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FUTURE STRATEGIES FOR THE TOOL AND DIE INDUSTRY

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ABSTRACT

Tool and die manufacturing occupies a key position in the industrial value-added chain. Companies producing tools and dies find themselves in an area of conflict between narrowing internal and external boundary conditions. Successful strategies in this complex and dynamic environment are hard to detect. Through an analysis of benchmarking figures from an industry sector-specific database trends and success factors of tool and die industry as well as differentiating features between successful and less successful tool and die companies could be determined. A systematic approach for the transformation of these successful patterns into company-specific strategies is described.

KEYWORDS: Tool and Die Industry, Benchmarking, Strategy, Trends, Success Factors

INTRODUCTION

Tool and die manufacturing occupies a key position in the industrial value-added chain. The effectiveness of this sector exerts considerable influence on the competitiveness of production companies [1,2]. On the other hand the tool and die manufacturing is in an area of conflict between external and internal boundary conditions. External boundary conditions are high pressure of time and cost as well as high quality standards caused by fierce competition, new technological developments and a lack of qualified personnel. Internal boundary conditions are a complex production of unique tools for a high product

spectrum which is disturbed by a high percentage of alteration orders, repair orders and rush orders. These conditions lead to high turbulence in the work environment (fig. 1).

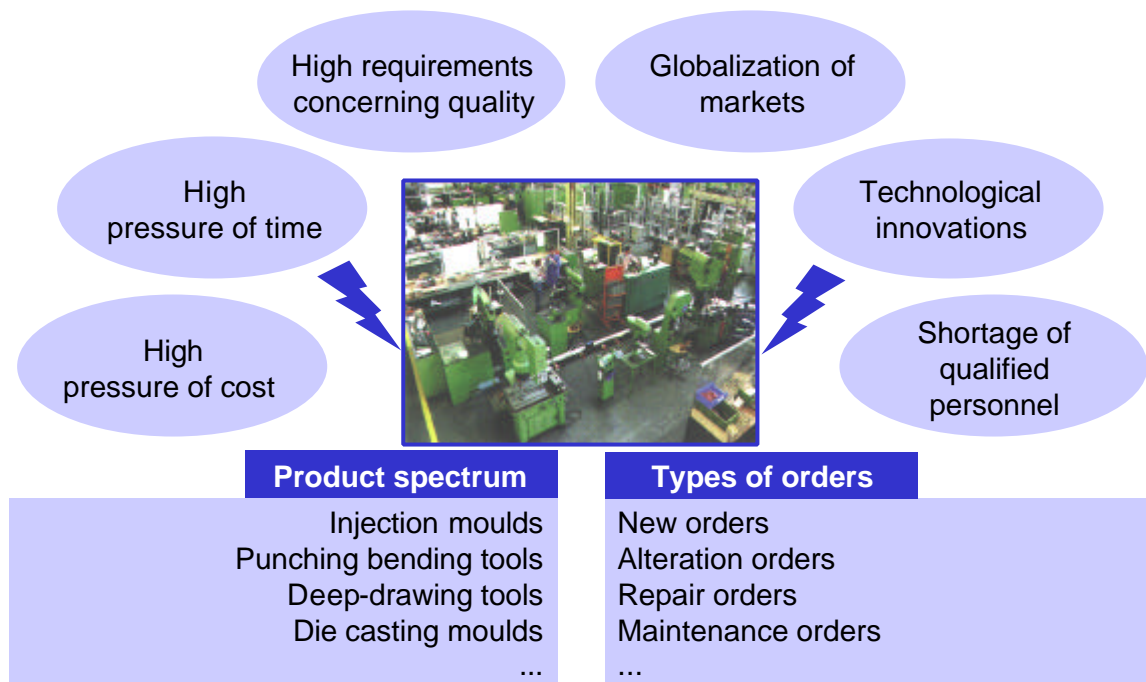


Fig. 1: Boundary conditions of tool and die industry

Strategies in tool manufacturing focus on the range of products and services, locations, process organisation and organisational structure as well as resources required. In this context it is important to strive for the overall optimum solution by applying successful strategies to the tool manufacture. This leads to the question what are trends and success factors in tool and die industry and how can they be helpful in finding successful strategies.

