AS ISO 22093—2004
ISO 22093:2003

Australian Standard™

Industrial automation systems and integration—Physical device control—Dimensional Measuring Interface Standard (DMIS)

STANDARDS AUSTRALIA

This Australian Standard was prepared by Committee IT-006, Information Technology for Industrial Automation and Integration. It was approved on behalf of the Council of Standards Australia on 30 March 2004 and published on 3 June 2004.

The following are represented on Committee IT-006:

Association of Consulting Engineers Australia
Australian Electrical and Electronic Manufacturers Association
CSIRO Centre for Planning and Design
CSIRO Manufacturing & Infrastructure Technology
Department of Defence (Australia)
Institute of Instrumentation, Control and Automation Australia
Institution of Engineers Australia
Monash University
RMIT University
The University of Melbourne

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Web Shop at www.standards.com.au and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Global Standard*, has a full listing of revisions and amendments published each month.

Australian Standards™ and other products and services developed by Standards Australia are published and distributed under contract by SAI Global, which operates the Standards Web Shop.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to the Chief Executive, Standards Australia International Ltd, GPO Box 5420, Sydney, NSW 2001.

This Standard was issued in draft form for comment as DR 04109.

Australian Standard™

Industrial automation systems and integration—Physical device control—Dimensional Measuring Interface Standard (DMIS)

First published as AS ISO 22093—2004.

COPYRIGHT

© Standards Australia International

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia International Ltd
GPO Box 5420, Sydney, NSW 2001, Australia

ISBN 0 7337 5956 4

PREFACE

This Standard was prepared by the Standards Australia Committee IT-006, Information Technology for Industrial Automation and Integration.

This Standard is identical with, and has been reproduced from, ISO 22093:2003, *Industrial automation systems and integration—Physical device control—Dimensional Measuring Interface Standard (DMIS)*.

The objective of this Standard is to provide a standard for the bi-directional communication of inspection data between computer systems and inspection equipment. The Dimensional Measuring Interface Standard (DMIS) is a vocabulary of terms, which establishes a neutral format for inspection programs and inspection results data.

The terms 'normative' and 'informative' are used to define the application of the annex to which they apply. A normative annex is an integral part of a standard, whereas an informative annex is only for information and guidance.

As this Standard is reproduced from an international standard, the following applies:

a) Its number appears on the cover and title page while the international standard number appears only on the cover.

b) In the source text 'this International Standard' should read 'this Australian Standard'.

c) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

Reference to International Standard		*Australian Standard*	
ISO		AS ISO	
10303	Industrial automation systems and integration—Product data representation and exchange	10303	Industrial automation systems and integration—Product data representation and exchange
10303-1	Part 1: Overview and fundamental principles	10303.1	Part 1: Overview and fundamental principles
10303-11	Part 11: Description methods: The EXPRESS language reference manual	10303.11	Part 11: Description methods: The EXPRESS language reference manual
10303-12	Part 12: Description methods: The EXPRESS-I language reference model	10303.12	Part 12: Description methods: The EXPRESS-I language reference model
10303-21	Part 21: Implementation methods: Clear text encoding of the exchange structure	10303.21	Part 21: Implementation methods: Clear text encoding of the exchange structure
10303-22	Part 22: Implementation methods: Clear text encoding of the exchange structure	10303.22	Part 22: Implementation methods: Clear text encoding of the exchange structure
10303-31	Part 31: Conformance testing methodology and framework: General concepts	10303.31	Part 31: Conformance testing methodology and framework: General concepts
10303-41	Part 41: Integrated generic resources: Fundamentals of product description and support	10303.41	Part 41: Integrated generic resources: Fundamentals of product description and support

