



ASME Activities

Enabling a Model Based Enterprise

By Fredric Constantino

Overview of ASME Standardization

- History
- Vision, Mission, and Strategic Focus
- Organization
- Enabling MBE Activities

WHAT IS A STANDARD?

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Standard – A set of technical definitions, instructions, rules, guidelines, or characteristics set forth to provide consistent and comparable results, including:

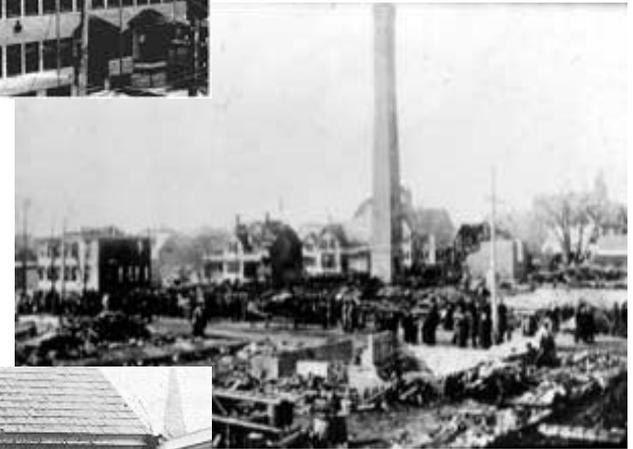
- Items manufactured uniformly, providing for interchangeability
- Tests and analyses conducted reliably, minimizing the uncertainty of the results
- Facilities designed and constructed for safe operation

HISTORY

- Industrial revolution: fueled by novel applications of steam power
- Between 1898 and 1903 alone, over **1200** people were killed in the U.S. in **~1900** separate boiler explosions
- Key problem: Lack of understanding, consistency, and safety features in boiler design and operation



