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 around 1,000 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 make up 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.
“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 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. This allows the problem-free implementation of warehouse and logistics simulations with over 40,000 storage locations and conveyor systems with more than 600 transport elements.

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 – 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. Synergy effects can be optimally used and potentials exploited to the greatest possible extent by implementing the 3D simulation software in all divisions of the company.

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, where many file formats (e.g. FBX, OBJ, WRL, JT, etc.) are supported.

In addition, programmable logic controllers (PLC) of various manufacturers (e.g. Allen Bradley, Rockwell, Schneider Electric, Siemens) can be integrated in fe.screen-sim.

Of course, the simulation of robots from various manufacturers – including ABB, Fanuc and KUKA – is also possible.

An SQL database interface ensures the smooth integration of fe.screen-sim in the workflow.

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**
  without system downtimes and danger to man and machine.

- **SOFTWARE DEVELOPMENT**
  Advance testing of the system software.

- **SALES/MARKETING**
  Customer acquisition and improved communication.

- **REAL COMMISSIONING**
  Administration of tasks and checklists directly on site.

- **CONTROL CABINET CONSTRUCTION**
  Automated control cabinet tests.

- **PROJECT PLANNING**
  Inspection and optimisation of the project.
With its modular structure, fe.screen-sim offers the right solution for every range of application. The "Core" – the physical calculation system – forms the central element of the software. The "Core" is used to connect to the individual modules, such as the "Library", which is the central storage location for individual object combinations. Using the "Logic Creators", procedure logics and interfaces – e.g. for motors or external systems – can be programmed whereas the "Interaction" module offers a flexible definition environment for control cabinet, operating and proprietary components.

The modular structure of the software also affects the license cost model – customers only pay for the functionalities they need. For example, the "3D Viewer" which is responsible for displaying the 3D environment for using fe.screen-sim in conjunction with VR and AR devices – such as Vive and Oculus Rift – is optionally available. In addition, further modules for the simulation of Power & Free conveyor systems, electric overhead conveyors (EHB), storage systems, robots or for connection to SQL databases can be purchased separately and entirely as required.
fe.screen-sim offers unique expandability and openness.

For example, all project data – from the system layout to the signal definition – is stored in readable **XML format**. This makes it possible to generate complete simulation systems with the data available in the company – e. g. using the “VBA” script language.

Another new feature in V4 is that the fe.screen-sim basic kernel can be purchased as a **Software Development Kit (SDK)** in C# on request. This opens up virtually limitless possibilities for the user: New simulation components, operating and control elements, menus and much more can be created. This means that the 3D simulation software can be freely expanded at any time.

VV4 also has a new interface for **application programming (API)**. Components can be created and used for interaction for all manual applications. In this way, your own applications and tools simplify recurrent tasks, allowing additional time savings during the creation and execution of the virtual commissioning.

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**INDEPENDENCE DUE TO OPEN SYSTEM**

The scope of operation of fe.screen-sim not only covers the areas of virtual commissioning, but – thanks to modules newly integrated in version 4 – goes far beyond that.

**Cabinet Test:** This innovative module enables automated **control cabinet tests**. Among other things, the procedures for voltage and visual inspections as well as I/O and signal tests can be defined, checked, logged and reused in test sequences. This guarantees that switch cabinets are fully tested and delivered to customers in 100% perfect working order.

**Commissioning Tool:** This module was developed for supporting activities during **real commissioning**. Compared to the Excel lists used up to now, the “Commissioning Tool” makes it considerably easier to maintain checklists and guarantees optimal clarity thanks to definable templates. Registered data is automatically synchronised over the network. In addition, I/O checks can be performed and logged without programming software. It is also possible to independently create plug-ins for new and individual “Commissioning aids”.

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**SUPPORT IN THE REAL PROJECT ENVIRONMENT AS WELL**
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 40,000 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 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

“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, Syskron GmbH – a subsidiary of Krones AG

“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

OTHER SATISFIED USERS INCLUDE:

EISENmann  SITLog  LANFer  GroB