10303-42	Part 42: Integrated generic resources: Geometric and topological representation	10303.42	Part 42: Integrated generic resources: Geometric and topological representation
10303-43	Part 43: Integrated generic resources: Representation structures	10303.43	Part 43: Integrated generic resources: Representation structures
10303-44	Part 44: Integrated generic resources: Product structure configuration	10303.44	Part 44: Integrated generic resources: Product structure configuration
10303-45	Part 45: Integrated generic resources: Materials	10303.45	Part 45: Integrated generic resources: Materials
10303-46	Part 46: Integrated generic resources: Visual presentation	10303.46	Part 46: Integrated generic resources: Visual presentation
10303-47	Part 47: Integrated generic resources: Shape variation tolerances	10303.47	Part 47: Integrated generic resources: Shape variation tolerances
10303-49	Part 49: Integrated generic resources: Process structure and properties	10303.49	Part 49: Integrated generic resources: Process structure and properties
10303-101	Part 101: Integrated application resources: Draughting	10303.101	Part 101: Integrated application resources: Draughting
10303-104	Part 104: Integrated application resource: Finite element analysis	10303.104	Part 104: Integrated application resource: Finite element analysis
10303-105	Part 105: Integrated application resource: Kinematics	10303.105	Part 105: Integrated application resource: Kinematics
10303-201	Part 201: Application protocol: Explicit draughting	10303.201	Part 201: Application protocol: Explicit draughting
10303-202	Part 202: Application protocol: Associative draughting	10303.202	Part 202: Application protocol: Associative draughting
10303-203	Part 203: Application protocol: Configuration controlled design	10303.203	Part 203: Application protocol: Configuration controlled design
10303-204	Part 204: Application protocol: Mechanical design using boundary representation	10303.204	Part 204: Application protocol: Mechanical design using boundary representation
10303-207	Part 207: Application protocol: Sheet metal die planning and design	10303.207	Part 207: Application protocol: Sheet metal die planning and design
10303-209	Part 209: Application protocol: Composite and metallic structural analysis and related design	10303.209	Part 209: Application protocol: Composite and metallic structural analysis and related design
10303-210	Part 210: Application protocol: Electronic assembly, interconnection, and packaging design	10303.210	Part 210: Application protocol: Electronic assembly, interconnection, and packaging design
10303-212	Part 212: Application protocol: Electrotechnical design and installation	10303.212	Part 212: Application protocol: Electrotechnical design and installation

10303-214	Part 214: Application protocol: Core data for automotive mechanical design processes	10303.214	Part 214: Application protocol: Core data for automotive mechanical design processes
10303-216	Part 216: Application protocol: Ship moulded forms	10303.216	Part 216: Application protocol: Ship moulded forms
10303-224	Part 214: Application protocol: Mechanical product definition for process planning using machining features	10303.224	Part 214: Application protocol: Mechanical product definition for process planning using machining features
10303-225	Part 225: Application protocol: Building elements using explicit shape representation	10303.225	Part 225: Application protocol: Building elements using explicit shape representation
10303-227	Part 227: Application protocol: Plant spatial configuration	10303.227	Part 227: Application protocol: Plant spatial configuration
10303-232	Part 232: Application protocol: Technical data packaging core information and exchange	10303.232	Part 232: Application protocol: Technical data packaging core information and exchange

CONTENTS

Page

Introduction ... **xiii**

1 Scope ... **1**

2 Conformance ... **2**
2.1 DMIS conformance testing ... **2**
2.2 Conformance testing services ... **2**
2.3 CHFile ... **3**
2.4 Complete standard conformance ... **3**
2.5 Application profiles ... **3**
2.6 Conformance levels ... **3**
2.7 Conformance claim ... **3**

3 Normative references ... **3**

4 Terms and definitions ... **4**
4.1 actuals ... **4**
4.2 Automatically Programmed Tools (APT) ... **4**
4.3 calibration sequence ... **4**
4.4 carriage ... **4**
4.5 characterization file ... **4**
4.6 Computer Aided Design (CAD) system ... **5**
4.7 Coordinate Measuring Machine (CMM) ... **5**
4.8 Dimensional Measuring Equipment (DME) ... **5**
4.9 Dimensional Measuring Interface Standard (DMIS) ... **5**
4.10 DMIS National Standards Committee (DNSC) ... **5**
4.11 feature ... **5**
4.12 filename ... **5**
4.13 geometric compensation ... **5**
4.14 High Level Language (HLL) ... **5**
4.15 Initial Graphics Exchange Specification (IGES) ... **6**
4.16 inner ... **6**
4.17 In Process Verification (IPV) ... **6**
4.18 input files ... **6**
4.19 label ... **6**
4.20 label type ... **6**
4.21 label name ... **6**
4.22 line reducible feature ... **6**
4.23 measurement sequence ... **6**
4.24 multiple carriage ... **6**
4.25 nominal ... **7**
4.26 orientation ... **7**
4.27 orientational deviation ... **7**
4.28 Orthonormal ... **7**
4.29 outer ... **7**
4.30 output files ... **7**
4.31 part coordinate system (PCS) ... **7**
4.32 plane reducible feature ... **7**
4.33 point reducible feature ... **7**
4.34 positional deviation ... **7**
4.35 postprocessor ... **7**
4.36 pre-processor ... **8**
4.37 Quality Information System (QIS) ... **8**

Page

4.38 ram ... 8
4.39 receiving system ... 8
4.40 rotary table system ... 8
4.41 selective processing ... 8
4.42 sensor ... 8
4.43 Standard Exchange Using Product Model Data (STEP) ... 8
4.44 statement ... 8
4.45 tolerance ... 8
4.46 tool holder ... 8
4.47 vendor ... 9
4.48 video inspection machine ... 9
4.49 work measuring zone ... 9
4.50 workpiece ... 9