Grover Shoe Factory
Brockton, MA 1905



HISTORY

Timeline of Early ASME Standardization Milestones



1880
ASME founded to address issues with industrialization and mechanization



1884
Issues first standard, Code for the Conduct of Trials of Steam Boilers



1905
Standard for Proportions of Machine Screw Sizes



1914
First edition of the Boiler and Pressure Vessel Code



1916
Safety Code for Cranes

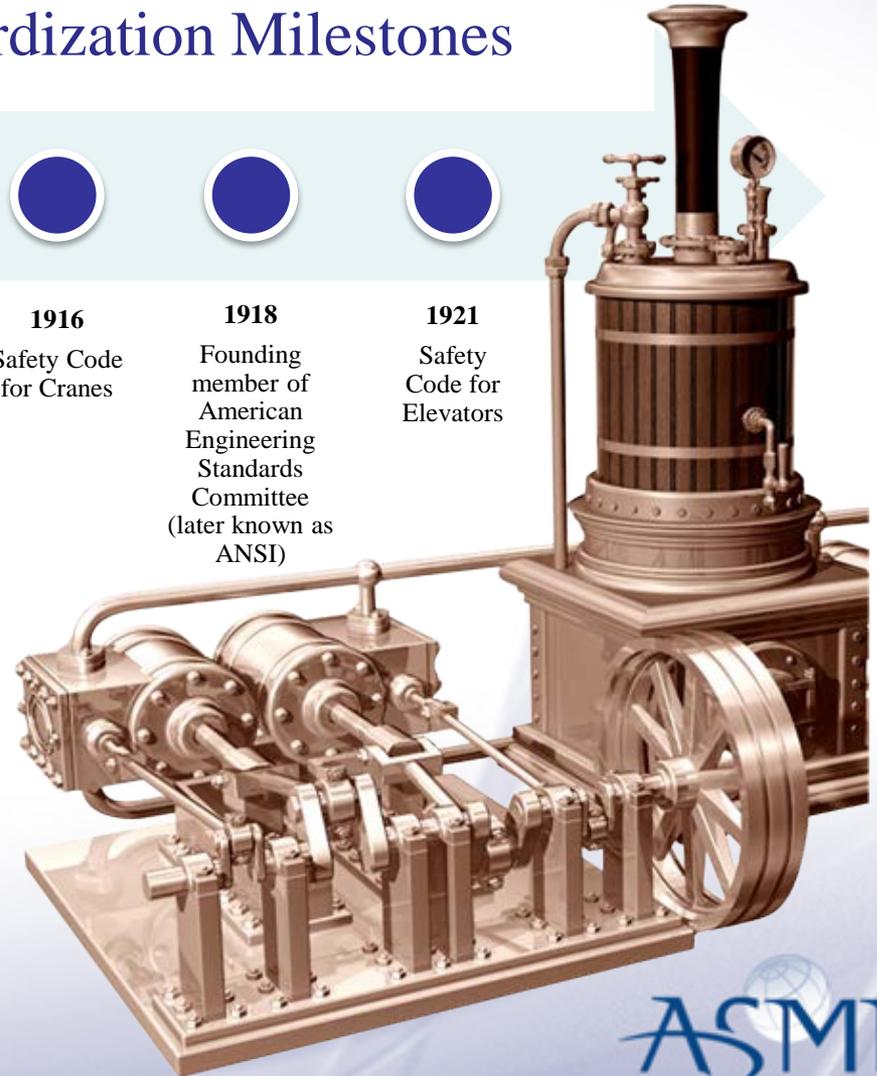
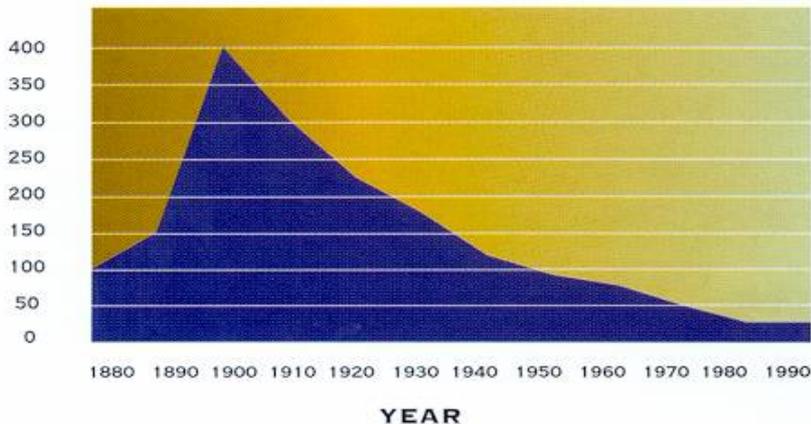


1918
Founding member of American Engineering Standards Committee (later known as ANSI)



1921
Safety Code for Elevators

NUMBER OF EXPLOSIONS



VISION STATEMENTS

MISSION STATEMENTS

ASME

To be the essential resource for mechanical engineers and other technical professionals throughout the world for solutions that benefit humankind

To serve diverse global communities by advancing, disseminating and applying engineering knowledge for improving the quality of life; and communicating the excitement of engineering

