Successful Calculation
in Tool Making

2016

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WZL | RWTH AACHEN UNIVERSITY
WBA AACHENER WERKZEUGBAU AKADEMIE

Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University

Across the world, the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University with its 900 employees stands for successful and forward-thinking research and innovation in the area of production engineering. Active in four different fields, WZL research activities not only relate to fundamental theories and findings, but also to the application of findings in an industrial context. Furthermore, practical solutions are developed to optimize production. The WZL covers all sub disciplines of Production Technology with its four chairs of Production Engineering, Machine Tools, Metrology and Quality as well as Manufacturing Technology.

WBA Aachener Werkzeugbau Akademie

The WBA Aachener Werkzeugbau Akademie develops industry-specific solutions for the sustainable competitiveness of the tool making industry in a network of leading companies. Its activities focus on industrial consulting, further education, industry solution as well as research and development. Its own demonstration tool shop enables the WBA to test innovative approaches in the laboratory and quickly make them accessible for its partner companies. Key issues are further addressed in the current studies. These provide information about trends and developments of the market and competition.

Imprint

Successful Calculation in Tool Making

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Spotlight

For tool rooms, a successful calculation of costs is an important prerequisite for their own ability to compete. With a lot size of one, this calculation is a major challenge within the tool making industry. It is composed of a company-specific approach, a reproducible classification and an intelligent back-coupling of information. The application of established methods of calculation and the employment of efficient aids can assist the calculation process in an optimal way. In the tool making industry, an efficient calculation of costs is achieved by addressing the success factors of exactness, transparence, speed, systematization and automation.

3.3 hours

pure working time to generate a quotation

3.7 days

time until a quotation request is answered with a quotation

Tool companies with a successful calculation quickly handle and answer requests.

36 %

assignment rate

Tool companies with a successful calculation reach a high assignment rate through a fast and exact calculation.

31,500 €

investment in calculation software and further training measures in the last three years

Tool companies with a successful calculation continuously invest in calculation software and further training measures.

Initial Situation

The Golden Gate Bridge: the bridge that connects the strait between San Francisco Bay and the Pacific Ocean. It is seen as the queen of bridges and spans 1.5 km of stormy sea. It owes its erection to a mixture of idealism, technical brilliance and reckless construction work. The structure weighs 887,000 tons in total. Each of the two towers is held together by 600,000 rivets. Every day, 120,000 vehicles cross the bridge, with an approximate increase of 10 % every year.

In 1930, the city planner of San Francisco Michael O'Schaughnessy began a search for experienced engineers. The unanimous view of objection raisers and experts: A bridge over the inlet to San Francisco Bay? A thing of impossibility. However, O'Schaughnessy could not be dissuaded from the project and wrote a letter to three experienced bridge engineers asking for their opinions. While one never answered and the other estimated costs at 56 m. $, the third, American Joseph Baermann Strauss of German descent, calculated costs at 35 m. $, and suddenly had the contract.

The construction of the Golden Gate Bridge began in the January of 1933. Strauss led the construction of the bridge from the beginning until its completion in 1937. When the bridge was finished after only four years, it cost exactly what Strauss had estimated, 35 m. $, which were solely financed through bonds. The repayment of the principal and interest of 75 m. $ in total was financed through the bridge toll, with all debts paid by 1971.

Adjusting for inflation, the building cost of 35 m. $ would correspond approximately to 654 m. $ nowadays. A comparable bridge, such as the fourth Nanjing Yangtze Bridge, which opened on 2012, cost 1.1 bn. $, making it almost twice as expensive.

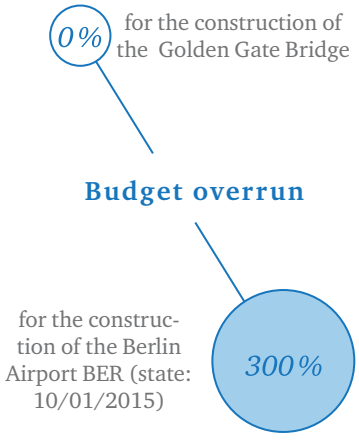
The disastrous consequences that can be caused by insufficient calculations can be seen in the construction of the Berlin Airport BER. Originally, the costs were calculated to be 2 bn. €. However, they have now ballooned to 6 bn. €, with the final cost estimated to be even higher.

Similar to the cost calculation for large-scale projects, tool rooms face the challenge of efficiently calculating costs for unique tools produced only once. Nowadays, it is crucial to calculate quickly and, above all, reliably. With a precise and quick calculation, companies can offer more competitive services.

The systematic examination of this calculation has been part of operating practice since the beginning of industrialization. At the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University there are also numerous publications, studies, research projects and research results as well as dissertations on the topic of calculation. For mass production, on which the majority of research activities and system support expenses are concentrated, the implementation of a reliable calculation is no longer a major challenge. Calculation software, which, for example, can be integrated into the enterprise-resource-planning-system, has become almost universally accepted.

In contrast to mass production, the tool making industry is characterized by a lot size of one. An optimization and methodical assistance is difficult to realize due to the high variance of the products and processes. Due to the unique character of the tools, the calculation usually is based on values obtained from experience or reference projects, which can cause quality and exactness to vary. With the rising level of global competition, this classical approach is often insufficient. The conversion rate for new tools, which is the ratio between the number of quotations and the number of accepted assignments, often lies under 15 %. Thus, with the low conversion rate in mind, the goal is to minimize the time and effort needed to create a proposal and especially the cost calculation.

Systematic methods for calculations are underused in the tool making industry. Approximately 85 % of tool rooms include estimates



from their most experienced employees in their rough calculations. In tool construction, the accuracy of the calculations based on these estimates is between ± 20 %, sometimes even ± 40 %. When comparing bid estimates and final cost, there can be deviation from - 40 to + 70 % of the originally calculated costs. Efficient aids exist only to a certain extent, despite the high demand in the tool making industry. The goal must be to noticeably reduce budget deviations and to eliminate large fluctuations. In particular, downward deviations can lead to existence-threatening funding gaps.

In order to stay competitive as a tool rooms in the future, it is vital to consider several factors of success: exactness, transparency, speed, systematization and automation. Simultaneous addressing all factors helps to reduce time and money needed in the medium term, while also sustainably increasing the process efficiency.
The study on hand shows recommendations for actions with which the named success factors can be addressed. The statements made are based on the benchmarking database of the WZL, which has over 1000 current data sets from tool rooms that are not older than 5 years. Furthermore, anonymized data of tool rooms from the WBA Aachener Werkzeugbau Akademie out of bilateral and consortium projects as well as survey results about tool cost calculation are utilized. Moreover, the study includes a market report about software systems, containing a detailed look at their performance profiles of the software providers that are suitable for tool cost calculation. Hence, the study gives a stimulus for the sustainable increase of competitiveness with the help of a precise and quick calculation and can be used as the basis for the selection of a software solution.

85 %

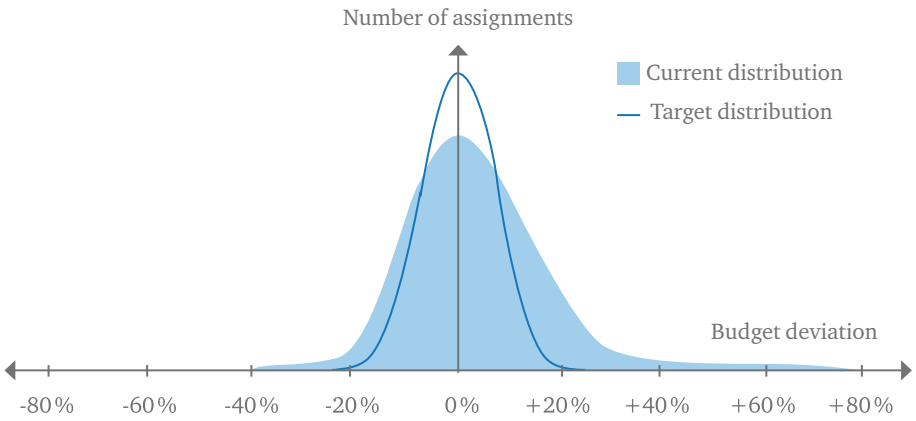
of all tool rooms use estimates from experts as their calculation method

+70 %

Budget deviation between bid estimates and final cost

-40 %

Budget Deviation of Assignments Undertaken



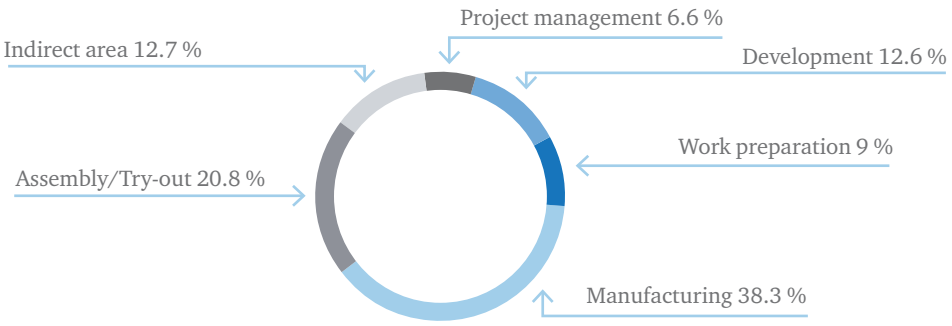
Basics
of Cost Calculation

Due to typically small production lot size in the industry, many tool rooms have difficulties in calculating the cost of their tools. A systematic calculation process often is not present throughout all phases, so that a price is usually determined on the basis of experience. This “calculation” leans more on a rough estimate made by the responsible employee regarding needed raw material, process time for each technology and cost of external services, than on the existing data from completed projects. These estimates are, by comparison, not very reliable, since usually there is no (continuous) documentation of data from past tool projects available.

In many tool rooms there often is no conscious knowledge of the total production costs of a tool along the whole value-added chain. It is clear that more than half of the incurred expenses originate in manufacturing and assembly/try-out. However, the areas of development, work planning and scheduling and last but not least the indirect areas can significantly influence the production cost of tools.

For tool rooms it is of central importance that a cost calculation is based on valid data and is not solely concentrated on tool manufacturing. Therefore, the existence and assessment of existing calculation methods as well as an understanding of the calculation process are essential. Tool rooms will also profit from an industry-specific calculation model for the tool making industry.

Distribution of Costs along the Value-Added Chain



Process

[A systematic process is the foundation of a successful cost calculation]

Tool cost calculation depicts a continuous process that reaches from the customer request until the tool is put into operation in the customer's production process. The process of tool cost calculation can be divided into three areas: quotation, ongoing cost calculation, and post calculation.

Quotation

In the context of the quotation, the price for the tool requested by the customer, or rather the tool needed to manufacture their final product, is determined for the first time. The quotation price is a central part of a complete quotation, alongside the technical description of the solution, the delivery date and other general or specific conditions. A requirement for a realistic calculation is the examination and evaluation of the request. In this regard, before even the technical design is identified, the first criteria that should be assessed are feasibility, desirability and strategic importance. After the quotation price is generated, all essential elements are documented and it is sent to the customer via the sales department. Nowadays, the documentation is principally carried out as an "open-book cost calculation", which leads to a high price transparency for tool components or processes.

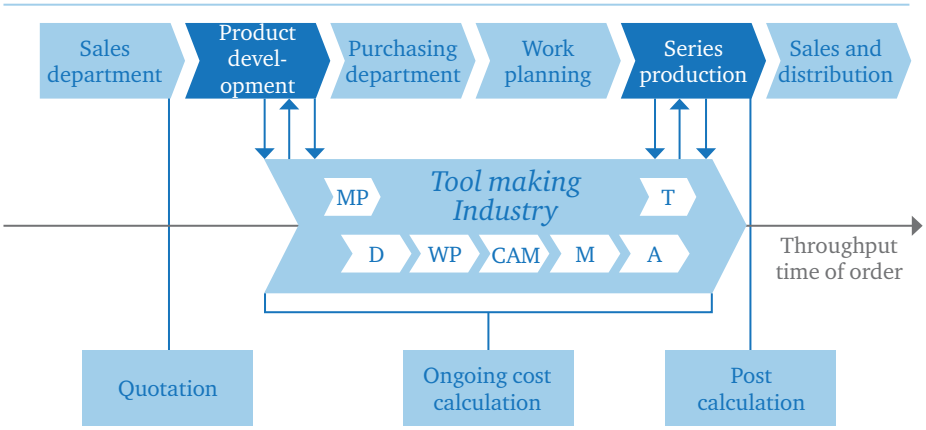
Ongoing Cost Calculation

After the contract is awarded by the customer and parallel to the start of the tool production, the ongoing cost calculation begins. During the manufacturing phase of the tool, the actual work hours (of personnel and machine) incurred are expensed and thus captured simultaneously. Through a continual comparison of calculated costs and already performed work hours, a concurrent cost calculation is created. Hence, there is a daily controlling of budget exceedance or under-usage in all areas that are part of tool production.

