



fe.screen
planning, simulation
virtual commissioning **SIM**

PLANNING, SIMULATION, VIRTUAL COMMISSIONING 3D SIMULATION SOFTWARE



fe.screen-sim® – planning, simulation, virtual commissioning

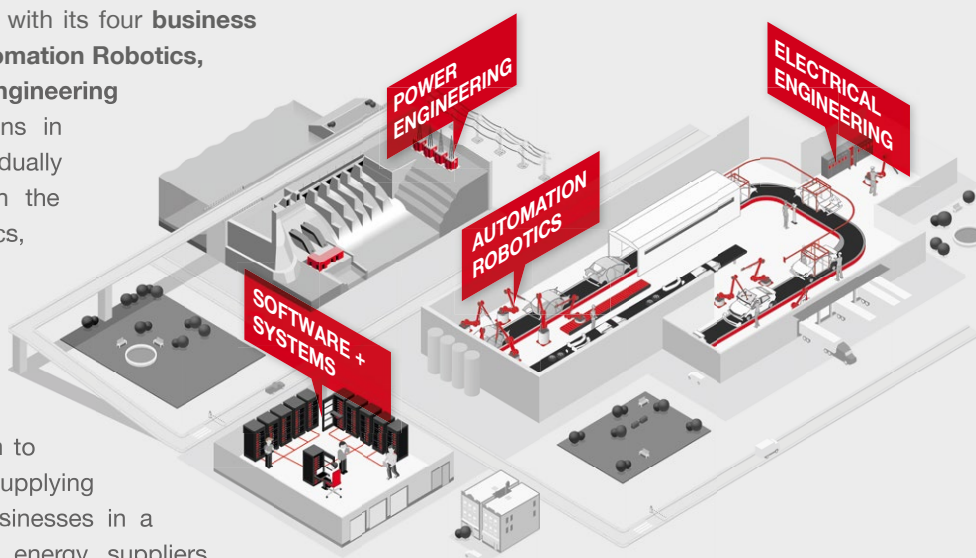


OUR EXPERIENCE IS YOUR ADVANTAGE

fe.screen-sim is a quality product of the **F.E.E. company group**. With currently around 1,100 employees, the company group is one of the German market leaders in production and automation technology.

Founded in 1982, the company offers with its four **business divisions Electrical Engineering, Automation Robotics, Software+Systems** and **Power Engineering** very successfully customised solutions in addition to products and services individually adapted to customer requirements in the fields of automation engineering, robotics, control cabinet construction, electrical engineering as well as informatics. In addition, F.E.E. uses its more than 40 years of experience for the development of state-of-the-art, practice-oriented industrial software. In addition to the worldwide automobile and supplying industry, small and medium-sized businesses in a wide range of sectors as well as energy suppliers,

municipalities and power plant operators also belong to the F.E.E. customer base. **State-of-the-art technical equipment, expertise, flexibility** and **many years of know-how** are among the strengths of the F.E.E. company group.



BENEFIT FROM **OVER 40 YEARS OF EXPERIENCE** IN
AUTOMATION TECHNOLOGY AND THE **REALISATION OF**
WORLDWIDE PROJECTS IN A WIDE RANGE OF INDUSTRIES!



WHAT IS “VIRTUAL COMMISSIONING”? EXPLANATION, REASONS, ADVANTAGES

“**Virtual commissioning**” is becoming more and more important in the Industry 4.0 era with ever **shorter commissioning periods** at the same time as **greater variant diversity** and **complexity**.

During “Virtual commissioning”, a “**digital twin**” of the system is created by importing the design data before the actual assembly and commissioning.

A special software – such as fe.screen-sim – is used, which makes it possible to transfer all existing data to the virtual model and thus simulate the behaviour of the planned system.

The **complex interplay of mechanics, electrics, programmable logic control** and existing **control systems** can be considered, analysed and optimised at an early stage. This means that the system software is already tested before the actual commissioning.