5 Language reference ... 9
5.1 Syntax and structure ... 9
5.1.1 Characters ... 9
5.1.2 Words, label names, text strings, parameters, variables, and expressions ... 10
5.1.3 Variable assignments ... 15
5.1.4 DMIS command and definition statements ... 15
5.1.5 Delimiters, blank lines, spaces, and tabs ... 17
5.1.6 Line length ... 19
5.1.7 Programming comments ... 19
5.1.8 Operator input ... 19
5.1.9 Data output ... 20
5.1.10 Program structure ... 23
5.1.11 File structure ... 25
5.1.12 Programming considerations ... 25
5.2 Execution and control ... 26
5.2.1 Declaration statements ... 26
5.2.2 Definition statements ... 27
5.2.3 Program statement sequences ... 28
5.2.4 High Level Language (HLL) ... 31
5.3 Mathematics ... 36
5.3.1 Assignment operators ... 36
5.3.2 Features ... 38
5.3.3 Tolerances ... 47
5.3.4 Datums ... 49
5.3.5 Coordinate systems ... 49
5.4 Equipment control ... 63
5.4.1 Machine parameters ... 63
5.4.2 Rotary tables ... 67
5.4.3 Sensors and sensor-related ... 68
5.4.4 Carriages ... 70
5.4.5 Motion control ... 74
5.4.6 Measurement control ... 75
5.5 Characterization file ... 79
5.5.1 Usage ... 79
5.5.2 Characterization file format ... 80
5.5.3 Syntax for CHFIL1...ENDCH1 section ... 82
5.5.4 Example DMIS Characterization file grammar ... 88

6 Statement reference ... 94
6.1 ACLRAT ... 95
6.2 ALGDEF ... 96
6.3 ASSIGN ... 97
6.4 BADTST ... 98
6.5 BOUND ... 99
6.6 CALIB ... 100
6.7 CALL ... 102
6.8 CASE ... 104

Page

6.9 CLMPID ... 105
6.10 CLMPSN ... 106
6.11 CLOSE ... 107
6.12 CMPNTGRP ... 108
6.13 CONST (input format 1) ... 109
6.14 CONST (input format 2) ... 111
6.15 CONST (input format 3) ... 112
6.16 CONST (input format 4) ... 113
6.17 CONST (input format 5) ... 116
6.18 CONST (input format 6) ... 117
6.19 CONST (input format 7) ... 119
6.20 CONST (input format 8) ... 121
6.21 CONST (input format 9) ... 122
6.22 CONST (input format 10) ... 123
6.23 CONST (input format 11) ... 124
6.24 CONST (input format 12) ... 125
6.25 CONST (input format 13) ... 126
6.26 CRGDEF ... 127
6.27 CRMODE ... 128
6.28 CROSCL ... 129
6.29 CRSLCT ... 130
6.30 CUTCOM ... 131
6.31 CZONE ... 132
6.32 CZSLCT ... 133
6.33 DATDEF ... 134
6.34 DATSET ... 135
6.35 DECL ... 137
6.36 DECPL ... 139
6.37 DELETE ... 140
6.38 DEVICE ... 141
6.39 DFTCAS ... 142
6.40 DISPLY ... 143
6.41 DMEHW ... 144
6.42 DMEID ... 145
6.43 DMESW ... 146
6.44 DMESWI ... 147
6.45 DMESWV ... 148
6.46 DMIS ... 149
6.47 DMISMD ... 150
6.48 DMISMN ... 151
6.49 DO ... 152
6.50 ELSE ... 153
6.51 ENDAT ... 154
6.52 ENDCAS ... 155
6.53 ENDDO ... 156
6.54 ENDFIL ... 157
6.55 ENDGO ... 158
6.56 ENDIF ... 159
6.57 ENDMAC ... 160
6.58 ENDMES ... 161
6.59 ENDSEL ... 162
6.60 ENDXTN ... 163
6.61 EQUATE ... 164
6.62 ERROR ... 165
6.63 EVAL ... 166
6.64 EXTENS ... 167
6.65 EXTFIL ... 168
6.66 FEAT/ARC (input format 1) ... 169
6.67 FEAT/ARC (input format 2) ... 171
6.68 FEAT/CIRCLE ... 173

