SIMULATION PLATFORM FOR VIRTUAL COMMISSIONING

Digital twins made of virtual components for automation solutions
ISG-virtuos is the simulation platform of ISG Industrielle Steuerungstechnik GmbH in Stuttgart, Germany. With a team of currently about 70 specialists, ISG has been developing innovative software solutions and technologies in the field of industrial control and automation technology for mechanical and plant engineering as well as other industries since 1987.

Based on the products ISG-kernel for CNC, MC and RC control and ISG-virtuos for the simulation of machines and plants in deterministic real time, ISG offers customized customer solutions as well as products and services that enable new business models. The portfolio is complemented by ISG-dirigent, the first commercial tool for test automation of control software and TwinStore, the online store for simulation models for virtual commissioning.

Since its market launch in 2005, ISG-virtuos has been developed in close cooperation with leading users in plant and machine engineering into a comprehensive simulation platform with a wide range of applications in various industries.

Users benefit not only from the functionality and performance of the simulation platform, but also from the many years of practical experience and great innovative strength of our development team as well as the partnership-based cooperation.

In addition to companies from the automotive and supplier industry, it is above all medium-sized companies from plant and mechanical engineering as well as, for example, the woodworking and packaging industry and companies in the field of automation that rely on software from ISG.

We believe that our many years of expertise, our enthusiasm for what we do, state-of-the-art technical equipment as well as our competence, reliability and flexibility speak for us. Our customers, some of whom we have been working with for over 34 years, are also convinced of this.

Let’s talk about the right solution for you.
Increasing variant diversity with the trend towards batch size 1, shortened product life cycles and high cost pressure: In the age of digitalization, virtual commissioning has become indispensable in plant and mechanical engineering.

In order to virtually commission machines and plants even before the real assembly and commissioning, a digital image of the real components and the system behavior is created by including the original engineering data. With the help of ISG-virtuos, automation scenarios including malfunction situations and safety are simulated in advance.

The complex interaction of mechanics, electrics and control technology can thus be tested and optimized at an early stage. The software is ready for use even before the actual commissioning.

In addition to the VIBN, the digital twin can be used over the complete life cycle of the system - without downtimes during the operating phase.

How do different component parameters influence the machine? How stable does the system run when a fault occurs? By what factor can the production speed be increased without loss of quality?

Such questions can be answered easily: Module, integration and system tests are performed reproducibly at any time using real machining and production data. With the help of the test automation tool ISG-dirigent, these tests can also be automated and integrated into requirements management.
With ISG-virtuos, you cover the **generation** and **holistic use of simulation models** from sales through digital engineering to the operational phase - and all this with **just one continuous simulation model**. In addition to model-in-the-loop (MiL) and software-in-the-loop (SiL) simulation, we also enable hardware-in-the-loop (HiL) simulation, in which the behavior of the components, machines and systems used, including the fieldbuses used, is simulated in deterministic control real time.

This ensures that you can extensively **test** and **optimize your programming of complex plants or robot systems** with the help of the simulation and save important time and resources in your projects.

ISG-virtuos 3 revolutionizes the **project planning of digital twins** through intuitive 3D workflows, enables the use of the digital twin over the entire life cycle of your plant and expands the range of applications of ISG-virtuos to **complete factory simulation** in order to be able to offer solutions in the areas of **manufacturing automation** and **intralogistics** beyond machine and plant engineering.

However, in our view, pure savings are too short-sighted: There are also **new business models** resulting from the creation and use of digital twins. For example, simulation models can be used for **training** operator personnel with connected control and HMI or for **service concepts beyond virtual commissioning**.

Component manufacturers and simulation experts in particular are finding new approaches in marketing digital twins of their components on our **online platform TwinStore**, where **simulation models for virtual commissioning** are made available to all ISG-virtuos users free of charge or with corresponding payment models.
With ISG-virtuos, control systems can be tested. Even complex simulation scenarios can be mapped simultaneously by integrating several real (HiLS) or digital (SiLS) controllers.

