

AUTOMATING LEGACY SEMICONDUCTOR FABS LIFESPAN EXPANSION MADE IN SAXONY

Jan Klinger, VP Sales & Business Development





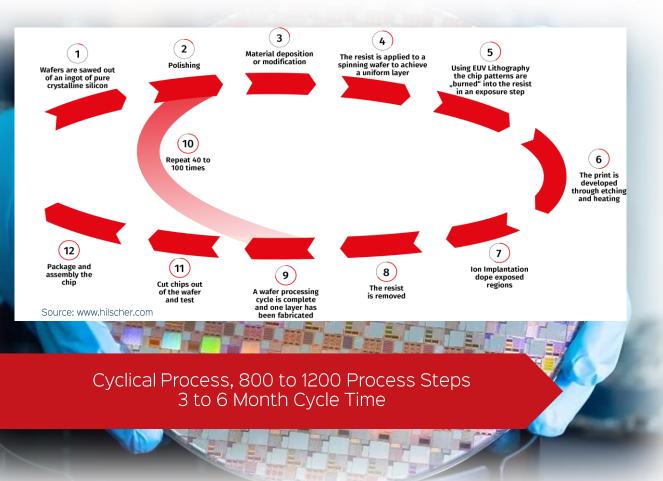


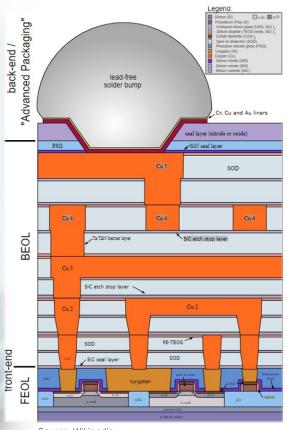
OUTLINE

- 1. What are Legacy Fabs?
- 2. Challenges of Legacy Fabs
- 3. Automation as a Key
- 4. Best Practice Example
- 5. From Saxony into the World

SEMICONDUCTOR MANUFACTURING

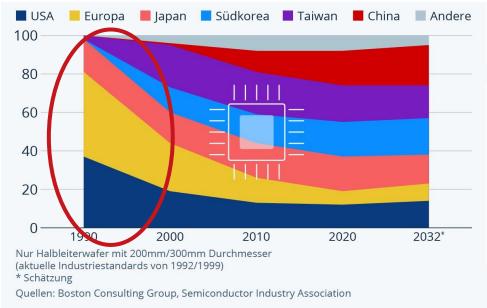


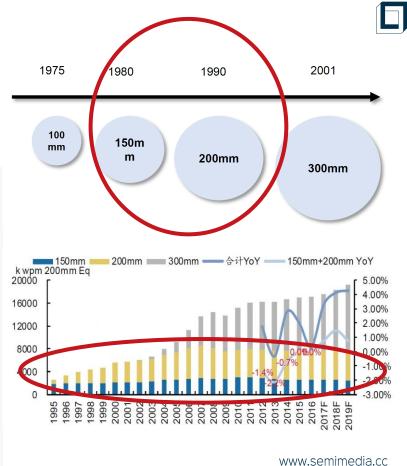




LEGACY FABS

- ▶ Semiconductor factories built before the year 2000
- ▶ Wafer sizes: 150, 200 mm
- Primarily built in the USA, Japan and Europe





LEGACY VS. MODERN FABS







Source: EE Times

Source: Globalfoundries

EVERY DAY PROBLEMS OF LEGACY FABS

- Outdated Technology and Equipment
- ▶ Lower Yields ,Human Factor'
- ▶ Higher Operating Costs:
 - Increased Maintenance
 - Manual Operation
- ▶ Lower Overall Efficiency
- ▶ Limited Flexibility in Production
- Paper-based WIP Tracking
- ▶ Talent Shortage





OLDIE BUT GOLDIE



- ▶ Local Supply Chain Re-establishment
- ▶ Relevance of Older Technologies
- ▶ Specialization Benefits
- ▶ Stable Demand in Mature Markets
- ▶ Fully Depreciated
- Sustainability



HOW DO WE MAKE LEGACY FABS COMPETITIVE AGAIN AND THUS EXTEND THEIR LIFESPAN?

MODERNIZATION THROUGH AUTOMATION

▶ Benefits of an automated material flow are widely recognized

No Lot Searching

Faster Leadtimes Repeatability **Speed** Controlled cycle time Accelerated and flexibility technology learning through intelligent dispatching through integral data analysis and automatic execution Improved process stability Efficient equipment usage through intelligent control and and yield through automated feeding. automated feedback loops. Cost Quality Saving of Operator Time Less Excursions

Enhanced **Cost Efficiency** through automatic execution.

Increased **line yield** through fault detection and exclusion of human error.



CHALLENGES ON THE PATH TO AUTOMATION



A longer history creates a complex environment



Infrastructure

- Buildings, tool layout, material flow – semi optimized over time
- Documentation can be patchy
- Many generations of "anything"



Source: Wikipedia

Factory Integration

- Solution landscape very diversified
- Often solution islands
- Various generations
- ...and still growing...



