Capturing Product Behavioral and Contextual Characteristics through a Model-Based Feature Information Network (MFIN)

DMDII 15-11 Project Call
Completing the Model-Based Definition


GE Global Research

LOCKHEED MARTIN

MATERIALS DATA MANAGEMENT

METROSAGE

MSC Software

PTC

PURDUE UNIVERSITY

Rolls-Royce

SIEMENS

This project has not yet been officially awarded by DMDII and is subject to pending negotiations.

Team Structure

Industry

GE Global Research

LOCKHEED MARTIN

Rolls-Royce

CAD, Analysis, Materials Database and PLM Tools

MATERIALS DATA MANAGEMENT

METROSAGE

MSC Software

PTC®

SIEMENS

Tools Test-Bed, Modeling, Process & Workforce Development

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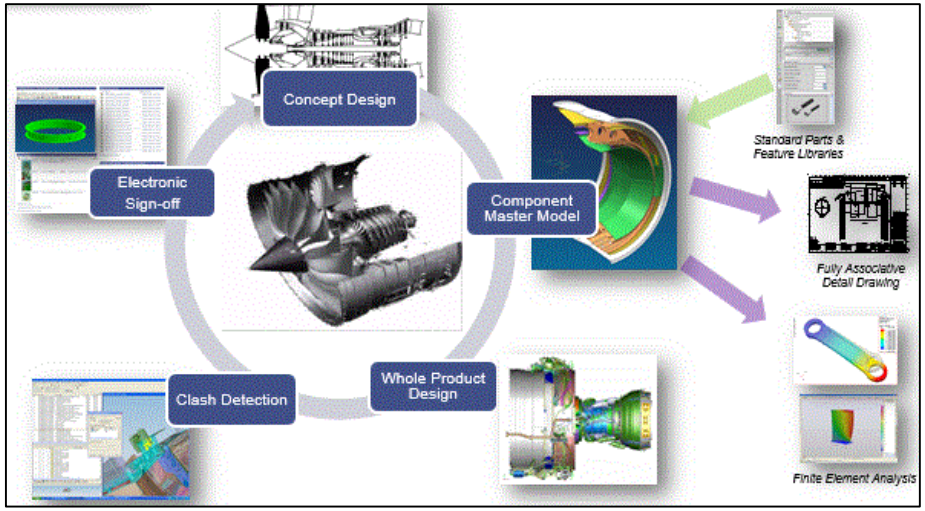
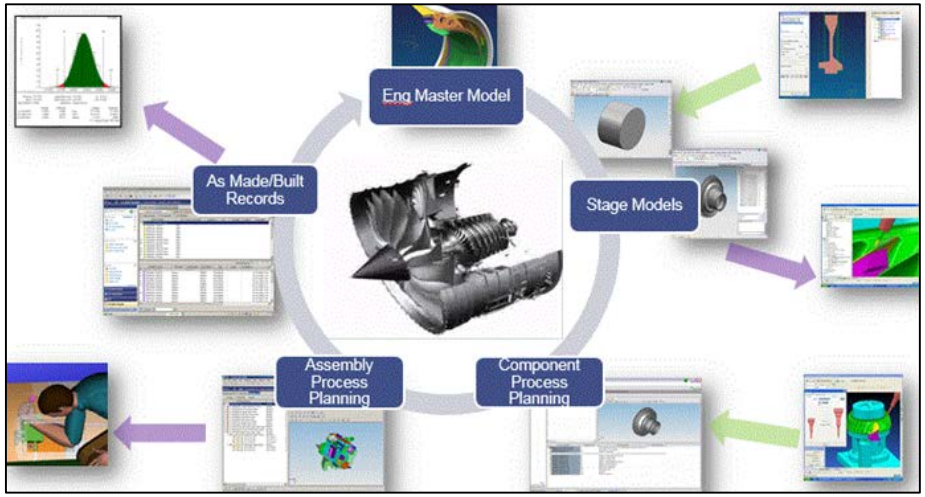
Proposal Objectives

- **Move MBD beyond geometry and 3D annotations**
  - **Demonstrate the use of semantic PMI and capture of materials characteristics at a part feature level**
  - **Link behavioral characteristics to the part feature model**
- **Address Larger Product Life Cycle**
  - **Link enhanced part and feature definitions to design intent, production information, and sustainment product data**
  - **Automate inputs into analysis tools**
  - **Generate planning documents**
  - **Automatically generate optimized high level measurement plans**
  - **Form a feedback loop to the design decision process**

