

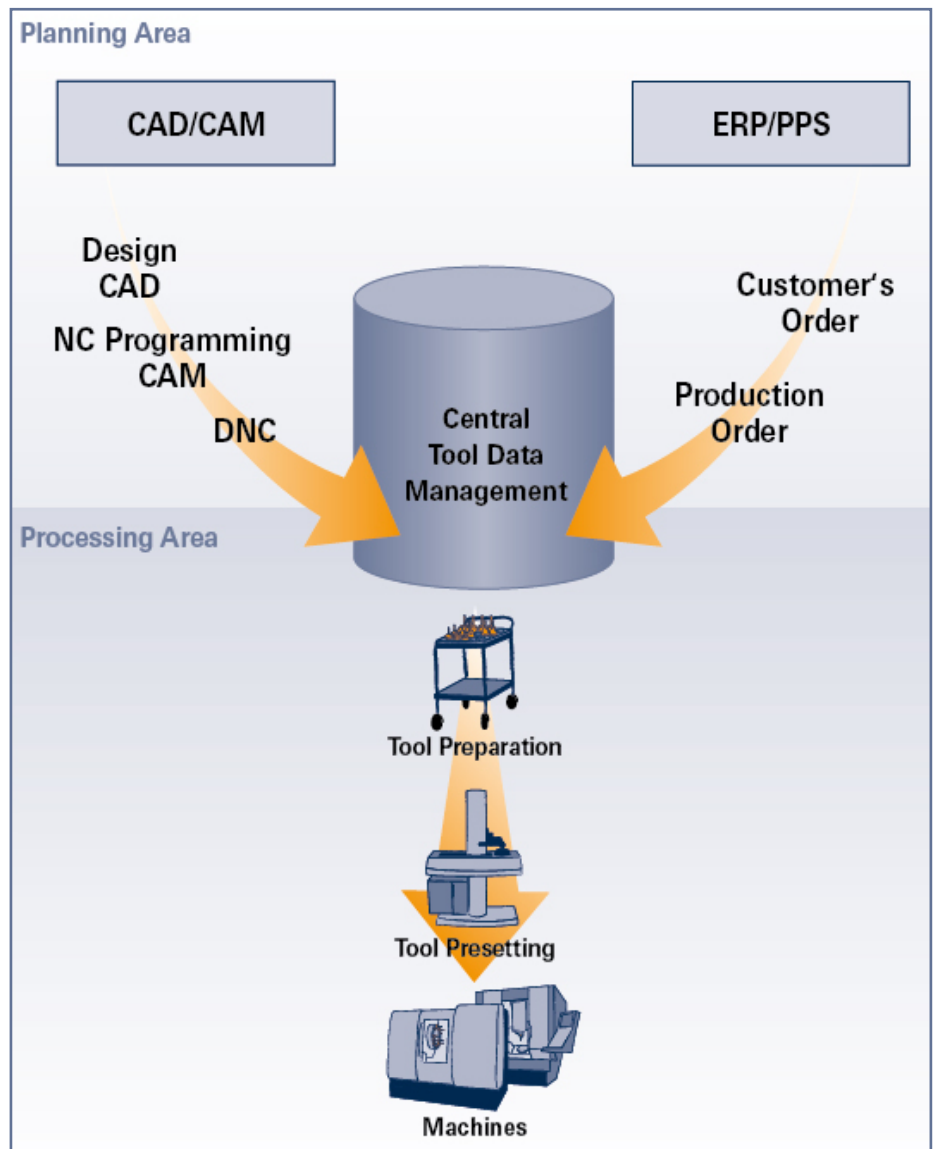


Precise Digital Planning and Tracking for Optimum Tool Availability

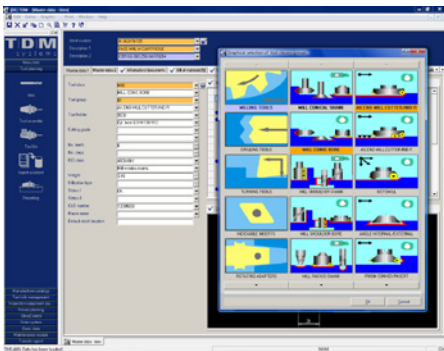
More Economy with Optimized Tool Preparation

For production order tools have to be at the machine - on time, every time - tool logistics must run smoothly. And that means that digital tool data are present throughout the in-plant tool circulation system, starting with planning and presetting and ending with actual tool use. Together with digital planning, software tool organization at the shop floor level ensures a direct exchange of information and permits near real-time tool preparation directly at the machine.

