

ASME

Digital Engineering

Standards Development Activities

*Providing Tools to Enable a Model-Based Enterprise and
Guidance on Data Workflows*



October 28, 2020

Additive Manufacturing Data Management Workshop

Kate Hyam, Project Engineering Manager ASME Standardization and Testing



What is ASME?



- Standards and Certification
- Conformity Assessment
- Courses
- Conferences
- Publications
- ASME.org
- Engineering Education
- Government Relations
- Engineering for Change
- Membership

ASME helps the global engineering community
develop solutions to real-world challenges



ASME at-a-Glance

- Established in 1880
- 100,000+ members in 140+ countries
 - Includes 28,000+ students
- 350 staff in Offices: US – Europe – Asia
 - HQ: New York City
 - Little Falls (NJ); Houston (TX); Washington DC
 - Brussels (EU); Beijing (China); New Delhi (India)
- Standards and Certification
 - 1884 Year first standard published
 - 500+ Standards
 - 700 Committees
 - 5900 Volunteers (Total)
 - 1290 Volunteers (International)

ASME BY THE NUMBERS 2019

ABOUT ASME

The American Society of Mechanical Engineers® (ASME®) helps the global engineering community develop solutions to real world challenges facing all people and our planet. We actively enable inspired collaboration, knowledge sharing and skills development across all engineering disciplines throughout the world, while promoting the vital role of the engineer in society.

MISSION

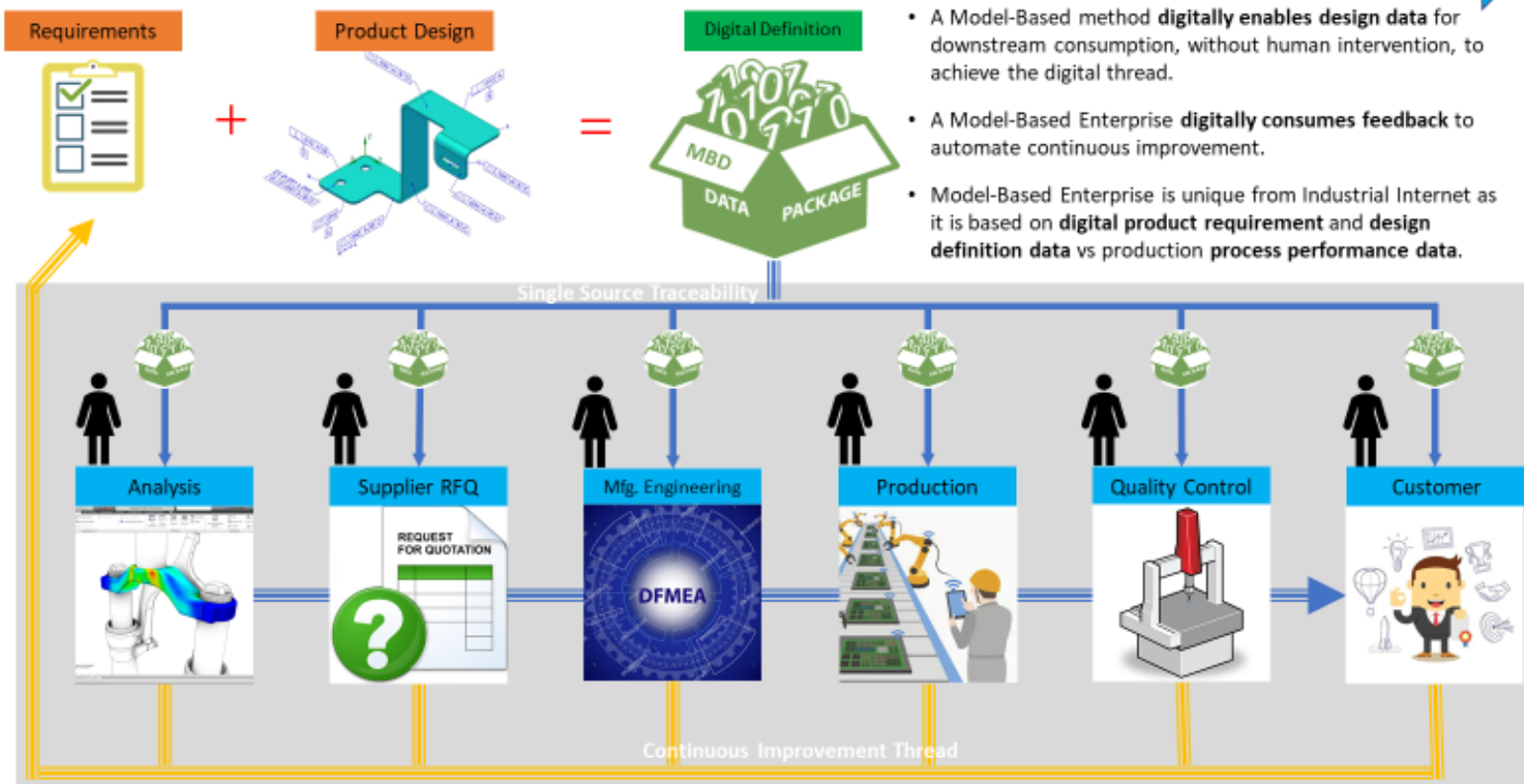
ASME's mission is to serve diverse global communities by advancing, disseminating and applying engineering knowledge for improving the quality of life; and communicating the excitement of engineering.