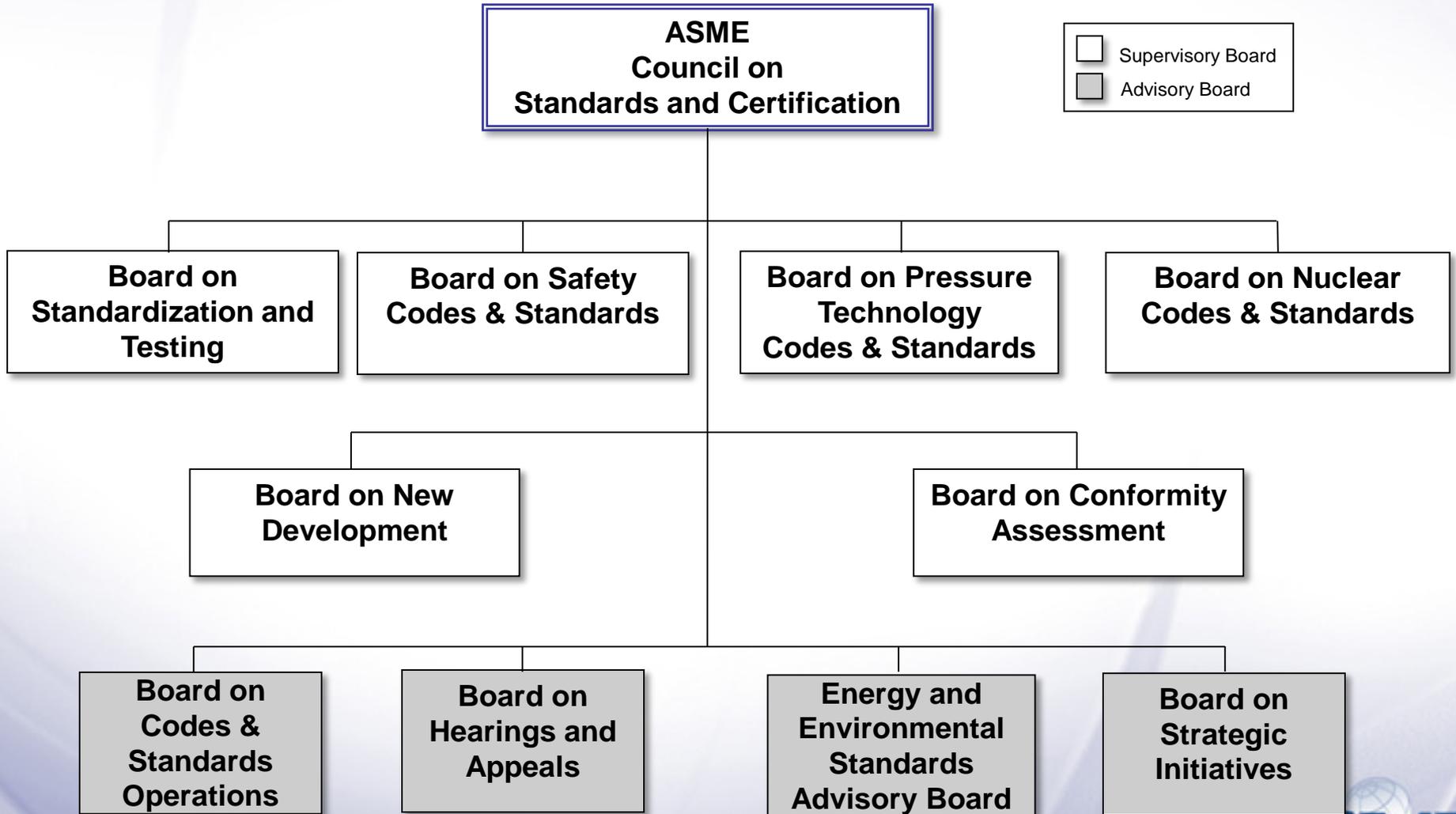
ASME STANDARDS & CERTIFICATION

To be the world leader in mechanical and multidisciplinary engineering codes, standards, conformity assessment programs, and related products and services

To develop the best, most applicable codes, standards, conformity assessment programs, and related products and services in the world for the benefit of humanity