In addition, the “digital twin” can be used throughout the **entire life cycle** of the system – for example, for training and conversion purposes.

THE **ADVANTAGES** OF VIRTUAL COMMISSIONING AT A GLANCE:

1

Enormous **time saving** in real commissioning as well as **shorter overall project duration**.



2

Early detection and elimination of systematic errors in the entire system software.



3

Training and testing of process/problem scenarios **without the pressure of downtimes and production**.



4

High safety: Extreme case testing/development of an emergency strategy without endangering man/machine.



5

Greater process, product and software quality at the same time as shorter start-up phase.



6

Cost reduction through time saving, early error recognition/rectification and optimisation of processes.





SIMULATION IN PERFECTION: VIRTUAL COMMISSIONING WITH HIGHEST PERFORMANCE AND RELIABILITY

fe.screen-sim – THE **ADVANTAGES** AT A GLANCE:

1

Multi-user capability:

Several users work together on a simulation project.



2

Enormously high performance and element amount enable the simulation of large systems.



3

Switching between design mode and simulation mode is not required.



4

Intuitive and simple operation: Short incorporation and rapid system modelling.



5

Realistic display due to new rendering techniques and connection of VR/AR glasses.



6

Open, extendable interfaces to third-party systems – including a new SDK.



fe.screen-sim is a 3D simulation software that can simulate complete production equipment and machines including all components – from robots and programmable logic controllers to feed and transport devices and sensors – in **real time**.

Thanks to **enormously high element amount and performance**, fe.screen-sim is also impressive in simulating large systems.

The physical calculation system enables absolutely realistic material behaviour. Transport objects can be, for example, stacked, accumulated, shifted and simulated in accordance with the real system by the setting of various parameters – such as friction.

fe.screen-sim is developed by a **team of software developers with experience in system construction, control and HMI programming**.

For years, the 3D simulation software has also been successfully used within the F.EE company group, where the **range of functions** is constantly being **practically extended** and **improved**.

This practical relevance makes the difference and is shown in its **multi-user capability** among other things. Several users can work on one simulation model simultaneously over the network – and this **without switching between design mode and simulation mode**. This reduces the time and cost factor considerably. **fe.screen-sim is thus the only true multi-user solution in simulation.**



SIMULATION FOR YOUR DIGITAL ENGINEERING: READY FOR IMPLEMENTATION IN COMPANIES OF TODAY

Flexibility is a header that has always played an important role in the development of fe.screen-sim.

By means of a **cross-divisional use** of 3D simulation software in the company synergy effects can be used optimally and potentials are exploited in the best possible way.

Simulation models can be created directly in fe.screen-sim **without using an existing database**. Also, it is possible to **import data from CAD programs**.

In order to make **usability** as simple and efficient as possible, an **object catalog** for the flexible modeling of a wide range of requirements was integrated, among other things.

The subsequent editing of material, model, physics as well as the targeted definition of collision areas is enabled by **editors**.

Using „Auto Assign“, variables are quickly assigned. The **signal recorder** also ensures reliable recording of robot and PLC variables.

The latest rendering techniques as well as the connection of **virtual reality glasses** enable an impressively realistic display and immersion in the simulated system.

fe.screen-sim thus forms an ideal tool in the context of the **digitization of your engineering workflow** and ensures the best possible use of the associated optimization potential.

fe.screen-sim – RANGES OF APPLICATION IN THE COMPANY:

**TRAINING/
EDUCATION** –
without system
downtimes and
danger to man
and machine.

SOFTWARE DEVELOPMENT –
Advance testing of the system
software.

Inspection and
optimisation of
the **PROJECT
PLANNING**.

SALES/MARKETING –
Customer acquisition
and improved
communication.

