
**Material and Processing Technology
Information System (MAPTIS) and
Aerospace Material Information System
(AMIS) <http://maptis.nasa.gov>**

NASA – Marshall Space Flight Center

Lab Lead Engineers Office

Materials & Processes Laboratory

Ben Henrie – Stanley Associates

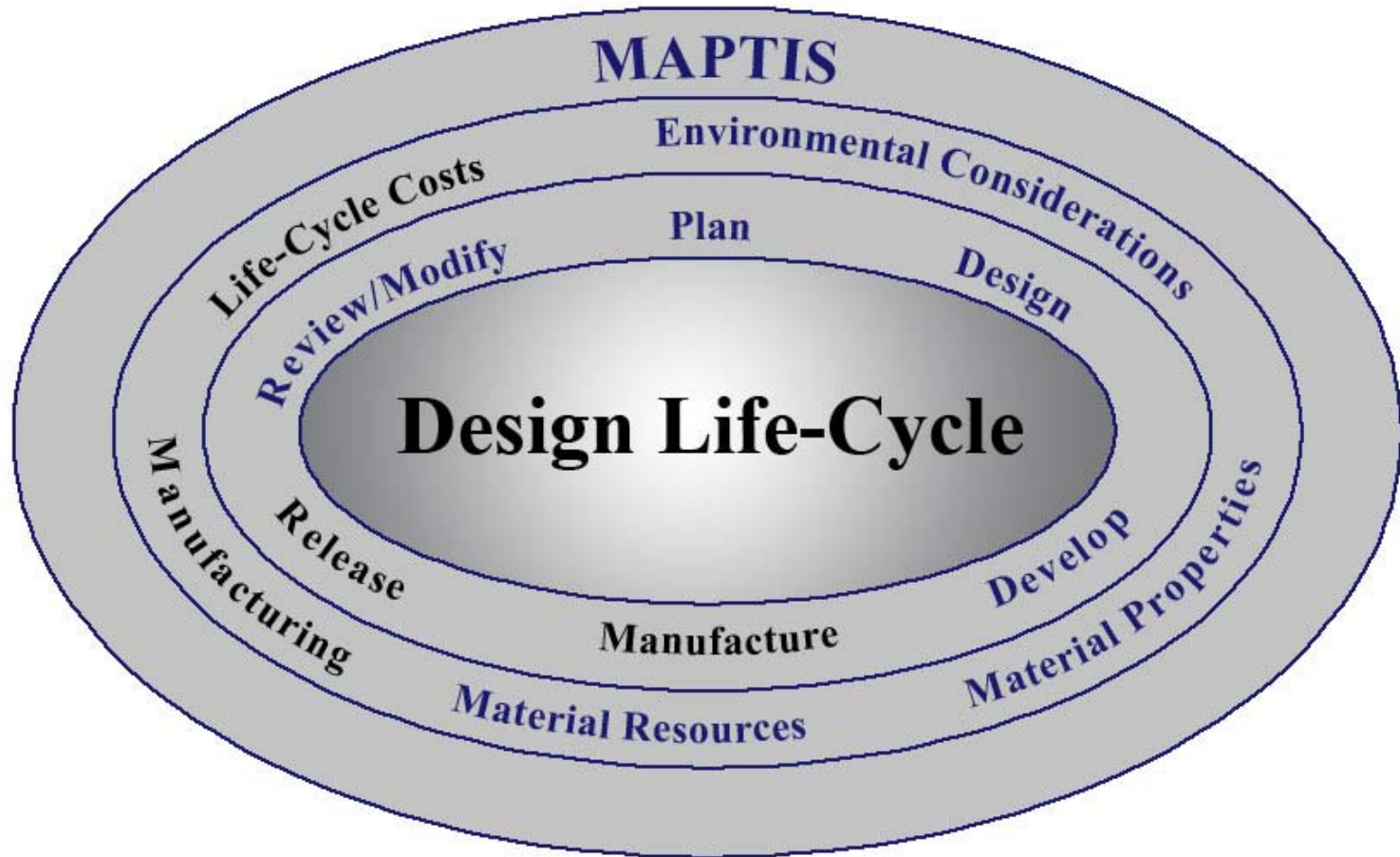


History



- MAPTIS was developed for the purpose of acquiring, archiving and disseminating materials information throughout a product life cycle
- After the Apollo I accident NASA started to look at material compatibilities by developing handbooks
- Several NASA handbooks were brought together into MAPTIS around 1986 on a VAX 8650
- Today, MAPTIS-II is a web accessible system

How MAPTIS can help



MAPTIS supports multiple aspects of a product life-cycle

MAPTIS Supports



■ Safe and Reliable Product Design

□ Material Evaluation

- Material Properties

□ Design Evaluation

- Modeling

□ Environmental Considerations - AMIS



- Regulations

□ Materials

- Waste Streams

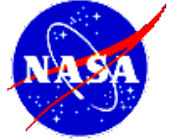
□ Materials

Commercial Material Data



- Aerospace Structure Metals Handbook
 - CAMPUS Plastics
 - ESDU MMDH
 - IDES Plastics
 - MIL-HDBK-17
 - MMPDS (formerly MIL-HDBK-5)
 - ASM International
 - Alloy Finder
 - ASM Handbooks
 - Coatings Data
 - Corrosion Data
 - Data Sheet & Diagrams
 - Fracture Analysis Center
 - Micrograph Center
 - Materials Property
-

MAPTIS Internal Material Data



- Marshal Space Flight Center
 - Goddard Space Flight Center
 - White Sands
 - Johnson Space Center
 - Kennedy Space Center
 - Contractors (Boeing, ...)
 - and others
-