VISION

ASME aims to be the essential resource for mechanical engineers and other technical professionals throughout the world for solutions that benefit humankind.

Enable the True Digital Thread

The Digital Thread requires a **Model Based** Approach for **Data Consumption Across the Product Lifecycle**



ASME Model-Based Enterprise (MBE)

- **Charter:** Develop standards or related products that provide rules, guidance, and examples for the creation, use and reuse of model-based datasets, data models, and related topics within a Model-Based Enterprise.
- 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
 - Management of links between product definition and process definition
 - Rules governing data quality
 - Creation, management, and use of product definition and process definition data
 - Management of discrepancies between existing standards affecting MBE and MBD



ASME MBE Recommendation Report

A Starting Point for MBE Standards Activities

- Developed by the ASME MBE Steering Group, which consisted of 8 existing ASME volunteers and 2 new members
- Establishes direction, activities, priorities, and organizational structure of the ASME MBE Standards Committee and its subcommittees
- Provides methodology for developing MBE standards using a model-based approach
- Outlines a roadmap for the MBE standards development process
- Describes a marketing and adoption strategy for MBE

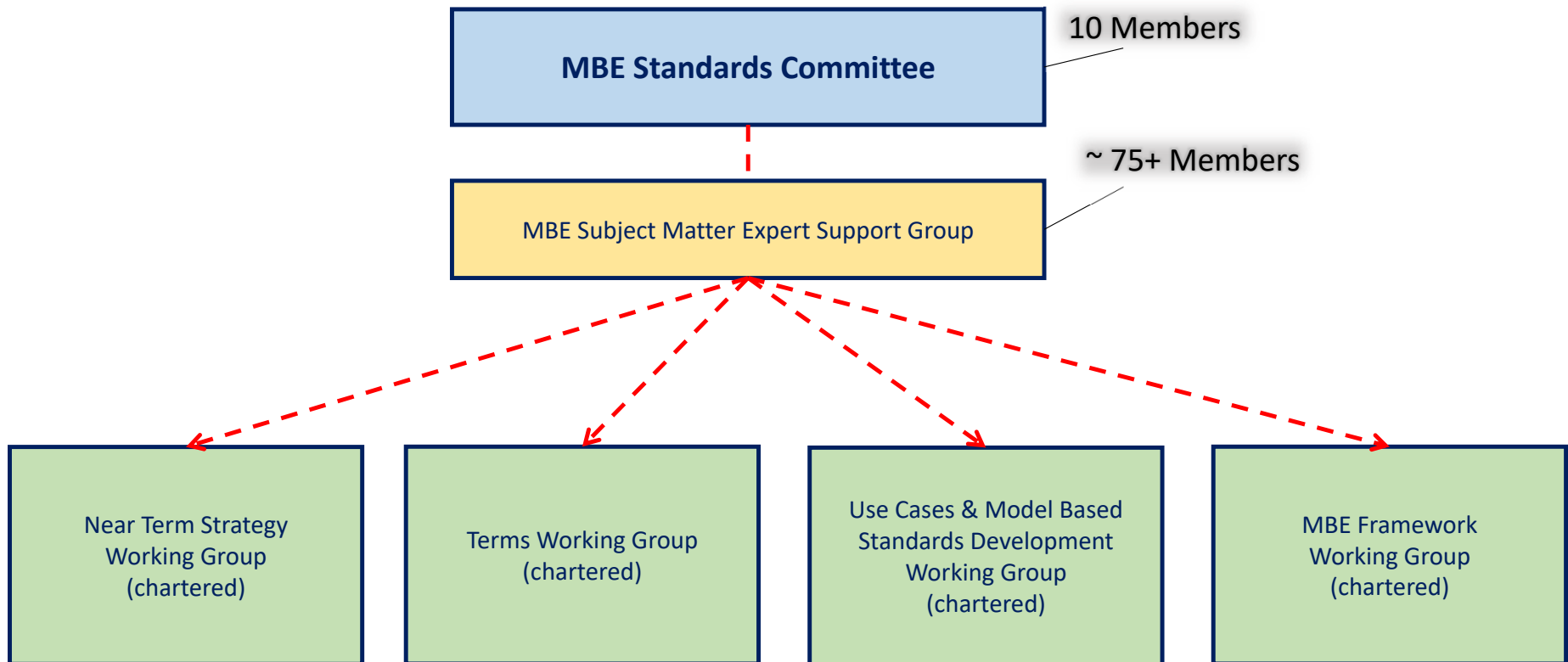
“MBE will transform industry by increasing productivity, quality, profitability, and types of products, and by reducing wasted effort, wasted time, non-value-added work, lost information, missed opportunities, and time to market.”



Download:
go.asme.org/MBEreport



ASME MBE Committee Structure



ASME MBE Meetings

MBE Meetings Week - November 16-20, 2020

- Fredric Constantino – MBE Standards Committee Staff
 - ASME S&C Project Engineering Advisor
 - Phone: 212-591-8684
 - E-mail: ConstantinoF@asme.org
- Michelle Pagano – MBE Staff Support
 - ASME S&C Engineer
 - Phone: 212-591-8399
 - E-mail: PaganoM@asme.org
- ASME MBE Standards Committee C&S Connect Page
 - <https://bit.ly/2K2mgXL>
- ASME MBE Redmine Collaboration Site
 - <https://projects.mbe.institute/projects/asme-mbe-public-page>



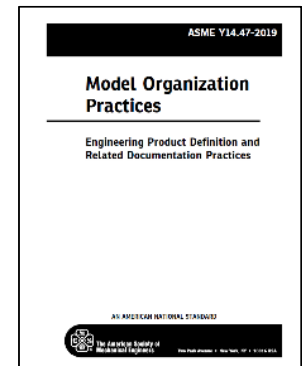
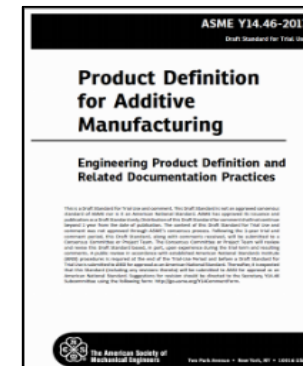
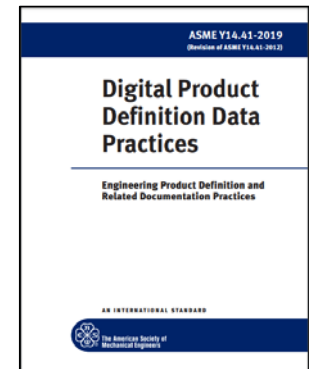
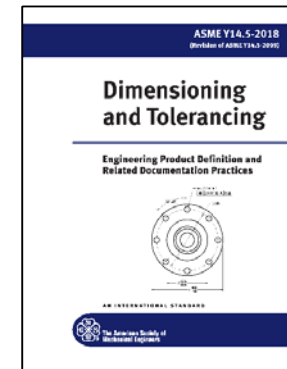
ASME Y14 Standards Additive Manufacturing Standards

