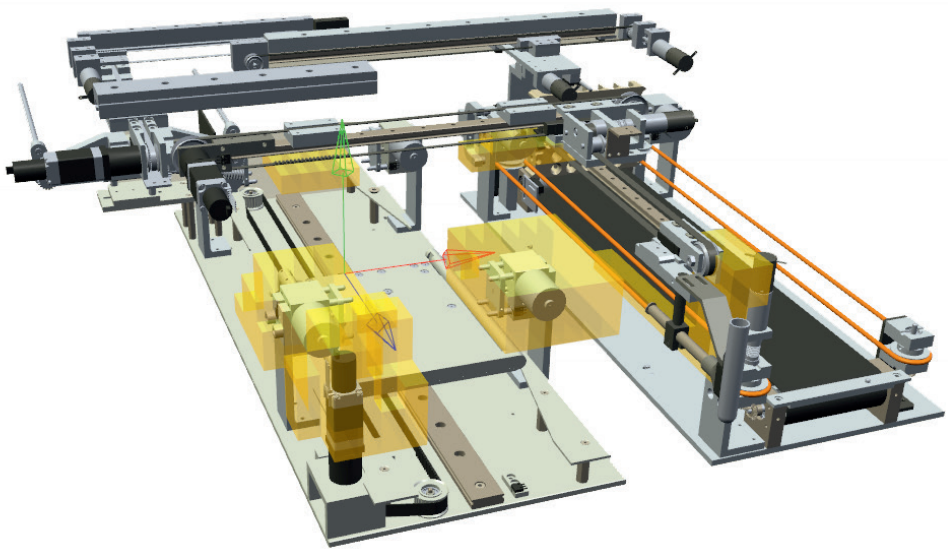
Fraunhofer
IFF

FRAUNHOFER INSTITUTE FOR FACTORY OPERATION AND AUTOMATION IFF, MAGDEBURG

EXPEDITING AND VALIDATING DEVELOPMENT



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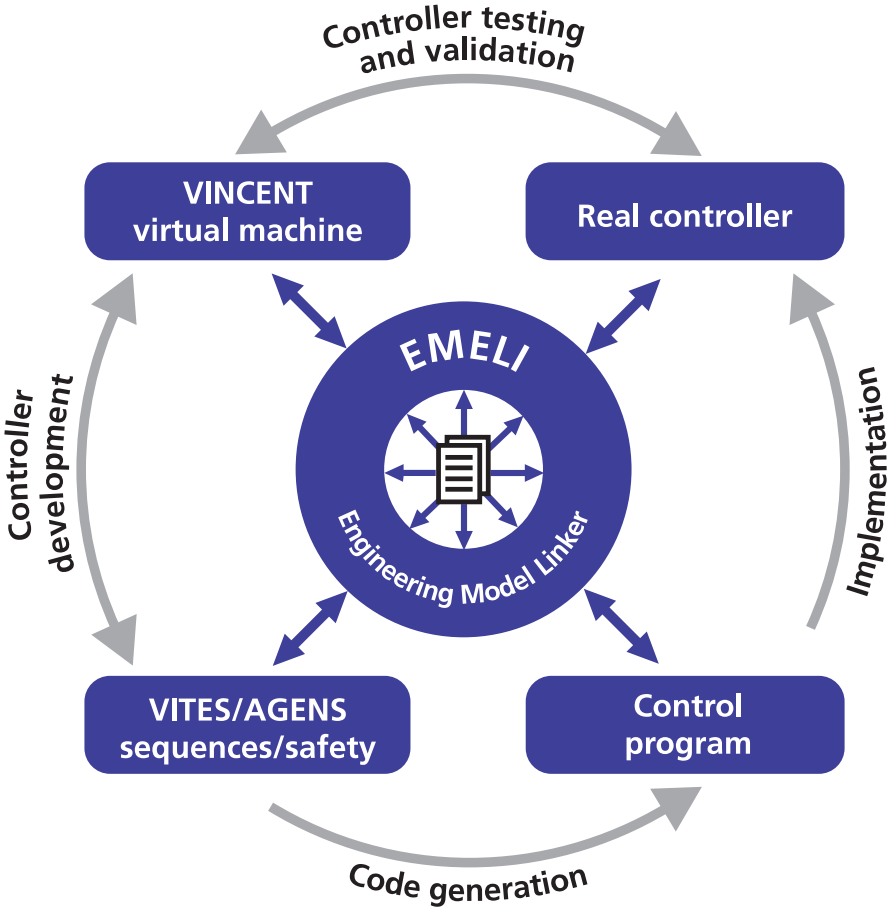
VIRTUAL DEVELOPMENT OF CONTROL SYSTEMS

The increasing complexity of machinery requires more work to develop control systems, from their design to their commissioning. Effective and efficient engineering counteracts the high time and cost pressure this entails.