Operational Processes

- Driven by experience and expertise
- Often not documented
- Differences between shifts/teams
- Automation addresses "Good case"



Resources

- Retrofitting written-off technology has challenges justifying
- Re-engineering of legacy technology is time consuming

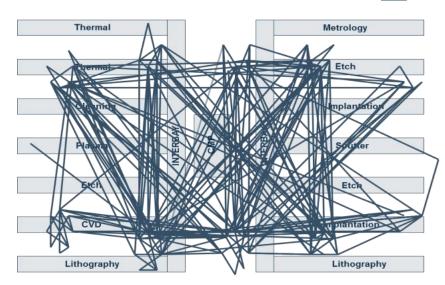
CHALLENGES ON THE PATH TO AUTOMATION



A longer history creates a complex environment

- Historically Grown Layout & Confined Spaces
- Manually Operated Non-Standardized Tools
- ▶ Cleanroom Class: up to ISO 3
- ▶ Wafer Transport: Open Cassettes, SMIF Pods, Boxes

Typical Material Flow in a Legacy Fab – non-optimized



Biggest Challenge: Automate the Fab while in Operation!

Basically an 'Open Heart Surgery'....

STEP-BY-STEP APPROACH TO AUTOMATE



MES* and





Digital material identification and tracking

STEP-BY-STEP APPROACH TO AUTOMATE



Paperless production

STEP-BY-STEP APPROACH TO AUTOMATE



Material transport partially automated





Fully automated dispatching & transport

STEP-BY-STEP APPROACH TO AUTOMATE





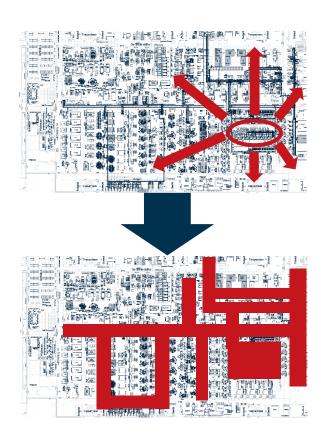
'Lights-out Fab'

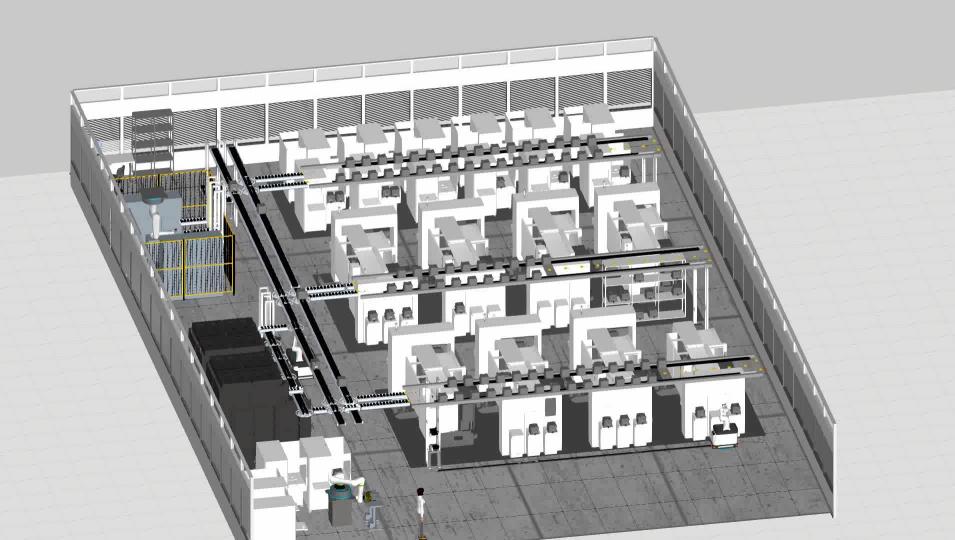
STEP-BY-STEP APPROACH TO AUTOMATE



- 1 Identifying and Definition of Key Parameters (Interbay/Intrabay)
- Evaluation of Potential per Area (e.g. HC, Utilization, Cycle Time, ...)
- 3 Analysis of Focus Area / Feasibility Study
- 4 Development of Technical Concept
- 5 Implementation of First Application
- 6 Gather Experience
- 7 Continuous Improvement & Further Development
- 8 Expand Automation Area by Area

Start with a Pilot Area! Expand Step by Step!





FABMATICS

Material Handling Automation for the High-Tech Industry













STORAGE





One-Stop-Solution Provider for **Fully Integrated Fab Automation**

FACTS

- Founded in 1991
- About 350 employees
- Headquarters in Dresden (GER), Subsidiary in Utica, NY (USA), Representations in Taiwan, Singapore, Japan

SECTORS

- Electronics
- Cleanroom
- About 100 customer sites



AUTOMATION COMPETENCE FROM SAXONY



Automation Network Dresden















January 30 - 31, 2025 Dresden, Germany



Source: Automation Network Dresden



THANK YOU

Fabmatics GmbH

Zur Steinhöhe 1 01109 Dresden / Germany +49 351 65237-0 info@fabmatics.com www.fabmatics.com

Member of



CONFIDENTIALITY NOTICE:

The information contained in this presentation is strictly confidential. The presentation may not be distributed, published or reproduced in whole or in part, nor may the content be disclosed to any third party. By receiving this presentation, the recipient agrees to maintain the confidentiality of the presentation.