

## Impact of Digital Manufacturing SpeedNews AMC Conference – May 1<sup>st</sup>, 2018

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- What is "Digital Manufacturing" and what can it be?
- What's holding up the industry from adopting it?
- As a manufacturer, where do we start?
- $\odot$  What does this all mean for the Aerospace Supply Chain?



## Great Vision: Connect <u>ALL</u> Phases of Supply Chain for Maximum Performance



SCM, CAM, TMS, IMS, ERP, MRP, HRM, IPM, Blockchain...

However, Dealing with an Alphabet Soup of Closed Systems within a Complex Ecosystem of Vertical Silos, Certifications and Regulations

## VelocityHUB IIOT Parallel to Autonomous Vehicles



## Cars = Level 3~4 Aircraft = Level 4~5 Manufacturing = Level 2~3

- Level 1: Driver assistance required.
   (Cruise control/ALT Heading)
- Level 2: Partial automation options available. (Adaptive Cruise, Lane Departure, A/P Engaged)
- Level 3: Conditional Automation.
   (Autopilot on Highway, NAV Engaged)
- Level 4: High automation. (Active Autopilot, ADS-B NAV)
- Level 5: Full automation. (No Driver Required, Just Program DEST)

# VelocityHUB What's Holding Manufacturing?

#### o Data:

- Bad data or no data Huge start-up costs...
- Lots of standards Difficult to harmonize...
- Building unique equations for each part NRE...
- "Digital Twin" concept Have to maintain it too...

#### Hardware/Software:

- Cybersecurity Fraud, IP protection...
- Federated systems vs integrated systems Jury's out...
- Interoperability/legacy systems Software, hardware...
- Lack of holistic view Context & constraints...
- NC Control Software archaic 50 years old, loss of accuracy...

## © Culture/Vision/Leadership:

- Fear or resistance to change Culture of the company...
- Lack of "Data Scientists" Do we really need them?
- ROI concerns OK to invest in tangibles vs. intangibles...
- Regulations ITAR, Exports, FAR...









## 1. **Collect the Right Data:**

- Start with monitoring assets performance to plan
- Merge with metadata (Context)
- Focus on "Features" as common thread Shapes to be machined out (Conventional) or added in (3D)

## 2. Cherry Pick Battles:

- Focus on chocking points
- Develop a roadmap
- Train users to use the technology you already have

## 3. **Improve OEE and WIP:**

- Take the opportunity to re-invent workflows
- Re-assess systems and processes
- Adjust your business model as you go









- "By 2023, SMART Factories may contribute \$500B in added value to the global economy" (Capgemini)
- "Potential to double the operating profit and margin in some industries ... A Sevenfold increase in annual efficiencies by 2022" (Oracle)
- Key Advantages
  - Significant Cost Reductions (Supply Chain, Inventory, Delivery, Manufacturing...)
  - Reduced Workforce Challenges Collaboration Human / Machine
  - Predictive Maintenance / Enabling the Outcome Economy
- ◎ "The risk of moving too slow are real" (WEF)





# Our Approach



- Prepare for the next wave of Digital Manufacturing (IIoT, I4.0..)
- Assess the maturity of [Company's] manufacturing processes (across the enterprise if large) and compare it to best in class in the industry

## Develop a comprehensive roadmap to:

- Harmonize around best practices
- ⊙ Surpass and lead industry standards
- Increase OEE and ROIC



- Traditional productivity programs can run out of steam when sourcing activities, six sigma and lean have been in place for a while.
- Sustaining these savings over time will require Company's manufacturing cells and/or locations to cooperate, share best practices and eventually lead industry standards on manufacturing practices.
- © Common wisdom is that 20% holistic manufacturing speed improvement equates to 15% total cost per part reduction – 5x to 10x more than point solution cost per part reduction methods.
- Speed also reduces or delay capital expenditures by improving capacity



## 1. **Baselining**:

 Define and Map Current State vs Best in Class, at the Cell or Plant level and at Corporate level (as required)

## 2. Understanding:

• Document workflows from "Art to Part" for each Cell/Division/Plant

## 3. Strategy:

 Define and Map Future State with key Stakeholders (Engineering, Operations, Procurement, Finance...)

## 4. **Planning:**

• Evaluate Scenarios for Execution (ROI, NPV...)

## VelocityHUB Defining Maturity Levels – Example

Holistic analysis of workflow mapped against industry best practices will identify where each cell/site falls:

Aware	Starting	Getting There	Pro	Leading
<ul> <li>Low interaction between Design and Manufacturing Eng.</li> <li>Sites essentially on their own as to what technology/proce ss to use</li> <li>No tooling engineer on site</li> <li>Low reliance on external technical support</li> <li>Local procurement</li> <li></li> <li></li> </ul>	<ul> <li>Some interaction between Design and Manufacturing Eng.</li> <li>Sites listen to HQ but no mandate on what technology or process to use</li> <li>No tooling engineer on site</li> <li>Some reliance on external technical support</li> <li>Global Procurement sees some data</li> <li></li> <li></li> <li></li> </ul>	<ul> <li>High interaction between Design and Manufacturing Eng.</li> <li>Corporate guidance enforced and shared</li> <li>Teoling angineer or sile of on bar</li> <li>Teoling angineer or sile of n bar</li> <li>High reliance on external technical support</li> <li>Global procurement in charge of major sourcing efforts</li> <li></li> <li></li> </ul>	<ul> <li>Integrated Design and Manufacturing Eng.</li> <li>Continuous Improvement Team meets regularly across sites at leadership level to define objectives and share best practices</li> <li>Tooling Engineering on site</li> <li>High reliance on external technical support</li> <li>Global Contracts</li> </ul>	<ul> <li>Engineering and supply chain interconnected digitally (source vs make)</li> <li>Integrated data capture, analytics, and reporting (real time)</li> <li>Automated workflows to standardize processes</li> <li>Suppliers as partners</li> <li>Global contracts with Cl guarantees at TCO level</li> <li></li> </ul>



# 1. **Evaluate where each site is on the map**

- Interviews with key stakeholders to define the ranking grid
- Visits or interview site leaders to get data
- Develop the ranking system

# 2. Baseline inventory of workflows

- Detailed understanding on how we get from "Art to Part" at each site.
- Interviews and "walking through" processes on the floor in detail
- Mapping and documenting



## 3. Future State definition

- Ideally, organize a visit of a non competitive company to benchmark upward
- Value Stream Mapping exercise with key stakeholders in a room for 1 or 2 days.
- Design future state

## 4. **Business Modeling**

- Quantify Potential for Cl savings per cell/plant
- Identify and Prioritize Projects based on impact versus cost and time to cash
- Develop business plan for executive approval
- Prepare execution plans



# About Us



## Industrial Problems Worth Solving:

- ⊙ Disruptive Technologies (IIoT, AM..)
- ⊙ Companies Not Growing
- Finding and Keeping Customers
- ⊙ Retaining Employees

## $\odot$ Our Solutions

- ⊙ Technology Roadmapping
- Strategy & Business Development
- ⊙ Industrial Marketing/PR
- Leadership Development