A software system developed at the Fraunhofer IFF uses virtual models to facilitate integrated development of machine controllers. The software tools make it possible to program and test control systems already in an early stage of a project: Sequences of functions are taught and tested and extensive safety functions are generated automatically on a virtual model. Having a complete model of a machine available at an early stage makes it possible to train operators on a virtual machine with real operator and display elements at an early stage as well.



The Fraunhofer IFF's methods and tools have already been used in numerous projects with industry partners to develop custom machines effectively and efficiently.

Reliable Engineering with VINCENT

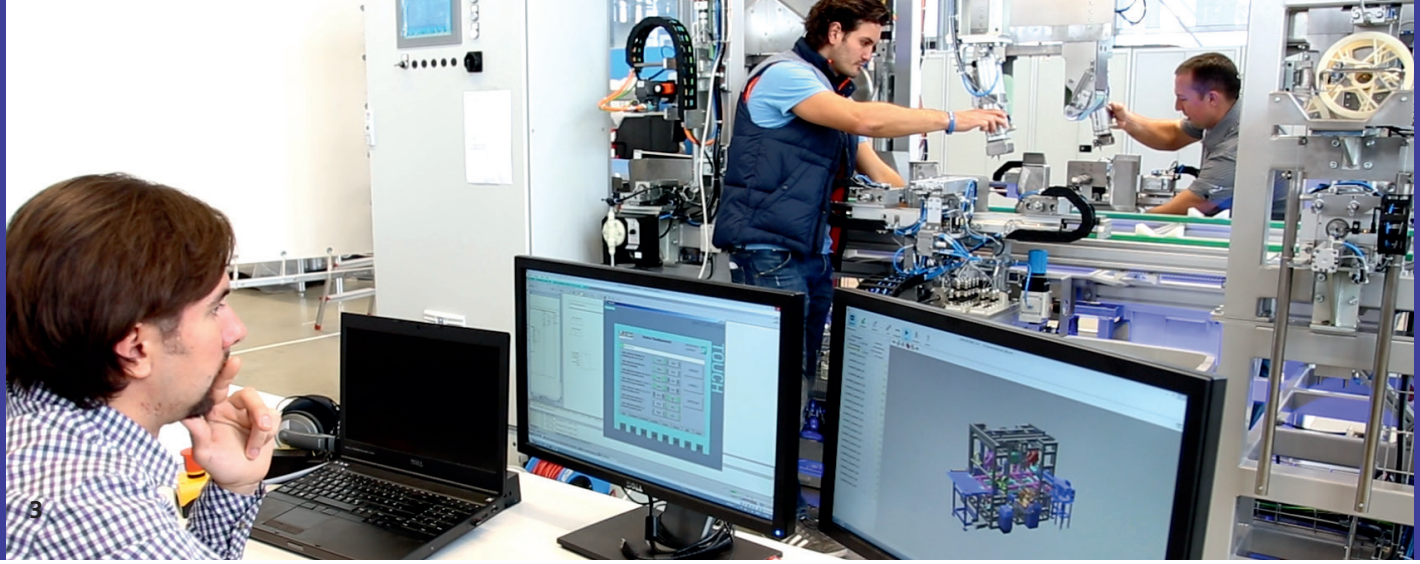
A virtual machine, automatically constructed from CAD data by VINCENT software developed by the Fraunhofer IFF, is the basis for effective and efficient development of a control program. It allows hardware-in-the-loop testing of a real controller on a virtual machine.

The first CAD models are used to start sequence testing with VINCENT already in an early stage of design. The development of control systems for new machinery is moved forward and the entire project period is shortened by as much as thirty percent.

The use of virtual models from the design phase through commissioning validates engineering from start to finish and supports the development of a control system, from its design to construction, and its testing on the real controller.

Virtual Teaching with VITES

VITES enables programmers to generate desired motion sequences together with design engineers simply by running them



on a virtual model. This automatically produces the program for the technological sequence, which is immediately checked and optimized on the virtual model.

Control Code at the Push of a Button

Once the control sequences have been created, the actuators' motions are planned completely and the sensor signals are evaluated. Then, the sequence is automatically transposed into transparent control code. Thus, control code can be generated from taught sequences for any common controllers.

More Safety with AGENS

AGENS makes predictive fault analysis possible. The virtual model is used to detect safety-related problems or major faults at an early stage. Thus, AGENS improves machinery's functional safety:

- Collision avoidance through automatic generation of safeguarded zones
- Rule-based formulation of safety-related correlations
- Automatic code generation for functional safety

AGENS enables you to validate control code and system operation and protect your equipment from damage.