TRENDS AND SUCCESS FACTORS IN TOOL AND DIE INDUSTRY

To answer this question a benchmarking system for the measurement of performance in tool and die shops has been developed at the Laboratory for Machine Tools and Production Engineering (WZL) of University of Technology Aachen. In the course of numerous benchmarking projects a database was filled currently comprising benchmarking figures of approximately 50 sets of data from various tool and die companies in Germany and abroad. The approximately 150 benchmarking figures describe parameters for effectiveness and efficiency (performance parameters) as well as different parameters by which the performance of a tool and die shop can be influenced (influence parameter). Furthermore WZL joined forces with the Fraunhofer Institute of Production Technology (IPT) in the business sector *aachener werkzeug- und formenbau* to combine the organisational and the technological view on tool and die making [3].

Various statistical analyses comprising trend analyses and correlation analyses have been conducted to find trends and success factors of tool and die industry in the database. These analyses showed clear trends over the last seven years. For example the work hours personnel in design and process planning have increased (fig. 2). Moreover the percentage cost in metal cutting has increased significantly. This leads to the conclusion

that manufacturing quality has increased due to new efficient manufacturing technologies and a continuous CAD/CAM-chain. This is supported by an increased usage of CAD-systems and an increased percentage of programming during the use of the machine. Furthermore the increase in both utilisation of personnel and equipment indicates that new forms of organisation of work concerning multi-machine handling and manless machine running time have been successfully implemented. A declining percentage of cost for external services and a growing percentage of cost for material (including purchased tools) show the tendency of insourcing core processes and outsourcing non-core products. Altogether an increase in productivity can be observed [4].

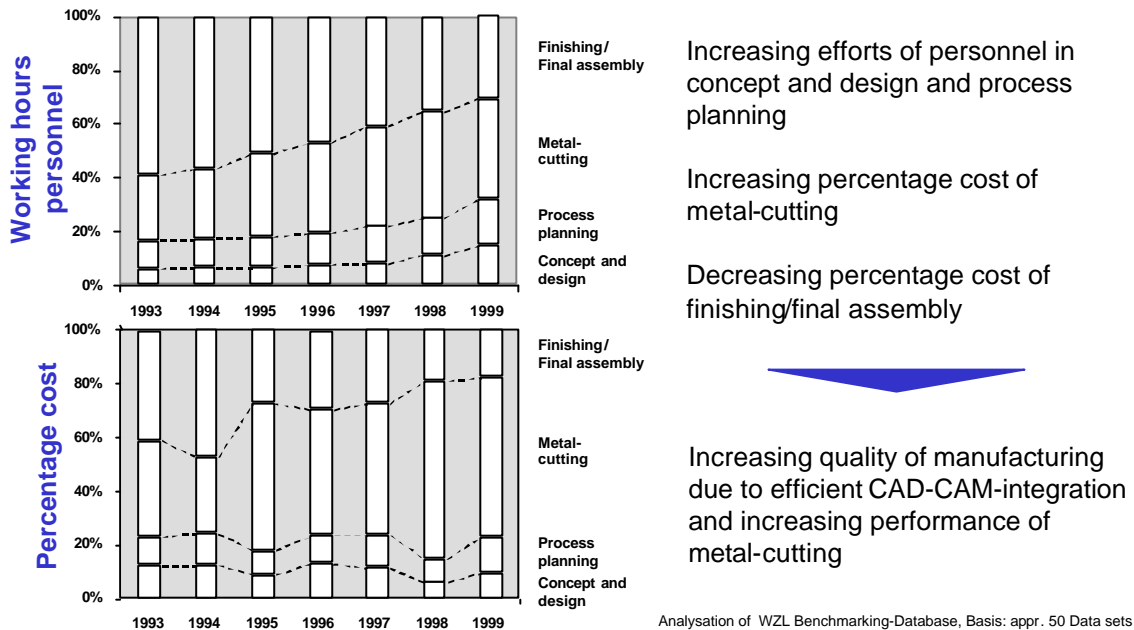


Fig. 2: Trends in working hours personnel and percentage cost

A statistical analysis of the correlation between 30 influence parameters (e.g. CAD quota) and 5 performance parameters gives a first hint at promising strategies. The most promising strategies can be classified under five success factors (fig. 3)[3]:

High motivation of personnel

Highly motivated personnel is the basis for a successful company. Motivation is indicated by a low quota of absence and high commitment.