Page

6.69 FEAT/CONE ... 175
6.70 FEAT/CPARLN ... 177
6.71 FEAT/CYLNDR ... 179
6.72 FEAT/EDGEPT ... 181
6.73 FEAT/ELLIPS ... 183
6.74 FEAT/GCURVE ... 185
6.75 FEAT/GEOM ... 187
6.76 FEAT/GSURF ... 188
6.77 FEAT/LINE ... 190
6.78 FEAT/OBJECT ... 192
6.79 FEAT/PARPLN ... 194
6.80 FEAT/PATERN ... 196
6.81 FEAT/PLANE ... 198
6.82 FEAT/POINT ... 200
6.83 FEAT/RCTNGL ... 202
6.84 FEAT/SPHERE ... 204
6.85 FEAT/TORUS ... 206
6.86 FEDRAT ... 208
6.87 FILDEF ... 209
6.88 FILNAM ... 210
6.89 FINPOS ... 211
6.90 FIXTID ... 212
6.91 FIXTSN ... 213
6.92 FLY ... 214
6.93 FROM ... 215
6.94 GECOMP ... 216
6.95 GEOALG ... 217
6.96 GEOM ... 219
6.97 GOHOME ... 220
6.98 GOTARG ... 221
6.99 GOTO ... 222
6.100 GROUP ... 223
6.101 IF ... 224
6.102 INCLUD ... 226
6.103 Intrinsic functions ... 227
6.104 ITERAT ... 231
6.105 JUMPTO ... 233
6.106 LITDEF (input format 1) ... 234
6.107 LITDEF (input format 2) ... 235
6.108 LOCATE ... 236
6.109 LOTID ... 238
6.110 MACRO ... 239
6.111 MATDEF ... 240
6.112 MEAS ... 242
6.113 MFGDEV ... 244
6.114 MODE ... 245
6.115 OBTAIN ... 246
6.116 OPEN ... 247
6.117 OPERID ... 249
6.118 OUTPUT ... 250
6.119 PARTID ... 253
6.120 PARTRV ... 254
6.121 PARTSN ... 255
6.122 PLANID ... 256
6.123 POP ... 257
6.124 PRCOMP ... 258
6.125 PREVOP ... 259
6.126 PROCID ... 260
6.127 PROMPT ... 261
6.128 PSTHRU ... 264

Page

6.129 PTBUFF ... 265
6.130 PTMEAS ... 266
6.131 PUSH ... 267
6.132 QISDEF ... 268
6.133 RAPID ... 269
6.134 READ ... 270
6.135 RECALL ... 271
6.136 REFMNT ... 272
6.137 REPORT ... 273
6.138 RESUME ... 275
6.139 RMEAS (input format 1) ... 276
6.140 RMEAS (input format 2) ... 278
6.141 RMEAS (input format 3) ... 280
6.142 RMEAS (input format 4) ... 282
6.143 RMEAS (input format 5) ... 284
6.144 RMEAS (input format 6) ... 286
6.145 RMEAS (input format 7) ... 288
6.146 ROTAB ... 290
6.147 ROTATE ... 291
6.148 ROTDEF ... 293
6.149 ROTSET ... 294
6.150 SAVE ... 295
6.151 SCAN ... 296
6.152 SCNMOD ... 297
6.153 SCNPLN ... 298
6.154 SCNSET ... 299
6.155 SELECT ... 301
6.156 SENSOR ... 302
6.157 SNSDEF (input format 1) ... 305
6.158 SNSDEF (input format 2) ... 308
6.159 SNSDEF (input format 3) ... 310
6.160 SNSDEF (input format 4) ... 312
6.161 SNSDEF (input format 5) ... 314
6.162 SNSDEF (input format 6) ... 316
6.163 SNSDEF (input format 7) ... 318
6.164 SNSET ... 320
6.165 SNSGRP ... 323
6.166 SNSLCT ... 324
6.167 SNSMNT ... 326
6.168 TECOMP ... 327
6.169 TEXT ... 328
6.170 THLDEF ... 329
6.171 TOL/ANGL ... 330
6.172 TOL/ANGLB ... 331
6.173 TOL/ANGLR ... 332
6.174 TOL/CIRLTY ... 334
6.175 TOL/COMPOS ... 335
6.176 TOL/CONCEN ... 337
6.177 TOL/CORTOL ... 338
6.178 TOL/CPROFS ... 339
6.179 TOL/CRNOUT ... 341
6.180 TOL/CYLCTY ... 342
6.181 TOL/DIAM ... 343
6.182 TOL/DISTB ... 345
6.183 TOL/FLAT ... 347
6.184 TOL/GTOL ... 348
6.185 TOL/PARLEL ... 352
6.186 TOL/PERP ... 354
6.187 TOL/POS ... 356
6.188 TOL/PROFL ... 358

Page

6.189 TOL/PROFP ... **359**
6.190 TOL/PROFS ... **360**
6.191 TOL/RAD ... **362**
6.192 TOL/STRGHT ... **363**
6.193 TOL/SYM ... **364**
6.194 TOL/TRNOUT ... **365**
6.195 TOL/USETOL ... **366**
6.196 TOL/WIDTH ... **367**
6.197 TOOLDF ... **368**
6.198 TRANS ... **369**
6.199 UNITS ... **371**
6.200 VALUE ... **372**
6.201 VFORM ... **380**
6.202 WINDEF (input format 1) ... **381**
6.203 WINDEF (input format 2) ... **382**
6.204 WKPLAN ... **383**
6.205 WRIST ... **384**
6.206 WRITE ... **386**
6.207 XTERN ... **387**
6.208 XTRACT ... **388**

