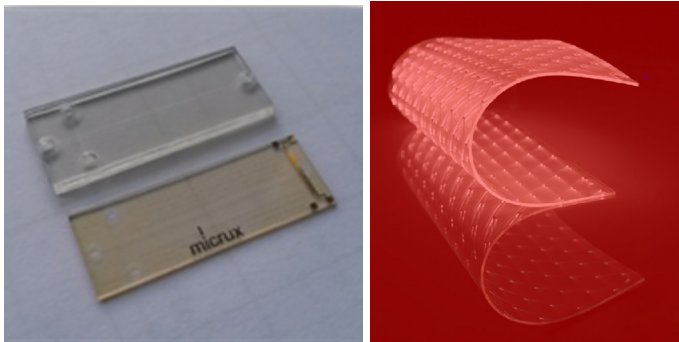


SMART production of microsystems based on LAMinated polymer films

Modular equipment setup for flexible, scalable manufacturing of small and medium series

The results of the technology evaluation as well as the conceptual approach again influence the design of the SMARTLAM equipment prototype building on state of the art and beyond concepts for equipment system integration.

It mirrors the requirements of the modular 3D-I approach and is again building on a modular approach with standardized interfaces for hardware, control and information.



Smartlam Demonstrators

Seamless Data Integration for faster time to market

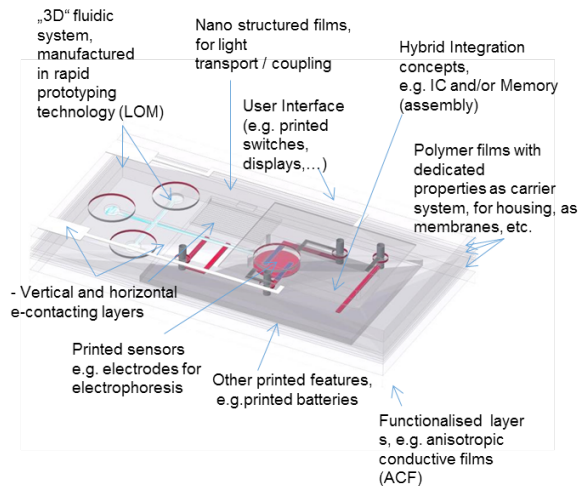
In SMARTLAM a knowledge based CAPP (computer-aided process planning) system, which includes a feature based design tool, significantly reduces the configuration times of new manufacturing platforms. This is achieved by minimising the risk of human error and automatic identification of machining parameters.

SL SMARTLAM in a Nutshell

The SMARTLAM 3D-Integration approach combines a set of key enabling technologies to allow for rapid prototyping of manufacturing of smart microcomponents:

- polymer films with novel material properties
- state of the art, scalable “digital” technologies such as aerosol jet printing, lamination and laser based micro milling, welding and surface functionalization, concepts for hybrid integration
- novel concept for application modeling, prove and re-
spective process model execution along a seamless data integration software framework

The resulting modular equipment system will be available from autumn 2015 on.



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A NEW PARADIGM FOR SMART MICROSYSTEM INTEGRATION

BUILDING ON DIGITAL MANUFACTURING TECH- NOLOGIES



SMARTLAM is funded by the European Commission under
FP7 Cooperation Programme Grant agreement No. 314580.

www.smartlam.eu

3D-I-Approach

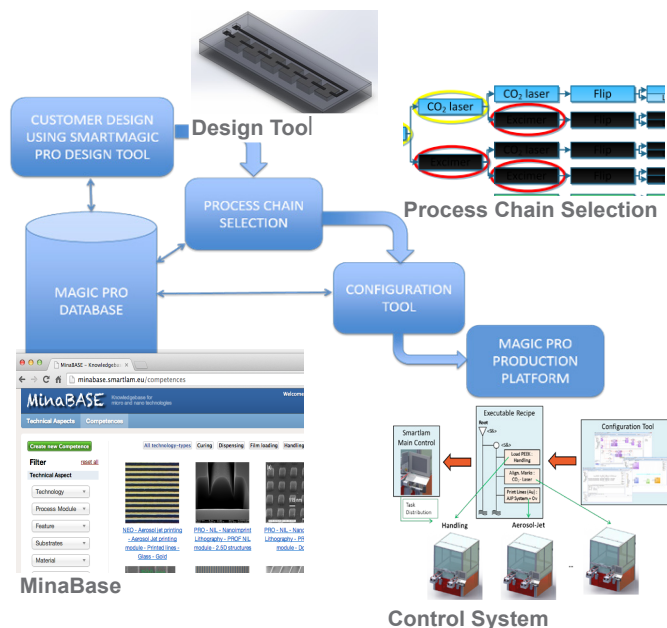
New conceptual approach for modelling of layer-by-layer manufactured devices

