PLQ: A Framework within Product Lifecycle Management (PLM) for Achieving Product Lifecycle Quality

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The following Strategic Initiatives of MESA International are associated with this presentation:

- Lean Manufacturing
- Quality & Regulatory Compliance
- Product Lifecycle Management (PLM)
- Real-Time Enterprise
- Asset Performance Management (APM)
PLM Institute

- Applied research oriented
- Oakland Univ based
- Industry-academia collaboration
- Multi-industry
View of PLM
Product Lifecycle – 4 Phases

Create → Build → Dispose → Service
Product Lifecycle Management (PLM) is an integrated, information-driven approach comprised of people, processes/practices, and technology, to all aspects of a product's life, from its design through manufacture, deployment and maintenance—culminating in the product's removal from service and final disposal. By trading product information for wasted time, energy, and material across the entire organization and into the supply chain, PLM drives the next generation of lean thinking.

Source: Product Lifecycle Management: Driving the Next Generation of Lean Thinking (McGraw-Hill, 2006)
PLM Model

Source: Siemens PLM Software
PLM Model

Manufacturing Engineering
Product Engineering
Concept Eng & Prototyping
Requirements Analysis & Planning

Info Core

User Perceived Value

Manufacturing & Production
Sales & Distribution
Service & Support
Disposal & Recycling

Product Lifecycle Quality (PLQ): A Framework within Product Lifecycle Management (PLM) for Achieving Product Quality. IJMTM. Forthcoming
Conceptual Ideal for PLM: Information Mirroring

Manufacturing Duality – Real and Virtual
Quality Hierarchy Map

- Perceived Value
- Requirements
- Specifications
- Instance

- Poor Mkt
- Poor Design
- Quality Control
MES Inspection Uses

- Pass / Fail
- Specification trend (SPC)
- As-builts
- Supply “chain” communication & verification
- Longitudinal design validation
PLM Manufacturing Model: Product Specification Management (PSM)

- Product is manufactured
- Automated / manual measurements integrated
- Virtual product transmitted
- Product accepted / rejected
- Product shipped
## Supply Chain vs. Net

<table>
<thead>
<tr>
<th>Chain</th>
<th>Net</th>
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</thead>
<tbody>
<tr>
<td>Materials based</td>
<td>Digital based</td>
</tr>
<tr>
<td>Low visibility</td>
<td>High visibility</td>
</tr>
<tr>
<td>Sequential</td>
<td>Integrative</td>
</tr>
<tr>
<td>IS int – None to low</td>
<td>IS int – med to high</td>
</tr>
<tr>
<td>Product precedes info</td>
<td>Info precedes product</td>
</tr>
</tbody>
</table>
Summary

• Quality is perceived user value – not conformance to specifications
• Manufacturing builds two products – real and virtual
• Product Specification Management (PSM) manages virtual product info as part of PLM
• PSM enables Supply Nets
Thank You

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