Annex A (informative) **DMIS example code segments** ... **389**
A.1 @ character, and use with a label. ... **389**
A.2 ASSIGN ... **389**
A.3 BADTST ... **389**
A.4 CALL ... **390**
A.4.1 Example 1 of CALL ... **390**
A.4.2 Example 2 of CALL ... **391**
A.5 CLOSE ... **391**
A.6 CONST (input format 8) ... **392**
A.7 CONST (input format 9) and CONST (input format 10) ... **392**
A.8 CRMODE ... **394**
A.8.1 CRMODE/SEQNTL ... **394**
A.8.2 CRMODE/SIMUL ... **395**
A.8.3 CRMODE/SYNC ... **395**
A.9 CZSLCT ... **395**
A.10 DEVICE ... **397**
A.11 DMISMN ... **397**
A.12 DO ... **398**
A.13 EQUATE ... **398**
A.14 EVAL ... **399**
A.15 FEAT/GEOM ... **399**
A.15.1 Constructing the nearest feature nominal on the part by using FA(PtFeat). ... **399**
A.15.2 Defining the closest feature nominal on the part by using FA(dummy) ... **399**
A.16 FEAT/GSURF ... **400**
A.17 GEOM ... **400**
A.18 GOTARG ... **400**
A.19 IF and JUMPTO ... **401**
A.19.1 Example 1 ... **401**
A.19.2 Example 2 ... **401**
A.20 ITERAT ... **402**
A.21 LITDEF (input format 1) ... **403**
A.22 Macro definition ... **403**
A.22.1 An example of a macro definition without an argument list: ... **403**
A.22.2 An example of a macro definition and a CAll statement follows: ... **403**
A.23 OBTAIN ... **404**
A.24 OPEN ... **404**
A.25 PROMPT, examples of numeric and alphanumeric input ... **404**
A.25.1 Example 1 numeric input ... **404**
A.25.2 Example 2 alphanumeric input ... **404**

Page

A.25.3 Example 3 multiple input and playing a .wav file ... **404**
A.26 QISDEF ... **405**
A.27 READ examples of delimited and formatted ... **406**
A.27.1 An example of the READ statement for a delimited file ... **406**
A.27.2 An example of the READ statement for a formatted file ... **406**
A.28 ROTDEF rotary table definition ... **406**
A.29 SELECT...CASE...ENDCAS...DFTCAS...ENDCAS...ENDSEL block example ... **407**
A.30 Sensor, wrist, component group, and build examples ... **408**
A.30.1 Example wrist, component, and sensor definition ... **408**
A.30.2 Example component definitions ... **410**
A.30.3 Example component, group, and probe definitions ... **411**
A.30.4 Example component definition and calibration statements ... **412**
A.30.5 Example complex wrist and component definitions ... **413**
A.30.6 Example tool definition statements ... **416**
A.30.7 Example sensor calibration statements ... **417**
A.31 SNSDEF (input format 2) ... **417**
A.32 TEXT ... **417**
A.33 TOL/GTOL ... **417**
A.33.1 Example 1, just GO/NOGO info desired: ... **418**
A.33.2 Example 2, GO/NOGO and percentage of good points data desired: ... **418**
A.33.3 Example 3, GO/NOGO and interference point/s info desired: ... **418**
A.34 VALUE ... **418**
A.35 Vector variable values ... **418**
A.36 WRITE ... **419**
A.37 XTRACT ... **420**

Annex B (informative) **Descriptive Figures** ... **422**

Annex C (normative) Standard characterization file ... **476**

Annex D (informative) **Characterization file extensions** ... **560**
D.1 Machine dependent parameters ... **560**
D.2 User defined options ... **561**

Annex E (informative) **Scanning reference** ... **562**
E.1 Introduction ... **562**
E.2 Technical briefing ... **562**
E.2.1 Scan statements ... **562**
E.2.2 Scan methods ... **563**
E.3 Applicable DMIS vocabulary ... **564**
E.3.1 The SCNSET statement ... **564**
E.3.2 The FEDRAT/SCNVEL statement ... **564**
E.3.3 The SCNPLN statement ... **565**
E.3.4 The SCNMOD statement ... **566**
E.3.5 The SCAN statement ... **566**
E.4 Using the SCNSET statement to specify point spacing ... **567**
E.5 Descriptive synopsis ... **568**
E.6 Applying nominals to surface scans ... **570**
E.7 Examples ... **571**
E.7.1 Scanning a Cylinder ... **571**
E.7.2 Scanning a cylinder with a rotary table ... **572**
E.7.3 Scanning Inside a bore with an interruption ... **573**
E.7.4 Scanning Sections Across a Surface using a generic curve ... **574**
E.7.5 Scanning a generic surface ... **575**