**CONTROL
CABINET
CONSTRUC-
TION** –
fast final wiring
and automated
control cabinet
tests.

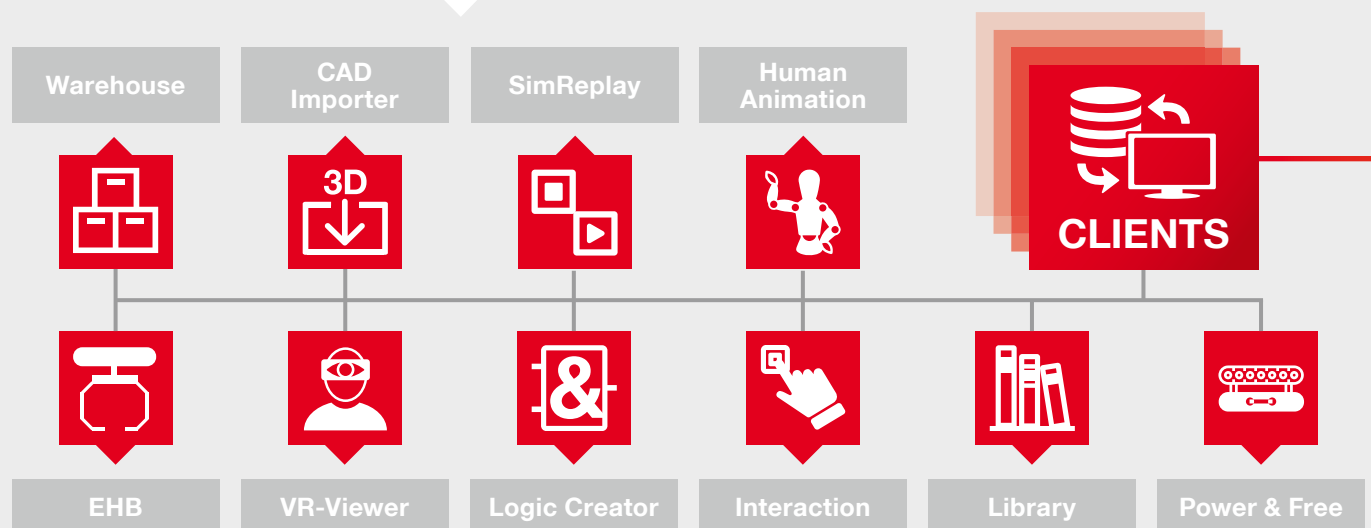
REAL COMMISSIONING –
Administration of tasks and checklists directly on site.

fe.screen-sim – THE SOFTWARE ARCHITECTURE

The beating heart of this software is the so-called “Core”, to which all clients, communication and extension interfaces as well as separate applications connect. On the client-side, it is even possible to individually expand the scope of operation as required by integrating various optional modules. **Transparency** and **fairness** are also at the forefront of the **licensing model**, which is modularly structured and based on **floating licenses**. While communication interfaces are licensed once at the “Core”, clients have the opportunity to acquire optional modules, software extension interfaces and separate applications.

OPTIONAL MODULES FOR EXPANDING THE FUNCTIONAL SCOPE

- **Warehouse:** Simulation of logistics facilities and warehouses.
- **CAD Importer:** Use of more than 30 CAD formats including native connection to the most popular CAD systems - such as SolidWorks, PTC, AUTODESK, Siemens, etc.
- **SimReplay:** Recording of simulation sequences, whereby one can move completely freely through the 3D simulation environment during playback.
- **Human Animation:** Mapping of human (inter)actions, e. g. the execution of transport activities by persons including consideration of different speeds for walking routes.

