

# Ansys Twin Builder

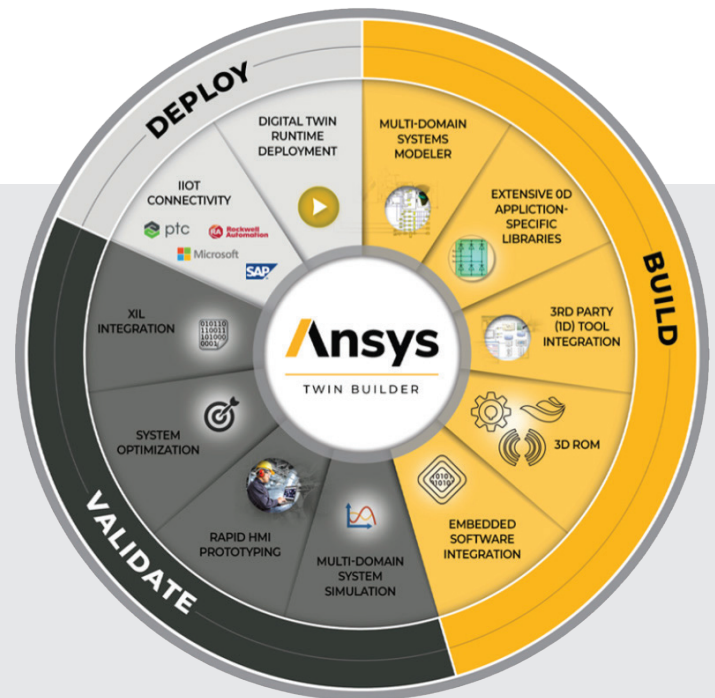
## Simulation-Based & Hybrid Analytics

### Build, Validate and Deploy Simulation-Based Digital Twins

Ansys Twin Builder is a multi-technology platform that allows engineers to create simulation-based digital twins — digital representations of assets with real-world sensor inputs. Twin Builder improves predictive maintenance outcomes to save on warranty and insurance costs and optimize your product's operations.

To build your system quickly and easily, Twin Builder combines the power of a multidomain systems modeler with extensive OD application-specific libraries, 3D physics solvers and reduced-order model (ROM) capabilities. When combined with embedded software development tools, Twin Builder allows you to reuse existing components and quickly create a systems model of your product.

To validate your system and ensure expected performance, Twin Builder combines multidomain systems simulation capabilities with rapid human-machine interface (HMI) prototyping, systems optimization and XiL validation tools. To connect your twin to test or real-time data, Twin Builder easily integrates with industrial internet of things (IIoT) platforms and contains runtime deployment options, allowing you to perform predictive maintenance on your physical product. It is the only product that offers a packaged approach for your digital twin strategy.

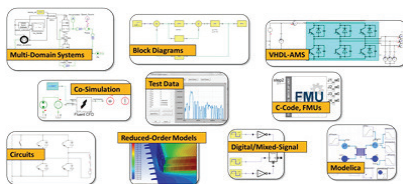


## Build System Models and Digital Twins

### Powerful Multidomain System Modeling

Create hierarchical schematics of complex power electronic circuits and multidomain systems. Model with standard languages and exchange formats, including:

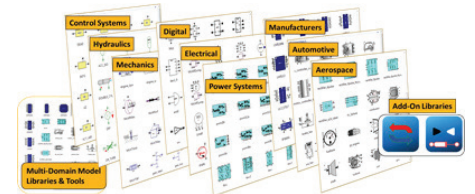
- ✓ VHDL-AMS (IEEE 1076.1)
- ✓ Modelica
- ✓ SML (Simplorer Modeling Language)
- ✓ FMI (Functional Mock-up Interface)
- ✓ C/C++
- ✓ Python
- ✓ SPICE



You can also:

- ✓ Use wizard-driven code editors to create VHDL-AMS, Modelica®, SML, C/C++ and SPICE models.
- ✓ Combine conserved (acausal), signal-flow (causal), and discrete event system behaviors.
- ✓ Use on-the-fly design checking tools to assure consistency of connection types and physical domains.