Model Based Definition- Today



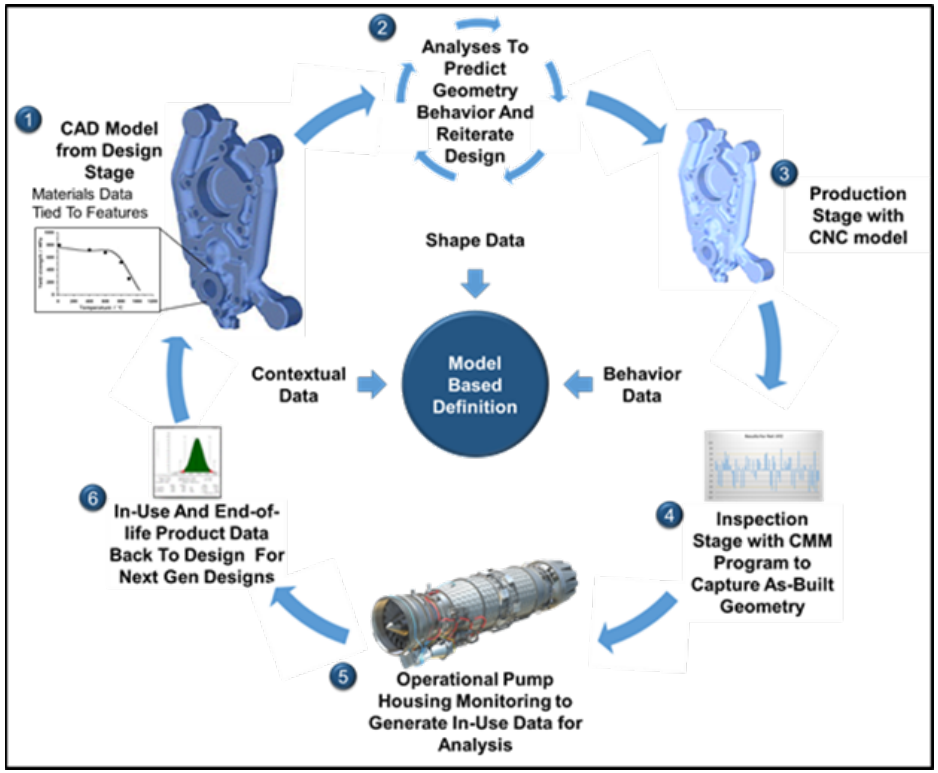
- **Model Based Definition Tends To Have a Geometric Focus Within the Design and Analysis Stage**



- **Creates Multiple Output Files To Support Manufacturing that Live As Independent Objects**