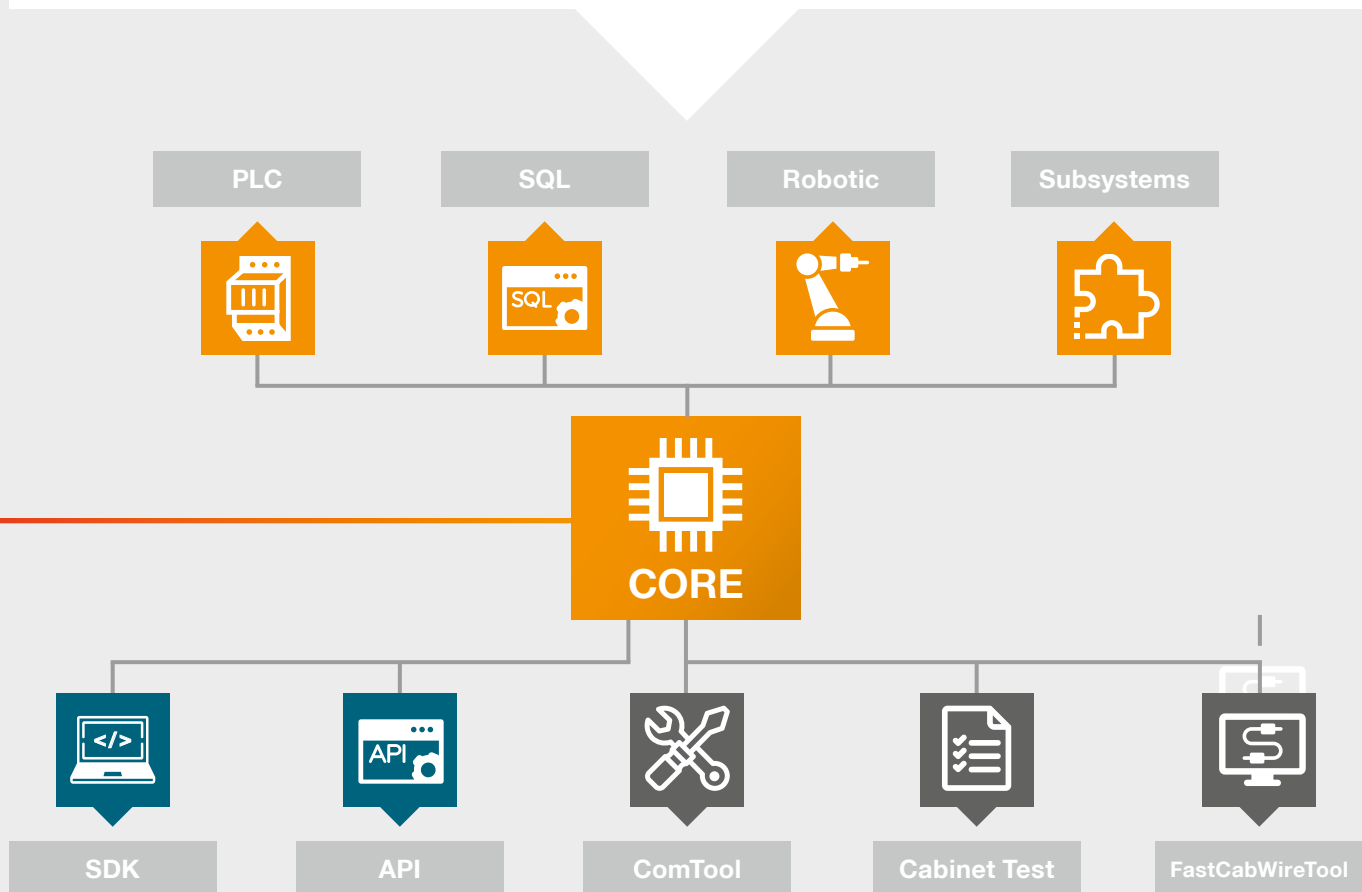


OPTIONAL MODULES FOR EXPANDING THE FUNCTIONAL SCOPE

- **EHB:** Simulation of electronic monohead tracks and all floor vehicles including autonomous vehicles.
- **VR-Viewer:** Allows any number of viewers to immerse themselves in the simulation using virtual reality glasses (Oculus Rift/Quest, HTC Vive/Vive Pro) and is therefore the perfect solution e. g. for control tests and training.
- **Logic Creator:** Creation and use of user-defined flow logic for devices and external systems in FUP (function plan), C# and FMU/FMI, whereby predefined standard modules and patterns for various devices facilitate the work.
- **Interaction:** Definition of individual operating elements (e.g. buttons, fuses) up to complete system operating consoles and control cabinets in 3D.
- **Library:** Cross-project work with user-definable library objects.
- **Power & Free:** Intuitive simulation of two rails arranged one above the other in conveyor systems.

