PRESS RELEASE

OPEN MIND Supports Research Project

Controlling Coolant Pressure Brings Enormous Energy Savings

Wessling (Germany), 25 October 2022 – Leibniz University Hannover’s [Institute of Production Engineering and Machine Tools](https://www.ifw.uni-hannover.de/en/) has researched whether it is possible to save energy when conducting machining work by adjusting coolant lubricant pressure (CL pressure). OPEN MIND provided financial support for the project and supplied the component geometry and programming for milling and analyses. During the project, a method was developed that makes it possible to determine the optimal level of CL pressure concerning the degree of tool wear that occurs. The result: energy savings of up to 33 percent. In the future, methods based on machine learning will make it possible to control CL pressure as needed by using an optimized NC code.

Professor Berend Denkena, Talash Malek (MS), Martin Winkler (qualified engineer), and Marcel Wichmann (MS), introduced their project in the April 2022 issue of The Association of German Engineers’ *VDI-Z* magazine under the title “Energy Efficient Process Planning”. As the authors were searching for ways to design machining processes to be more sustainable, they began dealing with the topic of high-pressure cooling. High-pressure CL systems can extend the service lives of tools by up to 250 percent, simultaneously they are responsible for up to 25 percent of a machine tool’s energy consumption.

Research on tool wear performance

Tools wear differently depending on which machining strategy is used and what the material removal rate is when milling. At a certain point, raising the CL pressure no longer increases the service life. That also means that in many situations, an unnecessary amount of coolant is introduced. The researchers carried out the machining test developed by OPEN MIND, which involves roughing several pockets in a Ti-6Al-4V block using a VHM end mill.The research investigated the effects of different machining strategies and CL pressures on tool wear.

Machine learning

Based on their findings, a simulation based on machine learning (ML) was developed that was able to use the process data to predict the amount of tool wear. The machine learning model was used to simulate the machining process with varying levels of CL pressure. Validating their findings using real components, the tests confirmed that the same surface qualities and tool services lives were able to be achieved by using a reduced level of pressure according to the machining application. The energy savings of up to 33 percent were even a little higher than expected after running the simulation.

A groundbreaking advancement for the industry

“We’re happy that we were able to contribute to this project, and we’re impressed with the result,” says Dr. Josef Koch, CTO of OPEN MIND Technologies AG. “For us, the project resulted in two methods to further develop our CAD/CAM systems. Dynamic CL pressure control might be integrated into *hyper*MILL’s NC code generator in the future.”

“We’re also investigating whether predictive models can be used to determine how much tool wear will occur with a given tool. That would enable users to compare the differences in how much tool wear occurs when using different milling strategies. That would be an interesting advancement for our VIRTUAL Machining Center.”

**Available images**

The following images are available for download in printable format at:   
<https://kk.htcm.de/press-releases/open-mind/>

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| Source: OPEN MIND  **Dr. Josef Koch, CTO OPEN MIND Technologies AG.** | Source: Malek/IFW  **In the future, methods based on machine learning will make it possible to control CL pressure as needed by using an optimized NC code.** |

About OPEN MIND Technologies AG

OPEN MIND is one of the world’s most sought-after developers of powerful CAM solutions for machine and controller-independent programming.

OPEN MIND develops optimized CAM solutions that include a high number of innovative features not available elsewhere to deliver significantly higher performance in both programming and machining. Strategies such as 2.5D, 3D as well as 5-axis milling/mill turning, and machining operations like HSC and HPC are efficiently built into the *hyper*MILL® CAM system. *hyper*MILL® provides the maximum possible benefits to customers thanks to its full compatibility with all current CAD solutions and extensive programming automation.

OPEN MIND strives to be the best and most innovative CAD/CAM manufacturer in the world, helping it become one of the top five in the CAM industry according to the “NC Market Analysis Report 2021” compiled by CIMdata. The CAD/ CAM solutions of OPEN MIND fulfil the highest demands in the automotive, tool and mold manufacturing, production machining, medical, job shops, energy and aerospace industries. OPEN MIND is represented in all key markets in Asia, Europe and America, and is a Mensch und Maschine company.

You can find more information at [www.openmind-tech.com](http://www.openmind-tech.com).

OPEN MIND Technologies UK Ltd., Oxford

Unit 3

Bicester Business Park

Telford Road

Bicester

Oxfordshire OX26 4LN

England

Phone: +44  1869  290 003

Fax: +44  1869  369 429

E-mail: Info.UK@openmind-tech.com

OPEN MIND Technologies USA, Inc.

1492 Highland Avenue, Unit 3

Needham MA 02492

USA

Phone: +1  339  225  4557 office

Phone: +1  888  516 1232 x0 toll-free

Fax: +1  270  912 5822

E-mail: Info.Americas@openmind-tech.com

Head office:   
OPEN MIND Technologies AG, Argelsrieder Feld 5, 82234 Wessling, Germany  
Tel.: (+49-8153) 933-500, Fax: (+49-8153) 933-501  
E-mail: Info@openmind-tech.com, website: www.openmind-tech.com

**Press contact:**

HighTech communications GmbH  
Brigitte Basilio  
Brunhamstrasse 21  
81249 Munich  
Germany  
Tel.: (+49-89) 500778-20  
Fax: (+49-89) 500778-78  
E-mail: b.basilio@htcm.de  
Website: www.htcm.de