Material Selection List



(Internal Material Data)

- The Selection List contains ~30,000 materials (metals and non-metals)
 - Each material is assigned a unique identification number
 - Once material test data has been analyzed and approved the results are added to the Selection List
 - This List contains data for use in Design Allowables
-

Material Selection List



(Internal Material Data)

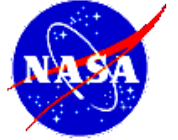
- Arc Tracking
- Corrosion
- Crack Growth
- Creep Rupture
- Electrical Overload
- Electrical Wire Insulation
- Flammability
- Flash Fire
- Fluid Compatibility
- Frictional Heat
- Fungi
- High Cycle Fatigue
- Low Cycle Fatigue
- Mechanical Impact
- Odor
- Outgassing (TVS)
- Particle Impact
- Pneumatic Impact
- Promoted Ignition
- Stress Corrosion
- Toxicity
- (VCM) Optical

Material Identification and Usage List (MIUL) Bill of Materials (BOM)



- MIULs documents materials usage with associated ratings for flight hardware
- Contractors are required to submit MIULs for all flight hardware
- MIUL generation has traditionally been a labor intensive activity
- **MAPTIS has improved the efficiencies of the MIUL process**

Material Usage Agreement (MUA)



Material Waivers

- NASA and Contractors are required to get waivers for a material if its use is outside of MAPTIS ratings
- MUAs are approved by an established MSFC Material Approval Board
- MUA documents the waiver process
- **MAPTIS facilitates the MUA process since the data is easily accessible to the Technical Authority**

Reference Library



Project and Testing Documentation

- Central repository for material related decisions
 - Stores electronic files related to test data, material selection decisions, project decisions, and more...
 - Ability to add additional information to enhance the file storage for improved search capability
 - **Saves documentation and retrieval time**
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AMIS - Restricted Substances



Environmental, Safety and Health Considerations (ESH)

- 15 United States, 12 European Union ESH, 5 UK, China RoHs, and other regulations
- ~4,200 regulated substances connected to MAPTIS materials
- New regulations are being added quarterly
- Lets designers know what ESH impact a material has or may have: Banned, Restricted, Regulated, Caution, or Unregulated

Material Restrictions



Material Selection List

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[Modify Search](#) \ [Search Results](#)

[Materials Definition](#) [Arc Tracking](#) [Wire Insul](#) [Elec Overload](#) [Flammability](#) [Flash Fire](#) [Fluid Comp](#) [Fungi](#)
[Mech Impact](#) [Odor](#) [Outgassing \(TVS\)](#) [Pneu Impact](#) [Promoted Ignition](#) [Promoted Combustion](#) [Toxicity](#) [VCMO](#)
[Material Restrictions and Regs.](#) [Manufacturers](#)

Material Definition Properties:

Material Code: 04662

Designation: DURAFLECT* WHITE REFLECTANCE

Composition: METHYL ETHYL KETONE (MEK) WITH TOLUENE BARIUM
SULFATE POLYTETRAFLUOROETHYLENE (PTFE) XYLENE
4-METHYL-2-PENTANONE (MIBK) AND CELLOSOLVE
ACETATE

Use Type: COATING OPTICAL

Use Temp Min(F):

Use Temp Max(F):

Material Restrictions and Regulations Rating:

Rating: To be phased-out

Material Restrictions and Regulations Details:

Substance	Rating
Chloroform [67-66-3]	To be phased-out
Methyl ethyl ketone [78-93-3]	To be phased-out
Methyl isobutyl ketone [108-10-1]	To be phased-out
Toluene [108-88-3]	To be phased-out
Xylene (mixed isomers) [1330-20-7]	Regulated

Partnerships



- Army Research Laboratory
 - POC - Wayne Ziegler
 - Collaboration to share material data

Scope from Space Act Agreement:

This is a joint effort of U.S. Army- Research Laboratory's Materials Applications Branch (ARL) and NASA-MSFC-EM03's (MSFC). The intent of this pilot is to reduce duplication of effort and provide a quicker time to market by taking advantage of systems already developed by other government agencies.

Summary



- MAPTIS is utilized throughout a product life-cycle
- 30+ Databases Web Accessible Flexible System configuration to adapt to our customer needs
- Search capability to query open material sources
- New data capabilities are added through ongoing material testing and analysis and investment in strategic initiatives like AMIS

Questions or Comments?



- For more information please visit <http://maptis.nasa.gov> or contact
 - Dennis Griffin at 256-544-2493
 - Ben Henrie at 256- 544-2446
 - Tim Polich at 419-621-3314

Security



- MAPTIS follows Federal Security Guidelines
- On-line application
- Secure transmission (SSL)
- “Personalized” menu according to users permissions
- Scanned and verified by NASA

Current User Demographics



- **Current number of register users: 3300+**
- **Average users per month: 400+**
- **NASA Centers (61%)**
 - **Marshall, Ames, Glenn, JPL, Johnson, Kennedy, Langley, White Sands Test Facility**
- **Contractors/Universities (26%)**
 - **Example Contractors: Boeing, Lockheed Martin, Orbital, Ball Aerospace, Hamilton, Honeywell, Goodrich, Raytheon, SAIC**
 - **Example Universities: Texas A&M, University of Colorado, University of Alabama, UCLA, MIT**
- **Foreign Users (13%)**
 - **ESA, JAXA (Japan), Canadian Space Agency, Italian Space Agency, Russian Space Agency**