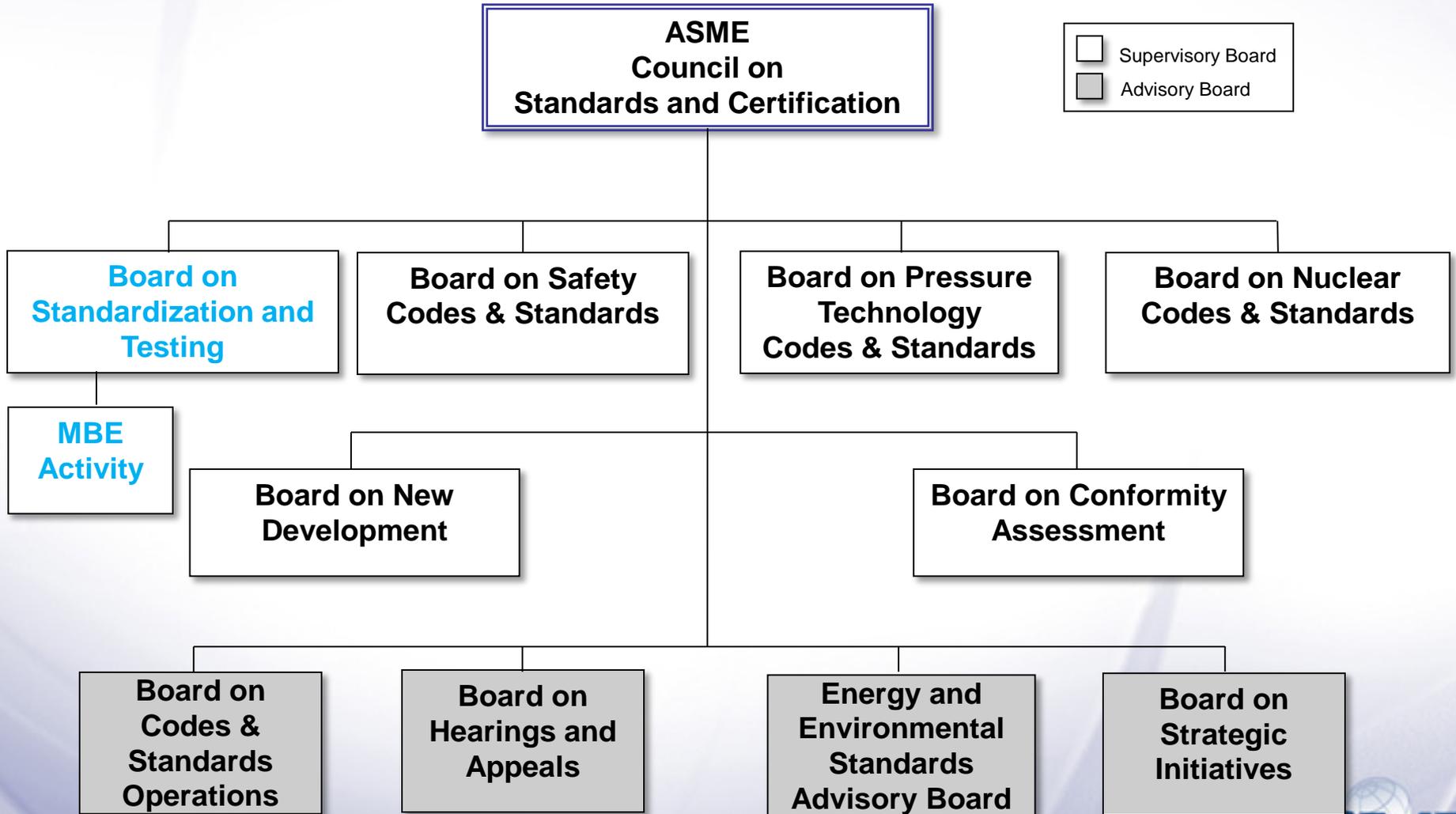
ORGANIZATION

ASME S&C Organization Chart



ORGANIZATION

ASME S&C Organization Chart



Board

Provides procedural oversight for all activities

Standards
Committees

Establishes consensus on all technical matters

Subcommittees

Provides recommendations on technical matters to the standards committee in a given subject area – e.g., Dimensioning and Tolerancing

