

CAD/CAM | MACHINING TECHNOLOGY

A Quantum Leap in Machining and Productivity

The SolidCAM iMachining technology has triggered a leap in machining productivity. It is already proving highly profitable for normal component sizes, where the advantages are exponentiated in the heavy machining of parts of up to six meters long.

Despite high internal hourly rates, the Mechanical Production division at Liebherr in Nenzing has created significant competitive advantages through iMachining. Thanks to efficient CNC programming with SolidCAM coupled with low tool costs and shorter processing times, internal production at Liebherr is now 20 to 30 percent more economical than the extended work-bench. This secures the economic future of the production site.

At its factory in Nenzing (Vorarlberg, Austria) Liebherr produces crawler cranes, deep foundation machines, and maritime cranes. Even though machining only makes up approximately three percent, the 60 employees and eight apprentices in the Mechanical Production division headed by Michael Torghele always have enough work to keep them busy. Almost all small crane parts are produced here for the Liebherr plants in Nenzing, Rostock (Germany), and Sunderland (UK).

In an effort to further optimize the production workflow, three years ago the CNC programmers, who previously belonged to the work preparation department, were integrated directly into Mechanical Production. For Michael Torghele, this was a necessary consequence to compensate for the lack of qualified personnel in the region: "We used to do a lot of the programming directly on the machine. These competencies had to be increasingly moved away from the machine and brought closer to Production Management. This means that personnel with lower qualifications can now also work at the machine."



Liebherr-Werk Nenzing GmbH.

To ensure this approach is successful, the CNC programs for every single one of the 25,000 different workpieces must be of high quality when they arrive at the machine.

At the Nenzing plant, engineers and technicians perform their design work at over 200 CAD workstations using the Pro/E 3D CAD system. They report that with the previous CAM system, it was extremely time consuming to control the milling in a targeted manner. What is more, many steel components are milled from the whole piece today. NC programmer Christian Huber says that – despite many attempts – the previous system was not able to cope with this at all.

The iMachining processing videos on the Internet prompted the testing of SolidCAM.

Michael Torghele looks back: "The first time I saw iMachining, I thought it was a fake. To me, it looked like the machining of wood." After conducting further research, Liebherr contacted the SolidCAM sales partner barho-ecs at the end of 2013 and requested a two-month trial in the production facility.



Head of Production Michael Torghele: "The switch to SolidCAM has more than paid for itself."

The initial tests with iMachining turned out to be an absolute key experience, remembers Christian Huber with excitement, because the tool life literally exploded. In doing so, the workers in Vorarlberg were the first SolidCAM users in the world to use iMachining in heavy machining with porcupine mills instead of solid carbide mills. All that was needed to achieve this was an addition to the freely editable iMachining technology database, in which all materials and tool parameters are stored.

The massive increase in tool life brought about by iMachining was much more important than the impressive cycle time reduction, emphasizes Michael Torghele. He reports that the consistent cutting depth means that the machines now work much quieter, and problems caused by defect spindles and mounts in heavy machining have been eliminated. Thanks to optimum tool paths, the service life of the machines has been significantly increased.

"For our workpieces with high machining volumes in batch sizes ranging from one to a maximum of 100 pieces, the high level of process reliability that we have achieved through iMachining is a

great advantage for us. If we recognize possible advantages and savings for a component, we reprogram using SolidCAM," adds NC programmer Alexander Pastella.

iMachining has forced many employees to radically change their way of thinking. Whereas the depth of cut and feed rate used to be crucial, now a defined width of cut and high speeds are the important factors to consider. The 18

"It's unbelievable how quickly we achieve ready-to-use, executable CNC programs using the SolidCAM modules and with iMachining in particular."

