Customer Interview: NC-Optimization

hyperMILL®

DONNER The Qualifactory

We are an owner-managed company based in Schorndorf (Baden-Württemberg, Germany). Our main business area is the CNC production of high-quality, custom components for various industries such as the production machining, racing, aerospace, bicycle, e-mobility, and electronics industries. We use high-tech machine tools to machine a wide range of metals or plastics with an accuracy down to the micrometer range.
www.the-qualifactory.com

In addition to contract manufacturing for our industrial customers, we also manufacture our own products. At our site in Schorndorf, we develop, manufacture, test, and distribute premium-quality motorcycle accessories under the Donner Tech brand – 100 percent made in Germany!
www.donner-tech.de

Interviewee:
Mr. Steven Donner
Managing Director

There are special software solutions that can analyze and optimize an NC program. What were your expectations of the *hyper*MILL® VIRTUAL Machining Optimizer?
The main thing we wanted to happen was to reduce the number of clearance movements so we could optimize our programs in terms of time. Shortening or even completely eliminating rapid movements naturally reduces wear and energy costs. Idle paths simply have no benefit, which is why they should be eliminated whenever possible. That's where the Optimizer does a great job. We save significant amounts of time, all without altering the process itself in terms of adapting the feed.

During NC code generation, the program is adapted to the kinematic properties of the machine. What impact does that have on your programming work and later when the machine is running?
We actually don't pay any attention to optimizing the necessary linking movements anymore when programming successive jobs with the same tool. The software is now responsible for linking the jobs in the most optimal and efficient way possible – the user doesn't need to get involved at all. We also no longer think about the kinematics of the machine, for example whether it is AC or BC. We program independently of the machine, and the Optimizer takes care of the rest. The tool is sometimes implemented on all axes at the same time somewhere between the component and the table, since this is the most efficient link from A to B. It looks dangerous, but it's not. In the past, we could only achieve this to a limited extent through linking jobs, but this meant we needed to put in additional programming effort as well.

Please compare NC programs with and without the Optimizer. What is the difference, and do you achieve runtime optimization with the Optimizer?
When we reissued our first set of programs with the Optimizer, it immediately became apparent about how much time we had saved. The Optimizer programs convert abrupt, axis-by-axis clearance movements and make them look like they're part of a graceful ballet performance. Everything just runs much smoother and more fluidly. For our series parts for the Motorcycle Accessories division, a program with 25 minutes runtime immediately required two minutes less machining time without any further adjustments, as I mentioned before. It is important to know that these programs have already been optimized in the best possible way with the tricks available so far. If you take a common batch size of 100 units as an example, that's 200 minutes of machine capacity that is now free to use. You can do a lot in 200 minutes. This is very much in line with our lean management approach, which we follow throughout the company. Rapid movements are a waste of resources, and they don't add value. They are of no use to us or our customers. No customer wants to pay us to run our machines for the sake of it instead of producing chips.

The Optimizer has a special option for table-table kinematics. What does that mean in concrete terms, and what advantages does it give you on your machines?
This option allows us to accommodate components in the workspace of a machine that we otherwise couldn't machine at all or would take a large amount of extra effort to do so. Depending on the axis kinematics, the traverse paths can quickly become narrow, especially with tilted rotary axes. We don't need to manually split machining jobs into different positions – the Optimizer takes care of that now. Exceeding the traverse path by a few tenths or millimeters used to be particularly annoying and time-consuming. Since the VIRTUAL Machine knows the exact size of the specific machine's physical workspace, this is actually no longer an issue – the simulation flags up these situations if the Optimizer hasn't avoided them already.

How beneficial do you find the Optimizer? Which components is it useful for?
In my opinion, the benefit that the Optimizer brings is apparent even if you're only machining a quantity of one (remember, we're all about lean production). Of course, the benefit increases proportionally to the batch size, but we don't manufacture large batches. In the 5-axis range, 500 units of the same item are already the exception. We are predominantly in the range of one to 50 units for contract manufacturing, although there are quite a few individual parts.

The optimized NC code is of course also simulated in the *hyper*MILL® VIRTUAL Machining Center and checked for collisions. How has your experience been with this?
You definitely have to get used to the machine movements generated by the Optimizer. Depending on the settings, some linking movements give you the impression that there is about to be a crash – which can sometimes cause a few heart-in-mouth moments. In the beginning, we often instinctively reached for the feed controller; now that we have gained confidence, most of the components run without us looking into the machines' workspaces.

Visit our website to learn more about what a networked manufacturing environment can do for you.

www.openmind-tech.com/de/cmpgn/cam-vernetzung.html