Post Calculation

The final costing occurs after the completion and delivery of the tool to the customer. If the tool rooms already implemented a continuous interim cost calculation, the planned and actual costs only need to be compared. Otherwise, the work hours need to be reported individually and then compared

Chronological Arrangement of Tool Cost Calculation



MP = method planning / D = design/ WP = work preparation/
CAM = programming/ M = manufacturing/ A = assembly/ T = Try-out

to the original plan. A possible positive or negative difference needs to be evaluated and the results implemented in calculating future costs and quotation prices. For a clear cost transparency, an itemization of the costs can be necessary depending on the area, e.g. in tool design when looking at the tool modules or in manufacturing when looking at the technology and machines utilized. Successful tool rooms also broach the topic of final costing during the tool debriefing. Together with all involved parties, the tool project is evaluated with reference to time needed, economic viability and technical approach. When regarding the cost controlling, all data that refers to the planned and actual use of materials, personnel and means of production along the entire process chain are compared. If there are relevant deviations, countermeasures including defined goals as well as responsibility are defined.

Methods

[Methodical assistance is a key component for the cost calculation of tools]

There are various methods for calculating the tool cost that are applicable in the context of tool rooms. Due to the high number of existing modifications, this study only explains the fundamental methods of expert estimate, cost function, similarity and analytical approach. The evaluation criteria used are the initial cost and the recurring operating expenses of a calculation, which are included in the description of each method.

In many tool rooms, the tool price is based mainly on an expert's estimate. This estimate is in turn based on the employee's experience, which has been built up during their career. However, these results are not easily reproducible due to the dependence on a single person and their know-how. The general execution of a cost calculation as well as its exactness also depends on the method used. Although there is little investment needed for an initial cost calculation, nowadays this method usually does not satisfy the demands of tool rooms, or rather is not adequate for the tools to be produced. A reason for this is the rather rough cost estimate, which is not sufficient anymore when looking at the sinking tool budgets. Furthermore, the requirements that tools need to fulfill are multiplying as a result of new products and production methods. However, this makes it more difficult for experts to properly estimate the cost.

A prerequisite for utilizing a cost function method is a database of past assignments. Out of the existing data of similar tools, influencing factors are determined that have a significant effect on tool costs. With the help of regression analysis, the identified cost drivers can be correlated with cost functions. In turn, these can be used for a quotation. It should be highlighted that it is crucial to keep the database, and thus the cost functions, current in order to guarantee the precision of the cost calculation results. Since the cost function needs to be determined, and the therefore required database of finished assignments, the initial cost is relatively high. Conversely, the cost of calculation is minimized while obtaining more precise calculation results. This method satisfies today's requirements in the tool making industry, but needs intensive care and constant updating of the database.

Similarity methods are widespread in industrial practice for calculating tool prices on the basis of the entire tool. The kilo cost method and the material cost method are increasingly used. The basic assumption of the kilo cost method is the proportionality of tool weight and cost. Hence, the costs can be deduced through the use of a proportionality factor. The material cost method assumes that there is a fixed ratio between material cost, wages, external labor cost and overhead costs. Then, based on the material costs, the total price of the tool can be determined. A necessary condition for both methods is a representative amount of past assignments with which the proportionality factors can be determined.

The initial cost and the cost of the calculation can both be assessed as average. Due to the increasing complexity of tools, an isolated view of weight or material is not sufficient anymore in tool cost calculation. Especially, the sometimes extremely complex production of shaping parts of the tool for designing or manufacturing is not properly represented by material or weight. Further, a direct proportionality between tool weight and required work input is not necessarily given, particularly in indirect areas or in the project management.

the cost per kilogram of injection mold in Germany

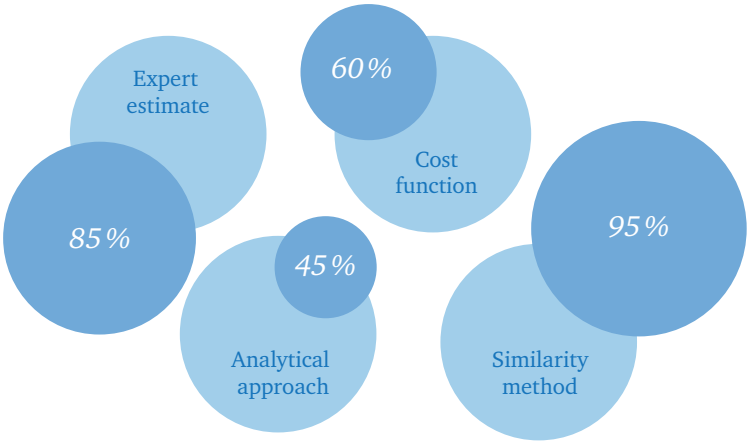
the cost per kilogram of solid and sheet metal forming tools in Germany

Contrary to the expert estimate, in this analytical approach the exact material costs, fixed costs and wages needed for manufacturing the tools are calculated on the level of tool components. The requirement for determining the expenses is the existence of all necessary information. They are usually not available with the requested level of detail, so that this method is only suitable for creating a quotation if there is software available for calculating the tool cost. Ironically, the implementation of a cost calculation software leads to a high initial cost, whereas the cost of a calculation itself depends on the software. All in all, the method of the analytical approach is sufficient for the requirements of tool making, but needs continual care and updates.

The methods presented for calculating tool costs each have different advantages and disadvantages. For the implementation in a tool room it is important to critically question the existing methods and test them, especially when considering the tool and product spectra. A meaningful assessment of the exactness and quality of the cost calculation method can only be made when the calculated costs are compared to the actual costs. It is recommended to implement several methods for the same tool in order to select the method that is most appropriate for a specific tool room.

Nowadays, tool rooms try to simultaneously apply or combine several methods for the best possible cost calculation for tools. A general statement about the quality of the cost calculation cannot be made, since the examined tool rooms are heterogeneous in their tool and product spectra as well as their size and structure.

Frequency of Use of Cost Calculation Methods in Tool Rooms

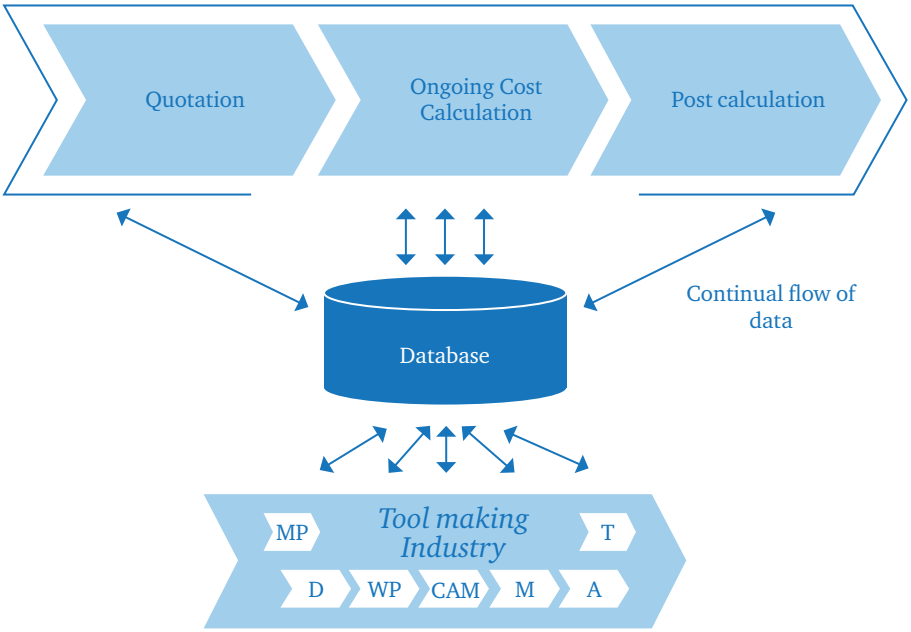


Model

[Cost calculation in the tool making making industry is carried out continuously and is based on data]

In cooperation with the WBA Aachener Werkzeugbau Akademie, the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University developed a model for cost calculation. With the help of this model, tool rooms are to be enabled to implement an efficient and systematic cost calculation process on the basis of assignment data. The model for a continuous, data-based cost calculation in the tool making industry is comprised of the central components of calculation process, database and continual flow of data.

Model for the continuous data-based cost calculation in the tool making industry



Cost Calculation Process

The cost calculation process is initiated by an incoming customer request. Based on the data supplied by the customer, a concept for the manufacturing of the tool is then defined. This is the foundation for determining the total manufacturing costs. Through a combined implementation of the already described cost calculation methods, the production costs of the tool are ascertained on tool component level. In addition, a comparison to existing information from past tool projects should be made. This comparison occurs via interfaces to a database. After the production costs are determined, the pricing is finished and the quotation is sent, the data is systematically saved in the database.

The ongoing cost calculation of the tool begins as soon as the assignment is started. In order to guarantee a realistic and transparent determination of costs, a detailed cost

and time feedback is important, particularly in the early phases of the tool production. For example, project management or other indirect areas are often not included in the cost of actual tool projects, which would lower the expenses incurred. With the end of the tool project, the ongoing cost calculation is also finished. In order to save the data about the expenses incurred during tool manufacturing, a connection to a database is necessary. An automated interface can also realize a continual comparison with the planned costs.

The cost calculation process ends with the post calculation. In this step, all the actual costs incurred for the tool project are aggregated and then compared to the planned costs from the quotation. Since the information is saved in a database, this comparison can be performed quickly and automatically. Based on this comparison, a detailed assessment of the cost differences can then be made. These data sets should be saved for future tool projects.

It should be emphasized that the cost calculation of tools is a continuous process before, during and after the tool manufacturing process. Hence, the cost calculation does not refer to concrete points in time, but rather should be understood as a continual support process. The basic requirement for this is the creation of a database and the implementation of interfaces.

Database and Interface

The database is a further central component of the cost calculation model that was developed. The content of this database is all relevant information of finished and current tool projects. This includes, for example, the planned and actual cost calculation tools, tool components, additional purchases and external services as well as machine and personnel hours in all areas of the tool rooms. Further, relevant information is also included, such as the throughput time or a detailed schedule of the tool project, including the needed machine and personnel time.

The purpose of saving all relevant data is to be able to use them for future toll projects, especially for the cost calculation process. Through a continual cost calculation based on real data, it is possible for tool rooms to exactly calculate along the complete value chain.

A necessary requirement for an automated transmission of data is the implementation of interfaces. Through the interfaces, the database is to be connected to all internal systems of the tool room that gather the actual incurred costs of the tool project. The database, for example, could be coupled with machine software that automatically reports the hours carried out for tools or tool components. Furthermore, interfaces are to be implemented between the database and the employee booking system. However, the desired data transparency also requires a project-specific booking of the hours.

The implementation of the model for continual data-based cost calculations in the tool making industry is linked to a high initial cost. Especially the implementation of an ongoing cost calculation process and the interface management for the database bind a lot of capacity. Nonetheless, the resulting gain in cost transparency and exactness of calculation more than justify the investment. The active use of a cost calculation model helps tool rooms predict their internal processes more efficiently.