COMMUNICATION INTERFACES

- **PLC:** Connection of programmable logic controllers (PLCs), such as Siemens S7 (series: 200, 300, 400, 1200, 1500) and compatible controllers (e. g. VIPA), Allen Bradley, Rockwell, Beckhoff (TwinCAT 3), Fanuc, WAGO, PLCSIM Advanced, Simulation Unit, B&R and Mitsubishi.
- **SQL:** Interface for connecting databases.
- **Robotic:** Interface to robot tools, e. g. from KUKA, ABB, Fanuc, Stäubli, Yaskawa, Universal Robots, Mitsubishi and RoboDK (others on request).
- **Subsystems:** Connection of different subsystems, e. g. MATLAB®/Simulink®, ABITRON, Siemens Process Simulate, control systems, etc.



SOFTWARE EXPANSION INTERFACES

- **SDK – Software Development Kit:** Makes it possible, among other things, to create new simulation components, menus, as well as operating and control elements.
- **API – Application Programming Interface:** Provides the automation interface for generators and tools of own applications or integrations in third party software.

SEPARATE APPLICATIONS

- **ComTool (Commissioning Tool):** This tool supports real commissioning by means of various plug-ins and enables own developments. Routine activities and checks that were previously processed with Excel lists, for example, are automated.
- **Cabinet Test:** The „Cabinet Test“ application enables the automated and logged test of real switch cabinets.
- **FastCabWireTool:** This tool is used for virtual wiring of switch cabinets and offers additional support for real operations, e. g. guided working.



AUTOMOTIVE

The requirements of the automotive and supplying industry are high and will continue to rise in the future due to shorter model cycles with increasing model diversity at the same time. This results in an **ever decreasing time frame for the complete system development and commissioning**.

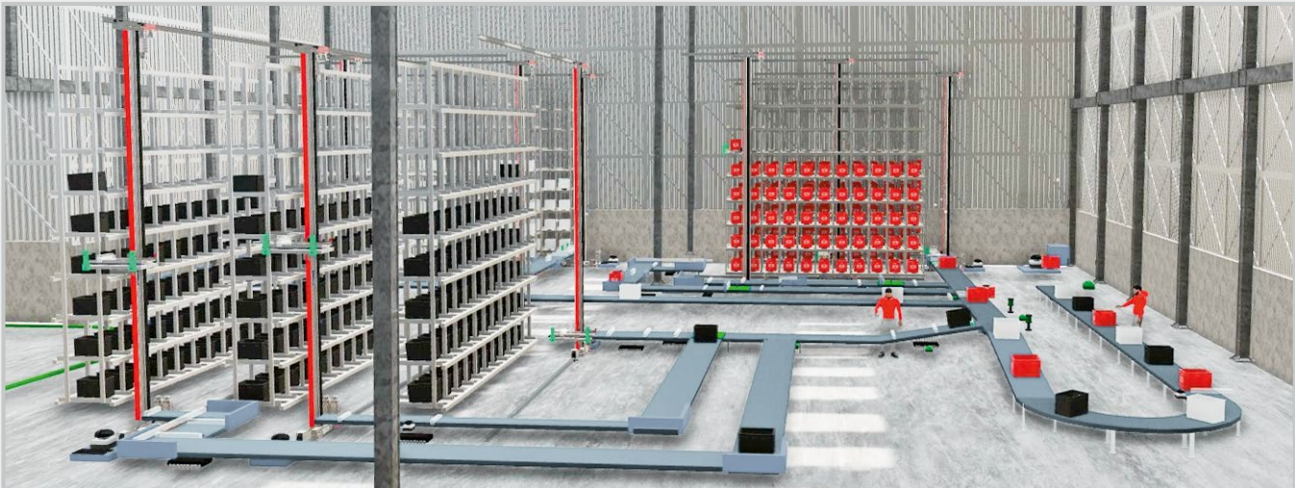
fe.screen-sim makes it possible to master the growing requirements – e. g. by shifting times from real to virtual commissioning. Thus, even **complex and time-critical projects can be successfully mastered**. In addition, fe.screen-sim can also be used for simulating system modifications and extensions as well as for upcoming retrofit projects or for carrying out training courses without system downtime.



