

WOST 2020

Workshop: Digital Twin

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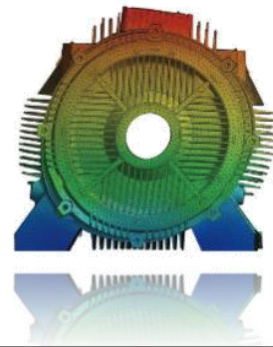
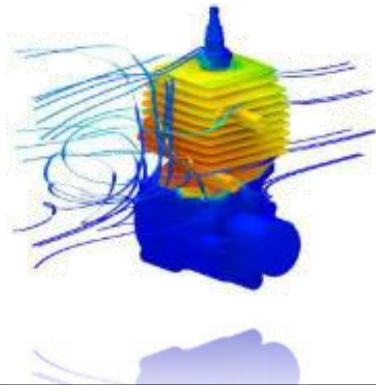
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What is a Simulation Based Digital Twin?

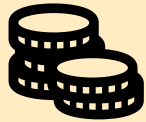
- Connected, virtual replica of an in-service physical asset, in the form of an integrated multi-domain simulation, that mirrors the life and experience of the asset
- Enables system design and optimization, predictive maintenance and optimize industrial asset management



How Digital Twins help our customers



Increase topline revenue



Manage bottom-line costs



Gain/retain Competitive Edge

Implementing A Digital Twin Presents Significant Challenges

1.65BN Assets under condition monitoring by 2025¹

\$80BN/Yr Investments in IIoT¹

Over 90% of executives say they are willing to digitally reinvent their industry and business.....yet less than 10% have fully integrated digital threads^{2,3}

To enhance adoption of digital twins, they must be:

- Predictive
- Accurate
- Real-Time

1. Forbes
2. Accenture: Seizing the Digital Opportunity in Aerospace & Defense 2018
3. Accenture: The Digital Thread Imperative 2017

/ Yet The Benefits Are Clear

15%

Revenue Gain¹

- New business models
- Improved productivity and accelerated new product introduction
- Competitive advantage

10%

Cost Reduction¹

- Warranty cost reduction
- Operational efficiency
- Shortened design and development cycles

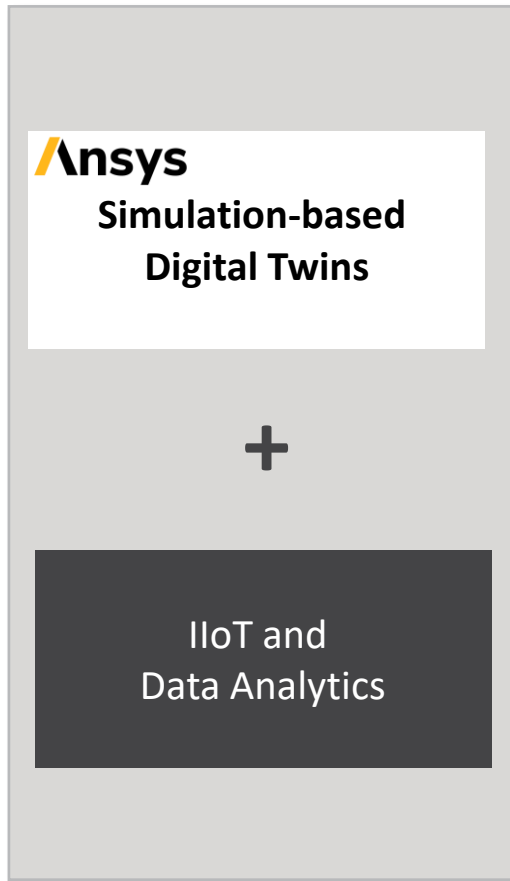
30%

Maintenance Cycle Time Improvement²

- Improved maintenance efficiency

1. McKinsey & Company: Five Keys to Digitizing Aerospace and Defense
2. Companies Aviation Week MRO

Customers are putting simulation at the center of their Digital Twin implementations



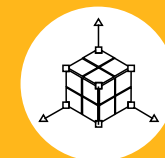
**Virtual Sensors to Simulate
Critical Quantities**