Concentration on core competencies

An optimisation of the depth of the value-added chain ensures the effectiveness (“doing the right things”) of the company and is a prerequisite for the efficiency (“doing things the right way”).

High efforts in early phases

In the early phases of the process chain a high percentage of cost for products and processes is determined.

Continuous investments / Modern machinery

Continuous investments are necessary to keep the machinery up to date. The adequate degree of automation offers opportunities for rationalisation.

Adequate NC-programming strategy

An adequate NC-programming-strategy increases the throughput resp. the utilisation of machines which leads to a reduced hourly rate.

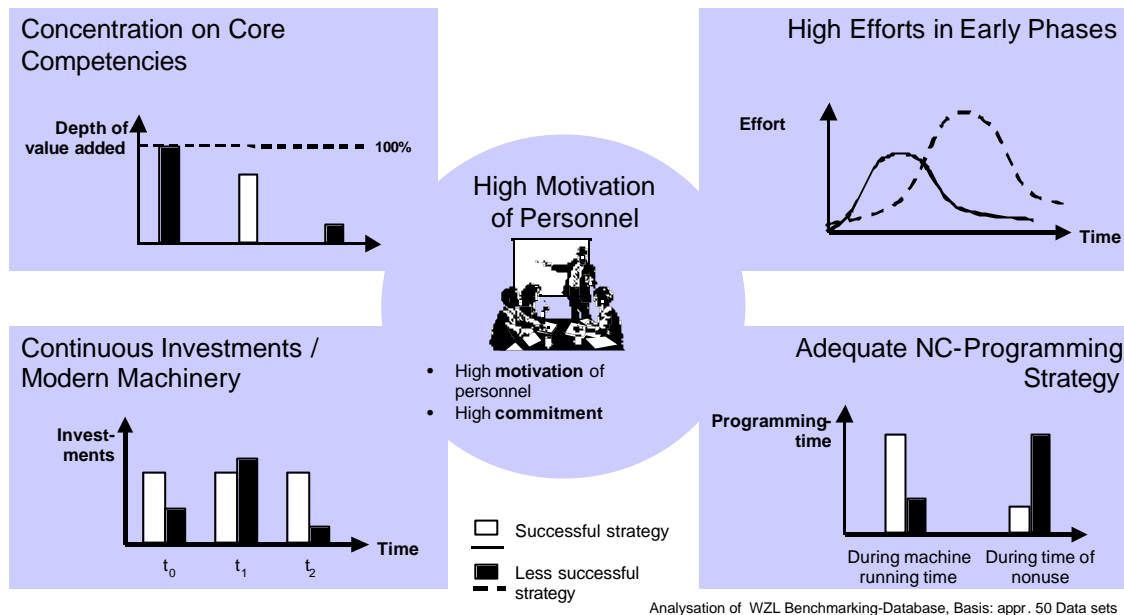
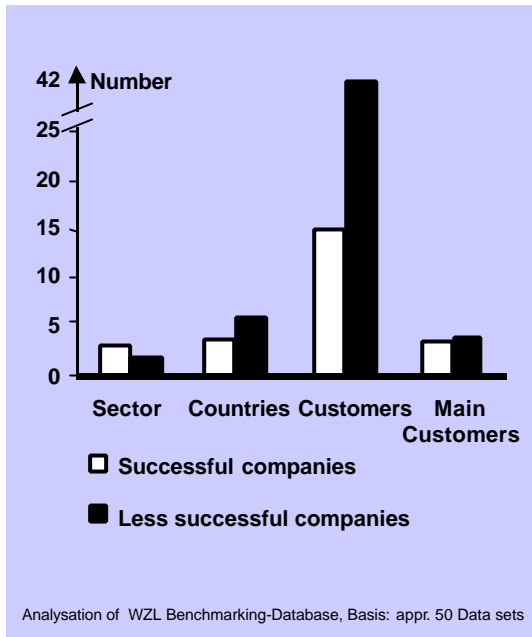


Fig. 3: Success factors in tool and die industry

SUCCESSFUL STRATEGIES IN TOOL AND DIE INDUSTRY

From the benchmarking figures turnover profitability, return on investment, turnover development and capital turnover which on the whole indicate profitable growth a normalised indicator was calculated. With the aid of this indicator the companies from the WZL database were clustered into three groups. The group containing the 25% best performers and the group containing the 25% worst performers were used for further analysis. The averages of all 150 benchmarking figures for both groups were calculated and compared. The comparison clearly showed successful patterns. This is subsequently described using two examples.