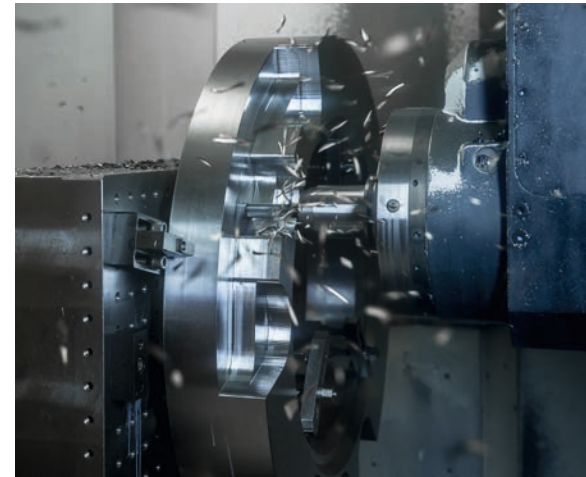
Alexander Pastella

CNC processing centers in various sizes have spindle capacities of up to 80 kW at their disposal. That is why conventional milling caused undefined tool breaks and unintentional shifting of the clamping on a regular basis. According to Michael Torghele, this is no longer an

issue wherever SolidCAM is deployed. Furthermore, the trust placed in the process reliability of the CNC programs created with SolidCAM combined with the high tool life have made it possible for Liebherr in Nenzing to switch to unmanned production overnight.

SolidCAM can be seamlessly integrated in the SOLIDWORKS and Autodesk Inventor CAD systems. To adopt 3D design data from Pro/E to the SOLIDWORKS and SolidCAM combination, the CNC programmers use both the

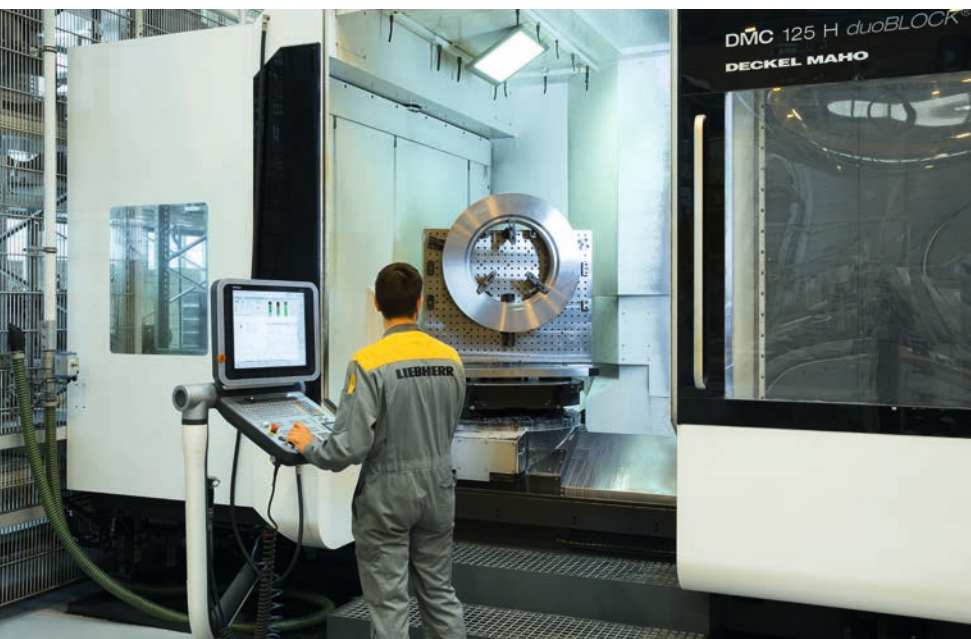
direct interface to Pro/E and the STEP format. According to Christian Huber, the advantages of SolidCAM and iMachining more than outweigh the extra work needed for data conversion.



Cycle times have been reduced and tool costs have been more than halved: highly efficient machining with iMachining.

Liebherr in Nenzing currently uses the SolidCAM modules iMachining 2D and 3D, 2.5D Milling, HSS High-Speed Surface Milling, 3D Milling, Turning, Mill-Turn, Simultaneous 5-Axis Milling, and Solid Probe at six workstations with network licenses. Alexander Pastella is full of praise for the easy operation of the CAM system: "It's unbelievable how quickly we achieve ready-to-use, executable CNC programs using the SolidCAM modules and with iMachining in particular. In the past, we often had to edit the G-code manually, whereas today, we go straight to the machine. We simply know we can trust the solution."

