PERVASIVE ENGINEERING SIMULATION WITH ANSYS
WHAT IS A SIMULATION-BASED DIGITAL TWIN?

• Connected, virtual **replica** of an in-service physical asset, in the form of an integrated multi-domain system simulation, that **mirrors** the **life and experience of the asset**

• Enables **system design and optimization, predictive maintenance and optimize industrial asset management**
DIGITAL TWIN = IOT + SIMULATION

Simulation-driven Product Operation

1. Connect
2. Think
3. Act

Source: Deloitte University Press.

Deloitte University Press | dupress.deloitte.com
Synthesize – Other Analytics Engines

Data flow

Scores and predictions

Job coordination

Job execution

Analytics Manager

Simulation
ANSYS SIMULATION PLATFORM

- Structures
- Fluids
- Electromagnetics
- Semiconductor Power
- Mission-critical Embedded Software
- Optical

Platform
SIMULATION-BASED DIGITAL TWIN VALUE

As Designed
MULTIPHYSIC SYSTEM SIMULATION

- Structures
- Fluids
- Electromagnetics
- Semiconductor Power
- Mission-critical Embedded Software
- Optical

Platform

As Operated
INTEGRATED IOT ASSETS & ECOSYSTEMS

Digital Signatures
- Normal
- Anomaly
- Sensed

Virtual Sensors

Design Decisions
- Cost
- Weight
- Efficiency
- Robustness

Operational Decisions
- Prognostics/Life
- Performance Mgt./Opt.
- Diagnostics/FMEA/RCA
- Fleet Optimization

Decision making
STORYBOARD: DIGITAL TWIN SERVICE AND VIRTUAL SENSORS

1. Remote Alert
   Connected Asset raises alerts to start service activity

2. Monitor Asset
   Asset conditions can be experienced with ThingWorx applications including contextually aware simulation models

3. Analyze
   Engineering intelligence is available for service professionals accelerating triage and root cause analysis

4. Optimize
   Corrective and/or preventative actions can be validated via digital simulation

5. Resolve
   Solutions are applied to the physical asset
MOTOR-PUMP DIGITAL TWIN

Motor-Pump in Operation

Preventive Maintenance
Value Added Services
Feedback to Engineering

Industrial IoT Platform (PTC ThingWorx)
Big Data Streaming
Big Data Analytics
History, Triggers
Security
Connectivity

Data
Inputs

Simulation Outputs
Pump courtesy of Flowserve
# MOTOR-PUMP DIGITAL TWIN

## Properties

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STORYBOARD: SIMULATION DRIVEN MACHINE LEARNING
Connect the Twins to IIoT Platforms and Deploy Run times In Operation

System Predictive Maintenance

System Validation & Optimization

Validate and Optimize the Twin

Build an accurate Physics-Based Digital Twin in record time

System Simulation

ANSYS TWIN BUILDER
PTC and ANSYS have developed a framework which allows customers to build **Predictive Digital Twins**, combining ANSYS simulation technology and PTC’s IoT Analytics to predict how an industrial component operates and responds to its environment.

The resulting solution enables companies to **improve product design, lower maintenance costs, and streamline operations**.
Thank you!

Questions?

ptc

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