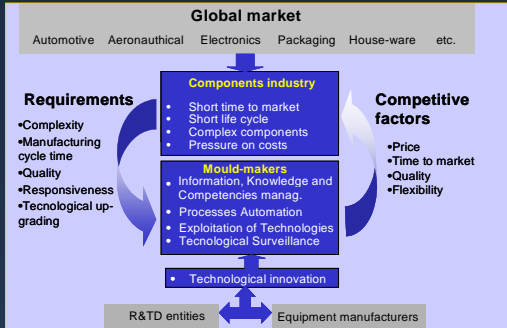


Lean and Agile Manufacturing in Mould Making Business

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Diagnosis of the Mould Making Business

Synergies in the mould sector



Portuguese Mould Making Scenario

"Small but important differences"

- Unique competences in the design and manufacturing of high complexity moulds.
- **Emphasis on:**
 - Experience in design and technologies
 - Smooth and long-term relations with clients
 - Perspective of engineering service providing
 - High productive flexibility

Strategies to improve competitiveness

- **Optimistic strategy:**
 - The Portuguese industry has unique and valuable characteristics to overcome competitiveness challenges
 - Flexibility, Experience and Service to Customer
 - Increase of mould value:
 - Increase of mould functions (client needs fulfil, delivery time reduction, mould in-service guarantee, etc.)
 - Reduction of manufacturing costs (reduction of wastes)
 - Average productivity indexes are acceptable
- Increase competitiveness through the increase of mould overall value
 - Increase competences in flexibility, know-how and service to customer and simultaneously
 - Decrease mould cost and delivery time
- **The tool: Lean Manufacturing**

The purposed LM model

LM Model and the Mould Sector

Level	Strategic	Management	Operational
Concepts and Tools	• Lean Thinking	• Value Stream Mapping • Continuous Improvement • People empowerment • TPM • JIT	• 5 S • Teams • SMED • Visual controls • Point of use storage • Standardized work • Quality at the source • Pull/kanban • Cellular flow • Error-proofing
Type of change	Cultural Change	Management Change	Procedures Change

Moulds sector feelings

- It doesn't apply to us!
 - We are different!
 - We don't produce hundreds parts per day!

Actually, the L.M. Model should be adapted to moulds sector.

Keeping Concepts and Using Different Tools

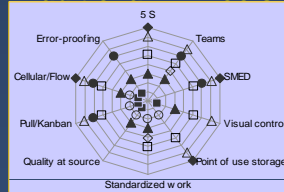
Lean Tools for the Mould Sector

Simultaneous Engineering Internet-based manufacturing Best-Practices of planning Autonomation

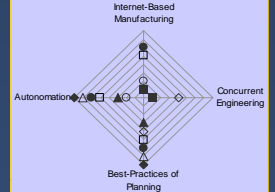
- Interaction with the client
- Agility of design
- Team work
- On-time information
- Remote access to information
- Communication and interaction with the client
- Planning after completed concept design
- All components lead time known
- Written planning procedures
- Procedures classification
- Automation
- Autonomy
- Adaptive control systems
- Process robustness and capability

Relation between Lean Tools

Traditional LM Tools



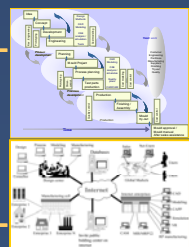
LM Tools for Moulds



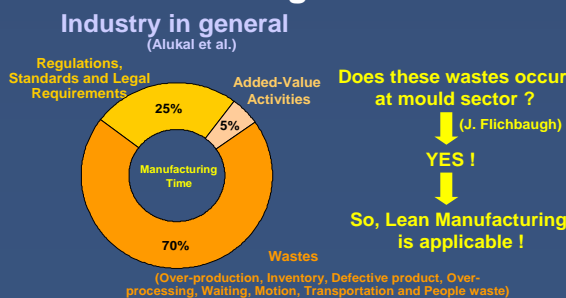
□ Waiting Waste ● People Waste • Over-Production ○ Inventory Waste
 △ Motion Waste ◆ Transportation Waste ▲ Defective Products ◊ Over-Processing

LM Model for Mould Making

Level	Strategic	Management	Operational
Concepts and Tools	• Lean Thinking	• Value Stream Mapping • Continuous Improvement • People empowerment • TPM • JIT	• Concurrent engineering • Internet-based manufacturing • Best-practices of planning • Autonomation
Type of change	Cultural Change	Management Change	Procedures Change



Lean manufacturing and the wastes



Conclusions

- Lean manufacturing concepts and aims match mould making business competitiveness factors.
- The limited expansion of L.M. at mould making can be attributed to the inadequacy of the traditional L.M. tools to the sector' specificity.
- The purposed model keeps L.M. concepts and aims, purposing tools accepted and compatible with mould making business.
 - Autonomation
 - Internet-based manufacturing
 - Best-practices of planning
 - Simultaneous engineering