Subgroups

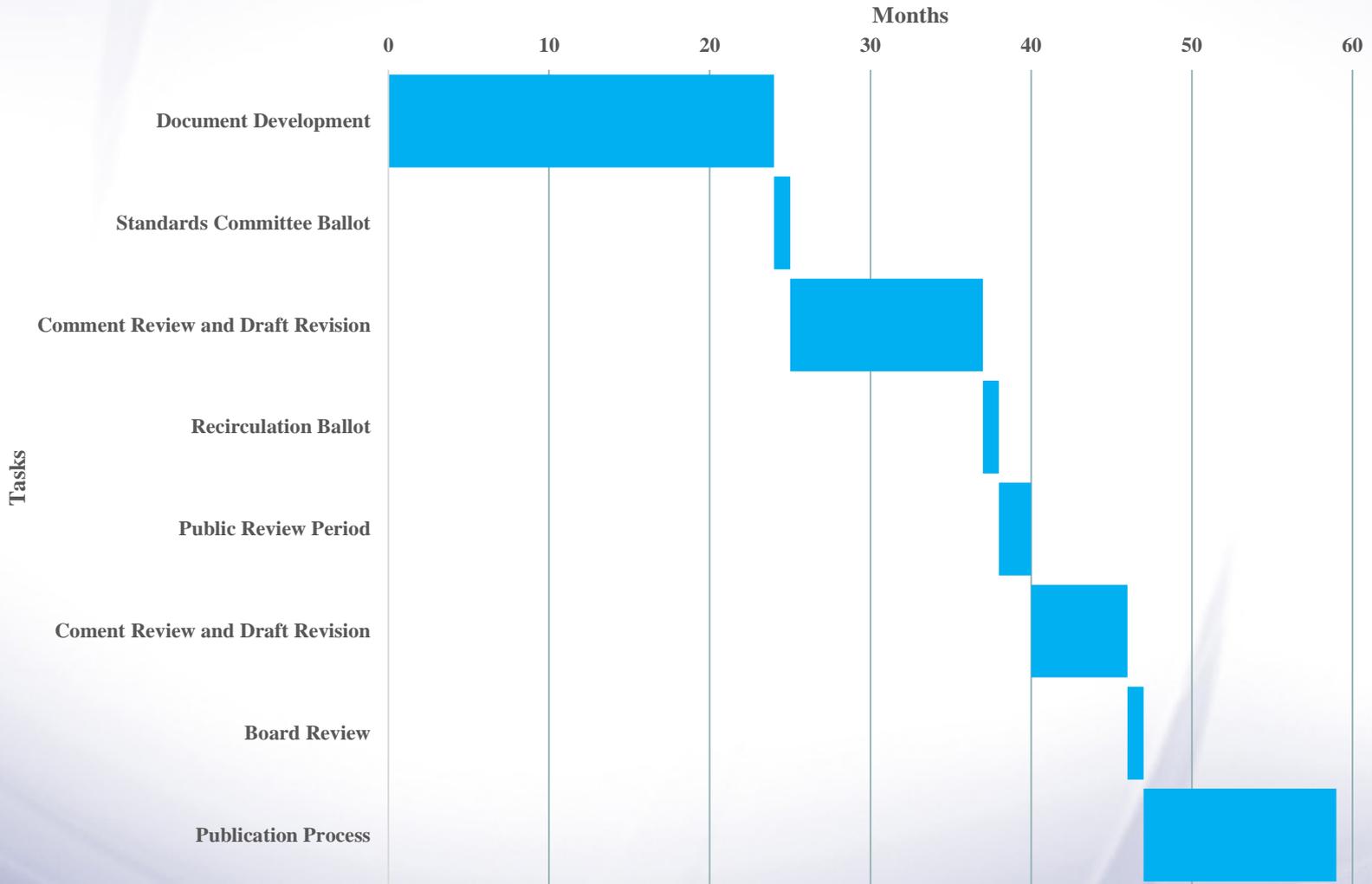
Develops proposal in a given specialty – e.g., Edges Treatment

WGs, TGs, PTs

Develops detailed proposals in a specific field – e.g., Valve Design

ORGANIZATION

ASME Standards Development Process Timeframe



ASME Y14 Engineering Product Definition and Related Documentation Practices

Charter:

The development and maintenance of national standards for defining and documenting a product throughout its life cycle and related certification activities. This shall be accomplished by:

- 1) recognizing the continuing need for existing standards regardless of the source medium (e.g., paper, film, and **digital**) or method of preparation (e.g., manual or **computer generated**);*
- 2) providing standardization where a variety of practices exist within industry and government;*
- 3) providing standards for new concepts and technologies; and*
- 4) supporting and coordinating development and harmonizing of standards with responsible standardization bodies, including ANSI, ISO, and government agencies.*