### Access to Extensive Model Libraries



- ✓ Develop multidomain system models using built-in Modelica and specialized Twin Builder libraries.
- ✓ Model complete electrical/electronic systems with libraries of analog and power electronics components, digital and logic blocks, sensors, and transformers.
- ✓ Build battery cell models from hybrid pulse power characterization data with the Twin Builder Modelica library, which includes several templates for equivalent circuit models (ECM) with SOC, temperature and current dependency.
- ✓ Select from broad collections of characterized manufacturers and components, including power semiconductors, power management ICs, magnetic devices and ultracapacitors.
- ✓ Use add-on libraries, including the Twin Builder Heating and Cooling library, Twin Builder Fluid Power Library, and EV Powertrain library.
- ✓ Use application-specific libraries for switch-mode power supplies, electric vehicle powertrains and aircraft electrical power systems.
- ✓ Create and manage user and corporate model libraries with built-in graphical tools.
- ✓ Use wizard-driven graphical tools to create power MOSFET, IGBT and diode components from datasheet information.

FOR INFORMATION:

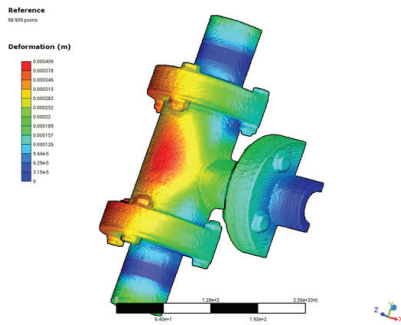
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## Model Exchange with External Tools

- ✓ Compatible with the functional mock-up interface (FMI) for model exchange to import models from all FMI-compliant tools and export Modelica models as FMUs.
- ✓ Create or reuse C/C++ models with the Twin Builder C interface.
- ✓ Import MathWorks® Simulink® models using Simulink Coder™.

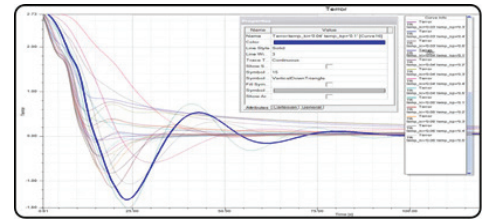
## Reduced Order Model (ROM)

- ✓ Use reduced-order modeling (ROM) interfaces to generate accurate, compact models from detailed 2D and 3D physics simulations.
- ✓ Visualize 3D fields with ROM viewer directly in the Twin Builder.
- ✓ Link to a variety of Ansys tools to create high-performing models for electromagnetic machines and actuators, circuit parasitics and cables, excitations for EMI/EMC, electronics thermal networks, signal integrity, general flow and heat transfer characteristics, and rigid-body dynamics.
- ✓ Multiple ROM generation techniques (including state-space, electrical circuit equivalent, SVD, modal response) support a range of analysis requirements (linear or nonlinear, steady-state or transient).



## Advanced Simulation Studies

- ✓ Sweep parameter values within defined ranges to identify effects on system response.
- ✓ Optimize system performance based on cost functions of specified design variables.
- ✓ Determine the sensitivity of performance metrics to variations in model parameters.
- ✓ Analyze the effects of statistical variations (e.g., manufacturing tolerances, environmental uncertainty, etc.) on system performance.
- ✓ Change variable values interactively to tune performance of the model.
- ✓ Connect with Ansys Workbench™ to construct and manage simulation project workflows with 3D physics solvers.
- ✓ Use Ansys optiSLang to construct sophisticated design exploration studies.
- ✓ Analyze Failure Mode and Effect Analysis of electrified systems.



## Integrated with Ansys SCADE Suite® for Embedded Control Software

- ✓ Use SCADE Suite to verify, optimize and calibrate performance of safety-critical embedded control software.

