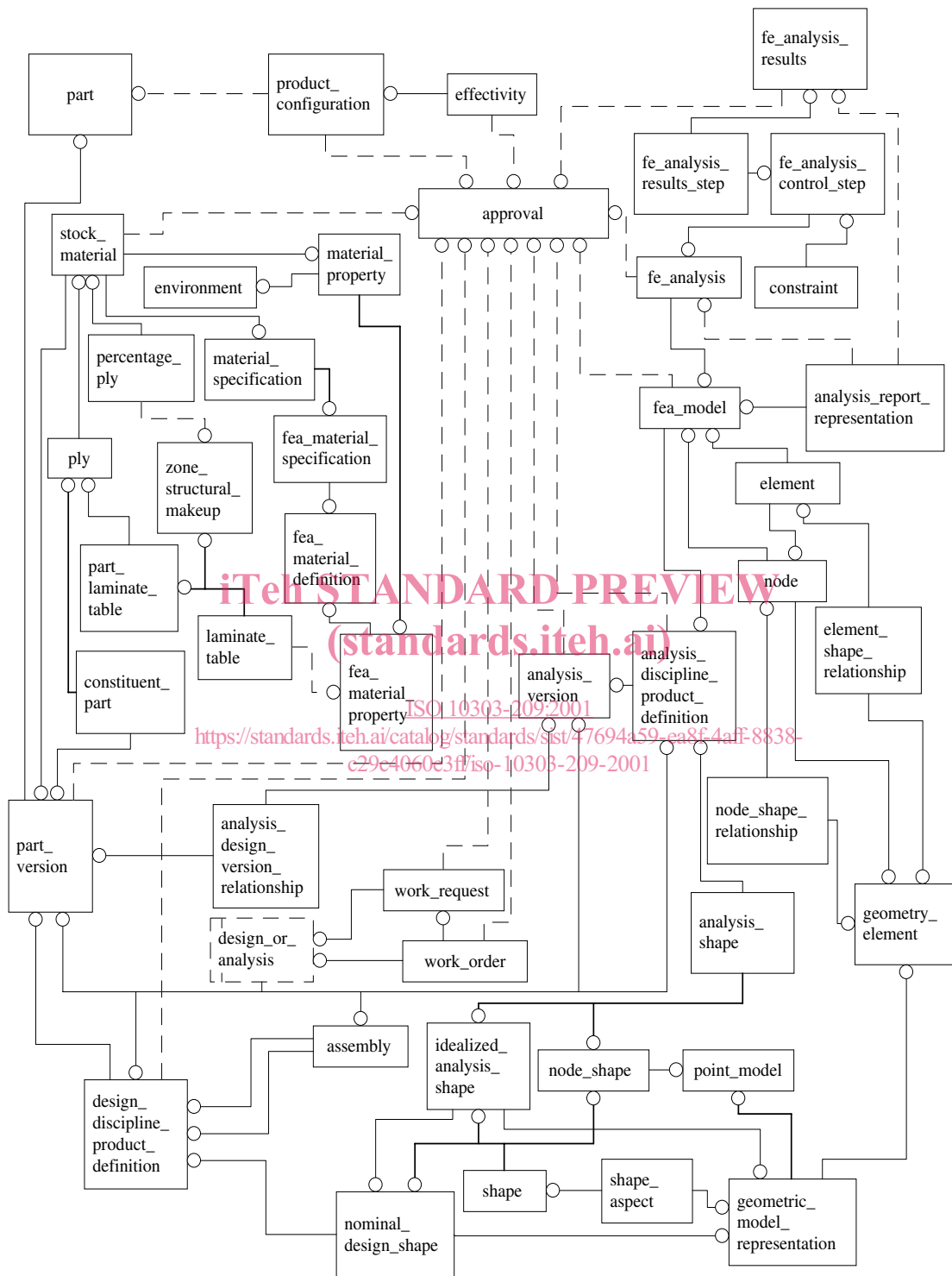


Figure 1 - Data planning model

The finite element analysis controls and results are associated with a finite element model. The analysis controls specify the operations to be carried out upon the model as a series of analysis steps. The analysis results specify the state of the analysis variables at an instant in time. The state information includes nodal solution variables such as deflections, the field variables within the elements, and the values of constraints at a node. An analysis report of the finite analysis results may be presented in tabular and graphical form. The analysis report also documents the detail analyses upon which the finite element analysis results are based.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 10303-209:2001](https://standards.iteh.ai/catalog/standards/sist/47694a59-ea8f-4aff-8838-c29c4060e3ff/iso-10303-209-2001)

<https://standards.iteh.ai/catalog/standards/sist/47694a59-ea8f-4aff-8838-c29c4060e3ff/iso-10303-209-2001>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 10303-209:2001](#)

<https://standards.iteh.ai/catalog/standards/sist/47694a59-ea8f-4aff-8838-c29c4060e3ff/iso-10303-209-2001>

Industrial automation systems and integration — Product data representation and exchange — Part 209: Application protocol: Composite and metallic structural analysis and related design

1 Scope

This part of ISO 10303 specifies the use of integrated resources necessary for the scope and information requirements for the analysis and related design of composite and metallic structural parts. This part of ISO 10303 satisfies the need for the exchange of computer-interpretable composite and metallic structural product definitions, including product shape, associated finite element analysis (FEA) models, material properties, and analysis results.

NOTE The application activity model (AAM) in annex F provides a graphical representation of the processes and information flows which are the basis for the definition of the scope of this part of ISO 10303.

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

- the definition of composite structural parts;
- the definition of metallic structural parts;
- linear static finite element analysis;
- linear modes and frequencies finite element analysis;
- the product definition and configuration control information pertaining to the design through analysis stages of a product's development;
- the information relating the part to the adjoining components in an assembly by either explicit or external reference;
- the 2D and 3D models depicting the product shape;
- the five types of geometric and topologic model representations:
 - wireframe and surface without topology;
 - wireframe geometry with topology;