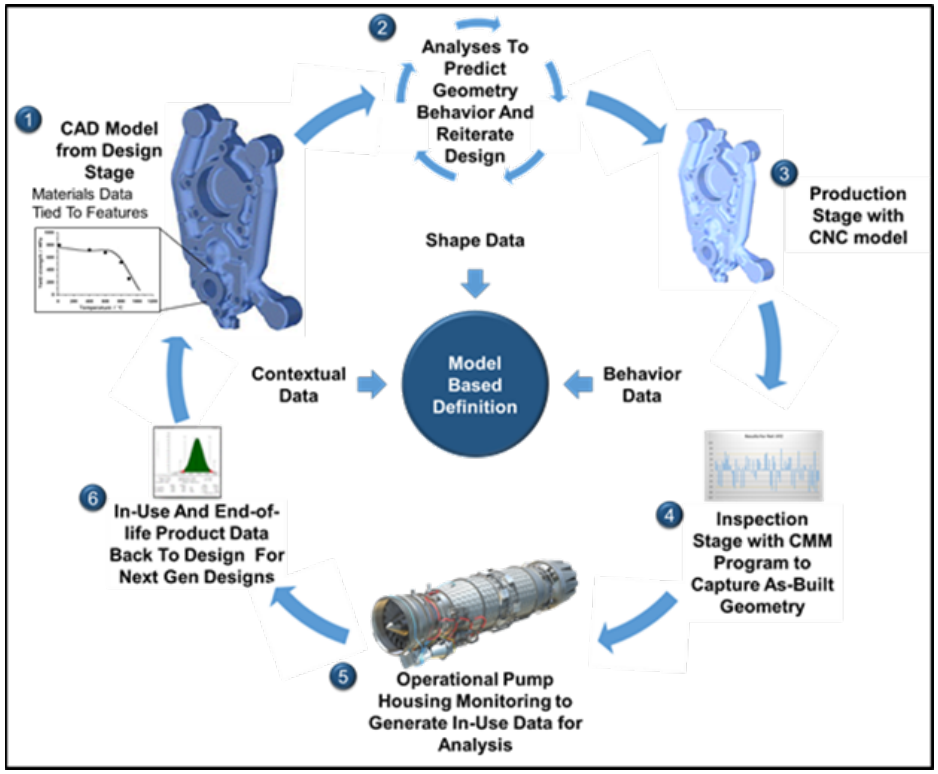
Model Based Definition- Tomorrow

- **Extend MBD to the Entire Life Cycle Through the Use of Semantic PMI and Model-based Feature Information Network (MFIN) Links to Capture and Communicate Contextual, Shape, and Behavioral Data**



MFIN Concept

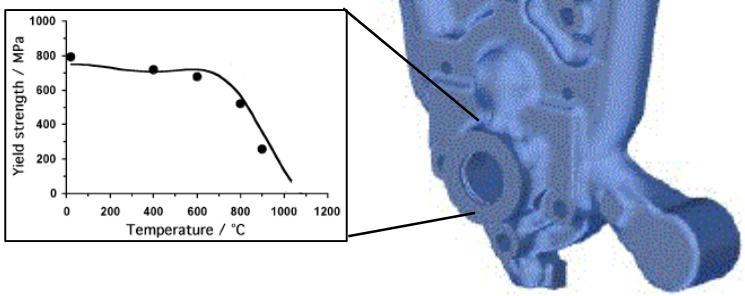
- **Seamless & Bi-Directional Virtual or Software Linkage Between CAD Part Model Features and Related Data Elements in Large Manufacturing, Maintenance, And Operations Data Sets**



Define Metallic Part and Associated Semantic PMI

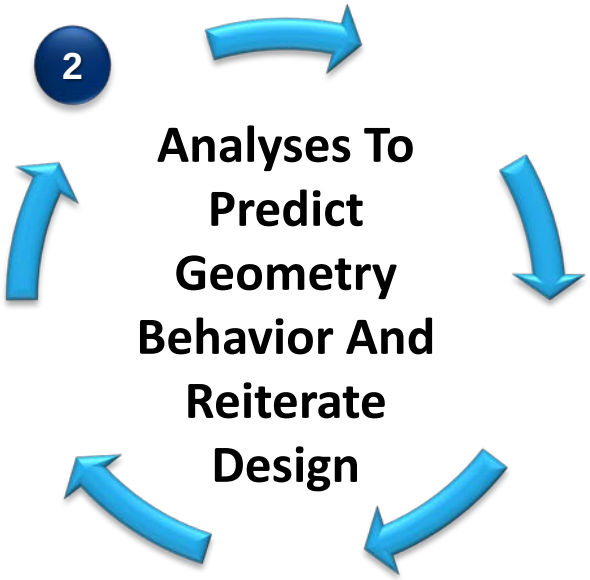
1 **CAD Model from Design Stage**

Materials Data Tied To Features



- **Define CAD Model in PTC Creo Parametric and Siemens NX**
- **Create Semantic PMI and MFIN links to embed critical data at the feature level**
- **Demonstrates flexibility and software agnostic aspect of the concept**

Develop Analysis Tool to Read in Semantic PMI



- **Create and Demonstrate MFINs Linked To Material Definition Databases from MSC Software, PTC, Siemens, and Materials Data Management**
- **Demonstrate CAE Analysis Tool Ability to Read In Semantic PMI**

