PLANNING, SIMULATION, VIRTUAL COMMISSIONING
3D SIMULATION SOFTWARE

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

The company is committed to the world’s growth markets of the capital goods industry, the energy sector as well as the engineering and services segments. With its four business divisions Electrical Engineering, Automation Robotics, Software + Systems and Power Engineering, the company offers very successfully customised solutions in addition to products and services individually adapted to customer requirements. As a rule, the business divisions operate independently of one another in the market. 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.EE customer base. State-of-the-art technical equipment, expertise, flexibility and many years of know-how are among the strengths of the F.EE company group.

OUR EXPERIENCE IS YOUR ADVANTAGE

BENEFIT FROM OVER 35 YEARS OF EXPERIENCE IN AUTOMATION TECHNOLOGY AND THE REALISATION OF WORLDWIDE PROJECTS IN A WIDE RANGE OF INDUSTRIES!
“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.**
fe.screen-sim – SIMULATION IN PERFECTION: VIRTUAL COMMISSIONING WITH HIGHEST PERFORMANCE AND RELIABILITY

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. For example, more than 100,000 elements, 16 controllers, 700 drives and approximately 150,000 inputs and outputs can be deployed in a single simulation.

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 – THE ADVANTAGES AT A GLACE:

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 – SIMULATION 4.0: 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, innovative **editors** for the simple and subsequent editing of material, model, physics as well as the targeted definition of collision areas have been integrated into fe.screen-sim. In addition, the software contains a **comprehensive element catalogue** for building your own models and library objects.

Using „Graphic Assign“, variables are quickly assigned and the included **signal recorder** automatically records robot and PLC variables.

The latest rendering techniques as well as the connection of **virtual and augmented reality glasses** enable an impressively realistic display and immersion in the simulated system. The user gains a tool that can be used to overcome the challenges of the Industry 4.0 age – that is what **Simulation 4.0** stands for.

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

- **TRAINING/EDUCATION**
  - Advance testing of the system software.
- **SOFTWARE DEVELOPMENT**
  - Inspection and optimisation of the PROJECT PLANNING.
- **SALES/MARKETING**
  - Customer acquisition and improved communication.
- **CONTROL CABINET CONSTRUCTION**
  - fast final wiring and automated control cabinet tests.
- **REAL COMMISSIONING**
  - Administration of tasks and checklists directly on site.
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 with more than 100,000 storage locations.
- **CAD Importer**: Simple data import of common CAD formats, such as SolidWorks, Step, JT, OBJ, FBX and AML.

**OPTIONAL MODULES FOR EXPANDING THE FUNCTIONAL SCOPE**

- **EHB**: Simulation of electronic overhead tracks and transport vehicles, whereby these can even be defined by the user parallel to the runtime via wizards.
- **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) and C#, 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**: Used to combine simulation models with each other and defining them as a new object.
- **Power & Free**: Intuitive simulation of two rails arranged one above the other in conveyor systems.
SOFTWARE EXPANSION INTERFACES

- **SDK** – **Software Development Kit**: The acquisition of the basic kernel of fe.screen-sim as an SDK in C# enables the creation of new simulation components, menus as well as operating and control elements.

- **API** – **Application Programming Interface**: Enables programming and use of own interaction components for all manual applications and tools.

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 and Simulation Unit.

- **SQL**: Interface for connecting databases.

- **Client Viewer**: View module for passing on processing-protected simulation models.

- **Robotic**: Interface to robot tools, e.g. from KUKA, ABB and Fanuc (others on request).

- **Subsystems**: Connection of different subsystems, e.g. MATLAB®, Simulink®, WinMOD, ABITRON etc.

SEPARATE APPLICATIONS

- **ComTool (Commissioning Tool)**: This tool contains various plug-ins to support the real commissioning and offers the possibility for own developments. Routine activities and checks that were previously carried out with the help of Excel lists 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.
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.

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.
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. This is where fe.screen-sim shows its performance strengths – warehouse and logistics simulations with more than 100,000 storage spaces have already been successfully implemented with the software. This makes fe.screen-sim ideally suited for the design of storage capacity and storage strategy as well as for optimisation purposes.

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.
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 FEE 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!

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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.


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).
SATISFIED CUSTOMERS SPEAK FOR THEMSELVES

“The simulation program from the F.EE allows us to influence the design already in the project phase. Any weak points in the system layout are detected in advance. We were able to significantly reduce the commissioning times of our systems thanks to fe.screen-sim.”

Thomas Ostheimer, Managing director of ATTEC Automation GmbH

„The simulation of the F.EE Group is so simple that you don’t even need a help file – truly successful usability. The simulation team is very helpful and ready to make any sensible adaptation in the software. The features that had to be created especially for us were specified in a very short time and developed on schedule.

The simulation is so powerful that even the large projects that we will be working on in the future can be implemented. The possibility of a simple and understandable import of elements offers the possibility of automated creation of the simulation.

In short: A simply beautiful and effective cooperation.“

Michael Bock, System Logistics GmbH – a subsidiary of Krones AG

ESTABLISHED IN PRACTICE – OTHER SATISFIED USERS INCLUDE:

ATTEC Automation GmbH
BMW GROUP Werk Dingolfing
EISENMANN
GROB GROB-WERKE GmbH & Co. KG
KLOTZ
KUKA
LANFER Automation
SITLog
SYSTEM Logistics
THD Technologie Campus Cham