The SMARTLAM design approach builds on the perception that most applications can be designed using modular building blocks with dedicated process sequences for each functional element – the 3 dimensional integration (3D-I) approach. Thanks to the seamless data integration concept the users can directly:

- model SMARTLAM compatible microcomponents
- receive a consistency feedback

On the order processing side the data will be

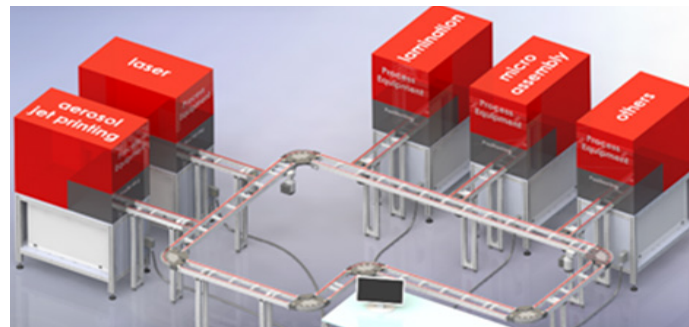
- automatically transferred into machine control data for the manufacturing process
- model execution will be monitored within forte, a high level framework for exchange of manufacturing information using standardized interfaces



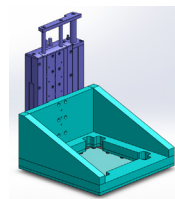
Flexible scalable manufacturing approach

Adaption of technology modules according to the requirements of a "SMARTLAM-compatible" production SMARTLAM pays specific attention to the evaluation and adaption of technologies available to the consortium with respect to their use in process chains:

- Key modules (see list of technologies on the right side)
- Standardized interfaces for logistics and exchange of modules have been developed allowing for an easy exchange of modules, when necessary

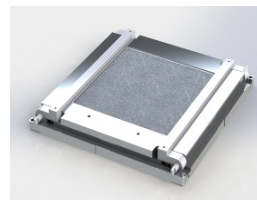


Smartlam Manufacturing Line



Glass Gripper

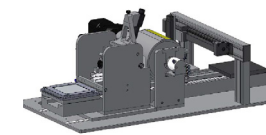
The gripper module is part of the laser welding cell and is used to stack polymer sheets.



Work Piece (WP) Carrier

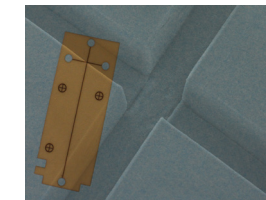
The carrier is part of the transfer system and is designed according to DIN 32561. To allow planar clamping a vacuum based solution is realized.

Equipment modules



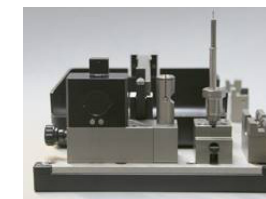
Laminator

The lamination cell provides a fully implemented scenario for film handling, positioning and lamination.



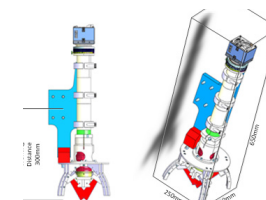
Laser milling module

The UV excimer laser milling module is used for a high flexible manufacturing of functional microstructures in material surfaces and devices.



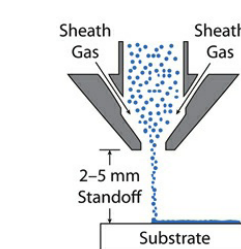
Assembly Cell

WP pallets are commonly used to transfer workpieces in automated, semi-automated as well as manual assembly and manufacturing lines.



Inspection

The inspection system is able to adapt to different products and therefore different error sources.



Printing Module

The Aerosol Jet Technology delivers the unique ability to print fine-feature electronics and structural and biological patterns onto almost any substrate.