Index of Statements ... **577**

Index of figures ... **579**

Index of tables ... **583**

Index of Statements by type ... **585**
Branching and looping statements ... **585**
Carriage statements ... **585**

Page

Datum statements **585**
Feature statements **586**
Feature construction statements **586**
File and machine parameter statements **587**
In process verification / Quality information system statements **587**
Input / output statements **588**
Macro statements **588**
Measurement statements **588**
Miscellaneous statements **588**
Motion statements **589**
Program flow statements **589**
Rotary table statements **589**
Sensor statements **589**
Scanning statements **590**
Tolerance statements **590**
Variable statements **591**

INTRODUCTION

DMIS provides the vocabulary to pass inspection programs to dimensional measuring equipment and to pass measurement and process data back to an analysis, collection, and/or archiving system. A piece of equipment which interfaces to others, using the DMIS vocabulary, may do so directly or it may have a pre-processor to convert its own native data formats into the DMIS format and/or a postprocessor to convert the DMIS format into its own data structure.

An environment making use of the DMIS formats as a data exchange standard is depicted in (Figure 1 — DMIS environment). As illustrated, an inspection program can be created by many different approaches. Inspection program creation can be assisted by CAD systems, non-graphical systems, automated systems, or constructed manually. A programming system may require a pre-processor, which converts the program into DMIS format. A DMIS inspection program can then be executed on dissimilar dimensional measuring equipment (DME)s. In (Figure 1 — DMIS environment), DME I has a DMIS pre-processor and post-processor which converts the DMIS data into its own unique data format. DME IV is utilizing DMIS as its native format and therefore no pre-processors or post-processors are required. Also, a host computer is being used to control DME II and DME III. The host has a post-processor which decodes the DMIS program and drives the two DMEs, either through DMIS formats, or through some user-defined data exchange format.

Resultant data may be passed back in DMIS format through various scenarios. For example, this data could be passed directly as DMIS or via a post-processor. Resultant data is typically passed to an analysis system and/or a storage system such as a Quality Information System (QIS).

The manual interface indicates that DMIS programs can be hand written, and results analyzed, without the use of computer aids. In addition, many other uses of the DMIS data exchange format could be applied.

The implementation of DMIS is dependent on individual users. DMIS simply defines a neutral data exchange format that can be transmitted via ASCII files from one DMIS supporting system to another. The method for the transmission, storage, and management of these files is user-dependent.

This version of DMIS incorporates the statements necessary to drive coordinate measuring machines, video inspection devices, and hybrid in-process verification systems for dimensional and functional inspection of discrete mechanical parts and electronic components. The intent of DMIS is to provide a standard of communication for all dimensional measuring equipment.

Future applications may expand capabilities to support:

1) robotics for both workpiece presentation and measurement, and

2) additional provisions for in-process verification and process adjustment in a closed loop manufacturing cell.

This First ISO edition of DMIS has been completely restructured from the previous DMIS 3.0 ANSI/CAM-I 101-1995 standard. This restructuring was required to conform with ISO/IEC Directives, Part 3. In addition to this restructuring, all approved changes since DMIS 3.0 ANSI/CAM-I 101-1995 was published have been incorporated. This release includes additional functionality in the areas of sensor definitions, sensor component grouping, complex alignment, CAD connectivity, soft functional gauging, quality information systems, relaxation of various length limitations, and operator interface using the PROMPT statement. The majority of approved changes are contained in clause 7; the remainder of the text has not changed significantly, although the restructuring tends to suggest otherwise. The DNSC acknowledges the support and participation of the European DMIS User group (EDUG) in the development of the DMIS 04.0 version. The significant changes are listed below:

(label name)	Allows the use of a period '.' in label names.
ACLRAT	Changes to the input format.

