NASA’s Materials and Processes Technology Information System (MAPTIS):

How it relates to Sustainable Aerospace Advanced Manufacturing and Sustainable Materials Management

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Refining the Goals of DoD's Strategic Plan for ‘REACH’

*This presentation does not represent the official position of NASA or the United States government. This presentation only reflects only the personal views of the presenters.*
# NASA’s Materials and Processes Technology Information System (MAPTIS): How it relates to Sustainable Aerospace Advanced Manufacturing and Sustainable Materials Management

Presented at the Partners in Environmental Technology Technical Symposium & Workshop, 29 Nov - 1 Dec 2011, Washington, DC. Sponsored by SERDP and ESTCP

Our poster shows how MAPTIS relates to Sustainable Aerospace Advanced Manufacturing and Sustainable Materials Management. MAPTIS is a "pre-Milestone B" design-engineering tool. MAPTIS provides materials and manufacturing processes information to design-engineers. One component of MAPTIS provides Environmental-Safety-Health (ESH) information on regulated materials, most notably information on materials regulated by the European Union’s REACH? and U.S. ESH regulations. MAPTIS’ ESH component is a powerful way to do Pollution Prevention ?at the Source?. The presentation will provide an overview of: (1) the importance of MAPTIS and the ESH component to the U.S. Aerospace Sector; (2) the relevance of MAPTIS and the ESH component to National and International initiatives; (3) the process for keeping MAPTIS and the ESH information current.
NASA'S MATERIALS AND PROCESSES TECHNOLOGY INFORMATION SYSTEM (MAPTIS)

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Our poster shows how MAFTIS relates to Sustainable Aerospace Advanced Manufacturing and Sustainable Materials Management.

MAFTIS is a “pre-Milestone B” design-engineering tool. MAFTIS provides materials and manufacturing processes information to design-engineers. One component of MAFTIS provides Environmental-Safety-Health (ESH) information on regulated materials, most notably information on materials regulated by the European Union’s ‘REACH’ and U.S. ESH regulations. MAFTIS’s ESH component is a powerful way to do Pollution Prevention “at the Source”. The presentation will provide an overview of: (1) the importance of MAFTIS and the ESH component to the U.S. Aerospace Sector; (2) the relevance of MAFTIS and the ESH component to National and International initiatives; (3) the process for keeping MAFTIS and the ESH information current.
NASA is about creating for the future using design-engineering tools to enhance sustainable use of materials and sustainable manufacturing processes.

MAPTIS: Materials and Processes Technical Information System

MAPTIS is a NASA Materials Science & Materials Engineering Portal

MAPTIS can be used to locate design problems before they become product problems.

MAPTIS can be used to find the right materials and the right manufacturing processes to give the right performance for the right applications so as not to endanger humans or the planet.
MAPTIS is (in DOD Terminology) **pre-Milestone B:**

“Technical Requirements, before Milestone B”
REMOTE SITE RESEARCH:
"THE DREAM"

http://www.nasa.gov/centers/glenn/images/content/101885main_C91_08781_516x387.jpg
http://www.nasa.gov/centers/glenn/images/content/101903main_C88_11517_516x387.jpg
ANTARCTIC BASE

http://response.restoration.noaa.gov/pribilof/

MATERIALS MANAGEMENT

REMOTE SITE RESEARCH: “THE REALITY”

ARCTIC BASE


www.cep.ag/default.asp?casid=6896
How Important is the US Aerospace Industry?

1) Positive U.S. trade balance only exists for two of the five High-Technology areas*
2) Greatest positive contributor to the Trade Balance is the U.S. Aerospace Sector

Materials efforts (new compositions, processing, manufacturing) are not linked with the design process.

"New commercial products today have a faster development cycle .... For example, jet engines are now developed in 30 months rather than 60, largely because of improved computational design tools." NRC (2001) Materials in the New Millennium, at page 10.
2001 Increasing Global Regulations; and 2008 Lack of Understanding About REACH, U.S. Survey
Apparent “Market Failure” to understand the importance of REACH to the U.S.

Brian Sherwin (CSP co-Founder, EORM / President, ESHconnect) & Jen Jeng (Associate EHS Consultant, EORM) (October 2001)

Cost locked in by Phase, and Cost of Change by Phase

70% of Costs Locked in by Concept Phase

Aerospace Industry:
Change Order Cost
Gavin Finn (1998)

1) $350,000 per “Production Stage” Change Order!!

Aerospace Study
Average Cost per Change
(G, Finn)

1) $3,500 Design Phase
2) $35,000 Build Phase
3) $350,000 Production Phase

“Leap-Frogging” Technology
MAPTIS and Making Decisions and Controlling Resources (including costs)

1) Design Engineer (CAD)
2) Project/Program Manager (PLM/PDM)
3) Corporate Executive/Senior Manager (ERP)

http://www.sei.cmu.edu/reports/03tr013.pdf
### MAPTIS and Sustainable Materials Management Opportunities:

**Product (Project, Program) Lifecycle Management (PLM)**

<table>
<thead>
<tr>
<th>Product</th>
<th>Lifecycle Management (PLM)</th>
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CROSS-CUTTING STRATEGIES* --

“Technology Roadmap Strategies”:


1. Detoxification
2. Dematerialization
3. Decarbonization

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**ISO/TR 14062**

ISO Guide 64

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**CROSS-CUTTING STRATEGIES**

"Technology Roadmap Strategies":


1. Detoxification
2. Dematerialization
3. Decarbonization
National Initiatives and NASA Technology Initiatives
And MAPTIS

MAPTIS can implement concepts that have the potential to significantly contribute to:

- National Advanced Manufacturing Initiative
- National Materials Genome Initiative

MAPTIS can implement concepts that have the potential to significantly contribute to:

- NASA Space Technology Grand Challenge
- NASA Technology Roadmap for Materials
- NASA Technology Roadmap for Information Technology
Potential Risks of Introducing New Materials

F Shadman (May 2008) EPA Science Forum: Environmental Challenges and Opportunities in Nano-Manufacturing (Semiconductor Manufacturing)
**MAPTIS**

Public-Private Activities

**The Material Data Management Consortium (MDMC)**

The Material Data Management Consortium (MDMC) is a unique collaborative project focused on developing and applying software to manage mission-critical materials data in the aerospace, defense, and energy sectors.

**Key industry sectors:** Aerospace, defense, and energy.

**Members**

- ABB International
- ASE
- Boeing
- Hughes
- Honeywell aerospace
- Kaman
- GE—Aviation
- GE—Energy
- Lockheed Martin
- Los Alamos
- Navajo Nation
- NASA—Glenn Research Center
- NASA—Marshall Space Flight Center
- Northrop Grumman
- Oak Ridge
- Honeywell
- Raytheon
- Rolls Royce
- US Army Research Labs
- Williams International

**The Materials Strategy Software Consortium**

The Materials Strategy Software Consortium is a collaborative project that defines and applies new software to manage materials data and meet the challenges of material selection, substitution, and cost optimization.

**Benefits**

- Decreasing overall manufacturing costs
- Mitigating the risks associated with global engineering
- Improving product quality

**The Environmental Materials Information Technology (EMIT) Consortium**

The Environmental Materials Information Technology (EMIT) Consortium is for any manufacturing organization.

The project develops and applies materials information technology solutions to assist design around environmental constraints.
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