Model Based Definition Standards

- Y14.41-2019 Digital Product
- Definition Data Practices
- Y14.46-2017 Product Definition for Additive Manufacturing
- Y14.47-2019 Model Organization Practices
- Y14.48 - Universal Direction and Load Indicators (in development)

Committees meet in Spring and Fall

Contact Fred Constantino at ConstantinoF@asme.org for more information.



ASME Verification & Validation (V&V) Committee – started 2008

CHARTER		Coordinate, promote, and foster the development of standards that provide procedures for <i>assessing and quantifying the accuracy and credibility</i> of computational models and simulations.	
V&V 10	Computational Solid Mechanics	2001	
V&V 20	Computational Fluid Dynamics and Heat Transfer	2004	
V&V 30	Computational Simulation of Nuclear System Thermal Fluids Behavior	2010	
V&V 40	Computational Modeling of Medical Devices	2011	
V&V 50	Computational Modeling for Advanced Manufacturing	2016	
V&V 60	Computational Modeling for Energy Systems	2017	
V&V 70	Machine Learning Applied to Mechanistic & Process Modeling	2019	



ASME V&V Standards

ASME V&V 10-2019
[Revision of ASME V&V 10-2006 (R2016)]

Standard for Verification and Validation in Computational Solid Mechanics

ASME V&V 10.1-2012

An Illustration of the Concepts of Verification and Validation in Computational Solid Mechanics

AN INTERNATIONAL STANDARD



AN INTERNATIONAL STANDARD

AN AMERICAN NATIONAL STANDARD



ASME V&V 20-2009

Standard for Verification and Validation in Computational Fluid Dynamics and Heat Transfer

AN AMERICAN NATIONAL STANDARD



AN AMERICAN NATIONAL STANDARD

ASME V&V 40-2018

Assessing Credibility of Computational Models through Verification and Validation: Application to Medical Devices

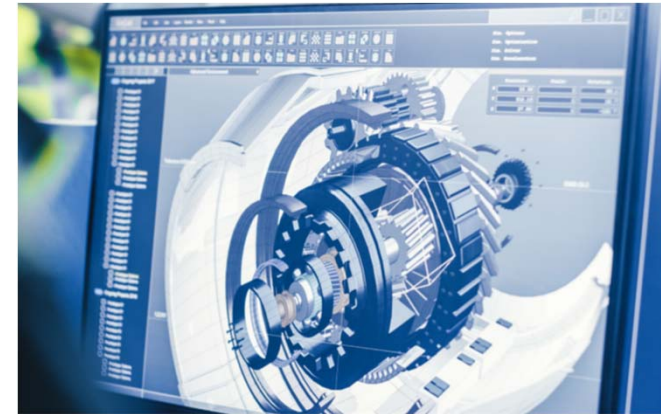
An International Standard



ASME V&V Meetings

V&V Meetings Week - November 9-13, 2020

- Kate Hyam - V&V, V&V 40 and V&V 60 Staff
 - Phone: 212-591-8704
 - E-mail: hyamk@asme.org
- Fredric Constantino –V&V 50 Staff
 - Phone: 212-591-8684
 - E-mail: ConstantinoF@asme.org
- Michelle Pagano – V&V 10 and V&V 30 Staff
 - Phone: 212-591-8399
 - E-mail: PaganoM@asme.org
- Dan Papert – V&V 20 and V&V 70 Staff
 - Phone: 212-591-8399
 - E-mail: papertd@asme.org
- ASME V&V Activities related to standards, the Journal of VVUQ, Challenge Problems and Annual Symposium
 - <https://www.asme.org/codes-standards/publications-information/verification-validation-uncertainty>