ASME Y14 Engineering Product Definition and Related Documentation Practices

Y14.41 – Digital Product Definition Data Practices

- Establishes requirements, defines exceptions, and references documents applicable to the preparation and revision of digital product definition data, referred to as data sets or drawings in digital format.
 - **Product definition data** denotes the totality of data elements required to completely define a product. This includes geometry, topology, relationships, tolerances, attributes, and features necessary to completely define a component part or an assembly of parts for the purpose of design, analysis, manufacture, test, and inspection. (See **ASME Y14.100**).
- Currently under revision
 - Revising figures for **weld and surface finish symbology** to coordinated properly with text and align with **Y14.36 Surface Texture Symbols**.
 - Reviewing **Non-Uniform Profile tolerance distribution in 3D**.

ASME Y14.41-2012
[Revision of ASME Y14.41-2003 (R2008)]

Digital Product Definition Data Practices

Engineering Drawing and Related Documentation Practices

AN AMERICAN NATIONAL STANDARD



ASME Y14 Engineering Product Definition and Related Documentation Practices

Y14.46 – Product Definition for Additive MFG

- Establishes methods to describe complex parts, internal geometric features (e.g., matrices, engineered voids, curving channels), build orientation, fill patterns, local toolpath orientations, integrated components manufactured at the same time, and specifying the geometric placement of the material and material gradients.
 - Covers GD&T methods, symbology, geometric tolerance controls, the control of free state variation, and the establishment of datums related to additive manufacturing technologies for their uniform specification on engineering drawings and related documents.

- **Published** as a Draft Standard for Trial Use December 2017
 - One year request for commenting:
 - <http://go.asme.org/Y14CommentForm>

ASME Y14.46-2017
Draft Standard for Trial Use

Product Definition for Additive Manufacturing

Engineering Product Definition and
Related Documentation Practices

This is a Draft Standard for Trial Use and comment. This Draft Standard is not an approved consensus standard of ASME nor is it an American National Standard. ASME has approved its issuance and publication as a Draft Standard only. Distribution of this Draft Standard for comment shall not continue beyond 1 year from the date of publication. The content of this Draft Standard for Trial Use and comment was not approved through ASME's consensus process. Following the 1-year trial and comment period, this Draft Standard, along with comments received, will be submitted to a Consensus Committee of Expert Users. The Consensus Committee on Expert Users will review and revise the Draft Standard based, in part, upon experience during the trial term and resulting comments. A public review in accordance with established American National Standards Institute (ANSI) procedures is required at the end of the Trial Use period and before a Draft Standard for Trial Use is submitted to ASME for approval as an American National Standard. Therefore, it is expected that the Standard (including any revisions thereto) will be submitted to ASME for approval as an American National Standard. Suggestions for revision should be directed to the Secretary, Y14.46 Subcommittee using the following form: <http://go.asme.org/Y14CommentForm>.

ASME Y14.46 – 2017

Structure

- **Data Package Requirements**
 - Identification of Data Products
 - Model Schema and Organization
- **Part Definition**
 - Distinguishing Intermittent Stages of AM Processing
 - Geometry Characteristics Specific to Additive Manufacturing
 - Material Definition
 - Datum Referencing
 - Notes
- **Process Specific Definition**
 - Planning and Pre-processing
 - In Process
 - Post-processing
- **Verification and Conformance to Specifications**
 - Functional Requirements
 - Inspection

ASME Y14.46 – 2017

Table of Content

- 1. General**
- 2. Definitions**
- 3. Supplemental Geometry**
- 4. Product and Process Definition Requirements**
- 5. Product Data Packages (PDP)**

Nonmandatory Appendices

- A. Example AM Notes**
- B. Defining Transition Regions**
- C. Reference Documents to Test for Conformance**

ASME Y14 Engineering Product Definition and Related Documentation Practices

Y14.47 – DRAFT 3D Model Organization Schema

- This standard establishes a schema for organizing the data within a 3D model contained in a digital product definition data set.
 - The schema defines a common practice to improve design productivity and to deliver consistent data content and structure to consumers of the data. An alternate method of data organization may be used as long as a cross-reference is provided to the schema.
- Shall replace **Appendix B of MIL-STD-31000A** used to **define a 3D technical data package (TDP)** for the DoD.
- Will **standardize the exchange of 3D model data** used to define an item for manufacturing and procurement.

