How Digital Twin Can Help Manufacturers Transform

Delivering excellence in digital manufacturing, today

May 11, 2017
Digital Transformation: An Imperative

40% of operational processes will be self-healing and self-learning by 2022. Only 4% of digital first movers that integrate vertically, horizontally and with Customers. The average digital company improves 2.9% p.a. revenue and reduces 3.6% p.a. cost.

70% of manufacturers will put operations at the forefront of digital transformation projects by 2020. 77% CEOs see agility as a growing source of competitive advantage.

Mastering digital up to 15% revenue increase and simultaneous reduction in cost to serve of more than 20%

48% manufacturers are ready for new forms of human-machine interaction.

Forces driving digital manufacturing

I4.0 Design Principles
Vertical integration | Horizontal integration | End-to-end engineering

Digital Twin
A virtual representation of a product, process, or service

Evolution of Digital Twin

2002
2003 – 2014
2014 – 2017
Future

The Value of Pursuing Digital Excellence

Leading manufacturers have mastered operational and manufacturing excellence.

Now, is the time to differentiate by mastering on digital excellence as well.

- An Automotive Value Network
- An Industrial Equipment Value Network
- Digital Factories
- The Field and Engineering Service Economy
- Immersive Experiences Delivering Business Value
Excellence in Digital Manufacturing, Today

Accelerate value creation and drive sustained improvement through immersive human-machine interaction and innovative partnerships, using a trusted cloud platform.

Digital Excellence strategic framework

Engage your customers to service efficiently

Empower your employees to respond productively

Optimize your operations to achieve excellence

Transform your products to unlock new revenue opportunities

Mixed reality | Cognitive & Intelligent Equipment | Value Network Collaboration
### A New Class of Digital Twin

#### Information Mirroring* Model
- Digital Twin as concept
- R&D & engineering focused

#### Digital Simulations, 3D Printing
- Product development
- Simulation and engineering workflow

#### Value Chain interaction
- Data unification across physical and virtual
- Digital Thread

#### Connected Operations and Industrial Services
- Mixed Reality
- Cognitive services
- Artificial Intelligence

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*Dr. Michael Grieves and John Vickers – University of Michigan*
Digital Twin: A virtual instance of a customer’s smart connected physical product

Product Model & Location by Customer

Market
- Model A
  - Location 1
- Model B
  - Location 2
- Model C

Digital Twin

Enterprise
- Market
  • Performance
  • Geographies
- Design
  • Features
  • Usage
- Quality
  • Suppliers
  • Procedures
- Operation
  • Efficiency
  • Reliability
- Service
  • Events
  • Incidents

Beneficiaries
- Sales & Marketing
- Engineering
- Manufacturing
- Customer Support

Product Lifecycle State
- As designed
- As built
- As maintained
Digital Twin Solution Architecture

SMART CONNECTED PRODUCT
- Computing Platform, Sensors, Connectivity
- Connected services, data and capabilities
- Joinable with other devices

DIGITAL TWIN PLATFORM
- Engineering, simulation & visualization platform
- Cognitive services & business intelligence
- Enterprise intelligence & system integration

DIGITAL TWIN SERVICES
- Design and innovation insights, actions
- Integrated customer support and field service
- Manufacturing, supply chain and quality performance

Digital thread

- Customer unique
- Fleet aware
- Tailored services
- Real-time
Microsoft Technologies for the Digital Twin

<table>
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<tr>
<th>Devices for Visualization &amp; Interaction (New UI, Holographic)</th>
<th>Simulation &amp; Visualization Compute (HPC/RDMA, GRID, VDI)</th>
<th>3D Printing Facilitation (3MF Format, Drivers, Apps)</th>
<th>IoT/Analytics/CRM (Devices, Analytics, Apps)</th>
<th>Cognitive Services (Bots, language, image recognition)</th>
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<tr>
<td><img src="image1" alt="Device Image" /></td>
<td><img src="image2" alt="Simulation Image" /></td>
<td><img src="image3" alt="3D Printing Image" /></td>
<td><img src="image4" alt="IoT Image" /></td>
<td><img src="image5" alt="Cognitive Services Image" /></td>
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Digital Twin System Architecture

Device Connectivity
- IP capable devices
- Existing IoT devices
- Resource constrained devices

Data Processing, Compute, Analytics and Management
- Stream Processing and Analytics
- Device Provisioning and Management
- Application Business Logic
- Vision, Speech, Language & Knowledge
- Simulation & Visualization Compute

Business Connectivity, Presentation & Interaction
- Solution UX
- Business Integration Connectors and Gateway(s)
- Common Data Model
- Customer Service
- Field Service
- Analytics
- Mixed Reality
- Mobility
- Productivity
- Computer Aided Design, Engineering & Visualization
- Software Development
- 3D Printing
- Product Lifecycle & Data Management
- Supply Chain Management
- Manufacturing Execution

Data Path:
- Optional solution component
- Microsoft IoT solution component
- Microsoft cognitive services
- Big compute services
- Line of business applications
- Microsoft cloud application

Microsoft cloud application

Common Data Model

Customer Service

Field Service

Analytics

Mixed Reality

Mobility

Productivity

Computer Aided Design, Engineering & Visualization

Software Development

3D Printing

Product Lifecycle & Data Management

Supply Chain Management

Manufacturing Execution
Digital Twin is a Strategic Journey

**The Connected Customer**
- Monitor performance & maximize efficiency, reliability
- Refine or add value-added equipment features & services
- Mitigate downtime and increase availability

**The Connected Enterprise**
- Drive design & engineering innovation through customer & equipment insights
- Improve quality and reliability
- Differentiate with 360 degree customer service
Go further

**Solution Strategy Workshop**
Engage with Microsoft Services in a 1:1 workshop to scope innovative solutions, architectural design and next steps.

**Solution Design Session**
Build a solution design and strategy for your organization that maximizes value.

**Proof of Concept**
Begin a POC to start your journey towards a Digital Twin strategy, solution or offering.

**Learning**