EMELI Closes Data Gaps

The Engineering Model Linker (EMELI) developed at the Fraunhofer IFF combines your engineering tools by:

- pooling data from a wide variety of engineering systems,
- configuring semantic relations between data cross-application,
- integrating the provision of data,
- assuring consistency, even when stages of development are iterative.

EMELI consolidates application-specific data. A functional view of an entire machine is produced. Design, electrical and control engineers thus all have the same data at their disposal.

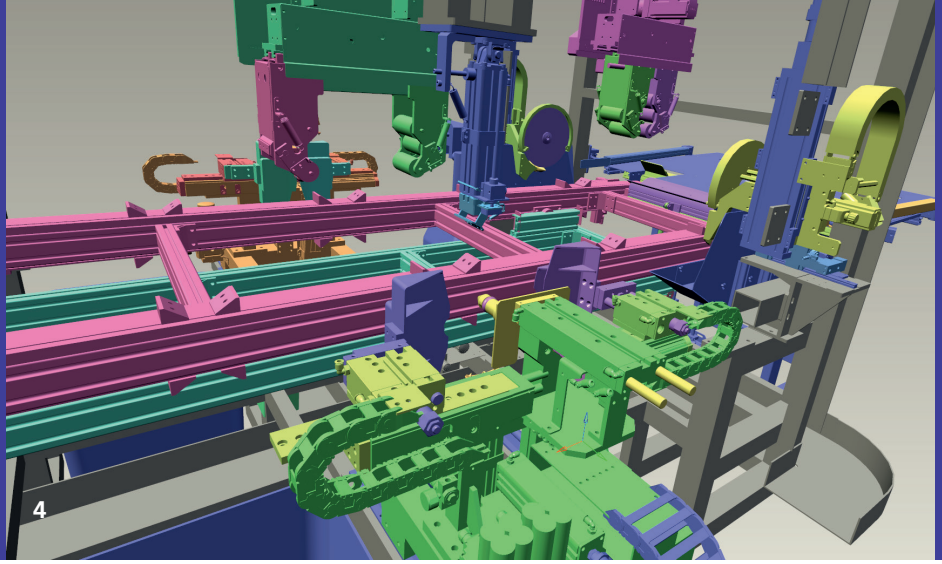
Technology Partner for Digital Engineering

The Fraunhofer IFF provides software solutions for virtual development of complex machinery and plants. The solutions make integrated function tests possible, from design through commissioning and even in running operation. Methods of virtual commissioning make it possible to parallelize engineering throughout the entire development process.

We would be glad to support you with consulting based on our many years of experience in control system engineering whenever you are introducing advanced methods of program generation.

We will provide you solutions matched to your needs to effectively and efficiently develop your machinery and plants' control systems to boost your company's competitiveness:

- Professional support when introducing an innovative engineering environment,
- Development of your control software on a virtual model based on your specifications,
- Creation of real-time simulations of your machinery,
- Connection with real control and operator hardware,
- Creation of complete automated solutions, from the idea to operation.



EFFECTIVE CONTROL SYSTEM DEVELOPMENT WITH THE FRAUNHOFER IFF'S SOFTWARE TOOLS

- Simple programming through demonstration
- Validated and tested control code
- Short programming and commissioning times
- Generation of control code for PLC, NC and computer-based control systems
- Coordinated and parallel engineering from the start of a project

VINCENT FOR NO-RISK FUNCTION TESTS

- Fast 3D modeling incorporating kinematics
- Programming of systems on virtual models
- Real-time collision detection
- Real-time capable online interfacing with PLCs and NCs
- Extension by special simulations, e.g. real time machine dynamics
- Parallelization of development and commissioning
- Validation and optimization of every design and functional feature before prototyping

VITES: ARE YOU STILL PROGRAMMING OR TEACHING ALREADY?

- Problem-driven specification of motion sequences on a virtual model
- Logical linking of motion sequences with a complete control sequence
- Integration of virtual and real sensor signals
- Collaboration of design and control engineers – simpler and more reliable know-how transfer
- Automatic controller programming

AGENS: AUTOMATIC SAFETY FUNCTIONS

- Implementation of safety-related control cycles in a safety layer and prevention of invalid machine states
- Incorrect operation without negative consequences
- Validated programming: Real control system starts with a fully developed control program

1 *VINCENT: A virtual machine in operation. Photo: Dirk Mahler, Fraunhofer IFF*

2 *AGENS: Automatic safety. Image: Fraunhofer IFF*

3 *Fast and safe controller development. Photo: Dirk Mahler, Fraunhofer IFF*

4 *Virtual machine for controller development. Image: Fraunhofer IFF*

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