Trends in Model-Based Definition based Assembly Information for High-Value Manufacturing

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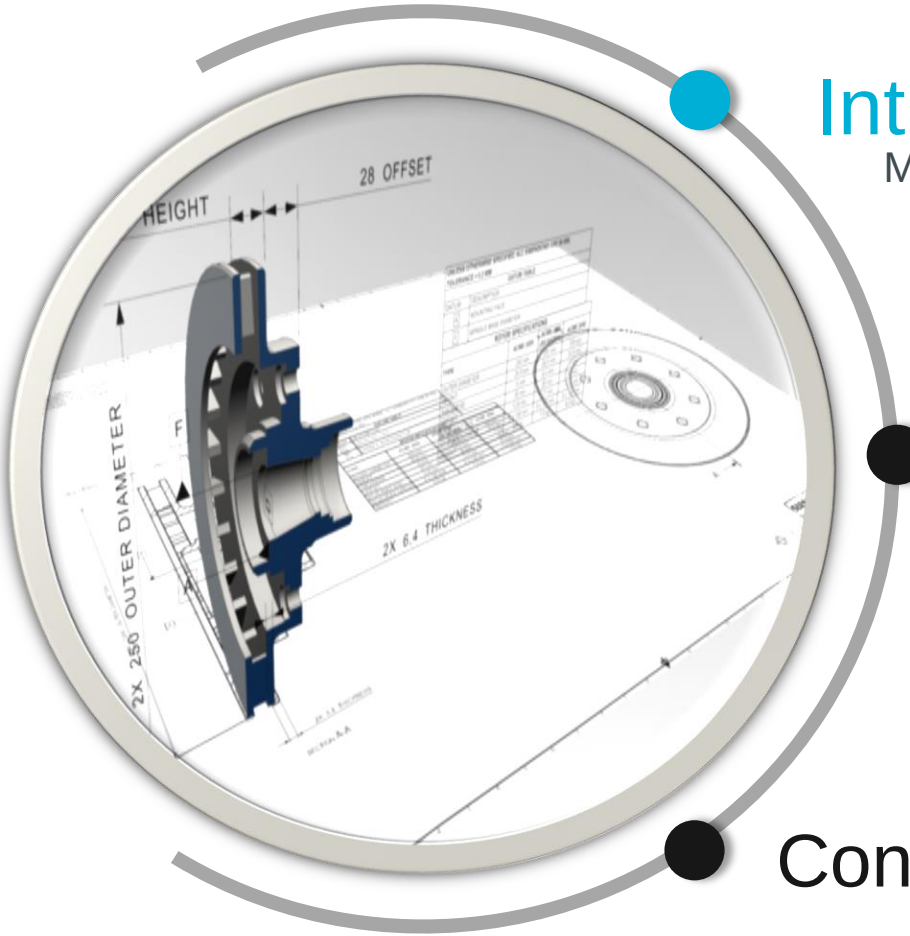
Agenda