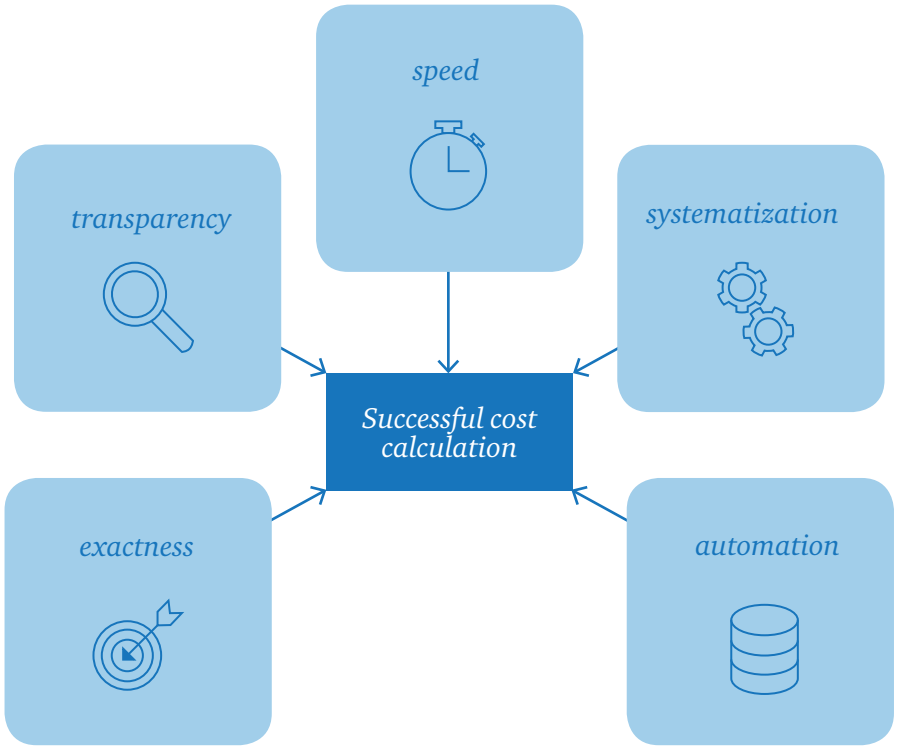
Factors of Success in Tool Cost Calculation

611

Average number of quotation requests tool rooms receive per year

Tool rooms receive an average of 611 quotation requests in a year, meaning that an efficient cost calculation process is particularly deciding in conquering the flood of requests. A successful cost calculation in the tool making industry can be expressed in characteristic numbers. These numbers can then be merged into success factors and thus offer spheres of activity for shaping a successful cost calculation. Via an all-encompassing analysis of benchmarking data as well as polls of companies, five vital success factors in tool cost calculation could be determined. These are: exactness, transparency, speed, systematization and automation.

Success Factors of Tool Cost Calculation



Exactness

The success of a cost calculation is particularly contingent upon the precision with which the predicted costs estimate the actual costs. On the one side, a too low prediction would lead to losses when an assignment is realized. On the other hand, a too high calculated cost can lead to the assignment being lost to the competition.

Successful tool rooms manage to finish 88% of projects without exceeding their budget and, thus, have actual costs below or at the estimated cost. By comparison, the average tool room examined had a value of 75%. Furthermore, successful tool rooms deliver the lowest realistic price due to their exact calculations. Therefore, they manage to achieve an assignment rate of 36%, whereas the average is 30%.

A possibility to get a greater exactness in cost calculation is to assign specially trained employees to this task. These employees can build up a better overview over the whole process of creating goods and services due to their focused function. Hence, known problems with specific tool concepts can be assessed better or cost traps avoided.

Transparency

With regard to transparency, it was determined that tool rooms create their tool cost calculations with varying depths of detail. However, it should be noted that, independent of the elected approach, a deeper breakdown of the quotation offers more transparency.

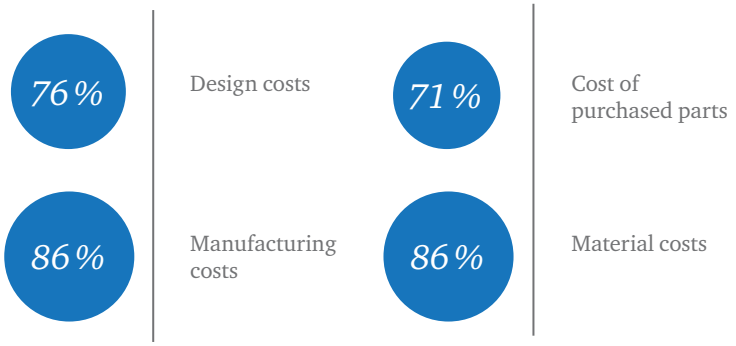
For the quotation, the majority of tool rooms differentiate between design costs, manufacturing costs, material costs and cost of purchased parts. Yet, 43% of successful tool rooms do their cost calculation on the level of the tool components. Other companies break their quotations down into functional groups, tool modules or just tool projects. A closer look at the individual points demonstrates that companies that break up their quotations in a more detailed fashion are usually more successful.

Through the concrete breakdown of cost calculations, the cost calculation is less dependent on the experience of the employees. Hence, cost calculations that are broken down in such a way are also transparent for colleagues and adapted further if necessary.

88 %

of all tool projects of successful tool rooms do not exceed their budget

Percentage of tool rooms that can break up the calculation for their quotation in the following components



43 %

of successful tool rooms do their cost calculation on the level of the tool components

3.3 h

pure working time to generate a quotation

87 %

percentage of quotations for successful tool rooms

Speed

Besides the exactness of the quotation calculation, the speed of calculation is also decisive in order to get assignments. This is especially the case for time-critical customer projects, as a quotation that is handed in too late cannot be considered anymore, automatically leading to a decline of the quotation.

When considering pure working time, successful tool rooms merely need a mean of 3.3 hours to generate a quotation, which is 1.2 hours less than the average. When looking at the entire processing time, from the request to the sending of a quotation, successful tool rooms only need an average of 3.7 working days, which is 20 % quicker than the mean company examined. This relatively high speed in creating quotations is a further important factor needed to reach a higher assignment rate. The following success factors also support a quotation considerably.

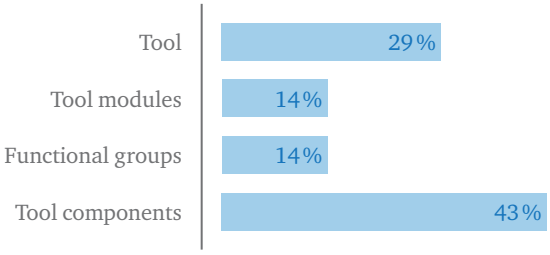
Systematization

When handling assignment requests, a systematic approach can be decisive. The first step should be to only accept requests that fit the strategic orientation of the company. Both successful and average tool rooms only accept a fraction of requests, 80 % and 87 % respectively. While evaluating the cost calculation methods utilized, a clear trend of using a combination of several methods was shown.

All successful tool rooms use the similarity method. Furthermore, 70 % use values derived from experience, 60 % analytical methods and 15 % cost functions. Independent of the method used, a continuous cost calculation during and after the whole process of the project is necessary to get relevant feedback on individual steps.

Another important aspect of a systematic cost calculation is the inclusion of external services. Depending on the depth of the added value, these can be a considerable part of the costs of a tool and must therefore be taken into account. The average depth of added value of tool rooms is 69.5 %, showing the significance of external partners and services in the tool making industry. In particular, successful tool rooms use external services in the areas of design and manufacturing and already plan these costs during the cost calculation for the quotation. For their design 57 % of tool rooms use external labor, 71 % in manufacturing, and 14 % in both simulation and try-out. However, in CAM and assembly no external services are contracted.

With what detail do successful tool rooms calculate the cost of a tool, based on a product-oriented itemization?



Automation

The automation and reproducibility of cost calculations depends heavily on the use of software in order to determine a quotation price. Cost calculation software is able to, if configured and used properly, significantly reduce the time and effort needed for a calculation and boost its quality and speed.

It was shown that successful tool rooms use software for 90 % of the quotation. Moreover, 100 % of successful tool rooms are satisfied or even very satisfied with the software used. This has to do with the fact that 86 % of these companies let their software be specifically adjusted for their purposes. The average tool room only arrives at 70 % for both of these values.

On average, the software is used for four years, with the software product being changed 1.5 times within the last 10 years. On the one hand, one could conclude that software on the market has developed considerably, but also that the selection of a software solution is difficult and that the software needs to be updated over time.

When selecting software, important criteria include that it can be individually adapted and designed in a process-oriented fashion for the respective company. If the process needs to be adapted to software, only small advantages can be reached. Further, it is imperative for the exactness that the software can use existing company data and factor it into the cost calculation process. Around 57 % of successful tool rooms use interfaces to this end, allowing a multitude of additional data to flow into the calculation, such capacity planning.

With regard to the application of cost calculation software in everyday work life, it is particularly important that the software can be adjusted to the conditions in the company. An easy and intuitive use of the software is also rated as important, whereas the compatibility with systems of other companies and the cost or license fee is of secondary importance. However, the price of cost calculation software is not to be disregarded. Hence, the tool rooms considered invest 31,500 € into cost calculation software and the necessary qualification on average in the last three years.

3.7

work days is the average processing time to generate a quotation in successful tool rooms

57 %

of successful tool rooms incorporate additional data via interfaces

Exactness

88 % of tool projects of successful tool rooms are finished without exceeding their budget

Transparency

43 % of successful tool rooms do their cost calculation on the level of the tool components

Speed

3.7 working days is the average processing time to generate a quotation in successful tool rooms

Systematization

60 % of successful tool rooms use analytical methods for cost calculation

Automation

90 % successful tool rooms use software for 90 % of the quotation


ams
Die ERP-Lösung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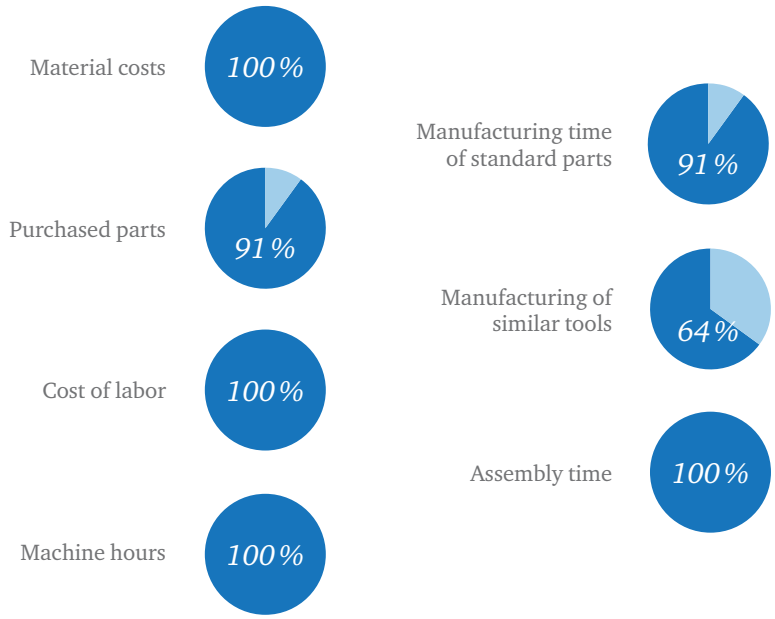
verstehen was zu tun ist


SIEMENS

Current Software solutions for the Tool Making Industry

A dependable and quick quotation calculation is vital for the success of tool rooms. Thus, the goal of tool rooms should be to reduce the time and effort needed to create a quotation, so that the growing number of requests can be processed. At the same time, the exactness of the cost calculation needs to be increased so that assignments are not lost due to high estimated costs or to reduce losses created by low estimates. The results need to be reproducible, so that pricing is not a matter of flukes but rather occur systematically. Apart from a suitable cost calculation method, the building blocks needed to achieve these goals are a structured process for generating a quotation and the collection and use of information from all parts of this process. Furthermore, the implementation of an automated documentation of quotations can accelerate the quotation generating process even more.

Information Incorporated into the Cost Calculation



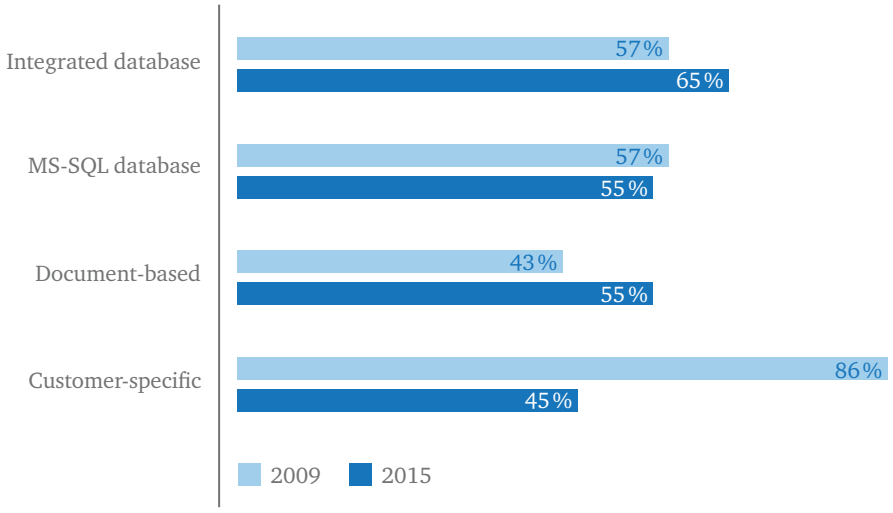
There are various different software solutions on the market designed to help calculate tool costs. After comprehensive research, eleven software providers of cost calculation solutions that are already established in the industry were selected. For the evaluation of the data, a previously published market survey of software solutions for tool cost calculation was taken into account. The Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University conducted this market analysis in 2009. The result was an overview of the status quo and characteristics of commercially available cost calculation software in the tool making industry.