AUTOMATION

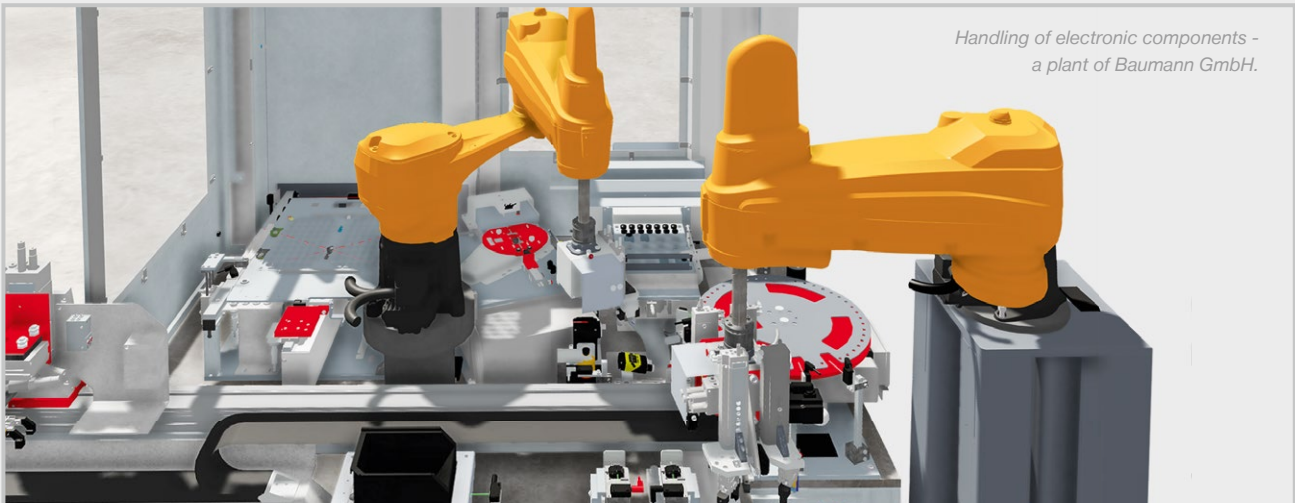
In the Industry 4.0 era, the demand for automation systems is also growing. Ever larger and more complex systems and machines, on which a wide range of products are produced, represent a major challenge for plant manufacturers. The **simulation and advance testing of all system components** as well as the implementation of **availability and cycle time studies** with fe.screen-sim can optimally fulfil the high customer requirements.

Positive side effect: **System knowledge is improved**. This means **interdependencies can be better detected and optimisation potentials can be exploited to the greatest possible extent**.



LOGISTICS

Without perfectly functioning warehouse and logistics processes, efficient production in today's companies would not be possible. Due to the high degree of automation and the increasing variety of products, ever more complex storage systems are required. This makes it all the more important to **simulate storage, retrieval and relocation processes** as well as **various warehouse variants** at an **early stage** in conjunction with the control technology in a **clear manner in real time**. Here, the high performance of fe.screen-sim also offers enormous advantages. In addition, the simulation tool is ideally suited for warehouse capacity and warehouse strategy design as well as optimization purposes.