Frank Barho, owner of authorized SolidCAM sales partner barho ecs, stated that iMachining and the dynamically trochoidal tool paths that it produces, reduced milling processing times by approximately 70%. He goes on to explain that the iMachining Technology Wizard not only takes the geometry of the workpiece, the tool data and the material into consideration at each tool position, but also the performance data of the machine to calculate the optimum cutting values at all times.



No risk of boredom: the Liebherr plant in Nenzing produces 25,000 different workpieces in batch sizes ranging from one to 100 in sizes of up to six meters.



SolidCAM is used to program a total of 18 different CNC processing centers in various sizes and with different control systems.

Frank Barho identifies the high level of productivity and process reliability in the CNC programming to be unique selling points. With the aid of the Technology Wizard, the user can generate an optimum CNC program with minimum input. Christian Huber can confirm this: "We no longer have to guess which feed rates, speeds, and step-ups should be used for which material and tool. iMachining takes this uncertainty and responsibility completely off our shoulders. This is extremely motivating."

Alexander Pastella adds that they first had to find out how aggressively they should machine the part. To do this, there is a level slider in the iMachining user interface with speed settings from 1 to 8 and a turbo mode. The iMachining level can be used to individually set the processing speed to the clamping situation and the general state of the machine. The workers in Vorarlberg currently use level 4 in most cases, because process reliability is of significantly greater importance to Head of Production Michael Torghele than the maximum possible reduction of cycle time.

is an infinitely valuable advantage when it comes to large workpiece dimensions and multi-axis machining.



Frank Barho and Karin Pichler from barho-ecs (left) together with Christian Huber, Michael Torghele and Alexander Pastella are pleased with the successful introduction of SolidCAM at Liebherr-Werk Nenzing GmbH.



The iMachining technology reduces the strain on the spindle, guides, and mount. In heavy machining, this results in reduced machine wear and increased service life.

To ensure trouble-free setup and uninterrupted production of the parts, SolidCAM can be adapted especially to the existing machinery in various areas. Realistic machine simulation allows processing to be checked before the CNC program is issued. SolidCAM initiator Christian Huber has already added almost all the individual CNC processing centers in Nenzing to the system. Every machine can be simulated in detail and with complete kinematics. This means, for example, that the end switch position on each processing axis can be precisely defined, which allows all workpieces to be simulated with a high degree of reliability. According to Mr. Huber, this

Christian Huber is also responsible for the adaptation of the currently 12 different post processors for CNC program generation: "The programs for our Heidenhain and Siemens control systems correspond exactly to our requirements and are comprehensible for our machine operators. In addition, we can use the Solid Probe module to implement probe and measurement cycles for measuring contours and automatic tool correction directly in SolidCAM."

Continuous improvement and further development are critical success factors for Michael Torghele and his team.

"We are always testing new functions in the CAM software. The combination of SolidCAM training courses, webinars, documentation, and the countless SolidCAM Professor videos available offer a learning effect that is one of a kind."

Head of Production Michael Torghele summarizes: "At first, Management was skeptical about the investment in SolidCAM because the advantages were not directly tangible for them."

The first iMachining demo soon changed their minds. In just one year, we have freed up production capacity, increased our productivity by at least 30 percent, and reduced tool costs by more than half. The investment has more than paid for itself. For us, SolidCAM with iMachining is definitely a quantum leap."

Liebherr-Werk Nenzing GmbH

Liebherr is one of the largest construction machine manufacturers in the world. As a recognized innovation leader on the international construction machine market and in the maritime sector, Liebherr-Werk Nenzing GmbH in Vorarlberg, Austria, has an extensive product portfolio. This includes crawler cranes, duty-cycle crawler cranes, piling and drilling rigs, mobile harbor cranes, ship cranes, offshore cranes, and reach stackers.

The Liebherr plant in Nenzing was founded in 1976 and currently employs 1,500 people.

Further information:



SolidCAM GmbH

Gewerbepark H.A.U. 36
D-78713 Schramberg
Tel.: +49 (0)7422 2494-0
info@solidcam.de
www.solidcam.de



Made in Nenzing, Austria: The H5885 duty-cycle crawler crane from Liebherr.