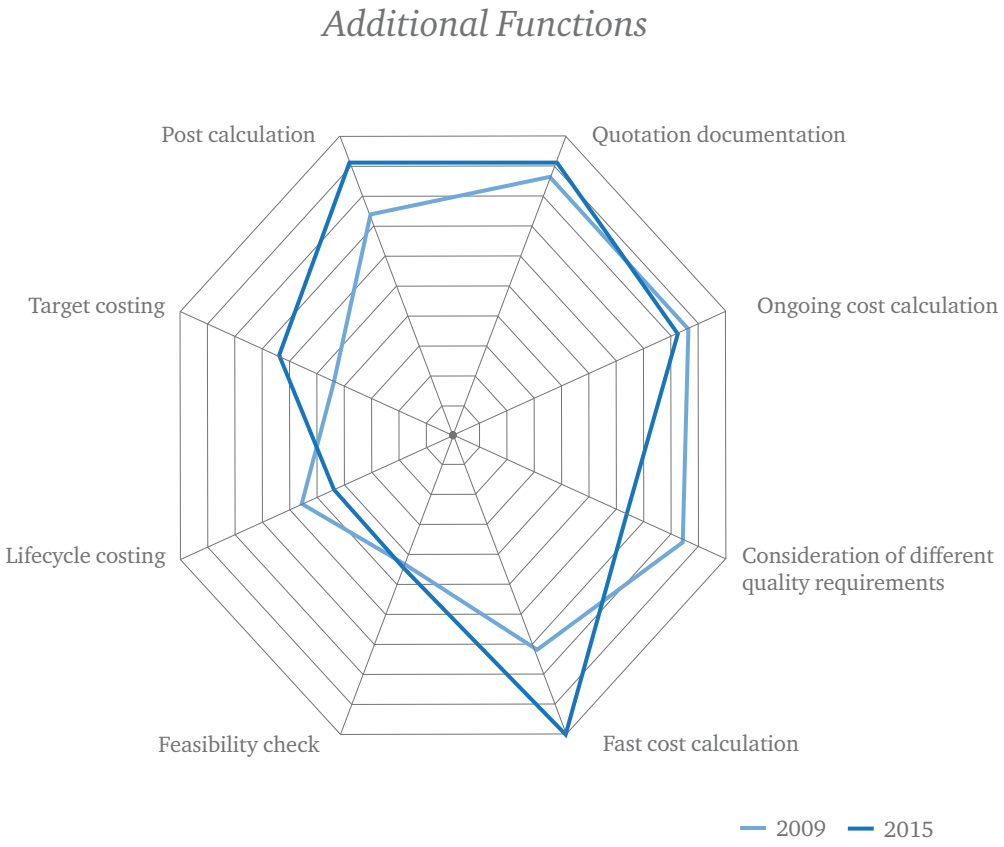
The size of the software companies that were examined varies considerably. Around half of the companies employ 6-20 people. The software offered is different for each provider and include differing functionalities. All programs allow generated quotations to be archived. Further, most can use internal databases or SQL databases. In addition, the storage can be carried out in a document-based fashion. If wished for by the customer, the software solutions can be adapted to specific archiving types.

All software solutions automatically generate a quotation document based on the input values and generated data. Often they can also be used for ongoing or post cost calculation. Hence, the percentages of post calculation and fast calculation have increased since 2009. In particular, process planning has found many uses for software assistance. At the same time, the use of functions that increase the complexity of the cost calculation has decreased.

Software-assisted quotation calculation allows for the use of methods and approaches that are not practical when used manually. A shortened cost calculation process is usually labeled as a fast calculation, which needs less data and, correspondingly, is less exact. The results of this fast cost calculation are sometimes given a larger safety margin. Fast calculations are designed to generate budget estimates while also allowing for less technical staff to get results. Compared to the comprehensive version, the time expended is lowered to up to 50 %. Feasibility checks, with respect to free capacity or fulfillment of certain technical demands, can also be conducted. Preceding the generation of a quotation, these checks allow company re-

Archiving of Quotations



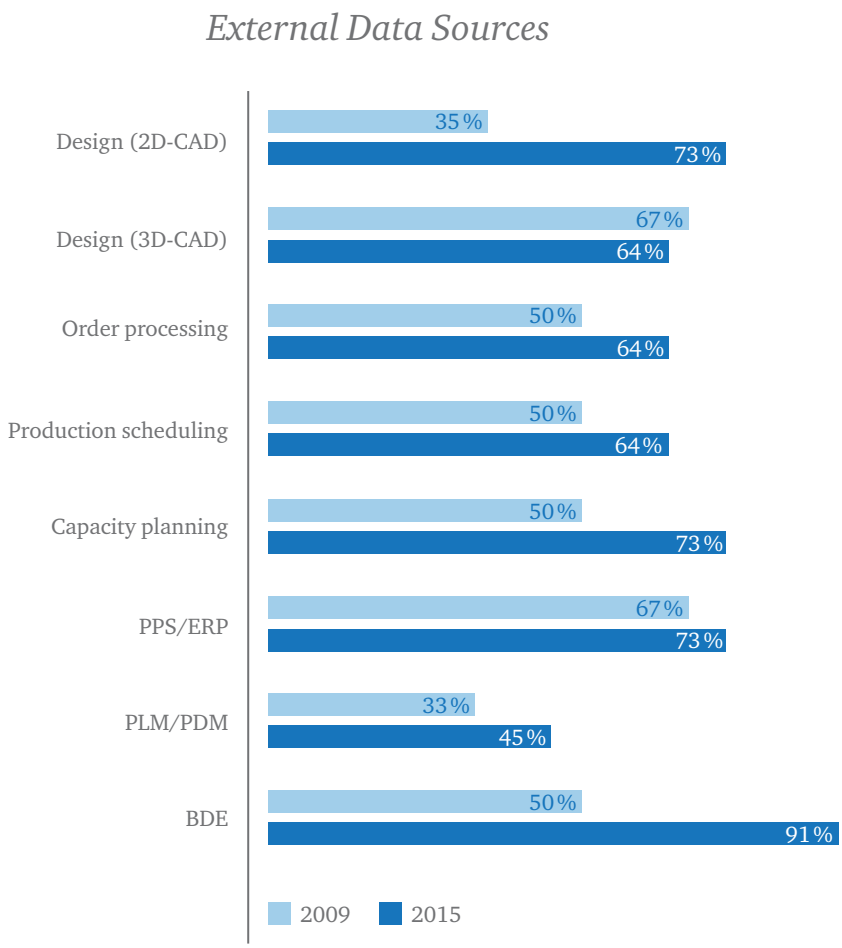


sources to be saved. Target costing allows for the design of a tool with a specific price set by the customer in mind. Also, suggestions for cheaper alternatives to the cost drivers can be submitted. The lifecycle costing function demonstrates the potential financial advantages of a tool, for example, with a high upfront price but low upkeep cost.

Finally, several tool variations with different levels of quality can be calculated for a quotation. This allows the sales department to respond to the individual wishes of potential customers. The creation of assorted quality levels is made possible by the use of different tolerance classes, purchased parts and manufacturing technologies.

Another advantage for a company can be the compilation of information for the sales department so that they can, for example, look at the impact a changing delivery date has on the price.

The software solutions for calculating quotation can usually be integrated into the existing IT landscape of the company. This means that various systems share data or place to each other's disposal. Thereby the manual transfer of this data, which is a possible source of error, is removed, which also saves time. All programs offer individual, customer-specific interfaces with which data from different CAD, ERP and PLM/PDM systems can be exchanged. The extent of the data exchange can vary significantly. For the integration with CAD programs, the relaying of material data and parts list is common. In addition, depending on the provider, considerably more information can be exchanged between programs. Often it is possible to let the software be adapted for each customer. A software producer usually offers a direct integration into most of the CAD systems available on the market. While the integration with PLM/PDM systems usually is not a strength of many of these software companies, the integration with ERP systems is more developed and widespread. It has become standard to integrate with the ERP software, typically using formats such as XML, CSV, Text files or even customer-developed. Order processing, production planning, capacity planning and factory data capturing have risen substantially as useful data source since 2009.

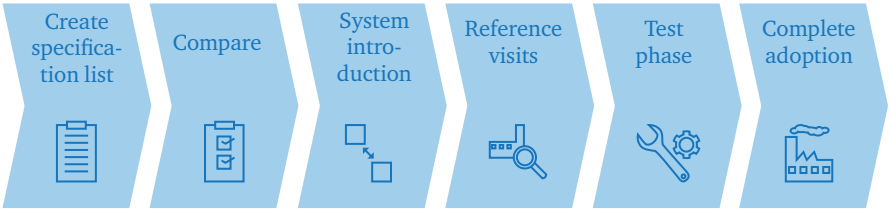


Most providers understand that the integration of their product with the existing software infrastructure of the tool rooms is on of the most important selling points. Therefore, most software companies are willing to work out solutions on-site with their customers.

The selection of a software solution suitable for a tool room should be approached systematically. The task of such a system is to find the solution whose properties fulfill the company's requirements best.

First, a differentiated profile of requirements needs to be determined that lists the indispensable and desired specifications. In the case of quotation calculation, for example, the calculable tool types would be indispensable whereas functions like target costing or lifecycle costing would be desired.
Then, this list is compared to all possible software solutions and the one with the most matches should be chosen. To this end, a value benefit analysis can be implemented, which gives each software solution a utility value. This means the best available solution will be given the highest value. Since the cost per software license is similar in the basic configuration for all providers, a directed inquiry is usually required. In the next step, the providers introduce the selected software system into the tool room. Afterwards, reference visits at tool rooms that already use the selected software give the possibility of validating it in practice. An elaborate test phase is recommended before the implementation in business. In the following table, an overview of the most important characteristics of the software solution is given. Furthermore, the subsequent company profiles give details about their software solutions, in order to assist with the selection.

Approach for Selecting Software for the Tool making Industry



	ams.Solution AG	AutoForm GmbH	Enomic GmbH & Co. KG	HOST GmbH	HSi GmbH	IKOffice GmbH	Moser GmbH &Co.KG	Schmale GmbH	Schouenberg & Partners	Segoni AG	Siemens Industry Software GmbH
Cost Calculation Method											
Analytical approach		●		●	●			●	●	●	●
Similarity method				●		●		●	●	●	●
Cost function	●								●		●
Calculable Tool Types											
Die casting tools	●		●	●		●		●	●	●	●
In-mold assembly	●		●	●		●		●	●	●	●
Elastomer tools	●		●	●		●		●	●	●	●
Forging die	●		●	●		●		●		●	●
Punching/bending tools	●		●	●	●	●		●		●	●
Molding dies	●	●	●	●	●	●		●		●	●
Other press tools	●		●		●	●		●		●	●
Any other tools	●		●	●		●	●	●	●	●	●
Rapid tooling	●		●			●		●	●	●	●
Contraptions	●		●			●			●	●	
Additional Functions											
Ongoing cost calculation	●		●	●		●	●	●	●	●	●
Post calculation	●	●	●	●	●	●	●	●	●	●	●
Fast cost calculation	●	●	●	●	●	●	●	●	●	●	●
Feasibility check		●	●					●	●	●	
Quality requirements	●	●	●					●	●	●	●
Design	●	●	●					●	●	●	
Production planning	●	●	●	●	●	●	●	●	●	●	
PPS	●		●	●	●	●				●	

	ams.Solution AG	AutoForm GmbH	Enomic GmbH & Co. KG	HOST GmbH	HSi GmbH	IKOffice GmbH	Moser GmbH &Co.KG	Schmale GmbH	Schouenberg & Partners	Segoni AG	Siemens Industry Software GmbH
Target costing		●	●	●		●		●	●	●	●
Lifecycle costing	●	●	●			●			●	●	●
Accompanying information	●	●	●	●		●		●	●	●	●
Level of product-oriented detail											
Tool project	●	●	●	●		●	●	●	●	●	●
Tool module	●	●	●	●				●	●	●	●
Functional groups	●	●	●		●		●	●	●	●	●
Tool parts	●	●	●	●	●	●		●	●	●	●
Internal capacities	●		●	●		●		●	●	●	
Planned external services	●	●	●	●	●	●	●	●	●	●	●
External data sources											
Design (3D CAD)	●	●	●	●				●	●	●	●
Order processing	●		●		●	●	●	●		●	
PLM/PDM	●		●					●	●	●	●
Production scheduling	●		●	●	●	●		●		●	
Capacity planning	●	●	●	●	●	●	●	●		●	●
Capture of production data	●	●	●	●	●	●	●	●	●	●	
PPS/ERP	●	●	●	●	●	●		●		●	
Data synchronization of the production process	●		●	●	●	●		●	●	●	●
Archiving											
Integrated database	●		●	●	●	●		●	●		●
MS-SQL database	●				●		●		●	●	●
Document-based	●	●	●			●		●	●		●
Customer-specific	●	●	●		●			●	●		●

ams.Solution AG

Company information

Year founded:
1988 (Hinrichs & Müller GmbH)
Address: Rathausstraße 1
D-41564 Kaarst
Homepage: www.ams-erp.com