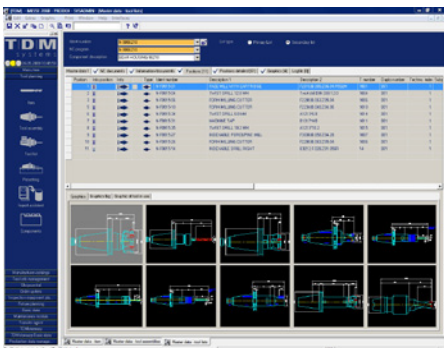
Many companies in the metal-cutting industry face exactly the same situation as that of Coperion in early 2007: "We were working with an outdated system in our production control area that was no longer up to our requirements. The same was true in our NC programming area," is how Thomas Mücke, project manager back then in Coperion's IT organization, describes it. A fresh concept was required for production to remain internationally competitive: one capable of displaying and controlling processes in the areas of design, NC programming, and work scheduling and extending all the way to tool preparation.



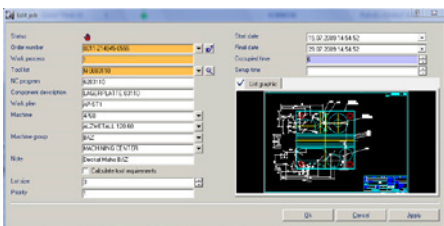
Digital tool data: graphic-based searches immediately show the user the best processing tool. An interface also makes tool data and graphics available to the NC Programming and Simulation Areas.



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The TDM software tool list names all tool assemblies required for a production order - complete with 2D graphic images and assembly instructions!



Production orders managed by the TDMshopcontrol software via an interface contain all necessary information. Filters, for example, make it possible to select all orders for a specific machine.

Systems Must Complement Each Other

Like Coperion in 2007, many other companies face the challenge of linking commercial and technological production processes together in order to achieve maximum efficiency and transparency. The software systems used for this must display processes and - extremely important - must communicate with one another. That communication begins immediately at the time of order entry: From a business point of view, production orders go from the customer order area via ERP to the production area. Then precise planning is carried out - usually with an MES system - for allocation of production resources. This makes it possible to monitor processes as a whole and pinpoint areas of weakness. Only in this way can the production planners reach their goal of reducing capital tie-ups and setup times; everything must run like clockwork.

Tool Scheduling and Resource Planning

Tool logistics begin when the Planning Area has ensured creation of a precise NC program based on the CAD/CAM processing chain. The central system role here is played by professional tool tracking and data management software (e.g. TDM V4 from TDM Systems Company). On the one hand, the software communicates with planning systems online, while on the other it also relays tool information to the shop floor level. TDM software, for example, supports the CAD/CAM chain with tool assembly data, digital 3D tool solids, and technology on the planning level. Here tool lists are a key factor in tool preparation on the shop floor: they must be drawn up for every NC program, and they must list tool assembly resources in detail.