ALGDEF	New statement added to define an algorithm, and assign to it a label name.
BADTST	New statement for trapping specific errors.
Characterization file	The format of the characterization file has changed to an Extended Backus Naur Form. Refer to paragraph 5.5 and sub-paragraphs, and also to Annex C.
CMPNTGRP	New statement added to group of components for a sensor, as a single component.
CONST (input format 4)	Extended capabilities.
CONST (input format 8)	New statement for constructing an offset feature.
CONST (input format 9)	New statement for soft functional gauging.
CONST (input format 10)	New statement for soft functional gauging.
CONST (input format 11)	New statement to copy a feature actual and transform it into another coordinate system.
CONST (input format 12)	New statement to construct a circle on an actual cone.
CONST (input format 13)	New statement to construct a nominal point from CAD geometry by locating the nearest point.
CROSCL	New statement to enhance use of rotary tables.
DECL	Added a VECTOR variable type, and multi-dimensional arrays.
DECPL	New statement to define decimal precision of output.
DMESW	Added DELAY as a minor word option.
DMISMD	The DMIS version is now mandatory with this statement.
DMISMN	The DMIS version is now mandatory with this statement.
EQUATE	New statement to equate two coordinate systems.
ERROR	Several changes to enhance error trapping.
EXTENS	New statement to define sensor extensions.
EXTFIL	The SYS minor word has been removed for the next major release of this standard.
FEAT/ARC (input format 1)	Removed the restriction that the arc must lie in a plane parallel to the current working plane.
FEAT/ARC (input format 2)	Removed the restriction that the arc must lie in a plane parallel to the current working plane.
FEAT/EDGEPT	New statement to define an edge point.
FEAT/GEOM	New statement to define a feature using previously defined geometry.
FEAT/TORUS	New statement to define a torus feature. The addition of this statement also caused changes to the CONST (input format 1) statement, the GEOALG statement, the MEAS statement, the RMEAS (input format 5) statement, the TOL/DIAM statement, the TOL/GTOL statement, and paragraph 5.3.2.1.1.

FEDRAT	Changes to the input format.
Figure Identifiers:	All Figure Identifiers have been renamed to conform to the ISO format.
FILNAM	The DMIS version is now mandatory with this statement.
FLY	New statement added to set or disable continuous motion mode on the controller.
GECOMP	New statement to turn geometric compensation on or off.
GEOM	New statement for defining CAD geometry associated with features.
GOTO	Extended the capabilities for the GOTO statement.
GROUP	New statement to define a group of previously calibrated sensors.
Intrinsic Functions:	Several changes to return system information.
ITERAT	New statement for complex alignments.
Label name Length:	Extended to 64 Characters. Refer to paragraph 5.1.2.2.
LOCATE	New statement for complex alignments.
MATDEF	New statement to specify parameters for functional mating.
POP	New statement to recall, from memory, various system information.
PROMPT	New statement to prompt the operator for input.
PUSH	New statement to save, in memory, various system information.
QISDEF	New statement for use in Quality Information Systems(QIS).
REFMNT	New statement to define a mounting reference point for a sensor mount component.
REPORT	Several minor words added, for enhanced reporting capability.
RESUME	New statement to recover from errors.
RMEAS (input format 7)	New statement for measurement of edge points.
SENSOR	New statement to define a sensor component capable of making measurement.
SNSDEF (input format 6)	XRAY sensor definition, and all references to XRAY sensors will be removed in the next DMIS major release.
SNSDEF (input format 7)	New input format added to build a sensor from wrists and components.
SNSGRP	New statement for defining a group of sensor components.
SNSLCT	Modified the format to specify wrist angles; Tip numbers; Feature axes; i,j,k, ang_tol; Sensor groups.
Statement Length	The statement length limit was 256 characters, this has been removed. See paragraph 5.1.6.
TECOMP	Added the capability to pass the thermal expansion coefficient of the part to the output file.

THLDEF	Added wrists and extensions to the tool holder/changer definitions.
TOL/ANGLR	Modified the input format to allow a second datum feature for orientation tolerances. Also added the capability to specify a parallel plane tolerance zone for all orientation tolerances on cylindrical tolerance features.
TOL/COMPOS	Modified to comply with ASME Y14.5M-1994.
TOL/CORTOL	The minor word RADIUS has been replaced with RADIAL. The minor word RADIUS was a typographical error. The RADIUS and RADIAL minor words have the same definition in this case. Both the RADIUS and RADIAL minor words will coexist for one DMIS version. The RADIUS minor word will be removed in the next DMIS major release.
TOL/GTOL	New statement for soft functional gauging.
TOL/PARLEL	Modified the input format to allow a second datum feature for orientation tolerances. Also added the capability to specify a parallel plane tolerance zone for all orientation tolerances on cylindrical tolerance features.
TOL/PERP	Modified the input format to allow a second datum feature for orientation tolerances. Also added the capability to specify a parallel plane tolerance zone for all orientation tolerances on cylindrical tolerance features.
TOL/POS	The minor word RADIUS has been replaced with RADIAL. The minor word RADIUS was a typographical error. The RADIUS and RADIAL minor words have the same definition in this case. Both the RADIUS and RADIAL minor words will coexist for one DMIS version. The RADIUS minor word will be removed in the next DMIS major release.
TOL/PROFS	An option in var_3; dev,AVGDEV was changed to AVGDEV,dev.
UNITS	A major change to allow multiple UNITS statements within a program. See paragraph 5.4.1.7.
VALUE	Major modifications have been made to gain access to the tolerance value when more than one value is possible, and to return various information.
VFORM	Added capabilities with var_3.
WRIST	New statement to define wrist rotations and offsets.
XTRACT	New statement to extract bounded features from complete curves or surfaces.