Contact person in Germany

Barbara Furthmüller
Phone: +49 172 1047451
Email: b.furthmueller@ams-erp.com

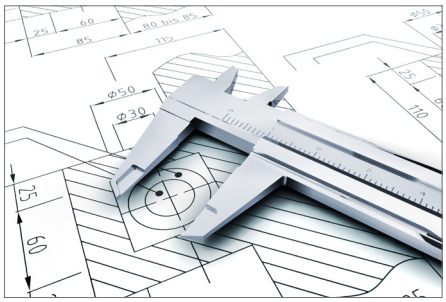
Product information

Name: ams.erp (ams++)
Version 7.0
Last update: September 2015
Number of licenses: 20,000
Languages available:
German, English, French, Spanish, Italian

ERP start screen of with cost calculation

Due to the large variety of requests, many tool rooms rely on their experience. In part, the actual costs of a project are also hard to determine. It is becoming more and more important to determine a real win or loss - almost in real-time.

For over two decades now, ams has been exclusively occupied with the question how contract manufacturers can profitably and competitively organize their complex project business. The quintessence of the consultant and software producer‘s experience: a higher process transparency makes it possible to distribute available resources more economically, to meet delivery dates more comfortable and to satisfy the customer‘s wishes more comprehensively. Thus, cost calculation, including the ongoing cost calculation, is an integral part of the ERP-solution for the tool making industry.



In order to ensure a valid prior and post cost calculation, the exact determination of hourly rate of machines and employees is indispensable. Furthermore, a complete integration of all assignment information at hand and process transparency is necessary. Only in this way, a consistent level of information is guaranteed, on the basis of which, customer’s questions regarding the assignment status can be answered and adherence to the delivery date is assured.

Against this background, data islands that do not communicate (e.g. excel lists) and stand-alone cost calculations are categorically rejected.

Since ams.erp cross-links all project processes, tool shops can control the risks associated with long throughput times and high investment needed for their assignments with the help of the integrated cost calculation software.

AutoForm Engineering GmbH

Company information

Year founded: 1996
Address: Fällmisstrasse 2
CH-8832 Wilen b. Wollerau
Homepage: www.autoform.com

Contact person

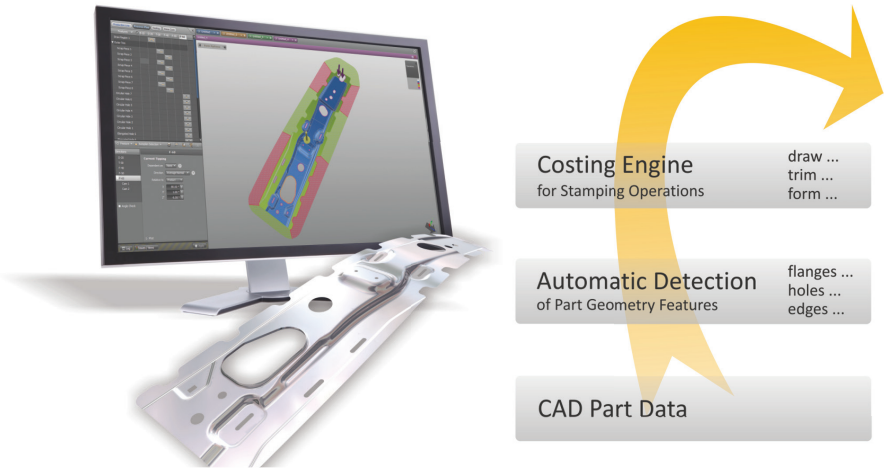
Alan Stimac
Technical Product Manager
Email: alan.stimac@autoform.ch

Product information

Name: AutoForm Planning & Bidding Solution
Launch: 2008
Last update: June 2015
Number of licenses: 500
Languages available: English, German, French, Italian, Spanish

AUTOFORM
Forming Reality

Overview of the Cost Calculation Software

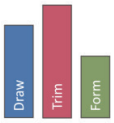


The AutoForm Planning & Bidding Solution is highly automated and easy to use for planners and estimators. Based on your CAD part data and stamping process details, the software automatically recognizes cost-relevant part features (holes, fl anges, etc.) and derives the relevant resource consumptions necessary to build the tools.

In this way, the software predicts tooling and piece costs – consistently, reliably and rapidly. So you can better estimate reliable costs in just minutes, with a few mouse-clicks. As a result, you can make tens or even a hundred cost estimations a day – meeting your deadlines for budgets, resource plans and quotations.

Tool Cost € 680 000

OP20 Draw	€ 180 000
OP30 Trim	€ 220 000
OP40 Form	€ 120 000
...	



Piece Cost € 11.15

Material	36.7 %	€ 4.09
Tooling	23.4 %	€ 2.61
Production	8.8 %	€ 0.98
...		

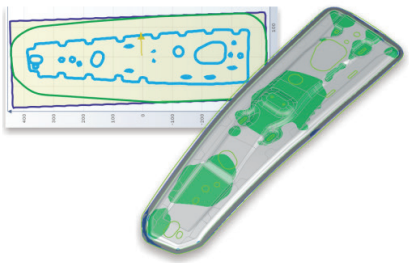
Revisions & Cost Categories

	Revision No. 1	Revision No. 2
Engineering	€ 120 000	€ 100 000
Initial Machining	€ 140 000	€ 120 000
Die Build	€ 170 000	€ 150 000
Materials & Components	€ 120 000	€ 100 000

Supplier Comparisons

Supplier	A	B	C
Location	Europe	USA	Asia
Source	Internal	Internal	External
Tool Cost	€ 450 000	$ 520,000	¥ 3,500,000
Piece Cost	€ 11.05	$ 10.50	¥ 910

Blank Utilization & Manufacturability



PBS

Customer Benefits

Your Solution in Minutes
- Easy to use software for planners and estimators
- Rapid estimates of tooling and piece costs
- Ideal for early planning and bidding activities

Better Estimates of Tooling & Piece Costs
- Based on CAD part data and process plan
- Make more consistent and reliable cost estimations
- Evaluate effects of engineering revisions on costs

Supplier Comparisons
- Establish reasonable cost targets
- Evaluate tooling and part supplier quotations
- Decide external versus internal sourcing

Automated & Intelligent Approach
- Automatic detection of part geometry features
- Intelligent costing engine for stamping operations
- 3D CAD viewer and report generator

Your Complete Solution
- Share AutoForm results with downstream departments, suppliers and customers
- Optimize blank utilization and nesting
- Assess manufacturability

Enomic GmbH & Co. KG

Company information

Year founded: 1998
Address: Steinhäuserstr. 20
D-76135 Karlsruhe
Homepage: www.enomic.com

Contact person in Germany

Andrea Lechner
Phone: +49 721 9864450
Email: info@enomic.com

Product information

Name: Enomic Calculation
Launch: 2010
Last update: 2016
Number of licenses: n.a.
Languages available:
any language

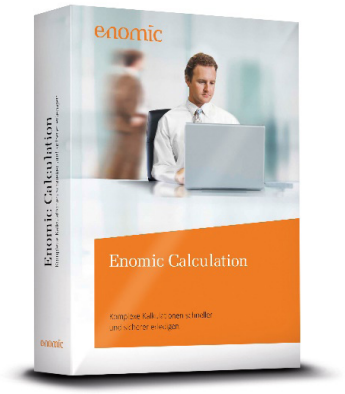
enomic
effizient aus prinzip

Screen shots of a calculation and its GUI editor

With the Enomic Calculation software, you can perform calculations based on your tried and tested company-specific calculation logic - only faster, more flexibly and more securely.

Calculating complex calculations requires a lot of expert knowledge, whether in sales, production, controlling or management. Support from ERP systems, sector software or CRM systems is usually unsatisfactory and spreadsheets are not viable in the long term either, since the complexity required to maintain and use them requires a lot of effort and makes them prone to errors. Things are completely different with Enomic Calculation.

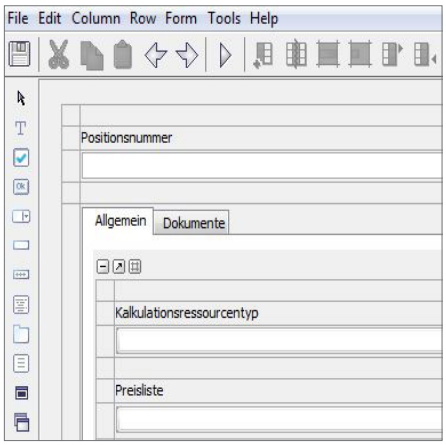
- Perform individual calculations with optimum reliability
- Minimize the time needed for calculation tasks
- Automate tried and tested calculation methods flexibly and correctly
- Retain your established calculation schema
- Take advantage of time savings and calculation security when negotiating prices
- Determine customer-specific prices for individual and bulk transactions
- Support controlling with specific analyses and meaningful reports



Thanks to the Enomic principle, your calculation software is always efficient, whether you are defining and updating your calculation rules or using it on a daily basis. Your calculation tasks are always under control.

Enomic provides intelligent software for companies with complex products. The central component is the unique, adaptable configurator. It manages highly complex business logic efficiently in a flexible body of rules, and provides the knowledge stored in it specifically for the required application.

Enomic software is adaptable, easy to maintain, reducing complexity and easy to be integrated into your IT system landscape.



HOST Software Entwicklung und Consulting GmbH

Company information

Year founded: 2000
Address: Simon Redtenbacher Platz 3
AT-4560 Kirchdorf an der Krems
Homepage: www.ulysses-erp.com

Contact person in Germany

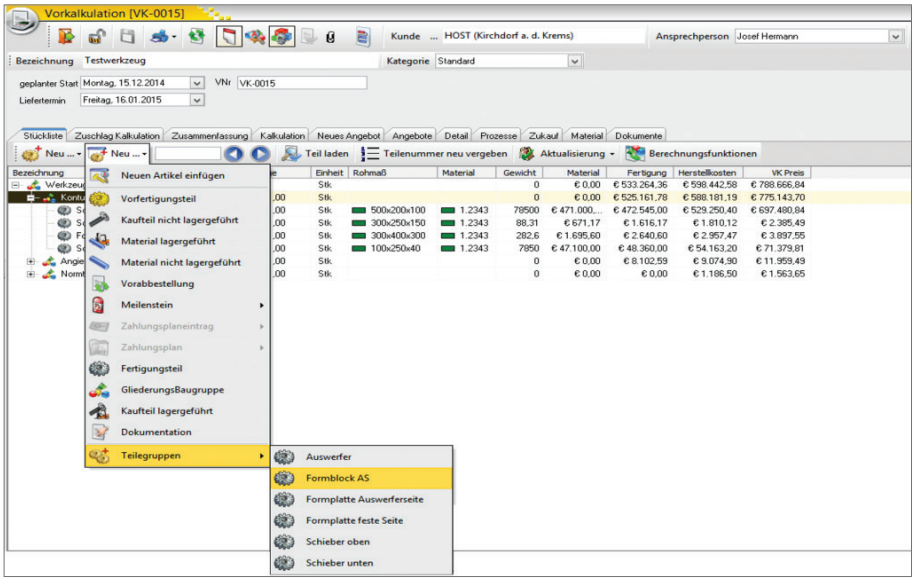
Christoph Wimmer
Phone: +43 7582 37533
Email: cw@ulysses-erp.com

Product information

Name: Ulysses
Launch: 2000
Last update: 2015
Number of licenses: n.a.
Languages available:
German, English, Hungarian, Slovak, Czech

ulysses

Start screen of the cost calculation software



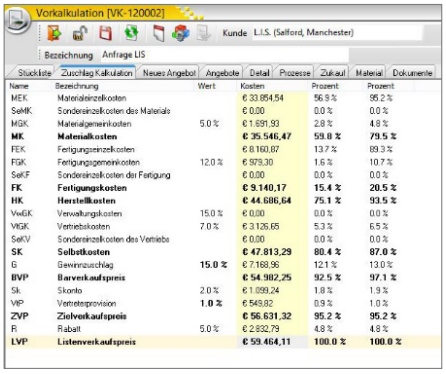
With Ulysses you will bring transparency into your company.