Y14.47 DRAFT 23 FEB 2018
Y14.47 DRAFT 23 FEBRUARY 2018

ASME Y14.47-201X

Model Organization Schema Practices

ENGINEERING PRODUCT DEFINITIONS AND RELATED DOCUMENTATION PRACTICES

DRAFT

TENTATIVE
SUBJECT TO REVISION OR WITHDRAWAL
Specific Authorization Required for Reproduction or Quotation
ASME Standards Certification

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
Two Park Avenue
New York, New York 10016-5900

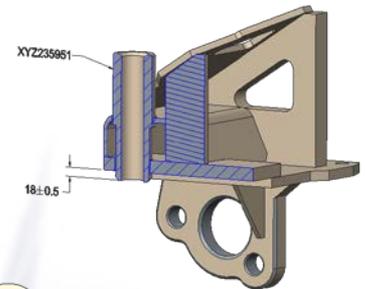
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ASME Y14.47 – 20XX

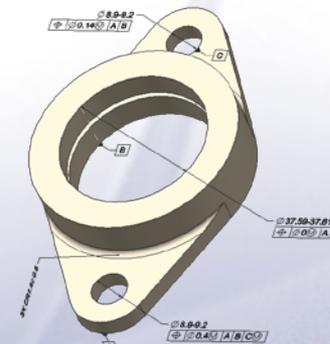
Topics Covered

- Glossary of Terms
- Data Set Completeness State
- Organizational Framework Requirements:
 - Naming Conventions
 - Associated Groups
 - Saved Views
 - Presentation States
 - Annotation Orientation
 - Model Notes
 - Meta Data

Default
Front View
Top View
Right Side View
Left Side View
Back View
Bottom View
Section A-A
Model Only
Management Data
Properties
Characteristics
Notes
Datums



MED0 Default Notices
MED1 Management Data
MED2 Model Only
MED3 Site Map
MED4 Titles
MED5 Properties
MED6 General Notes
MED7 Set Datums
MED8 Key Characteristics
MED9 Assembly
MED10 Machining
MED11 Weld
D1 Section A-A
D2 Detail B
D3 Face View



ASME Model-Based Enterprise (MBE)

- Charter
 - Developing standards providing rules, guidance, and examples for the creation and use of model-based datasets, data models, and related topics within a MBE.
- Areas of Concentration
 - Types of models and their intended uses; rules for representing requirements and constraints; types of features and data elements for model-based datasets; schemas for datasets; creating, managing and using product definition and process definition data; managing links between product definition and process definition; rules governing data quality; managing discrepancies.

ASME Model-Based Enterprise (MBE)

ASME Meeting: 05 Apr 2018

- **Open to all NIST MBE Summit Attendees**
- **Draft Agenda:**
 - 13:00 to 13:10, Welcome (Fred and Tom)
 - 13:10 to 13:30, MBE committee logistics update (Fred)
 - 13:30 to 14:15, Near-term (2-3 yr) Use Case Identification
 - Each attendee provides top 3 use cases the committee should tackle immediately
 - 14:15 to 14:25, Break
 - 14:25 to 15:10, Long-term (5-10 yr) Use Case Identification
 - Each attendee provides top 3 use cases the committee should tackle eventually
 - 15:10 to 15:30, Solicit input on liaisonships
 - Other organizations we should engage (e.g., IEEE, INCOSE, SME, ASTM)
 - 15:30 to 15:45, Getting involved
 - 15:45 to 16:15, Question and Answer
 - 16:15 to 16:20, Next steps and summary

QUESTIONS??

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