Introduction

MBD-based Assembly Information
Context

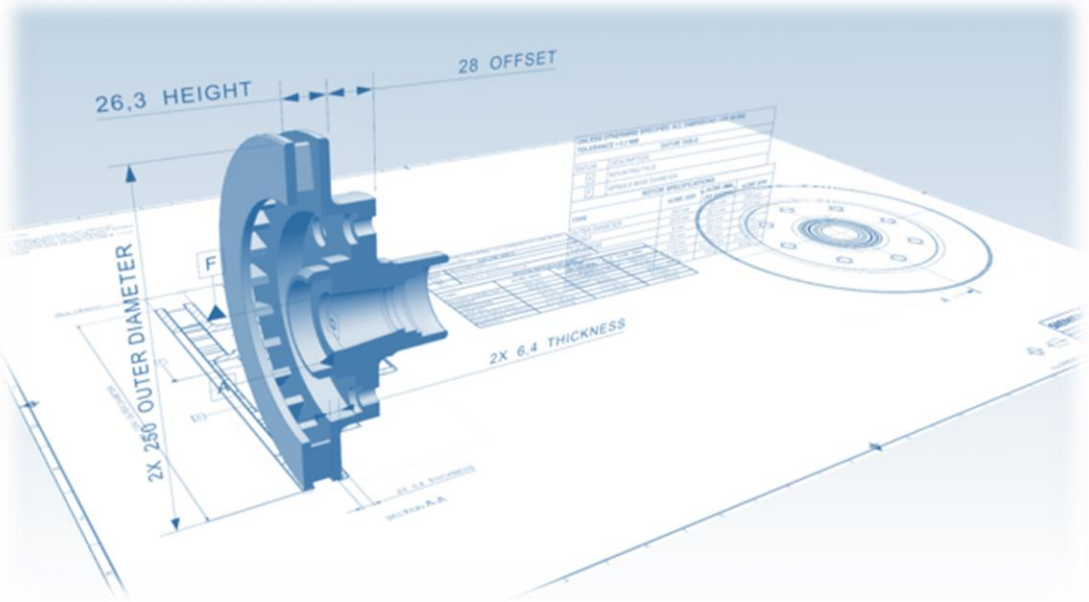
State of the Art

Key Observations
Current Trends

Conclusions

Courtesy: https://www.plm.automation.siemens.com/global/en/products/mechanical-design/model-based.html

MBD Based Assembly Information



Use of 3D models for preparation and delivery of assembly process information at assembly shop floor instead of drawing and text based instructions.

Courtesy: https://www.plm.automation.siemens.com/global/en/products/mechanical-design/model-based.html

Context - Assembly and Test

- Manual and Complex Operations
- Large Number of Parts and Tools
- Restricted Approach and Space
- Fitting Instructions and Testing Criteria
  - Huge Volume of Documents
- Not getting the potential of MBD

Courtesy: https://en.wikipedia.org/wiki/Rolls-Royce_Trent_900

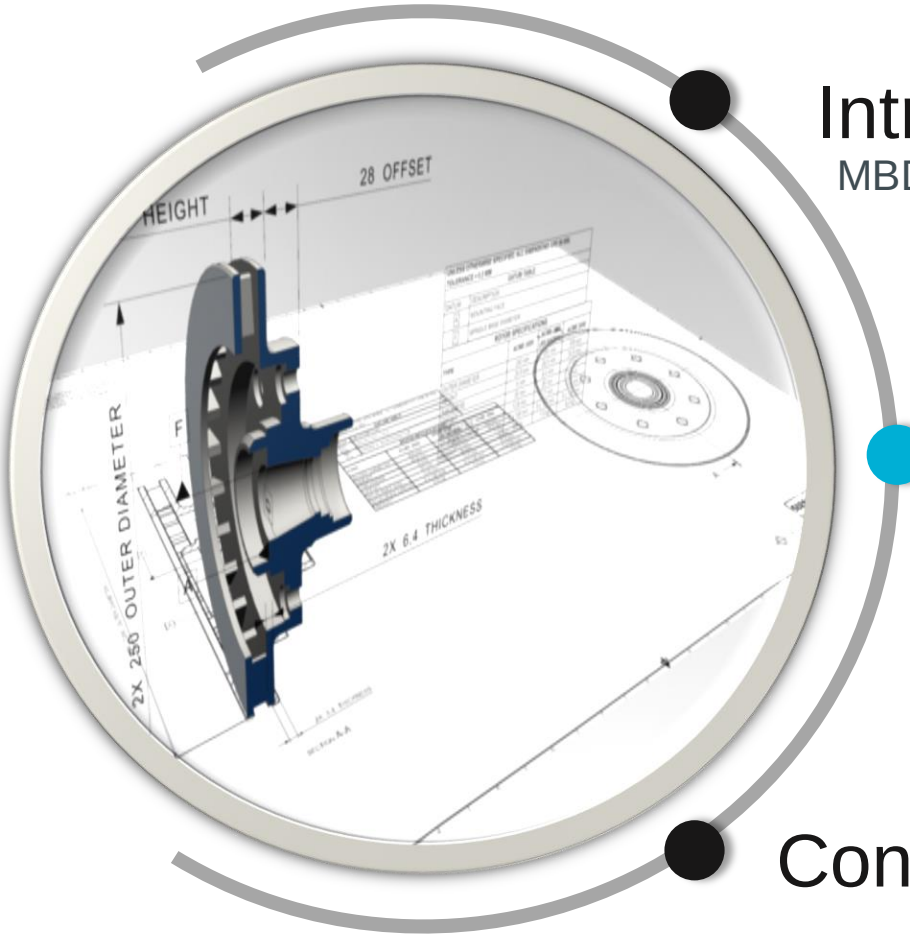
Context – Assembly and Testing

- Design Drawings, Technical Requirements, Fitting Instructions

Assembly Information at Shop floor:

