

The background features a stylized, futuristic illustration of a human head in profile, facing right. The head is composed of various mechanical and digital elements. The left side of the head is a solid white, while the right side is a complex network of blue and orange lines and shapes, resembling a circuit board or a digital brain. A large, orange, circular mechanical component, similar to a turbine or a fan, is prominent in the center of the head. The overall color palette is dominated by blue, orange, and white. The Siemens logo is in the top left corner, and the main title is in a large blue box on the right. The background also includes a network of yellow dots connected by thin lines, and several yellow hexagonal icons representing different digital concepts like a laptop, cloud storage, a padlock, and a Wi-Fi signal.

SIEMENS

Ingenuity for life

Siemens Digital Industries Software

Intelligent Performance Engineering

Drive innovation and boost
productivity through simulation
with Closed-Loop Validation

[siemens.com/IPE](https://www.siemens.com/IPE)

Trend #1

Consumer-driven demand for highly customized machines.



Trend #2

Smart manufacturing, explosive growth in the number of industrial machines connected via the Internet of Things (IoT).



Trend #3

Hyperautomation, the need to integrate silos of data across domains to gain knowledge.



Trend #4

Global competition, advanced technology increases pressure on companies to **innovate**.



In an age of **unprecedented technological change** in the industrial machine industry, machines are becoming more **complex**, raising new challenges for designers and engineers.

End customer demand for **highly customized machines** is growing, and with it the need for OEMs to be able to **produce one-of-a-kind machines** for their customers. To do so efficiently a **new design approach** is needed. Companies must **evolve away from traditional product engineering**.

Technology is the driving force for change in the industry. The **Internet of Things (IoT)** has drastically changed the way machines work, hardware and software components must integrate seamlessly to ensure **reliability**.

Thanks to **machine learning and smart manufacturing**, companies have more data than ever at their fingertips. If this data can be managed effectively companies can **gain huge insight** into machine performance and harness this information to **improve their innovation process**.

The need to find innovative solutions to offer to customers is ever present in a **competitive, global market**. Companies are increasingly under threat from competitors who are **more responsive, more innovative, or lower cost**.

To thrive you must offer **differentiation, cost competitiveness and cutting edge innovation**. But how?

Siemens offers the digital tools to help you evolve. With **Intelligent Performance Engineering (IPE)** you can **discover better designs faster and boost productivity**.

Key Drivers



Increased **machine complexity** drives a greater need for testing to ensure reliability.



Today's industrial machines need to be highly **customizable and adaptable**.



Advanced technology enables the creation of smarter machines.



Global competition forces manufacturers to **compress cycle times and lower costs**.

Embrace the power of digitalization. Validate from design to commissioning and beyond.



Siemens offers a comprehensive solution to meet your validation needs so you can ensure reliability and minimize risk for your customers.

Closed-Loop Validation, an integrated testing and simulation solution from Siemens.

Closed-Loop Validation helps industrial machine manufacturers **validate** component and machine performance resulting in **better reliability and improved designs** for their customers.

From design to commissioning.

Closed-Loop Validation gives you the ability to move seamlessly through design, commissioning, machine operation in the field and back again.

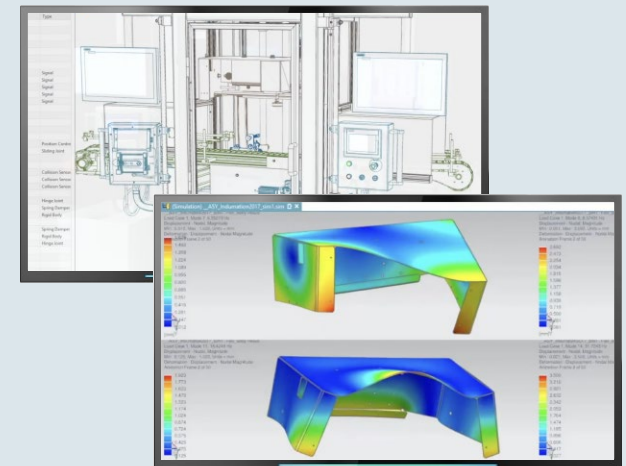
Thanks to the **digital twin**, a digital blueprint of the physical machine, simulation models are generated to **accurately predict** the behavior of components. You are then able to validate the simulations by **capturing and testing the relationships between requirements, functional layout, logical implementation, and physical implementation with Model-Based System Testing (MBST)**.

Validating the virtual machine allows you to **verify designs earlier, test multiple configurations rapidly** and understand the **impact of variables** on one another, without the need for an expensive physical prototype.

Closing the loop.

Once the machine has been commissioned you are able to leverage the power of the **Internet of Things (IoT)** to receive product performance data as it is **collected from the field in real time**. Feedback on variables such as **vibration** and **noise** from the operational machine can be used to **validate and improve the accuracy** of future simulation models back in the **digital twin**.

This effectively **connects simulation data to the design object**, giving you **greater insight** into the validation process and enabling you to **finetune parameters and improve future design and engineering**.



Get ready to produce the fully optimized machine faster.



Market demands for improved performance, energy efficiency and safety have given rise to more complex machines that must integrate advanced technology. Address this complexity and offer your customers innovative and reliable solutions, with Closed-Loop Validation.

Now it's your turn to drive innovation through simulation:

Reduce development costs, virtually validate component performance in parallel to design when it is cheaper and more effective, ensure customised variations work as they are intended to, before going to production.

Innovate faster and more effectively, monitor and collect real-world data to ensure the physical machine matches the digital twin, use this data to continuously improve performance and production for the next generation of machines.

Guarantee shorter commissioning times, integrate test and simulation in a single environment, validate and verify performance with Model-Based System Testing (MBST) to improve reliability and reduce risk.

Gain greater system insight, leverage the power of the Internet of Things (IoT), from the operational machine, validate usage, design, simulation and testing to finetune parameters.

Whatever you imagine, simulate and validate it under real conditions, with **Closed-Loop Validation**, part of the **Intelligent Performance Engineering** solution from Siemens.

About Siemens Intelligent Performance Engineering:

Siemens' Intelligent Performance Engineering solution leverages Closed-Loop Validation to help industrial machine manufacturers go from design to commissioning and beyond, closing the development loop by integrating real world data back into design simulations. Digital twin technology provides a single thread of information to optimize processes and seamlessly connect requirements to physical implementation to drive innovation. This single source of reliable information enables companies to efficiently design, simulate and validate in a single environment to boost productivity.

For more information on Intelligent Performance Engineering solution, visit www.siemens.com/plm/IPE or follow us on [LinkedIn](#) and [Twitter](#).

Siemens Intelligent Performance Engineering

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