*Handling of electronic components -
a plant of Baumann GmbH.*

MECHANICAL

In the mechanical engineering sector, where complexity and time also play an important role, the implementation of fe.screen-sim brings many advantages. With the help of 3D simulation, costly and time-consuming **machine collisions are ruled out from the outset**. **NC programs** can be analysed and verified before the machine is completed. Thanks to the intuitive combination of existing simulation elements, fe.screen-sim can simulate **machines with any number of axes**. During the instruction of the machine operators on the digital twin, the **best possible understanding of the functions** is conveyed. This reduces incorporation and downtimes/set-up times on the real system and saves costs





OUR KNOW-HOW FOR YOUR EFFICIENCY – THE F.EE RANGE OF SERVICES

OUR RANGE OF SERVICES AT A GLANCE:

1 Support in the **optimisation of CAD models** (e. g. addition of non-existent kinematic information).

2 Creation of **3D simulation models without available CAD data** (on the basis of images and dimensional sketches).

3 Generation of **macros and code interfaces** – e. g. for PLC, HMI – for the creation of software from available data.

4 Development and realisation of **customer-specific software solutions** as well as additional functions in fe.screen-sim.

5 Creation of **complete virtual system models/parts** and **training documents** for initial and follow-up training.

6 Support in the **implementation of the complete virtual commissioning** and all associated activities

7 **Advisory service** (incl. the introduction of virtual commissioning and efficiency increasing potentials during real commissioning).

As a user of fe.screen-sim, you will benefit not only in terms of software functionality and performance from the many years of practical experience of our software developers.

On request, our team will be happy to assist you in the **implementation of virtual commissioning**.

We would also be happy to **create complete virtual system models** or **individual components** for you.

If you are planning the **introduction of virtual commissioning** in your company, we would be happy to pass on our experience in this area in a consulting capacity.

In addition to continuous **further development**, the F.EE software developers are also happy to implement **customer-specific software solutions** and **additional functions** in fe.screen-sim. The optionally available **update service** keeps you up to date.

Get in touch with us and allow us to convince you of our know-how!

SATISFIED CUSTOMERS SPEAK FOR THEMSELVES



"Thanks to the simple way of creating models, we were able to reduce the modelling time. The connection via an API also offers a variety of possibilities to further automate the modelling process in the future. During virtual commissioning, fe.screen-sim makes it possible to make changes to the model during runtime and also to intervene in the simulation scene. This allows the rather small time window of virtual commissioning before real commissioning to be used more effectively."



Matthias Gies,
GROB-WERKE GmbH & Co. KG

"Mass tests, availability tests, performance analyses and troubleshooting - these are all activities that can normally only be performed during commissioning. F.EE's valuable tool allows this to be done before the start of commissioning. Our internal development can, thanks to the accessible fe.screen-sim software and by means of SDK/API, very flexibly adapt, extend or supplement existing functionalities to our needs. The F.EE development team is always a reliable development partner and is very responsive to suggestions for improvement. The interfaces provided to the systems, in conjunction with fe.screen-sim, form a solid basis for virtual commissioning."



Patrick Spinotti,
KNAPP AG

"Working with F.EE's solutions for virtual commissioning has significantly reduced our commissioning times and significantly increased the software quality. The effects were visible in more satisfied customers and employees. Today, we can no longer imagine installing new plant sections without prior simulation with fe.screen-sim. By interconnecting several client units, we can now also simulate and test plants with several Sinumerik controllers and a large number of axes. In doing so, several employees work in parallel on the same model in different plant areas. Since the beginning of our cooperation, the F.EE team has responded very helpfully and quickly to our suggestions and tasks."



Roger Kirsch, Head of technology
and member of the management Felsomat GmbH & Co. KG

ESTABLISHED IN PRACTICE – OTHER SATISFIED USERS INCLUDE:



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