- Drawing based with Text Information
- A large amount of documents
- Complex and Time consuming to prepare and consult
- Clarifications need long times to resolve – effecting overall lead time
- Offline - Change in Original Design Needs Reconstruction

Agenda



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State of the Art Research

Knowledge Reuse	Jig Designing
AR based API	Assembly Scene Aware API
Light Weight Model	Assembly, MRO Instructions
Assembly Digital Mock up	BOM with Assembly Tools
Data Modelling	Interrelationship of Data Sources
	Automatic BOM from Assembly Model

AR: Augmented Reality
API: Assembly Process Information

BOM: Bills of Material
MRO: Maintenance, Repair & Overhaul

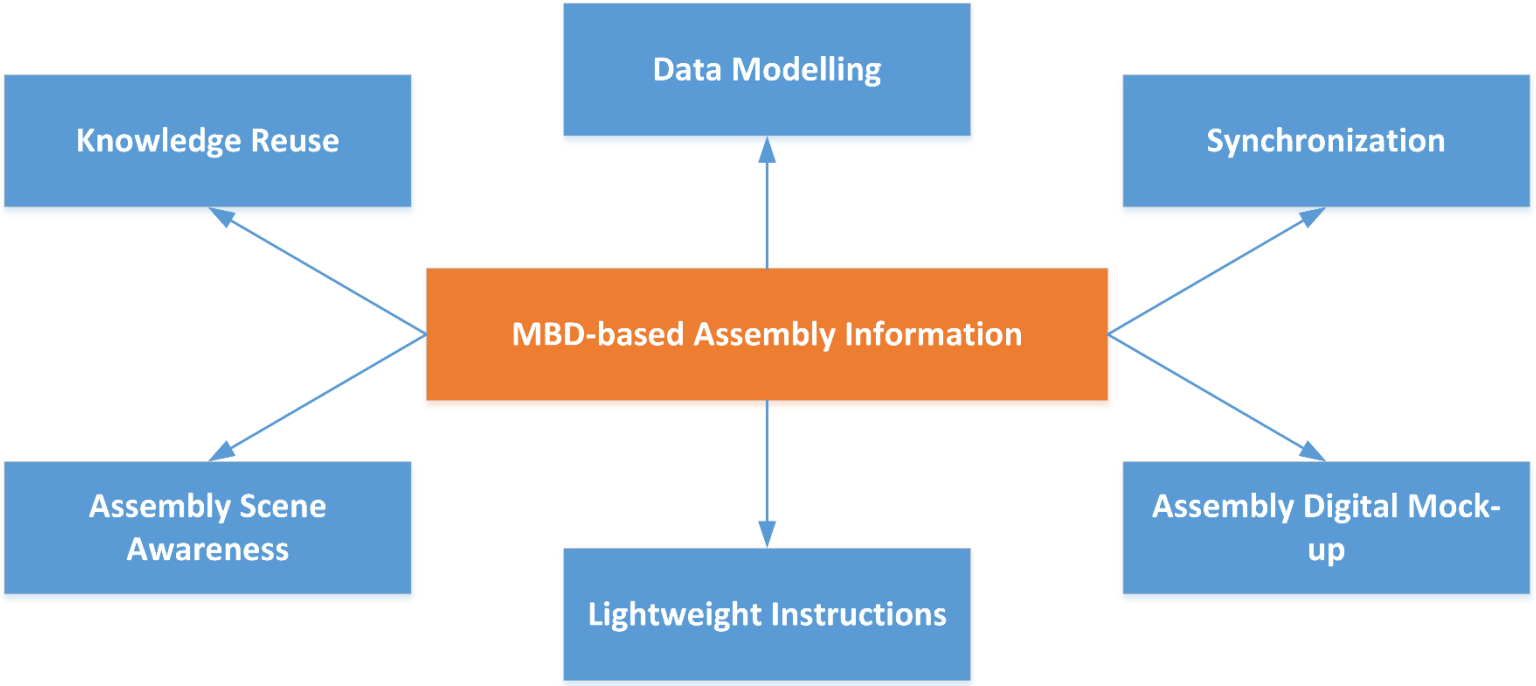
Key Observations

Focus of MBD research

- Part Definition
- Plug-Inns for Software Applications
- Enhanced CAD Models – Annotations, Search Techniques and Feature Recognition
- MBD Data Sets
- Re-use of CAD and Knowledge from various domains
