Smart Manufacturing, Manufacturing Intelligence and Demand-Dynamic Performance

Smart Manufacturing Leadership Coalition (SMLC)

Jim Davis – UCLA
February 6, 2011

http://smartmanufacturing.com

National Modeling and Simulation Coalition
The second transformation? Smart manufacturing. This is the first structural shift since Henry Ford launched the economic power of "mass production."

We are just entering an era where the very fabrication of physical things is revolutionized by emerging materials science. Engineers will soon design and build from the molecular level, optimizing features and even creating new materials, radically improving quality and reducing waste.

The Internet is evolving into the "cloud"—a network of thousands of data centers any one of which makes a 1990 supercomputer look antediluvian.

From social media to medical revolutions anchored in metadata analyses, wherein astronomical feats of data crunching enable heretofore unimaginable services and businesses, we are on the cusp of unimaginable new markets.
21st Century Smart Manufacturing

• **Demand-dynamic economics** keyed on the intelligence of the ‘customer’

• **Coordinated enterprise responses** throughout the entire manufacturing supply chain

• **Predictive, preventive**

• **Integrated computational materials engineering**

• **Performance-oriented enterprise**, minimizing energy and material usage and maximizing environmental sustainability, health and safety and economic competitiveness

Dramatically intensified application of **manufacturing intelligence** using advanced data analytics, modeling and simulation to produce a fundamental transformation to transition/new product-based economics, flexible factories and demand-driven supply chain service enterprises
Raising the Level of Abstraction

If Smart Manufacturing is such a smart idea why aren’t companies already doing it?

Already Investing in Information Technology, Automation and Controls for 40 years

Business (Collaboration, Broader Metrics, Real-time Decisions)

Organizational Mindset

Technology (Horizontal & Vertical Pervasive)

Workforce (Innovation & Broad-Based)
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Smart Manufacturing is the Application of Networked-Based Manufacturing Intelligence & Integrated Performance Metrics

- Actionable business & operations tradeoffs
- Untapped degrees of Freedom: performance, efficiency & productivity
- Tracking & traceability
- Anticipate, plan, manage risk across suppliers
- New forms benchmarking
- Computational Materials Engineering

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Performance and Demand Dynamics

New real-time global Performance metrics –
• customization
• energy performance
• reuse

• Less vertically integrated
• More information driven
• Workforce ecosystem

• Customers “pushing” demands

• Flexible production - smaller volumes of custom products
Smart Manufacturing Platform
*Infrastructure for Real-Time Data Driven Modeling and Simulation*

- **SMLC Industry-Driven Integrated Performance Metrics**
  NCMS, AIChE, NIST

- **SMEs Small & Medium Enterprises**
  NCMS, AIChE

- **Real-time Data & Modeling Workflow & Metric Toolkit/App Development**

- **Community Source Resources**

- **Pre-competitive & Competitive Hub**

- **Apps Store Cloud Services**

- **Business Collaborations Benchmarking**

- **Key Development Resources**
  Universities, SME’s Manufacturers, Labs

- **Standards and Reference Architecture**
  Emerson, Honeywell, Invensys Rockwell

- **Test Bed Manufacturer & Supplier Crosslinking Engagements**

- **Real Time Collaborative Cloud Computing**
Smart Manufacturing

http://smartmanufacturing.com

http://smart-process-manufacturing.ucla.edu/