Engineering Drawing and Related Documentation Practices

ASME Y14.41-2003

DIGITAL PRODUCT DEFINITION DATA PRACTICES

An American National Standard

The American Society of Mechanical Engineers

ADOPTION NOTICE

ASME Y14.41, Digital Product Definition Data Practices, was adopted on 7 July 2003 for use by the Department of Defense, (DoD). Proposed changes by DoD activities must be submitted to the DoD Adopting Activity: Commander, U.S. Army TACOM-ARDEC, ATTN: AMSTA-AR-QAW-E, Picatinny Arsenal, NJ 07806-5000. Copies of this document may be purchased from The American Society of Mechanical Engineers (ASME), 22 Law Drive, PO Box 2900, Fairfield, NJ 07007-2900; http://www.asme.org.

Custodians:
Army — AR
Navy — SA
Air Force — 16
DLA — DH

Adopting Activity:
Army — AR

Review Activities:
Army — AT, AV, CE, CR, EA, GL, MI, SM, TE
Navy — AS, CH, EC, MC, OS, SH, TD, YD
Air Force — 11, 13, 19, 68, 70, 71, 84, 99
DLA — CC, IS
NSA — NS

AMSC N/A

AREA DRPR

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

The American Society of Mechanical Engineers

AN AMERICAN NATIONAL STANDARD

DIGITAL PRODUCT DEFINITION DATA PRACTICES

ASME Y14.41-2003

Date of Issuance: August 15, 2003

The next edition of this Standard is scheduled for publication in 2007. There will be no addenda or written interpretations of the requirements of this Standard issued to this edition.

The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

CONTENTS

Figures

Tables

Mandatory Appendix

FOREWORD

The development of this Standard was initiated at the request of industry and the government. A meeting was held to determine the interest in this subject in January 1997 in Wichita, Kansas, hosted by The Boeing Company in their facility. A subsequent meeting was held during the spring ASME meeting in 1997 to enlist membership of those who would be interested in working this project.

This Standard was largely built using the e-mail systems now available to industry and government. This was actually a revolutionary happening, since in some part, the subcommittee was establishing ground rules for the use of 3D data in new design systems that were not fully tested or fully developed. The subcommittee understands a need for documented systems and systematic work. The evolution of the tools available to those that create and produce drawings has enhanced the capabilities of designers in producing complex hardware. The computer and the computer graphics design software is at a stage where using the design package to extend the normal drawing usage to a new level is a real possibility. Those who have chosen to spend the time and effort in the definition of the product shall see a return on their investments associated with implementing three-dimensional drawing packages. The accuracy of the product design is unparalleled, and provides the users of the design data the ability to interrogate the digital data that controls the design. Companies were clamoring for guidelines on how to use these innovative techniques. There were many issues in using the 3D data for the manufacture and inspection of the product. This is indeed a first, since digital data was usable in the manufacturing of the product but was widely disapproved for inspection. The intent of this Standard is to set forth a logical and manageable system in the use of the new design systems available to manufacturers both large and small. This advancement is a change in media used in the design, manufacture, and inspection cycles of the product.

Suggestions for improvement of this Standard are welcomed. They should be sent to The American Society of Mechanical Engineers, Attention: Secretary, Y14 Main Committee, Three Park Avenue, New York, NY 10016.

This Standard was approved as an American National Standard on July 7, 2003.

ASME STANDARDS COMMITTEE
Y14 Engineering Drawing and Related Documentation Practices

(The following is the roster of the Committee at the time of approval of this Standard.)

OFFICERS

F. Bakos, *Chair*
K. E. Wiegandt, *Vice Chair*
C. J. Gomez, *Secretary*

COMMITTEE PERSONNEL

A. R. Anderson, Dimensional Control System, Inc.
F. Bakos, Consultant
J. V. Burleigh, The Boeing Co.
R. A. Chadderdon, Southwest Consultants
M. E. Curtis, Jr., Rexnord Industries, Inc.
D. E. Day, Monroe Community College
C. W. Ferguson, WM Education Services
L. W. Foster, L. W. Foster Associates, Inc.
C. J. Gomez, The American Society of Mechanical Engineers
B. A. Harding, Purdue University
K. S. King, Naval Surface Warfare Center, Dahlgren Division
A. Krulikowski, General Motors Corp.
H. S. Lachut, ABB Combustion Engineering, Inc.
J. G. Liska, Aerojet Propulsion, Division of Gencorp
P. J. McCuistion, Ohio University
P. E. McKim, Caterpillar, Inc.
E. Niemiec, MTD Products, Inc.
R. L. Nieukirk, *Alternate,* Caterpillar, Inc.
G. H. Whitmire, Gary Whitmire Associates
K. E. Wiegandt, Sandia National Laboratory
B. A. Wilson, The Boeing Co.
P. Wheeler, Hutchinson Technology, Inc.