You will save precious time with your daily work using Ulysses and its extensive functions, such as prior calculation, generating quotations, capturing production data, production planning and post calculation.

Ulysses is a modular ERP system that can quickly be adapted to the requirements of a company. The unique application architecture allows adjustments to become the standard and secures the lowest costs while continuing to operate.

A realistic pricing is based on values derived from experience and comparisons with similar tools. Ulysses offers the greatest possible flexibility. You can combine individual items, existing tools and manufactured and purchased parts. When an order is placed, the prior calculation is converted into an assignment with one mouse click.

Advantages:
- Ulysses template system
- Calculate costs of individual items
- Link planned and real values
- Material database
- Dynamic calculation models
- Capacity planning “what would be if?”

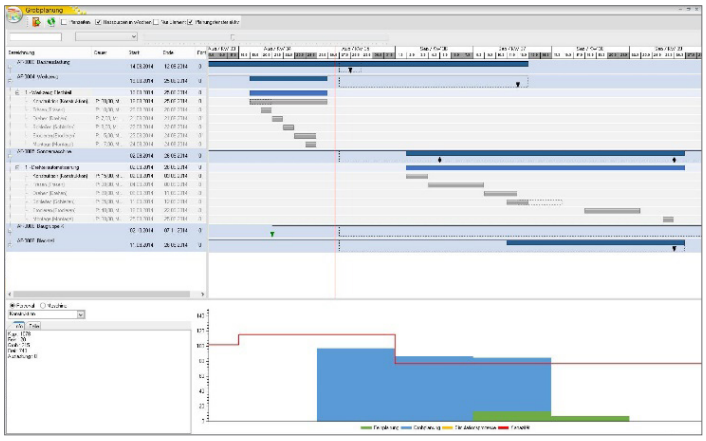


- Generate quotation at the push of a button
- Graphical editor “what you see is what you get”
- Track quotations and resubmissions

Ulysses 3 phase planning allows for bottlenecks to already be recognized in the quotation and rough planning phase with an ingenious template system.

In the third phase, detailed planning, machines are optimized with regard to setup costs and unmanned hours.

Ulysses 3 Phase planning for the tool making industry



HSi GmbH

Company information

Year founded: 1995
Address: Flughafenstraße 12
D-99092 Erfurt
Homepage: www.HSi4m.com

Contact person in Germany

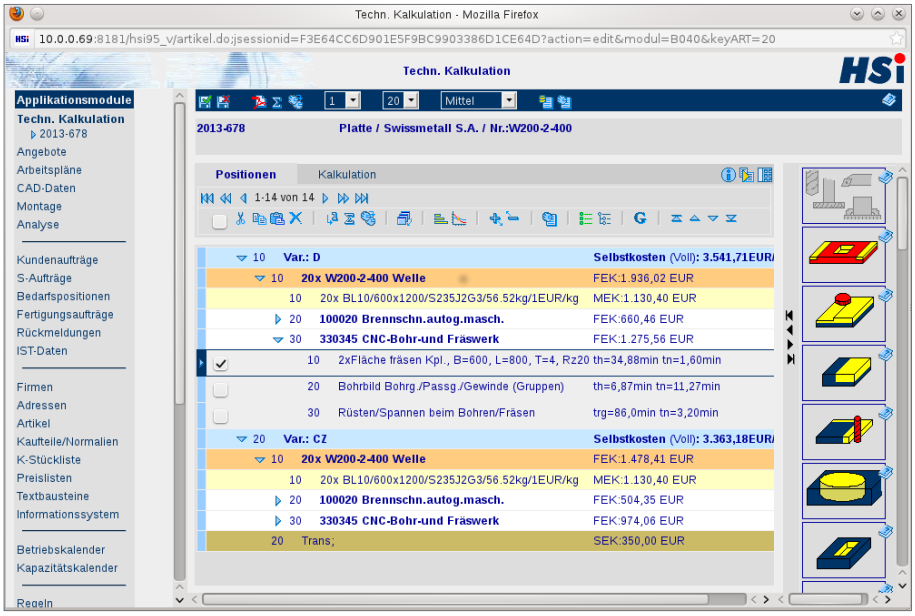
Andreas Heß
Phone: +49 361 43 02 97 50
Email: info@HSi4m.com

Product information

Name: HSkalk/ HSauftrag/ HSplan
Launch: 1999
Last update: June 2015
Number of licenses: 1,100
Languages available:
German, English

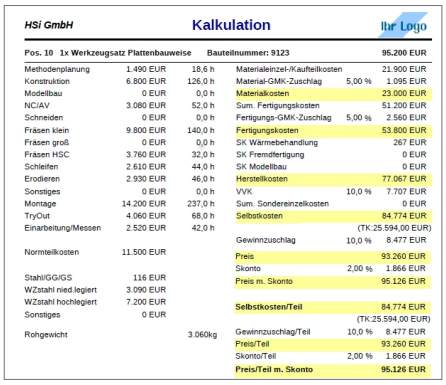
HSi
IT solutions for manufacturing

Start screen of the cost calculation software



Since its establishment in 1995, HSi has been an innovative and competent software company with significant know-how and a focus on its customers and lasting business relationships. The company offers individual producers, mass producers and contract manufacturers proven self-adjusting software modules, which satisfies company-specific demands and technological advancements.

Customers come from the mechanical engineering –, tool making –, steelwork –, automobile – and aerospace industry. Due to the automation of the schematic processes, the time and money needed for production scheduling and cost calculation are significantly reduced. To this end, the HSi technology basis includes all mechanical manufacturing methods such as milling, turning, drilling, eroding, etc. and preconfigured process modules for complex assembly tasks. A high exactness of the cost calculation and planning software is reached in the shortest time.

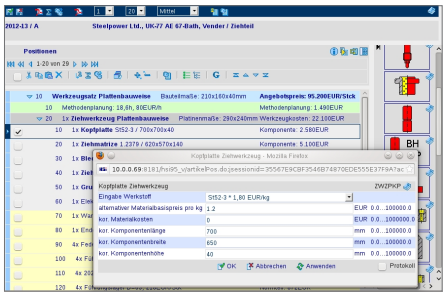


HSi GmbH — **Kalkulation** — Ihr Logo

Pos. 10 1x Werkzeugsatz Plattenbauweise — **Bauteilnummer: 9123** — **95.200 EUR**

Methodenplanung	1.490 EUR	18,6 h	Materialeinzel-/Kaufteilkosten		21.900 EUR
Konstruktion	6.800 EUR	126,0 h	Material-GMK-Zuschlag	5,00 %	1.095 EUR
Modellbau	0 EUR	0,0 h	Materialkosten		23.000 EUR
NC/AV	3.080 EUR	52,0 h	Sum. Fertigungskosten		51.200 EUR
Schneiden	0 EUR	0,0 h	Fertigungs-GMK-Zuschlag	5,00 %	2.560 EUR
Fräsen klein	9.800 EUR	140,0 h	Fertigungskosten		53.800 EUR
Fräsen groß	0 EUR	0,0 h	SK Wärmebehandlung		267 EUR
Fräsen HSC	3.760 EUR	32,0 h	SK Fremdfertigung		0 EUR
Schleifen	2.610 EUR	44,0 h	SK Modellbau		0 EUR
Erodieren	2.930 EUR	46,0 h	Herstellkosten		77.067 EUR
Sonstiges	0 EUR	0,0 h	VVK	10,0 %	7.707 EUR
Montage	14.200 EUR	237,0 h	Sum. Sondereinzelkosten		0 EUR
TryOut	4.060 EUR	68,0 h	Selbstkosten		84.774 EUR
Einarbeitung/Messen	2.520 EUR	42,0 h			(TK:25.594,00 EUR)
			Gewinnzuschlag	10,0 %	8.477 EUR
Normteilkosten	11.500 EUR		Preis		93.260 EUR
			Skonto	2,00 %	1.866 EUR
Stahl/GG/GS	116 EUR		Preis m. Skonto		95.126 EUR
WZstahl nied.legiert	3.090 EUR				
WZstahl hochlegiert	7.200 EUR		**Selbstkosten/Teil**		84.774 EUR
Sonstiges	0 EUR				(TK:25.594,00 EUR)
Rohgewicht		3.060kg	Gewinnzuschlag/Teil	10,0 %	8.477 EUR
			Preis/Teil		93.260 EUR
			Skonto/Teil	2,00 %	1.866 EUR
			Preis/Teil m. Skonto		**95.126 EUR**

HSkalk is a system for the complete cost calculation of parts and assembly groups. Scaled prices and site comparisons assist decisions for optimal production and logistic. With dependence on the lot size and the released quantity, the cost per unit is determined and the setup costs allocated or declared separately. Quantity-dependent material and special charges are also considered. Using the machine parameters provided by the HSi technology basis, unit costs and setup costs can be determined and compared for each workplace.



The connections between the part that needs to be manufactured, the necessary components and the production expenditure are all included in the HSi technology basis. In a generated parts list, the components and their form elements are already dimensioned. Using adjustable hourly rates, the system determines the production costs. The hourly rates, material prices, average and basic time needed for processes are individually adjustable.

IKOffice GmbH

Company information

Year founded: 1994
Address: Marie-Curie-Str. 1
D-26129 Oldenburg
Homepage: www.ikoffice.de

Contact person in Germany

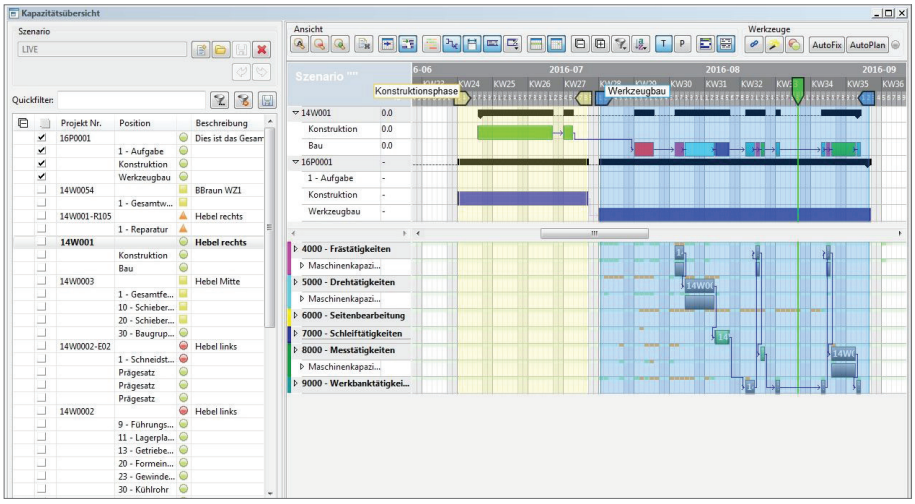
Ingo Kuhlmann
Phone: +49 441 21988950
Email: ikuhlmann@ikoffice.de

Product information

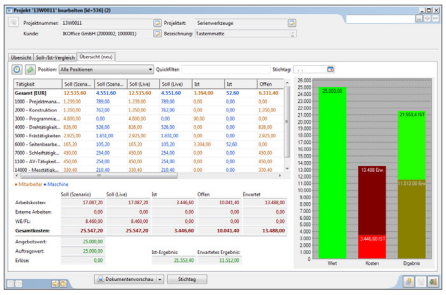
Name: IKOffice MoldManager
Launch: 2006
Last update: 2016
Number of licenses: 1,000
Languages available:
various languages

IKOffice
UNTERNEHMENSSOFTWARE

Capacity planning



In the cost calculation and planning software IKOffice MoldManager, it is possible to effectively distribute tasks to groups or even individual employees. Contrary to machine scheduling, absences or holidays are considered with the help of a calendar.