Automate the Process Planning System

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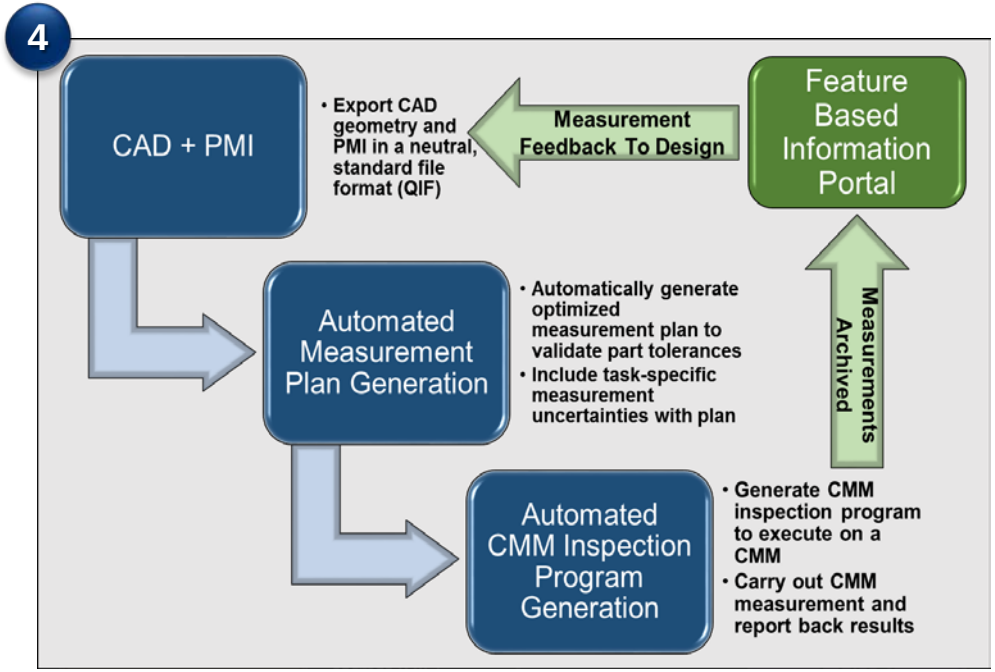
Production Stage with CNC Model

- **Develop Capability to Interrogate the MBD, Extract the Semantic PMI, Parse the PMI and Apply Rules Relevant to Each Data Element to Auto-Generate a Skeletal Process Plan**
- **Leverage Commercial PLM Systems From PTC and Siemens to Demonstrate Viability**

Automate Creation of Optimized CMM Inspection Program



Inspection Stage with CMM Program to Capture As-Built Geometry

- **Demonstrate the Creation of Optimized CMM Inspection Program Using Semantic PMI**
- **Create MFIN Linking CMM Data to the CAD Model**

Create Feedback Loop Between Operational Data and Design

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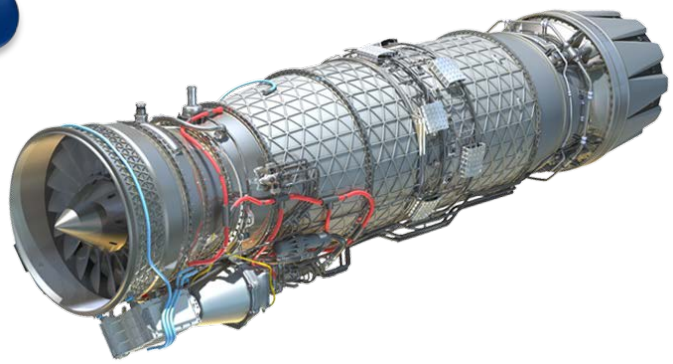

Operational Pump Housing Monitoring to Generate In-Use Data for Analysis

- **Link Operational Data to the CAD Model through MFINs**
- **Connect Critical Part Features Through a Series of Designated Keywords Mapped to Existing Design and Manufacturing Ontologies**

Create Connectivity Between LOTAR Data And Design

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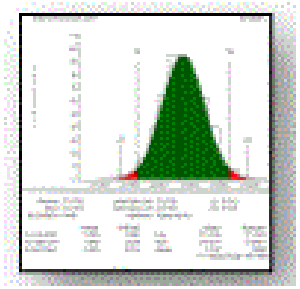

In-Use and End of Life Product Data Back To Design For Next Gen Designs

- **Demonstrate linkage between ISO 10303 and an ISO 14721 LOTAR compliant archival system**
- **Develop Verification & Validation Process to Ensure Design Intent Remains Intact Over Its Life Cycle**

Program Innovation

- **Empower Manufacturers to Seamlessly Relay As-Built and As-Used Dimensions and Test Reports to Designers Using the MFIN Process**
- **Seamless, Bi-Directional Data Transfer with a Single File**
- **MFIN Framework Will Significantly Reduce the Number of Errors Due to Misinterpretation and Manual Data Reentry**
- **Potential to Link Design, Manufacturing, Procurement, Component Engineering, and Suppliers as Part of a MBD Environment**