**Perform What-ifs before
applying a solution**

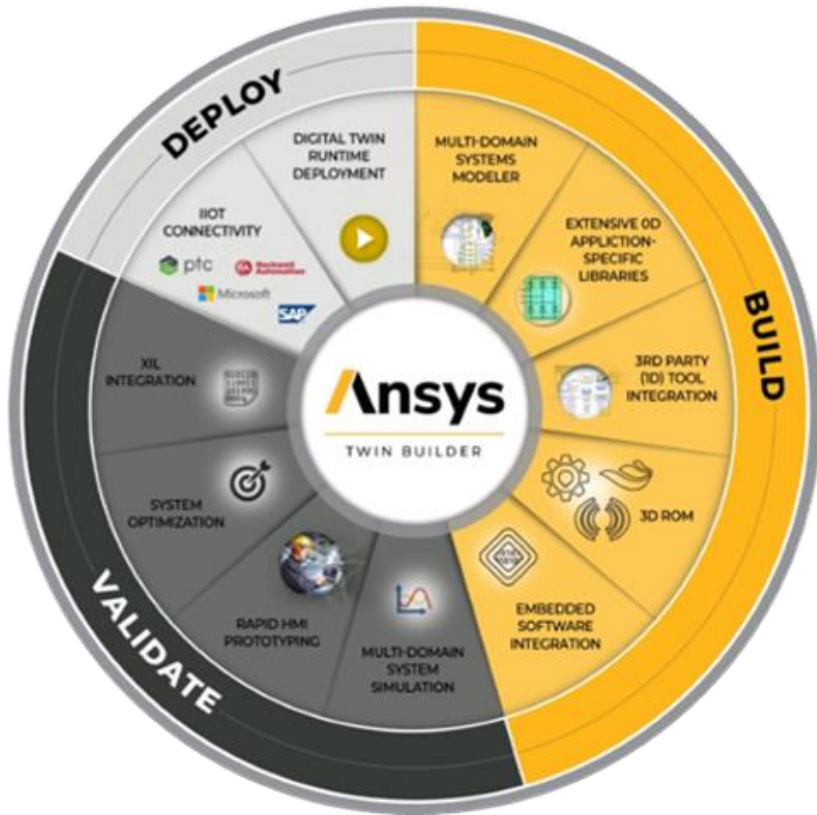


**Physics Based Accuracy,
Improved ROI**



**Generate baseline and
failure data using Physics**

Solution Capabilities Required To Deliver These Benefits



Build an Accurate, Physics-Based Digital Twin



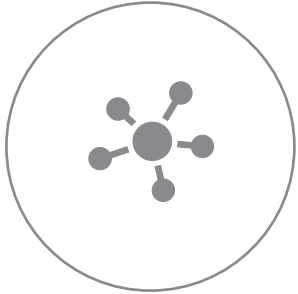
Validate and Optimize the Twin



Connect Twins to IIoT Platforms and Deploy Runtimes in Operation

Simulation based Digital Twin

Deploy



**System
Predictive
Maintenance**

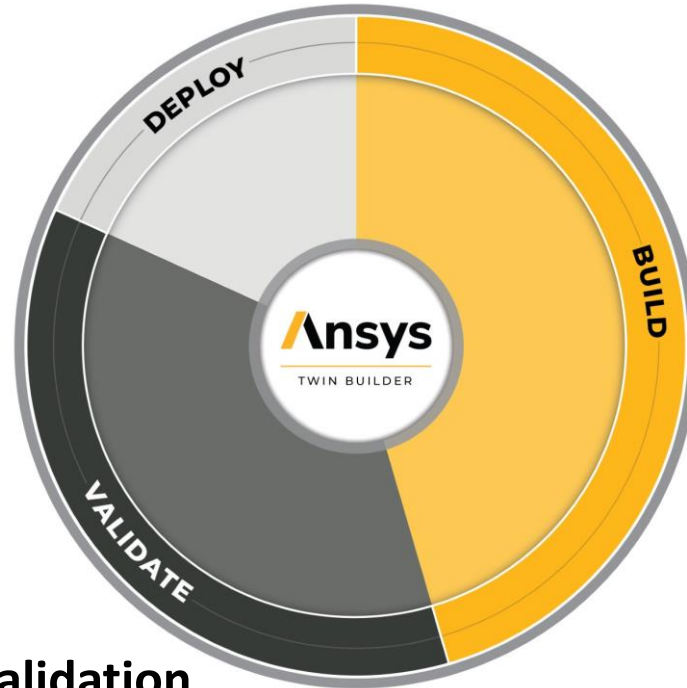
Connect the Twins to IIoT
Platforms and Deploy Run times
in operation

