IMS

Manufacturing Research through International Collaboration

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Intelligent Manufacturing Systems

Introduction

Knowledge • Networks • Resources • Knowledge • Networks • Resources

What is IMS? *An international network for collaboration!*

- Industry-led R&D program for advanced manufacturing technologies and innovation
- An adaptive program responsive to changing industrial requirements
- Proven collaboration networks for complex issues resolution

What is its purpose?

- Enhance knowledge networks
- Facilitates international cooperation to expand resources
- Reduce costs and risks

Introduction

- Established network running for 17+ years

  … Europe, North America, Asia

- Experienced in formation of collaborative R&D

  … between institutions, companies, projects

- Established global platform support services

  … coaching, workshops, forums

- Provides a government sanctioned structure to address standards, policy & technical challenges

Manufacturing Technology Platform

Knowledge • Networks • Resources • Knowledge • Networks • Resources

Five platforms for research

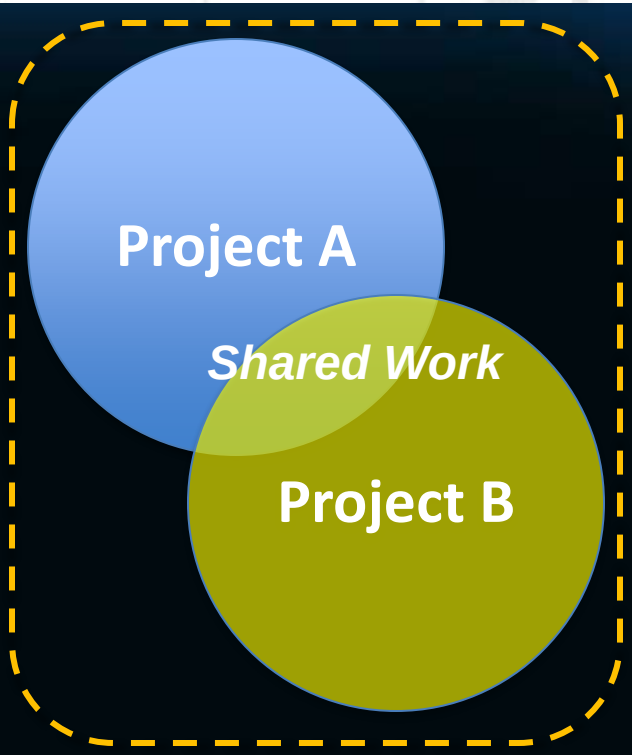
1. Sustainable manufacturing
2. Key technologies
3. Standards and interoperability
4. Energy Efficiency
5. Education

Streamlined requirements:

- Three IMS Regions participating
- Budget of about $1M US or more
- Two-year project or longer
- Active project plan and execution
- MOA & Project Description
  - 2 page submission

MTP Collaborative Project Formation

- Linked Projects
  - Duplicate research is combined
  - IP can be shared
  - Additional synergy between projects
- Standards Projects
  - Global standards require international cooperation
  - Network through standards bodies
  - Government supported



Proposed IMS Project: Cost/Benefit Analysis for Model Based Manufacturing

- Currently a PDES Inc. project
  - Strong US participation
  - Logical follow-on to “Testing the Digital Thread”
  - Includes participation from additional regions
- Project will study the impact of model use from design through procurement and manufacture of mechanical parts and assemblies
- Potential benefits to expansion with IMS
  - Expand study to include regional ROI & additional metrics

Cost/Benefit Analysis for Model Based Manufacturing

Project Scope

- Follow the process from design concept through downstream manufacturing and quality
- Determine upstream and downstream cost avoidance opportunities
  - Determine how dimension/tolerance of a feature impact cost throughout the part/product lifecycle
  - Utilize software upstream to check for Design To Cost (DTC) and Design for Manufacturing (DFM) issues.

Objective

- Build cross-functional industry Use Cases across the "digital thread" (design through manufacturing and quality)
- Identify producibility/cost issues earlier in the design phase prior to design release
- Improved design practices for manufacturing
- Reduction of product cost
- Reduction in Engineering Change Orders (ECOs)
- Reduction in rework, scrap
- Reduction in lead time

Justification

- Acceleration of model based manufacturing practices and support throughout industry
  - Bridge remaining gaps between model based definition and manufacturing
- Definition of more comprehensive requirements from industry, supporting DTC & DFM
- Supports advancements in Lean Manufacturing

Deliverables

- Robust ROI study
- Standard verification criteria to support industry for DTC/DFM
- Costs associated with tolerance scheme
  - Feature Control Frame, types of callouts: profile of a surface, runout, surface finish, etc.
- Inspection capability enhancements

Backup Slides

Additional projects being considered for IMS proposals – contact John Russell for further info

Model Based Manufacturing - Plant Simulation

Project Scope

- Utilize manufacturing operation data to optimize manufacturing cell layout
  - For assemblies, find optimal subassemblies and shortest path of full assembly
- Utilize model based definition to determine the process capability of a new part
- Highlight benefits of advanced manufacturing processes including adaptive machining

Objective

- Identify optimal cell layout for Plant
- Assist in optimization of work center loading
- Reduction in: lead time, WIP, and travel time
- Demonstrate how adaptive machining can utilize the master model and interact with machine tool to find optimal approach to produce feature at the part level
- Visualization of material movement at the plant level
- Support value steam mapping with historical data

Justification

- Increased complexity of designs & the availability of new tools and technologies
- Supports the advancement of Lean Manufacturing: Inventory, travel, lead times, continuous flow
- Improve understanding how tools can be used in the Supply Chain

Deliverables

- Use Case definitions where software is used to dictate the layout of a shop or cell
  - Assemblies and optimal subassemblies for level loading
  - Cost savings, lead time reduction, WIP reduction estimates
- ROI study for adaptive machining
  - Reduction in time in hours and distance traveled
  - Improved quality - comparison of CMM results

Improving the Business Case for Model Based Manufacturing from Legacy Data - 2D to 3D

Project Scope

- Converting old legacy 2D data into a 3D CAD model with semantic annotations
- Software neutral/ support a variety of inputs
- Support conversion of features, dimensions, tolerances, associatively, notes and attributes
- Enable new design practices
  - Partially annotated models, note updates, material specs.

Objective

- A solution supporting the transition to model based designs from legacy data, for some use cases
- Reduce business impact from re-mastering 2D data into 3D

Justification

- Acceleration of model based manufacturing practices throughout industry through significantly increased product applicability

Deliverables

- Solutions that support legacy 2D data
  - Define data for inputs – PDF, Raster, etc.
  - Definition of remaining gaps