Technician Education in Additive Manufacturing & Materials
TEAMM
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Additive Manufacturing: Materials and Processes

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Abstract
This module provides: an overview of the materials used in Additive Manufacturing printers, including the properties, process, Strength, production time, uses, post processing requirements and relative cost for use.

Objective:
The student will be able to:
Define the types of materials used in additive manufacturing.
Explain the various processes used in additive manufacturing.
Determine the appropriate process, using a straw man template, for the generation of a 3D part.
Explain the uses of various materials for creating 3D parts.

AM core competencies addressed (most important in bold)
8Aa2 Explain and illustrate the various additive manufacturing processes
11Aa3 Compare the differing properties and characteristics of common materials used for additive manufacturing models

Key Words: Materials, processes, uses, prototyping, modeling

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)

Additive Manufacturing: Materials and Processes

A. Please refer to the accompanying PowerPoint presentation titled: Materials Used in Additive Manufacturing Processes

A. Types of Materials

a. Starch
b. Stainless Steel
c. ABS (Acrylonitrile Butadiene Styrene)
d. Photo-polymer
e. Aluminum
f. Nylon
g. Ceramic
h. Titanium

B. **Properties**
a. Powder
b. Solid
c. Liquid

C. Processes(es)
a. 3D Printing
b. FDM (Fused Deposition Modeling)
c. SLS (Selective Laser Sintering)
d. SLA (Stereolithography)
e. DMLS (Direct Metal Laser Sintering)
f. SLM (Selective Laser Melting)
g. EBM (Electron Beam Melting)

D. Uses
a. Prototyping
b. Modeling
c. Production parts

E. Post Processing
a. Infusion

Evaluation:

1. Describe FDM.
2. What post processing requirements are used on an FDM part?
3. Which process would you use to create an inexpensive 3D prototype with minimal production time?

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

2. Users Guide to Rapid Prototyping; Grimm, Todd; Society of Manufacturing Engineers (SME), Copyright 2004