Successful tool and die companies concentrate on the essential and thereby focus on a selected circle of customers (fig. 4). The number of supplied countries as well as the number of customers resp. main customers of successful companies are noticeably lower. Furthermore successful companies offer their customers core products and services where a competitive advantage concerning knowledge exists. Concerning order processing successful companies make the demands of the customers their straightedge for time, cost and quality.



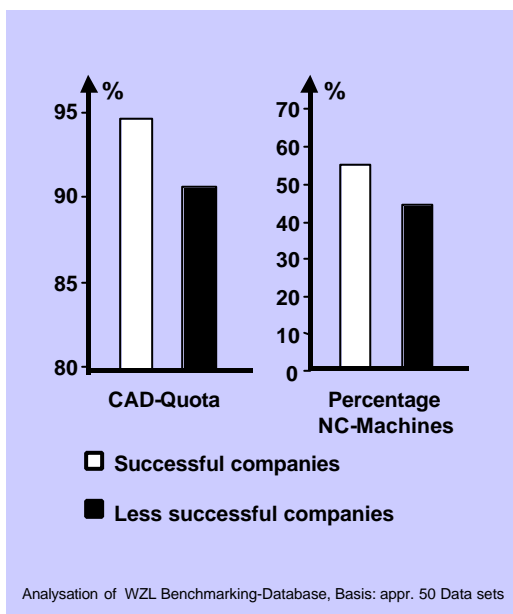
Smaller number of supplied countries and number of customers resp. main customers at successful companies



Focus on Selected Customers

Fig. 4: Example of a successful pattern: focus on selected customers

By a high percentage of computer-aided design with CAD-systems and a high percentage of central NC-programming successful companies realise a continuously computer-aided process chain. Less successful companies on the other hand have no clear preference concerning programming strategy but seem to use the different types of programming unreflectedly. Especially programming during the standstill of the machine is aligned with high cost and therefore not modern anymore.



Higher percentage of CAD-quota (number of designers with CAD) in successful companies

Higher percentage of NC-machines in successful companies



Continuous CAD/CAM-Chain

CAD: Computer Aided Design

CAM: Computer Aided Manufacturing

NC: Numerically Controlled

Fig. 5: Example of a successful pattern: continuous CAD/CAM-chain

STRATEGIC ORIENTATION FOR TOOL AND DIE INDUSTRY

The strategic orientation of tool and die shops demands the adoption of a systematic and methodical approach in order to ensure that adequate account is taken of company-specific boundary conditions such as core competencies, technologies and capacities. The *aachener werkzeug- und formenbau* has been addressing this issue for several years and has developed and tested an approach, that is geared to cover strategic potential into practical success (fig. 6) [5,6]:

1. Determine the future requirements for tools
2. Identify strategic areas of business in tool manufacture
3. Define the core areas of expertise and core processes in tool manufacture
4. Quantify the capacities in tool manufacture
5. Define the organisational structure for tool manufacture
6. Plan implementation

