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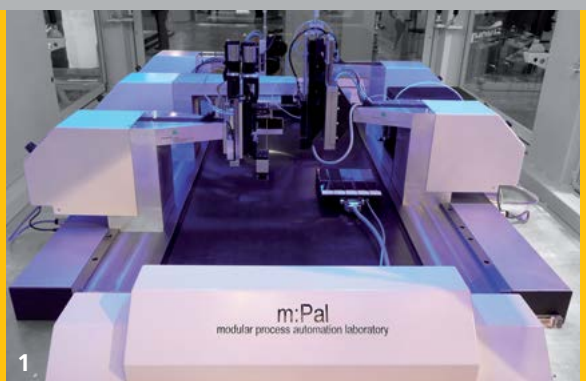

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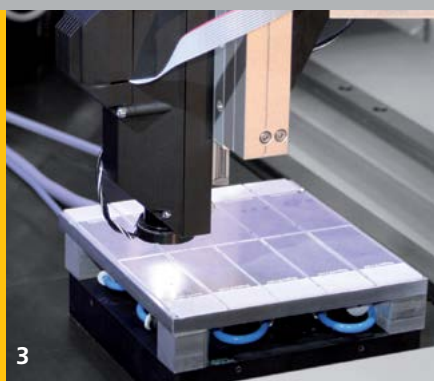
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1 *Maximal freedom in process design by a modular concept independent from vendor*
2 *Dynamic material flow and flexible interoperability by precision planar bench drives*
3 *Extension of process operations by simple integration of new technologies*

m:Pal – FLEXIBLE AND FAST LABORATORY AUTOMATION

The m:Pal concept

The m:Pal (Modular Process Automation Laboratory) is a technology platform for the development and testing of devices and plants as well as for the automation of laboratory processes. The basic idea of m:Pal is to provide manufacturers of complex plants with reliable empirical data from practical experience and validation of concepts at a very early stage of development, thus enhancing planning security and efficiency.
The result is cutting costs for development and in respect of the operation of the subsequent plant, for system errors can be detected early and avoided.
The technical realization of the m:Pal platform is based on the segregation of the processes and functions occurring in the subsequent plant in the form of modules. Any complex automation solution can be realized by interlinking the modular functions within the superordinate control architecture.

Module library and modular principle

The Fraunhofer IPA has a comprehensive module library for the presentation and automation of biotechnical production and laboratory processes which is steadily extended. The range of available modules comprises among other things transportation modules with a positioning accuracy in the micrometer range, media supply facilities as well as several metering systems for liquid handling. Both conventional needle and magnetic valve systems and contactless piezo-electric printing processes for drop by drop dispensing low-viscosity fluids with a voluminous accuracy in the nanolitre range and displacement process for dispensing highly viscous fluids are available.

Moreover, control systems accomplish an uninterrupted process monitoring and quality assurance. An incubator and internally separable clean room areas also meet special requirements regarding air conditioning and sterility.

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Interactive module recognition of the control architecture easily permits a custom-designed combination of any optional modules according to the modular conception.

Visual real-time programming and simulation of process operation

A visual programming in real time allows an intuitive process planning. According to the rule "What you see is what you get" (WYSIWYG) in a 3-D environment, virtual models of the modules can be given a three-dimensional layout on the virtual model of the m:Pal platform. The complete access of the planning and configuration tool to the dimensions, functions and performance parameters of the modules hereby eliminates inconsistent solution concepts already in the planning phase.

After a one-time configuration of the particular operating parameters of the single modules and after defining the steps of the process a corresponding process run can be repeated on demand.

Flexible laboratory automation

The m:Pal platform is characterized by a high adaptability along with a short setup time. The number of viable process operations and hence the number of applications is quasi unlimited.

Likewise, the modular architecture involves a high adaptability and flexibility. By exchanging single modules or modifying the module configurations both optimizing steps in process operation and rapid responses to product modifications, changes in process run and in laboratory process reports are applicable.

Production processes or laboratory processes can be automated step by step. Based upon an existing set of modules the degree of automation of a process run can be extended by adding more modules. By this means, an upscaling of the throughput can be achieved. The integration of additional modules hereby is supported by the standardized communication interfaces and by interactive module identification.

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