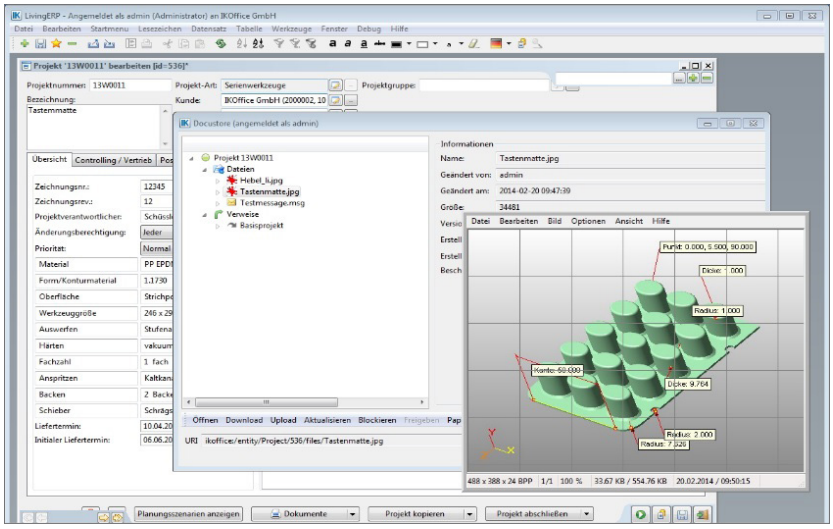


Through the longstanding, close collaboration with customers in the tool making, form, model and jig making industry a product has been developed that is specially fitted for its needs.

It unites a good overview of information with rationality and speed for the administrative work around an assignment and project. Quotation templates allow for a quick and safe answer to received requests. All quotation positions are specified in these templates and cannot be forgotten. With the press of a button post calculations from similar projects can be compared. Together with product pictures and corporate design, an attractive quotation is generated, which can be reviewed at any time.

The integrated document management eases the classification of all project information. The MoldManager gathers information from all departments and places them at your disposal in a clear, and quick fashion.

The feedback from the performed work is directly processed via PC terminals and integrated. A comparison of the planned and real values, and thus the assessment of the performance, supports the continuous improvement process. The gathered data helps to determine the pricing of future projects.



Moser GmbH & Co. KG

Company information

Year founded: 1979
Address: Hauptstraße 50
D-52146 Würselen
Homepage: www.moser.de

Contact person in Germany

Maximilian Moser
Phone: +49 2405 4711
Email: max.moser@moser.de

Product information

Name: MOS‘aik
Launch: 1996
Last update: 2015
Number of licenses: 28,000
Languages available:
German, Dutch

Herzlich Willkommen.
MOSER

Mos’aik Cost calculation software

The company MOSER, located in Würselen/ Aachen, develops and sells software for medium-sized companies since 1979 and belongs to the foremost developers of business software for German companies in the industrial sectors of skilled trades, services, and manufacturing trades.

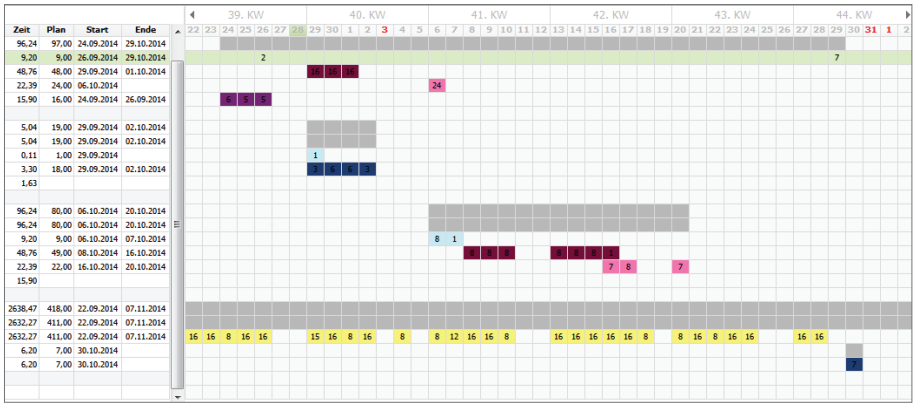
MOSER develops standard business software and individual solutions for medium-sized companies. The software products are in use at over 100,000 workplaces.

MOSER stands for excellent technical and industry-specific programs and its products convince with their flexibility and adaptability.

MOSER is also one the few owner-led, medium-sized, software companies, not only in Germany but also in neighboring European countries like the Netherlands, Belgium, Luxembourg and Austria.

The business software MOS'aik is laid out as a modular system and can thus be optimally adjusted for individual requirements and processes. The software is also a workflow-management solution and supports companies in carrying out business procedures from the quotation calculation to the project administration and the continuous cost calculation and post calculation, purchasing, accounting and mobile use. The workflow management is a holistic concept that reaches from regulation to surveillance of processes in the company and company-wide work.

Various industry-specific MOS'aik expansions round off the service spectrum of the software. The services offered by MOSER extends from software projects, consulting, training, online service and IT service.



Schmale Werkzeug- und Formtechnik GmbH

Company information

Year founded: 1997
Address: Limbergstr. 9
D-35649 Bischoffen
Homepage: www.schmale-gmbh.com

Contact person in Germany

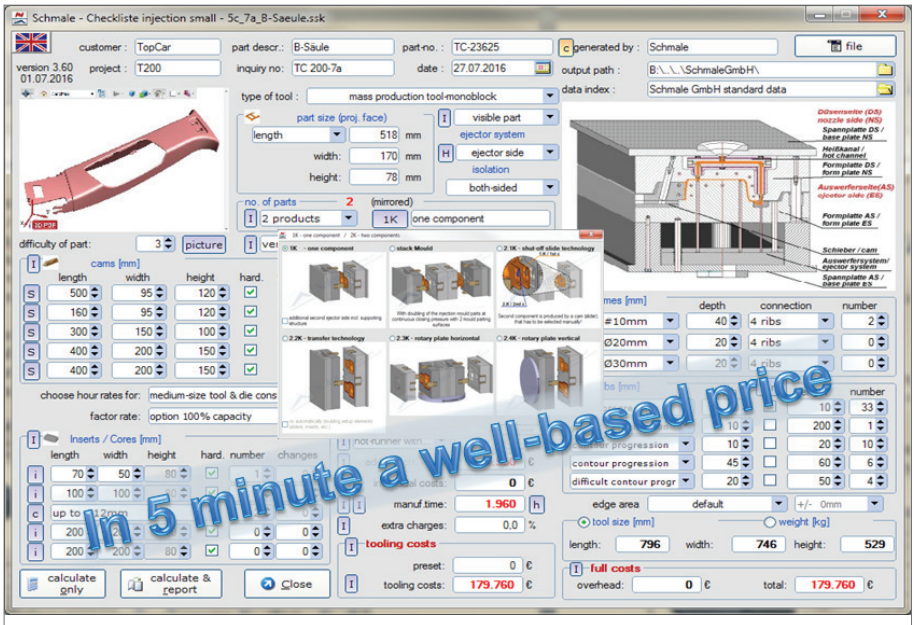
Mr. Schmale
Phone: +49 6444 / 921780
Email: info@schmale-gmbh.com

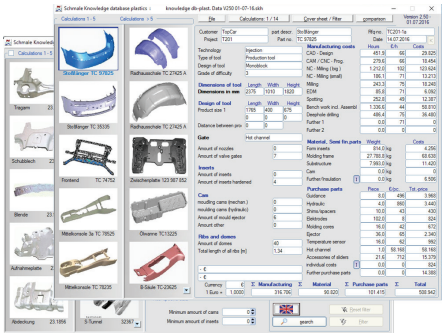
Product information

Name: Schmale Kalkulationssoftware für den Werkzeug- und Formenbau
Launch: 2001
Last update: July 2016
Number of licenses: 10,807
Languages available:
German, English, Italian, Spanish, Czech, Portuguese, Hungarian

Schmale Werkzeug- und Formtechnik GmbH

Speed cost calculation for the tool making industry





Tool cost calculation – Cost of changes – workshop cost calculation – unit cost determination

The following technologies are supported:

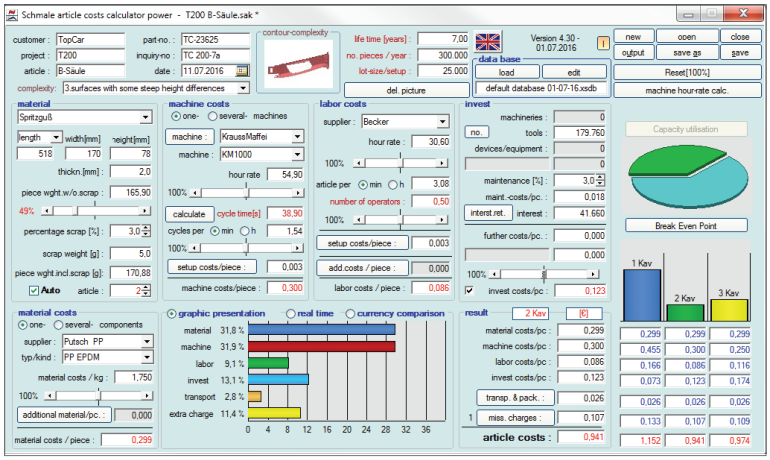
- Injection molding (1K, 2K, prototypes, small and large series)
- Pressing tool (extrusion, molding, carbon composites [RTM, …])
- Die casting mold/low pressure die casting/ forging tools
- Rubber injection tools
- Foam tools/negative forms
- Sheet-metal forming tools (prototypes, restrike, hot forming)
- Punching tools (steel, alu, plastic, deburring tools)
- Compound progressive tools

You have the choice between different cost calculation strategies:

- Speed cost calculation
  The speed cost calculation leads you to a realistic result with only five input values.
- Detailed cost calculation
  The detailed cost calculation gives you comprehensive and individual cost calculations for every demand.
- Knowledge database
  In the knowledge database you can archive the cost calculation (quotation or post calculation). The data is well-arranged and can be updated centrally.

Unit cost power/individual – Project controlling

- Calculation of product cost is process-oriented with an analytical perspective.
- Unit cost power
  With fast cost calculation on the basis of Schmale standard values for technology/ article size/material type/runtime/lot size per year/tool costs
- Individual unit cost
  Every user can set up standardized processes in the database.
- Project controlling
  Single parts of an assembly group or project can be combined to a complete quote and updated.



Schouenberg & Partners The Netherlands

Company information

Year founded: 1990
Address: Burg Stolklaan 16
NL-4002 WJ Tiel
Homepage: www.schouenberg.nl

Contact person in Germany

Mr. Harry Schouenberg
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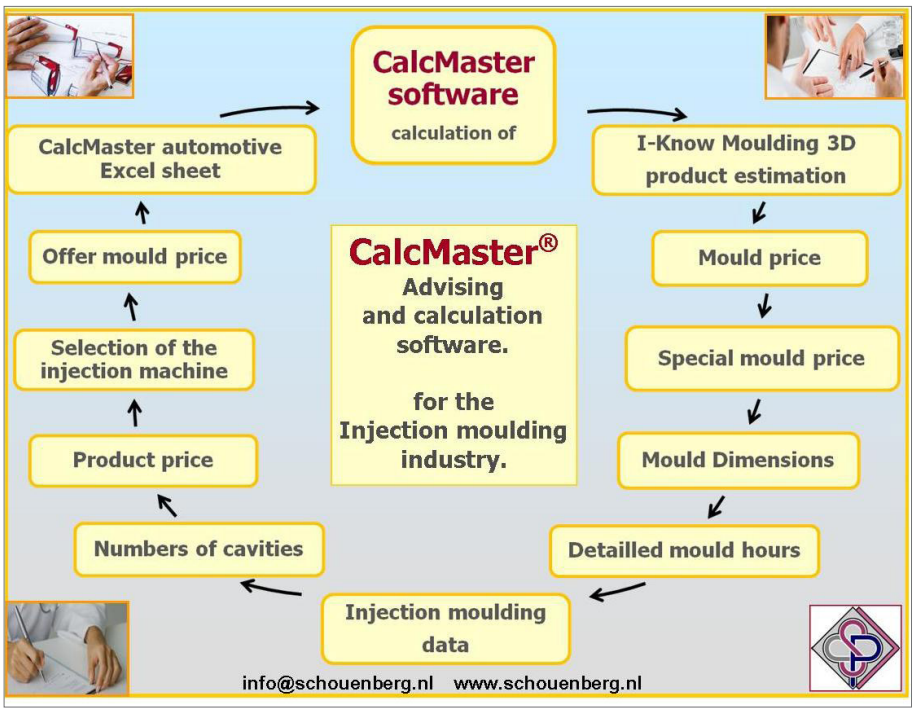
Email: info@schouenberg.nl

CalcMaster® software for the complete moulding industry

Product information

Name: CalcMaster® advising and calculation of the mould, injection moulding and product prices software
Launch: 1990
Last update: 2016
Number of licenses: n.a.
Languages available:
Dutch, English UK and USA, German, French, Italian, Portuguese, Finnish, Spanish, Turkish, Swedish, Hungarian, Polish, Czech, Romanian

Overview of the cost calculation software



Product designer, toolmaker, injection molder and management should always receive the right information for a new product development, which should be communicated in the shortest possible time internally or externally to employees or customers.