Prognostics and Health Management - Manufacturing

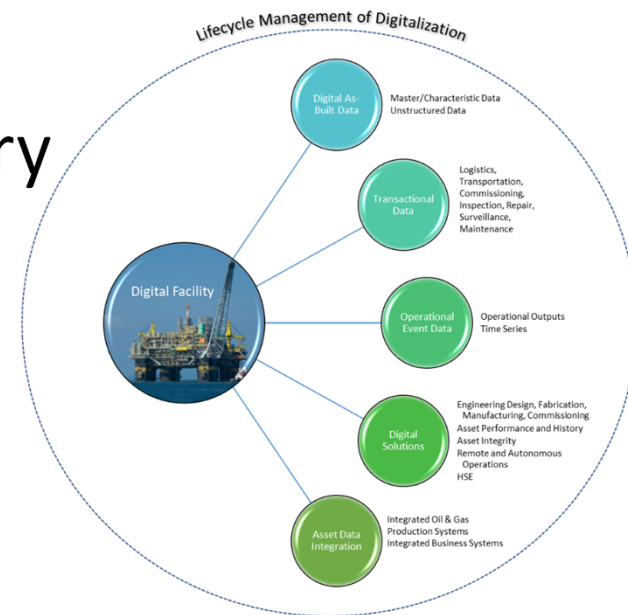
PHM – Prognostics and Health Management

- Prognostics is the process of predicting the reliability of a product or process
- Health Management refers to the process of measurement, recording, and monitoring equipment deviation from normal operation conditions
- Subcommittee on Monitoring, Diagnostics, and Prognostics for Manufacturing Operations Charter: Develop standards and guidelines that advance the design and implementation of monitoring, diagnostic, and prognostic capabilities, along with ways of verifying and validating their performance, to enhance adaptive maintenance and operational control strategies within manufacturing.
- 1st Guideline Document – Determining When and Where PHM Should be Integrated in Manufacturing Operations
 - Help companies assess the health of their equipment, subsystems, work cells, and the overall process
 - Identification of Critical Metrics and Pain Points(e.g. OEE, KPIs)
 - Develop Business Case and Determine where to Implement PHM
- Committee Formed in July 2018



Big Data/Digital Transformation Workflows and Applications

- Guideline on Big Data/Digital Transformation Workflows and Applications for the Oil and Gas Industry – publication December 2020
- Committee on Digital Engineering/Big Data/Digital Transformation forming in early 2021



Contact Kate Hyam at hyamk@asme.org for more information.

Additional Activities

PTC Committee on Control and Quality Improvement of Process Data

- Develop procedures and guidelines for using techniques such as data validation and reconciliation to determine the quality of measurements, reduce the uncertainties, and assess reconciled results.

Manufacturing and Advanced Manufacturing Standards Committee formation of a new Subcommittee on Additive Manufacturing

- Develop standards or related products that provide rules, guidance, and examples of the design, manufacture and quality assurance of additively manufactured parts.

Bioprinters (Hardware) Standards Committee

- Develop, review and maintain guidelines and standards for bioprinters hardware requirements. This document provides guidelines for extrusion bioprinting calibration of devices, operations, compatibility, and interoperability of these components to best print ex vivo tissue results.

Questions?

Thank you for your kind attention!

Kate Hyam

ASME Project Engineering Manager

Phone: 212-591-8704

E-mail: hyamk@asme.org