SUBCOMMITTEE 41 — DIGITAL MODELING

A. Krulikowski, *Chair*, General Motors Corp.
N. Smith, *Vice Chair*, The Boeing Co.
B. Dinardo, *Secretary,* U.S. Department of the Army, TACOM-ARDEC
D. M. Braun, Rockwell Collins, Inc.
J. L. Cerio, Raytheon Co.
C. Cubeles, Dassault-Systems
D. D. Cunningham, Jr., Thiokol Propulsion
P. E. Damron, The Boeing Co.
K. Dobert, EDS PLM Solutions
D. L. Ellis, General Dynamics Land Systems
L. Holmes, Raytheon Co.
L. F. Irwin, SDRC
J. I. Miles, Lockheed Martin Aeronautics Co.
T. J. Miller, Ford Motor Co.
M. A. Murphy, General Motors Corp.
G. R. Mussell, CNH Global NV
R. L. Nieukirk, Caterpillar, Inc.

A. F. Pettenger, DEPCO, Inc.
J. M. Simmons, Rolls-Royce Corp.
J. M. Smith, Caterpillar, Inc.
E. A. Spinelli, Raytheon Co.
T. T. Taylor, Siemens Power Generation
F. A. Tolmie, Rockwell Collins, Inc.
J. C. Weers, The Boeing Co.

Y14/SC 41 SUPPORT GROUP

J. F. Bradshaw, The Boeing Co.
J. V. Burleigh, The Boeing Co.
B. A. Dahl, The Boeing Co.
B. Davis, Ford Motor Co.
B. A. Harding, Purdue University
G. A. Hetland, Hutchinson Technology, Inc.
L. R. Lange, Consultant
C. A. Wearring, EDS PLM Solutions
D. Welever, The Boeing Co.

DIGITAL PRODUCT DEFINITION DATA PRACTICES

1 GENERAL

1.1 Scope

This Standard establishes requirements and references documents applicable to the preparation and revision of digital product definition data, hereafter referred to as data sets. This Standard defines exceptions and additional requirements to existing ASME standards for using product definition digital data sets or drawings in digital format. Where no exception or additional requirements are stated, existing ASME standards shall apply.

1.2 Structure of Standard

This Standard supports two methods of application: model only, and model and drawing in digital format. The structure starts with the requirements common to both methods, and then branches to the other sections that have differing requirements for each method. In addition, it provides a guide for the many CAD software packages to develop better modeling and annotation practices for computer aided design and engineering disciplines.

1.3 Figures

The figures in this Standard are intended only as illustrations to aid the user in understanding the practices described in the text. In some cases, figures show a level of detail as needed for emphasis; in other cases, figures are only complete enough to illustrate a concept or facet thereof. The absence of figures has no bearing on the applicability of the specified requirement or practice. To comply with the requirements of this Standard, actual data sets shall meet the content requirements set forth in the text.

To assist the users of this Standard, a listing of the paragraph(s) that refer to an illustration appears in the lower right-hand corner of each figure. This listing may not be all-inclusive. The absence of the listing is not a reason to assume inapplicability.

Most figures are illustrations of models in a three-dimensional environment. Figures illustrating drawings in digital format have a border included.

1.4 Reference to This Standard

When data sets are based on this Standard, this fact shall be noted in the data set or in a document referenced by the data set. References to this Standard shall state ASME Y14.41-2003.

1.5 Units

The International System of Units (SI) is featured in this Standard. United States (U.S.) customary units could equally well have been used without prejudice to the principles established.

1.6 Text In Figures

Text in upper case letters used in the figures is intended to appear in data sets. Text in lower case letters is explanatory of the figures only and is not intended to appear in data sets.

1.7 Symbols

The use of symbols to indicate dimensional requirements does not preclude the use of equivalent terms or abbreviations in accordance with ASME Y14.38 where symbology is considered inappropriate.

1.8 References

ASME Y14.1-1995 (R2002), Decimal Inch Drawing Sheet Size and Format

ASME Y14.1M-1995 (R2002), Metric Drawing Sheet Size and Format

ASME Y14.2M-1992 (R1998), Line Conventions and Lettering

ASME Y14.3M-1994 (R1999), Multiview and Sectional View Drawings

ASME Y14.4M-1989 (R1999), Pictorial Drawing

ASME Y14.5M-1994 (R1999), Dimensioning and Tolerancing

ASME Y14.8M-1996 (R2002), Castings and Forgings

ASME Y14.35M-1997, Revision of Engineering Drawings and Associated Documents

ASME Y14.38-1999, Abbreviations and Acronyms

ASME Y14.100-2000, Engineering Drawing Practices

Publisher: The American Society of Mechanical Engineers (ASME International), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300

IEEE/ASTM SI 10, Standard for Use of the International System of Units (SI): The Modern Metric System

Publisher: Institute of Electrical and Electronics Engineers (IEEE), 445 Hoes Lane, Piscataway, NJ 08854-1331

Publisher: The American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959