

# Digital twins for variable speed drive systems

## Mitigate risk and boost plant performance



Ever wondered how a variable speed drive will react if operating conditions change? Or the potential risk of damage to an asset if the source and/or load changes on a system? ABB's medium voltage drive digital twins can remove the uncertainty and risk associated with testing live hardware, ensuring nothing detrimental happens to your actual system.

Using a digital twin in place of a real drivetrain system avoids excessive set-up and pre-tuning time and costs. It mitigates risk as any faults merely halt the digital twin thereby avoiding any damage that could be inflicted if real equipment is used. Furthermore, by using a digital twin, training of personnel to understand real hardware is simplified and less costly.

A digital twin can be offered as a service, whereby ABB carries out the drivetrain analysis and delivers a ready-to-use package to the customer. Alternatively, a digital twin can be supplied for customers to undertake their own simulations. Whichever option is chosen, ABB experts are on hand to help determine the right digital twin solution.

The following digital twins are available for medium voltage drives. Each can be scaled according to the complexity of the drivetrain application and the depth of the required testing.

- Real-time digital twin
- Virtual-time digital twin
- Behavioral digital twin

### Main benefits



#### De-risking repetitive testing

- Safe testing of customized functionalities, critical scenarios and special equipment
- Seamless integration and validation of the installed assets with realistic onsite conditions



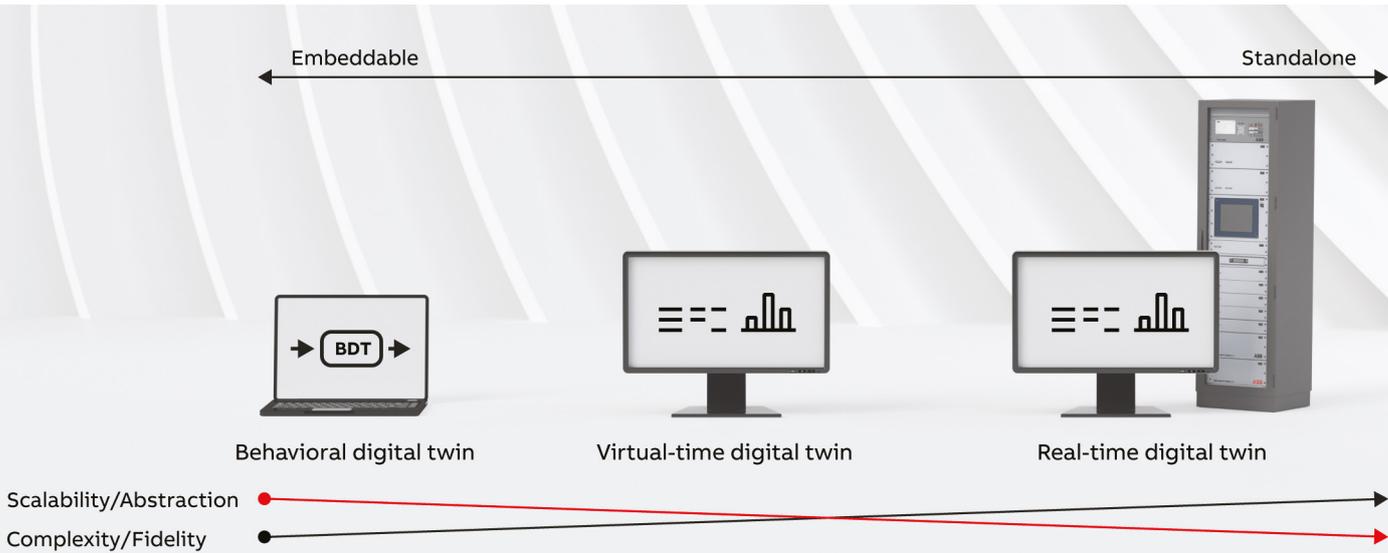
#### Plant wide performance optimization

- Fast integration of digital twins into larger simulation and assessment tools, such as power systems
- Easy scalability of digital twins to multi-drive-multi-process assets and optimization of plant wide fleet performance



#### Customized training and support

- Accelerated training of technical staff
- Fast assessment of onsite data



Portfolio of digital twins for medium voltage variable speed drive systems

### Real-time digital twin

At the heart of ABB's offering is the real-time digital twin which represents the closest replica and behavior of a customer's installed asset. It is typically used by high-risk environments like oil and gas and by testing facilities where safety and time associated with trialling equipment could prove prohibitive.

The real-time digital twin comprises a modular cabinet which provides a live, one-to-one representation of the drivetrain control and protection hardware and software. It also provides a high-fidelity simulation of the physical system, including grid, transformer, drive, motor and process. Moreover, it can be interfaced to an overriding system emulation or another twin installation.

By pre-testing and verifying the complete drivetrain system, the real-time digital twin de-risks and speeds up the entire testing process, providing results that are the closest possible to a real system.

### Virtual-time digital twin

The virtual-time digital twin is a PC-based equivalent of the real-time version. Here the control hardware and software, as well as the physical drivetrain system, are totally simulated. This twin, therefore, operates in virtual-time as opposed to the real-time response of a physical system.

It is an ideal solution for customers in any industry wanting a plant-wide analysis or assessment, especially when testing new concepts before a project is installed. It is also suitable for training personnel to understand the functionality of the system and operate the equipment.

The virtual-time digital twin can be seamlessly scaled to multi-drivetrain system installations.

### Behavioral digital twin

The behavioral digital twin provides a standalone software model that simulates any customer-defined abstraction of drivetrain functionalities, such as simplified system models and control layers. These models can be embedded into a larger simulation, for example, where power grid analysis is carried out, comprising several drives that are part of a complete network. This version can be scaled up to several hundred units and seamlessly embedded into a larger simulation environment.

For more information, please contact your local ABB representative or visit:

[new.abb.com/drives/services/engineering-and-consulting](http://new.abb.com/drives/services/engineering-and-consulting)

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