The modular design allows flexible and scalable solutions as well as mixed operation with hardware and software control systems and real components.

The connection of real controllers as HiL simulation can be done via common fieldbus systems. Here, there are explicitly no gateway functions used, i.e. the controller only sees real fieldbus participants. Addressing and timing of the fieldbus nodes must therefore not be adapted in the control applications.

Every clock pulse specified by the controller in the simulation is taken into account and safety systems can also be integrated into the real-time simulation.

The interfaces required for the connection of software control systems are available for download in the ISG library of the TwinStore.

In ISG-virtuos 3 it is possible to perform the fieldbus connection automatically. All fieldbus participants (simple digital I/O terminals, up to intelligent fieldbus participants) are generated as real fieldbus participants for connection within the HiL simulation, e.g. based on a Siemens TIA Portal, B&R Automation Studio or Beckhoff TwinCAT 3. The results of the electrical design can be used for the virtual commissioning without any adjustments.
TWINSTORE. SEAMLESS INTEGRATION OF DIGITAL PRODUCT CATALOGUES IN ISG-VIRTUOS

Via TwinStore, the online store for simulation models for virtual commissioning, suppliers from various industries provide digital twins of their components with which virtual plants can be created within a very short time. The user selects the required components from the digital product catalogues and seamlessly integrates them into the simulation.

The digital twins of the components consist of the original CAD data, a comprehensive real-time capable interlinking model, corresponding I/O on the fieldbus and, if necessary, their own control panels for manual manipulation of individual signals, for example to move a mover manually.

This clearly structured data model, in conjunction with comprehensive component documentation, enables realistic use on the fieldbus and the associated quality assurance in the simulation.

The online store for component and plant suppliers as well as plant operators thus enables the comprehensive virtual design, safeguarding and commissioning of machines and plants.

In the TwinStore libraries you will find component models of well-known companies e.g. for applications in the areas:

- Sensors
- Handling technology
- Drive Technology
- Conveyor Technology
- Rotary indexing tables
- Robotics
- Readers and writers
- Movers / AGVs

Furthermore, modeling templates are available in TwinStore. For example, standard conveyor belts can be modeled quickly and easily in ISG-virtuos.

For more information, please visit our website at www.twinstore.de. Or contact us directly.
ISG. YOUR PARTNER IN SIMULATION TECHNOLOGY

We want you to be successful.

Therefore, in addition to the functionality and performance of ISG-virtuos, we provide our many years of expertise. Through years of experience in consulting and implementation of various customer projects, we have refined our approach when introducing simulation software to new customers.

In order to move from the pilot phase to the production phase as quickly as possible, we have developed the so-called realization workshop. Here, you not only build up the corresponding simulation know-how, but also already create your first own plant.

In the productive phase, you will implement future projects independently. As your technology partner, we will continue to support you in word and deed. Be it with special training, project implementation or by taking over entire simulation projects on your behalf.

As part of our development and innovation partnership, we integrate your technologies together: Embed your models directly into the TwinStore or generate your digital twins for the entire lifecycle: From the early engineering phase to the training of operating personnel.

For further information please visit our website at Services/Simulation Technology. Or contact us directly.
We are convinced by the concept of "simulation-based engineering". It allows processes to be paralleled as early as the development phase. The quality of the control programs, design and configuration data can also be tested in advance on the virtual prototype. Thanks to the modular design principle with reusable modules and the numerous test functions, we have been able to significantly simplify and accelerate many of our processes - especially the commissioning of our plants.

Ludwig Albrecht, Manager Digital Predevelopment / Digital Factory, HOMAG Group AG

To ensure efficient start-up of our production lines [...] we rely, among other things, on the virtual commissioning of complex plants and production processes. In the operational phase, it offers the possibility to efficiently integrate software-intensive changes in a few days without subsequent loss of production. Crucial for this is both the use of a flexible simulation tool with open interfaces and an extensive component library to reduce model creation time.

Dr. William Tekouo, D-Lab Manager, BMW Group

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