Validate



**System Validation
and Optimization**

Validate and Optimize the Twin



Build



Simulation

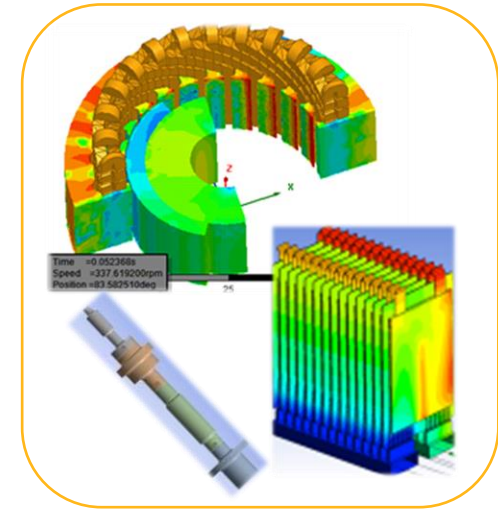
Build an accurate Physics-based
Digital Twin in record time



3D Reduced-Order Modeling Interfaces

Transforms 3D simulation results into system-level models

- Use Reduced-Order Modeling (ROM) interfaces to generate accurate, compact models from detailed 2D and 3D physics simulations.
- Simulates in a fraction of the time required by 3D Techniques for all ANSYS physics
- Link to a variety of ANSYS tools to create high performing models.

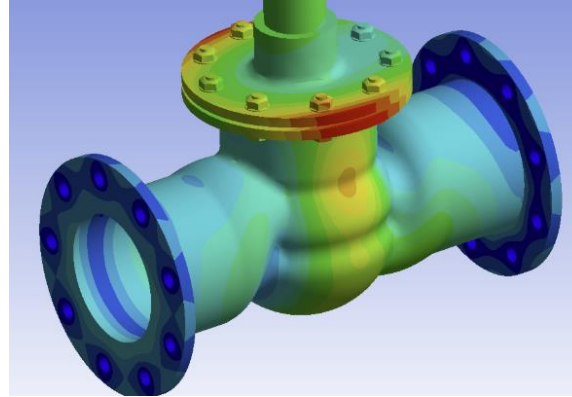


**Connections with
3D Physics**

Application Examples of Digital Twins with Twin Builder



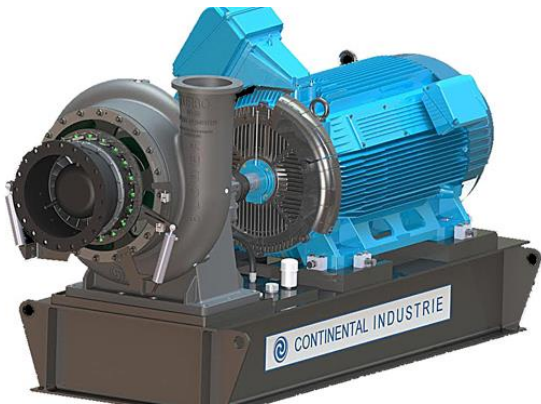
Battery/Electrification



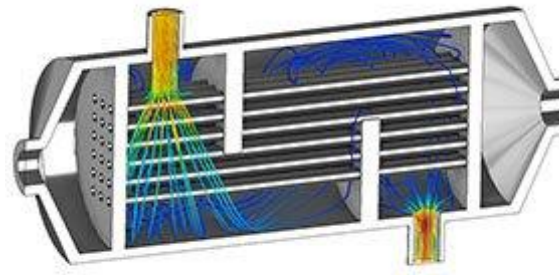
Structural



Industrial Automation



Electric Motors and Machines



Heat Exchangers



Rotating Machinery