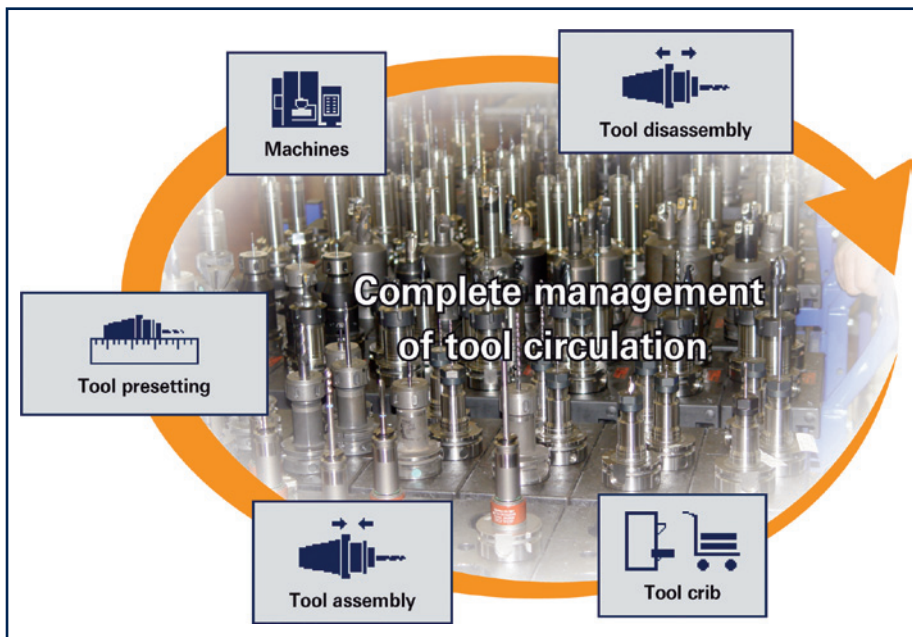
If the order is to be relayed from the Planning Area to the Production Area, TDM System's TDMshopcontrol software can take over the management of this. This software program was developed precisely for the requirements of tool preparation and logistics on the shop floor level. In the tool preparation area, data coming from the NC programming area is linked with information provided by the ERP system (logistics), and net tool needs are ascertained in detail on the basis of numerous factors. The software not only takes batch sizes and tool life into consideration but also notes which tools are at the machine and in the Presetting Area. The result: only those tools are put in readiness which will in fact be exchanged at the machine, while any required twin tools are automatically identified and put in readiness. Only in this way can machine downtimes be reduced significantly.

Controlling Tool Costs per Component

Here TDM Software plays its ace: it integrates and links all participating systems together while bringing presetting devices online, along with the respective machines and their feedback. This goes so far that tools with an elapsed service life are automatically reported to the Tool Presetting Area (this happens only with twin tools and limited production quantity settings); that avoids production stops. This naturally includes allocation of tool use for each production order, with sets of feeds and speeds, feed rates, and cutting speeds. When the order is finished, the TDMshopcontrol software can use this information to draw up a cost account sheet showing tooling costs per component (i.e. cost per part).

Optimum Milling Tool Circulation at Tornos

Tornos Company shows how software shop floor solutions can give long-term support to the automation process. This Swiss maker of turning machines uses the TDMshopcontrol software to manage production orders received from SAP through an interface. TDMshopcontrol creates production schedules and BOMs showing which component is to be processed and how. The tool list for each order is stored and used for reference by this tool tracking and data management software. A work schedule is drawn up in coordination with the production lines. TDMshopcontrol also specifies which tools are to be loaded into the magazine of a production system for each order and which ones can be removed from it.



With TDMshopcontrol organized Tornos the entire tool cycle

When an order is planned for one of Tornos' three production lines, a tool order is sent automatically to the assembly and presetting areas and then to the Fastems production management system. The presetting personnel see a number showing which orders are coming next, and they begin their preparations. A mouse click shows them which items and tool assemblies are available and which are missing. In the past, this often required a search, but now, since introduction of the TDM shop floor solution, Tornos works with minimum inventories. When the order is finished, the TDM software immediately books an internal order for dismantling and crib storage of the tools upon their removal from the machine. The person organizing the work sees at a glance whether any needed tools are already in the magazine of a machining station and allocates the order to that machine. The tooling data go directly to Fastems, thus saving even more setup time. Machines are used at much higher capacity, and administrative work in the tool presetting area is reduced.