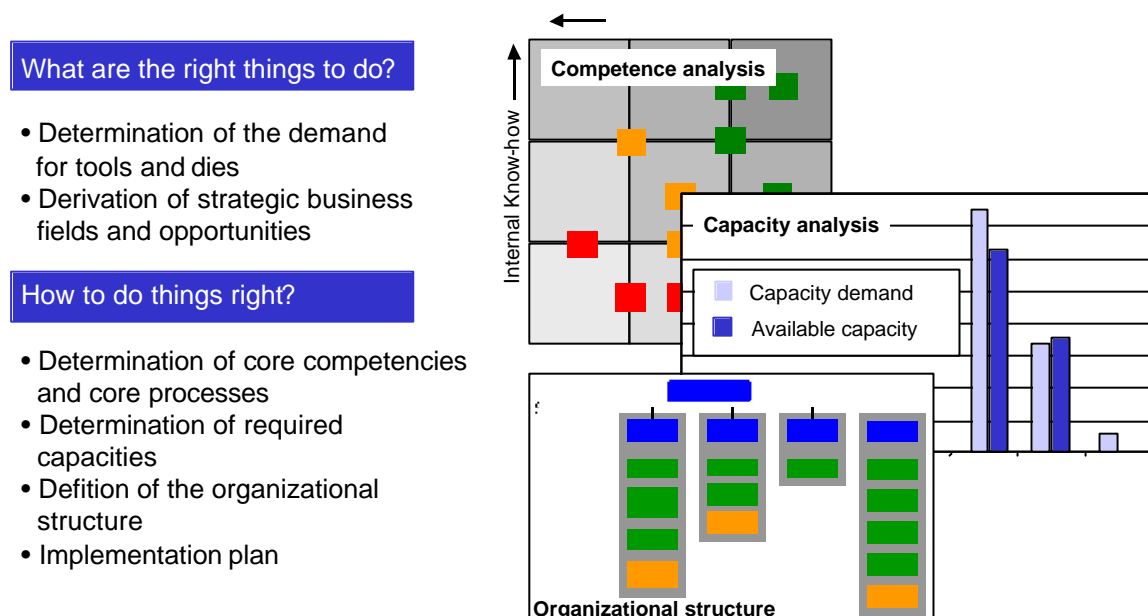


Fig. 6: Company-specific strategic orientation

The strategic orientation of tool manufacture offers significant qualitative and quantitative potentials as shown by examples of projects conducted by the *aachener werkzeug- und formenbau* (fig 7):

Qualitative Potentials

Strategic orientation presents opportunities to identify future market developments, to ensure future-oriented organisation and positioning of the tool manufacture as well as considerable increases in innovative strength, reaction speed and in the ability to meet deadlines.

Quantitative Potentials

Lead times can be reduced by up to 25%, machining times in mechanised manufacture by up to 60% and the hourly rate by up to 35% given consistent strategic orientation and the resultant optimisation of the relevant processes and process chains.

Potentials of strategic orientation

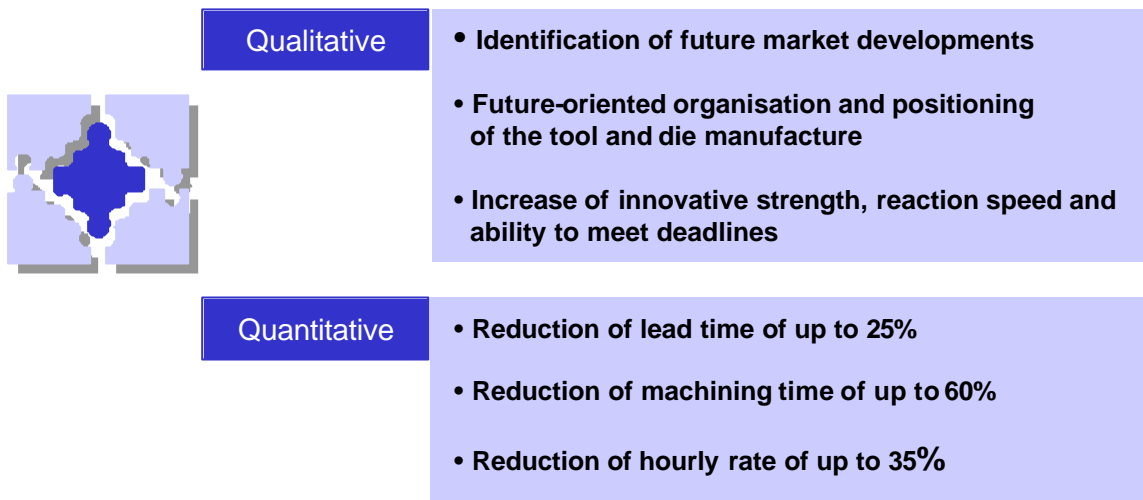


Fig. 7: Results from completed projects

CONCLUSION

The strategic orientation of the tool and die department is a requirement for long-term success of the company (fig. 8). The strict orientation according to the trends and success factors leads to specific patterns of success which can be deduced by the benchmarking figures of the database of WZL. These patterns of success must be understood and adapted to the company-specific situation. The companies in the sector of tool and die making are challenged by their complex situation to transform these patterns into individual strategies in the areas of technology, IT-infrastructure (information technology) and organisation which in combination lead to sustainable success.



Fig. 8: Conclusion

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