  - Addressing Design, Manufacturing and Inspection

- Assembly and Test Needs – Lack of Work
- Visualization and Transfer - Evolving in combination with Lightweight Formats, Digital Mock- up and Augmented Reality Solutions

Current Trends



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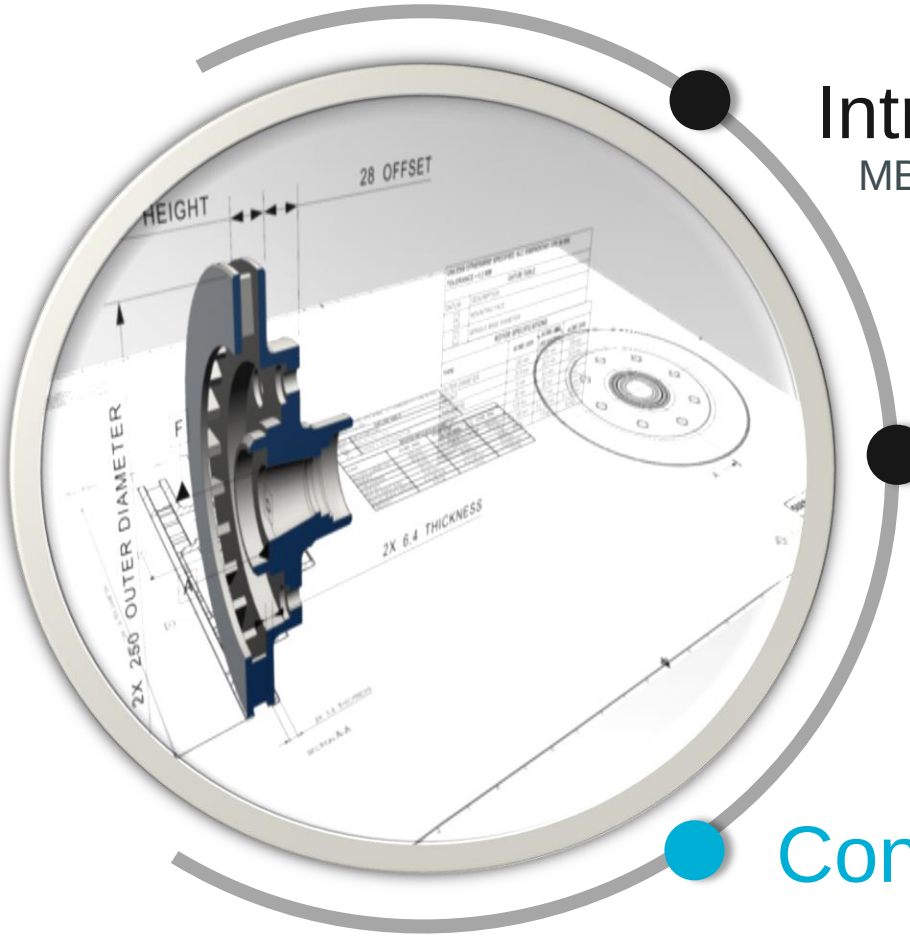

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MBD application at Assembly: Currently limited – Plenty of Grey Areas

- Synchronization: with the Original Design
- Complex Assembly Operations at Restricted Space
- Need to define the information: essential to be part of the model to suit Assembly
- Frameworks: to impart the Assembly Information early at design stage
- Layouts of Assembly Information: To suit various situations
- Data Modelling: To Assist Assembly Information
- Alternative Iconic Notations: in Place of Text based information – Smart Instructions

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