EADTC

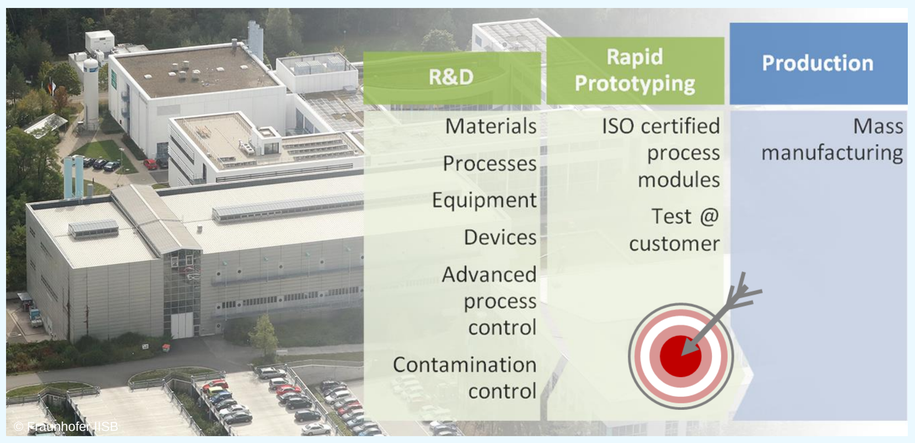
European Advances in Digital Transformation Conference

Smart Platform For Rapid Prototyping

A first solution approach to improve time-to-market in low-volume device fabrication

Explanation of the Idea

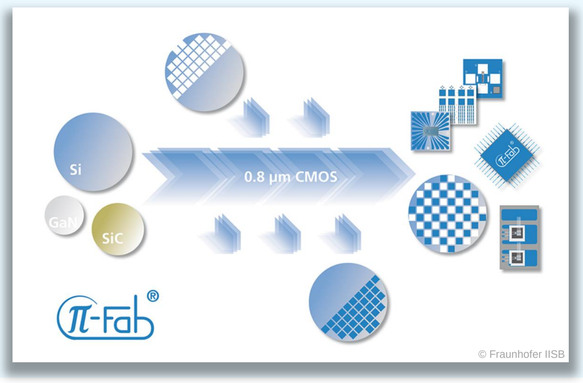
- Demonstration of a smart (“digital twin”), effective and flexible platform for prototype device fabrication
- Smart combination of existing know-how and proven process/ device modules with “on the fly” R&D results in order to accelerate the transfer of process development to ISO-certified production
- The manufacturing environment of π-Fab® – run by Fraunhofer IISB – serves as use case to demonstrate iDev40 R&D results.



Key Benefits

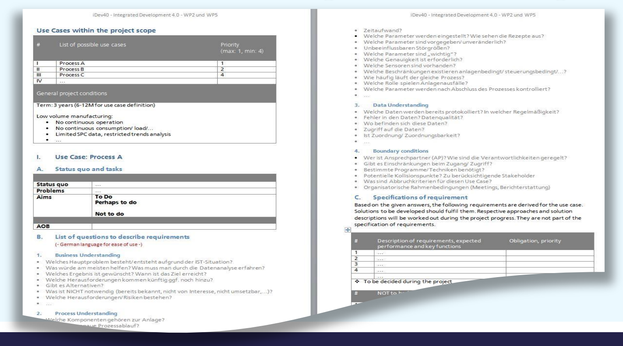
- Creation of new perspectives for the prototype fabrication of small lot-size with high product diversity on different substrate materials
- Speed up of the value chain in low-volume manufacturing

Integration-time for newly developed processes



Current Status

- First solution approach to evolve the π-Fab towards a smart platform for rapid device prototyping available
- A statement of requirements survey including various stakeholders yielded in a differentiated understanding of issues to be addressed to augment existing elements



Additional Information

- Daily business @ π-Fab and challenges involved:
  - Continuous silicon CMOS and silicon carbide process line in an industry-compatible environment offering prototyping services and low-volume manufacturing for electron devices (power devices, CMOS devices, passives, sensors, MEMS)
  - Flexibility as a matter of principle: π-Fab handles various wafer sizes and types, the customer may determine the points of entry and exit from the process line
  - Multiple customer requirements to be met w.r.t. broad variability of materials, processes, device layouts, functionalities
- R&D activities appropriately focus on this specific concern (see figure for details).

	1. The Virtual Factory Cluster	2. Smart Experiments	3. Real Time Control and Planning 4.0
	Data-driven strategies for optimized wafer container management **APC-strategies per process in rapid prototyping**	**Smart experiments in the context of rapid device prototyping**	**Smart logistics and flexible manufacturing control for rapid prototyping**
WORK PLAN			
ACHIEVEMENTS	• Data and corresponding data-bases for statistical analysis of wafer contamination identified • First investigations started based on data sets of three different data bases provided by Infineon Dresden	• Most promising application identified: Etch equipment • First data sets available • First concept for “smart experiments” developed	• Functionalities and require-ments for smart logistics and flexible manufacturing control concepts (e. g. adaptive process flow planning/ execution based on real-time experiment results) defined
CURRENT ACTIVITIES & NEXT STEPS	• Modeling of wafer container contamination behavior depending on lot process flow and transportation routes • Starting actual APC-strategy development	• Data analysis • Refinement of “smart experiments” concept • Approach alignment with project partners	• MES specification and evaluation considering specified functionalities and requirements

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