The necessary information has influence on tool investments and item price. It is important that the lowest item price is chosen. It is possible that this means investing more into the tool. Instead of being completely dependent on the experience of company employees, it would be better to assist the experience with software, in order to have the right information ready when needed. The CalcMaster consultancy and cost calculation software provides all relevant information, such as 3D product and tool concepts, detailed tool hours, tool dimensions, injection molding data, economical number of cavities, the correct selection of an injection molding machine and the article price for different cavity amounts.

When a new product is designed, as much information as possible should be directly available in order to properly advise and generate a real cost calculation. For a good communication, it is possible to look at the product in 3D, tool separation and thus measure the core and cavity of the tool. Undercuts are still shown. If spacers are necessary, the tool separation can be corrected by hand and the draft angle and surface plate displayed.

The designer can use the CalcMaster 3D software to look at both tool form plates after importing the product's STL file, in order to see what problems there are in the tool design. The following functions are possible:

- Look at undercuts
- Look at and correct tool separation
- Assess draft angle
- Assess steep surface plate
- Look at main dimensions of cavities
- Change the direction of the opening
- Change the tool separation
- Exchange product and separation data with CalcMaster using a XML file

Segoni GmbH

Company information

Year founded: 2000
Address: Grunewaldstr. 27
D-10823 Berlin
Homepage: www.segoni.de

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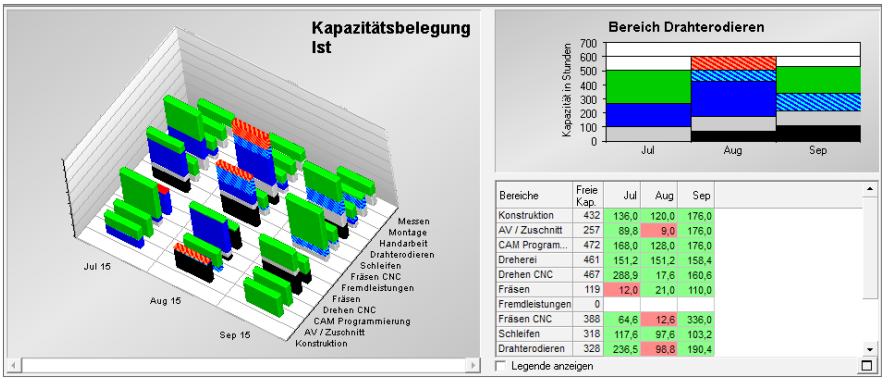
Product information

Name: SEGONI.PPMS
Launch: 2001
Last update: July 2015
Number of licenses: approx. 7,000
Languages available:
German, English (limited)

Overview of the cost calculation software

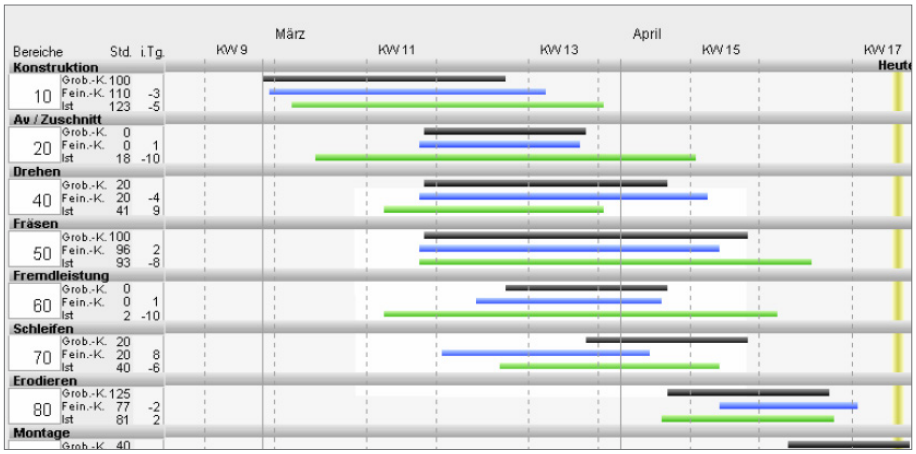


Bereiche	Freie Kap.	Jul	Aug	Sep
Konstruktion	432	136,0	120,0	176,0
AV / Zuschnitt	257	89,8	9,0	176,0
CAM Program...	472	168,0	128,0	176,0
Dreherei	461	151,2	151,2	158,4
Drehen CNC	467	288,9	17,6	160,6
Fräsen	119	12,0	21,0	110,0
Fremdleistungen	0			
Fräsen CNC	388	64,6	12,6	336,0
Schleifen	318	117,6	97,6	103,2
Drahterodieren	328	236,5	98,8	190,4

Segoni is present nationwide since 2001 with SEGONI.futur, using the motto “from practice for practice, from a lot size of one” for all tool rooms, mold makers, jig manufacturers and machine builders, for contract and small series production, now with over 400 satisfied customers and 700 users.

Characteristic for SEGONI.futur is a clear menu structure that follows the users logic and enables a quick and efficient introduction to the software. The cost calculation is divided into rough, assembly group and position calculations, allowing for the adjustment to all wishes and organizational circumstances. Also, examining before and after the quotation is sent out with the motto “what would be if?” if the necessary capacities are available and what measures can be applied if necessary. If the quotation turns into an assignment, the production status can be output and planned new or differently down to the work process level (planning table). Over the purchasing module, outsourcing can unburden the production. The amount of unburdening is also reflected in the capacity planning.

The material list shows what materials, parts or services are needed in what time period. Since everyone is informed, further inquiries are unnecessary. All assignments are registered online or offline via barcodes. Manufacturing, deadline or cost developments are all known according to the task. Evaluation of assignments, cost center analyses, employees, inventory, article management and more give the possibility of always completely informing oneself.



Siemens Industry Software GmbH

Company information

Year founded: 1963
Address: Franz-Geuer-Straße 10
D-50823 Köln
Homepage: http://www.plm.automation.siemens.com/de_de/

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Product information

Name: Teamcenter Product Cost Management
Launch: 2002
Last update: November 2015
Number of licenses: n.a.
Languages available:
German, English, French, Italian, Russian, Brazilian Portuguese, Japanese, Chinese

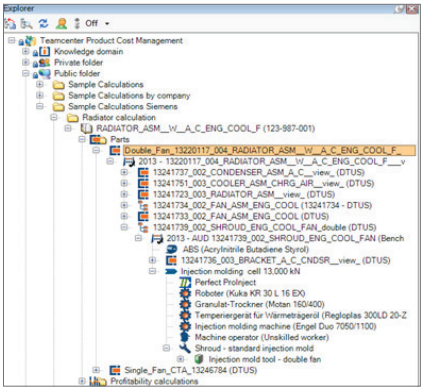
SIEMENS

Start screen of the cost calculation software

Siemens PLM software, a business unit of the Siemens Digital Factory Division is a leading, global provider of software, systems and services for product lifecycle management (PLM) and the manufacturing operations management (MOM) with over 11 million licensed users and more than 80,000 customers worldwide. Siemens PLM Software is headquartered in Plano, Texas and creates industry software solutions on close collaboration with customers. It helps companies worldwide to realize pivotal innovations and thus create a sustainable competitive advantage.

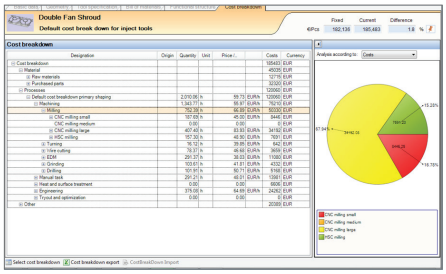
With Teamcenter Tool Costing, valid tool cost calculations can be made within the shortest time. The costs are itemized and plausibly depicted. Tool variants and changes are controllable and cost calcula- tion knowledge is saved at company level. Tool costing makes a parametric cost calculation of various tool technologies possible, e.g. injection molds, HP pressure dies and follow-on dies.

Teamcenter also offers access to an extensive, integrated, knowledge database of reference data like labor costs, materials, machines and manufacturing processes as well as an integrated cycle time calculator. This guarantees a company-wide standard of



cost calculation. The result is a tool cost calculation with a high level of detail. Flexible cost breakdowns enable customer-specific quotation information to be sent out.

With teamcenter, interactions between component and tool costs with varying lot sizes and layouts are reliably and transparently determined. Moreover, the interplay of Tool Costing with Product Costing can be used for a fully integrated cost calculation solution. Consequently, the tool costs are consistently summed up over the product parts list and the product program. Using this interaction, comprehensive cost examination is possible due to the integrated and standard view of the tool and parts costs.



Outlook

[Successful tool rooms calculate costs in relation to components and use knowledge out of the entire process chain]

Due to increasing globalization, tool rooms have to compete worldwide for their assignments. Therefore, it is important to use all economic potential to secure a competitive advantage.

A central component of securing future business is a systematic and efficient cost calculation. Nowadays, companies primarily use data derived from experience and comparative values from finished reference projects to determine tool prices. Next to a relatively long processing time, this approach has a significantly higher planning risk.

Successful tool rooms already follow systematic approaches for cost calculation in order to generate realistic and suitable quotations. As well, both internal and external production capacities are considered, costs calculated on the level of tool component and a continuous cost calculation process sought after. Thereby, a high transparency and efficient controlling are guaranteed. At the same time, strong deviations can be recognized early on and corresponding measures initiated. Additionally, successful tool rooms use the support of newer, individually adapted cost calculation software. The goal is to carry out the quotation generation process precisely and efficiently with a reproducible approach. Due to the increasing digitalization and networking of manufacturing, there are also new potentials for the use of internal data that could be used to optimize the cost calculation systematic.

The present study shows key success factors for a systematic and efficient cost calculation in the tool making industry, so that the available potentials in the cost calculation can be made useful for the entire industry. In order to optimize the existing cost calculation and thus be more successful against the competition, three recommendations for action were derived from the success factors.

Recommendations for Action

- Development of an end-to-end cost calculation system, consisting of quotation, ongoing cost calculation and post calculation
- Implementation of a systematic assessment and comparison process to select a suitable cost calculation software
- Use of software solutions as support for the cost calculation system


SPEED
LIMIT
45

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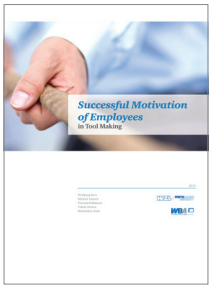
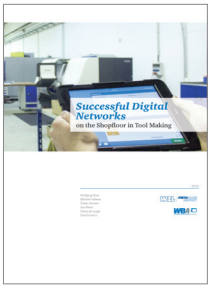
Our Studies

Tooling in Germany
2016

Tooling in China (Injection Molding)
2016

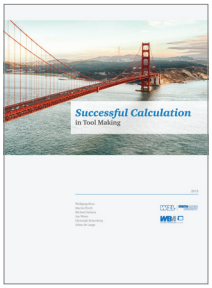


Successful Motivation of Employees
2016

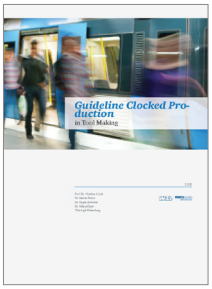


Successful Digital Networks
2016

Successful Planning
2016



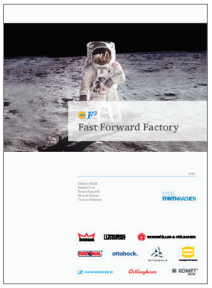
Successful Calculation
2016



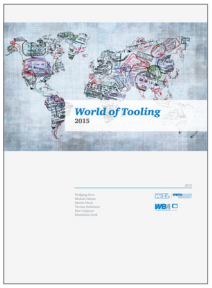
Guideline Clocked Production
2016

Tooling in China (Sheet Metal and Solid Forming)
2016

Fast Forward Tooling
2015



F3 Fast Forward Factory
2015



World of Tooling
2015

Tooling in South Africa
2014

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