## Validate and Optimize Digital Twins

### Robust Solvers

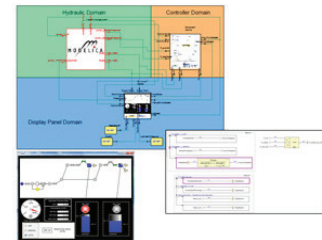
- ✓ Perform fast and accurate simulation of continuous-time, discrete-time, digital and analog/mixed-signal behaviors.
- ✓ Achieve high numerical efficiency with sophisticated solver synchronization and adaptive time-step control.
- ✓ Connect to high-performance compute resources to increase throughput of simulation runs.

### Basic Simulation Experiments

- ✓ Calculate steady-state, time-domain and frequency-domain responses of the system.
- ✓ Create multiple analysis configurations with options for fine-grain control of solver settings.
- ✓ Replay simulations from existing results.

## Tool Integration and Customization

- ✓ Connect with SCADE Suite® and SCADE Display® for interactive white-box and black-box simulation with embedded control designs.
- ✓ Dynamically couple with Ansys 2D and 3D electromagnetic (low- and high frequency), CFD and mechanical solvers.
- ✓ Build custom graphical panels with rapid prototyper to control and monitor Twin Builder simulations.
- ✓ Co-simulate with Mathworks Simulink Write or record Python or Visual Basic scripts to automate simulation workflows.
- ✓ Build custom toolkits with Twin Builder's comprehensive Python API.
- ✓ Add new model libraries and application extensions from the Ansys ACT store.

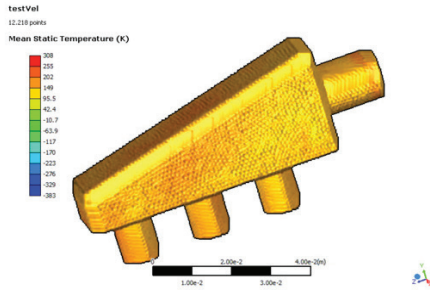


Seamlessly integrate Embedded Software for Control and Display

## Deploy Digital Twins on IIoT Platforms

### IOT Connectivity

- ✓ Configure a connector to connect to an IIoT platform and send and receive operational data.
- ✓ Export from Twin Builder to generate portable, cloud-deployable twin for Microsoft® Azure® IoT, Microsoft Azure Digital Twins, PTC ThingWorx®, SAP Predictive Asset Insights, Rockwell Automation Emulate 3D and Rockwell Studio 5000.
- ✓ Significantly reduce deployment time by performing validation and verification on Twins with Twin Deployer.
- ✓ Export sample code from Twin Deployer to easily deploy Twins on the cloud, edge or offline.



### Analysis and Reporting

- ✓ Creating Graphical and Tabular Reports.
- ✓ Select from a broad range of graphical and tabular reports for displaying and analyzing simulation results.
- ✓ Plot time-domain and frequency-domain waveforms and parametric relationships in 2D and 3D.
- ✓ Display frequency-domain responses as Bode and Nyquist plots.
- ✓ Generate data tables and numeric displays.
- ✓ Display graphical reports directly on system diagrams and update them as the simulation progresses.
- ✓ Apply a range of transformations, markers and measurements to waveform traces.

### Export to Other Environments

- ✓ Quickly export diagrams, plots and tables to Microsoft® Excel® or a variety of image formats.
- ✓ Automatically generate design summary reports in HTML.

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EnginSoft is a premier consulting firm in the field of Simulation Based Engineering Science (SBES) with a global presence. It was founded in 1984, but its founder and initial employees had been working in SBES since the mid '70s. Throughout its long history it has been at the forefront of technological innovation and remains a catalyst for change in the way SBES and CAE technologies in general are applied to solve even the most complex industrial problems with a high degree of reliability.

Today, EnginSoft is comprised of groups of highly qualified engineers, with expertise in a variety of engineering simulation technologies including FEM Analysis and CFD, working in synergic companies across the globe. We are present in Italy, France, Germany, the UK, Turkey and the U.S.A. and have a close partnership with synergetic companies located in Greece, Spain, Israel, Portugal, Brazil, Japan and the U.S.A.

EnginSoft works across a broad range of industries that include the automotive, aerospace, defense, energy, civil engineering, consumer goods and biomechanics industries to help them get the most out of existing engineering simulation technologies.