AUSTRALIAN STANDARD

Industrial automation systems and integration — Physical device control — Dimensional Measuring Interface Standard (DMIS)

1 Scope

The objective of this International Standard is to provide a standard for the bi-directional communication of inspection data between computer systems and inspection equipment. The Dimensional Measuring Interface Standard (DMIS) is a vocabulary of terms, which establishes a neutral format for inspection programs and inspection results data.

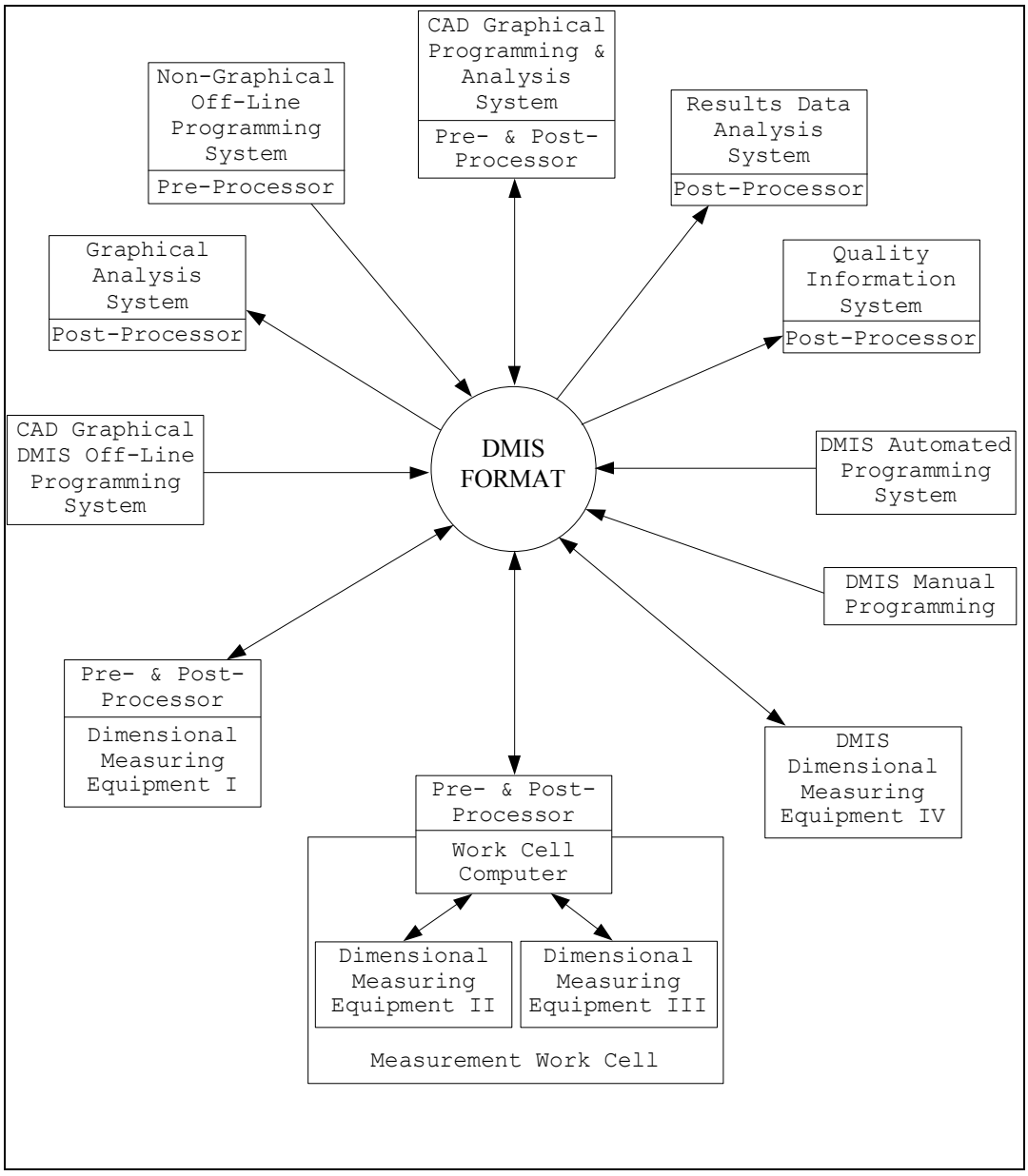


Figure 1 — DMIS environment

© Standards Australia