Standard Practice for Reporting Data for Test Specimens Prepared by Additive Manufacturing

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Abstract
This module provides: an overview of the standard specification for additive manufacturing file format.

Objective:
The student will be able to:
Identify Test Specimen report forms
Explain the data contained on test specimen report forms
Describe the physical alignment for test specimens in the build box for proper building for testing

AM core competencies addressed (most important in bold)
0Bb1 Prepare tests and record test details and data neatly and accurately
0Bb3 Analyze test data, compare and contrast information, draw rational conclusions
1Aa1 Measure accurately hardness, impact strength and related properties of materials

Key Words: material, coordinate systems, material specifications, test methods, test specimens

Type of Module: Discussion

Time Required: 1 hour

Grade Level
Grades 8 through college

Equipment and supplies needed
Standard classroom set-up (computer, overhead projection)

Reporting data for test specimens

A. Please refer to the accompanying PowerPoint presentation titled: Standard Practice for Reporting Data for Test Specimens Prepared by Additive Manufacturing

B. Intent See Slide 2
   a. Provide a common format and data requirements
b. Allow AM suppliers to report their data in a common format to aid with procuring activity requests for materials and services.

c. Allow design authorities and other industry organizations to gather supporting data to select AM and incorporate AM into designs and products.

d. Allow Government Agencies and Laboratories to support AM adoption with a standard means to publish performance data.

e. Allow common data reporting to establish qualification plans, material specifications, process specifications, and exchange of data with some traceability to how the data was first generated.

B. Element Requirements See Slide 3

a. Minimum data element requirements for reporting of material and process data for the purpose of:
   1. Standardizing test specimen descriptions and test reports.
   2. Assisting designers by standardizing AM materials databases.
   3. Aiding material traceability through testing and evaluation.
   4. Capturing property-parameter-performance relationships of AM specimens to enable predictive modeling and other computational approaches.

b. Materials and Process Reporting Requirements See Slide 4
   1. All standard material specifications used. – Information from these specifications should include, as a minimum:
      a. Description and preparation of feedstock materials prior to AM operations.
      b. Procedure for using or re-using feedstock material.
      c. A description of any non-standard materials used and/or deviations from materials standards used.
      d. All standard process specifications used, as a minimum:
         1. All processes used to produce the specimen from feedstock material.
         2. Placement and orientation of the test specimen in the build chamber.
         3. A description of all non-standard processes used and/or deviations from process standards used.

C. Test and Inspection Reporting Requirements See Slide 5

a. The following test and inspection information must be reported for test specimens built using AM:
   1. All standard test and inspection methods used.
   2. The shape and dimensions of the test specimens, with tolerances specified.
   3. The test plan.
   4. Test procedures.
   5. Non-destructive inspection procedures and results.
6. A description of all non-standard test methods used and/or deviations from standard test methods used.
7. Post Processing Reporting Requirements.

D. Report Header Requirement
   a. Corresponding to detailed Materials and Process Specifications (detailed)
   b. See Slide 6

E. Additive Manufacturing Sample Report
   a. See Slide 7

F. Additive Manufacturing Sample Report
   a. Corresponding to commercial Materials and Process Specifications (Commercial Specification)
   b. See Slides 9,10

G. Review the Specifications

Evaluation:

1. Describe the components of a Technical Drawing
2. Why is reporting data so important to AM?
3. What information is required on an AM Report?

References:

1. The core competencies used in the development of this module were taken from the draft of the Additive Manufacturing Core Competencies for Technicians soon to be released by The National Resource Center for Materials Technology Education (MatEdU), Technician Education in Additive Manufacturing (Project TEAM), under NSF Grant: DUE #1003530