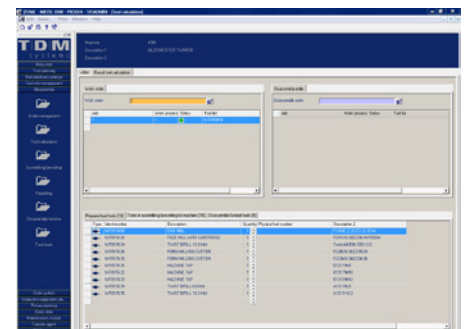
Large-Scale Assembly Manufacturer Controls Tool Logistics with TDMshopcontrol

Thomassen Machining in Rheden (The Netherlands) is a producer of large-scale metal components. The tool circulation operates smoothly thanks to TDMshopcontrol software: all needed tools are completely assembled, pre-set and promptly measured right at the machining center. Thomassen is a supplier of centrifugal compressors and turbines to the petrochemical industry and the energy market. The gigantic cast metal components - up to 50 tons in weight - are produced in small series and may stay at a single machine for several hours. The complex

drilling, milling, turning processes required for these massive parts require a large selection of tools and up to 5,600 tool assemblies. 5,800 items are kept in the crib.

More Productivity and Processing Accuracy with Esprit

Well-designed NC programs and true-to-life simulation of production sequences are important in planning the production of large-scale components. The CNC machine operator needs reliable NC programs. At Thomassen, an online interface links TDM's Tool Data Management Software with the CAM program Esprit, ensuring the needed processing accuracy. During tool selection, geometric and technological tooling data are taken over directly into the Esprit CAM system and made available there to the NC programming area for true-to-life production simulation.



Calculation of net tool needs via tool tracking and accounting

Legend: The TDM tool tracking and accounting feature produces different types of results: here it shows tools to be assembled and/or put in readiness. In addition, the accounting feature provides information about tools already in the presetting process and tools to be unloaded from the machine and/or disassembled.

Automated Production Process

Thomassen's production planners make intensive use of the TDMshopcontrol software for precise determination of net tool needs at the machines. For this, orders read out of the ISAH ERP system via an interface are relayed to the TDMshopcontrol software, which then takes over further planning: it determines net requirements and sends the tool data to the presetting device. Once the tools have been measured and pre-set, release is given for the machine, and the tools are put into the magazine.

Simultaneously, TDMshopcontrol determines which tools are not needed for the order and generates a removal list; the tools then go to the assembly room for dismantling and crib storage. Here an online interface with the plant DNC system goes into action: NC programs are transmitted to the machine control system with simultaneous relay of tool data from the presetting area. "In the past, we always had to double-check which tools were delivered to the machine; but with TDMshopcontrol we see it at the touch of a button. That has made everything much more transparent," says Ton Heurnink. "Needless waits to find missing tools or assemble and pre-set them in time can now be avoided through the use of TDMshopcontrol."

In short:

The user examples given above clearly show that digital tool tracking and data management, with an integrated shop floor software solution can be smoothly meshed with factory processes and existing CAD/CAM + ERP/MES systems. All systems supplement and communicate with each other. The prerequisite for this is a comprehensive digital tool database. The resulting carefully coordinated processes and data reduce not only overall capital tie-up in tools and raw materials, but also setup times, setup costs, and batch sizes. The upshot: less overall processing time for production orders!



TDM Project Director Ton Heurnink (at left) standing with tool presetter Derk Moll at the Zoller presetting device. Tool data management is integrated by means of a standard interface: target data and measurement program parameters are relayed automatically to the setting system, and actual values are relayed back again.



With TDMshopcontrol to the machine: this TDM software program determines net tool needs on the basis of the orders. No unused tools remain at the machine, thus reducing tool inventories

Transparent Tracking of Overall In-Plant Tool Circulation with TDMshopcontrol

Cost and time savings result from:

- Clearly structured management of orders and tool lists
- Minimized tool preparation activities
- Planning of needs according to machines and orders
- Coordination of tools in the machines and in circulation
- Generation of loading and unloading lists
- Elimination of missing tools

Tool profitability is ensured by:

- Proactive planning of tool needs
- Optimum tool use
- Uninterrupted supervision of tool use
- Reduction of crib removal, assembly and tool presetting times required for tool preparation
- Minimized machine downtimes due to fast loading and unloading, along with optimum tool assembly and adjustment
- Time-optimized setup depending on the status of work preparations
- Optimized data transmission by means of links to presetting devices and machines