

Metalworking Coolant finally under control

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After a long search and numerous bad experiences, M&M Zerspanungstechnik GmbH headquartered in Nidda, federal state of Hesse, Germany, has only positive things to say about the use of its cooling lubricant. Why this is so and what role is played by the "Petrofill Profi A-S" automatic cooling lubricant filling system, which was installed in January 2017, was explained to us by Norbert Moufang, Managing Director, in the following interview.



The machine room of M&M has been fully automatically supplied with cooling lubricant since January 2017.

The corporation M&M Zerspanungstechnik GmbH (Zerspanungstechnik = machine tool technology) has about 30 employees, and produces between 2.5 and 3 million precision parts per year on Index and Okuma [automated] machines. As a contract manufacturer for very different sectors, such as hydraulics, automotive, road construction, building facade and general building technology, and construction machinery, the company has a very broad base. It manufactures in both small and large serial production, with all the products being fabricated with single-spindle machines. Most of the sales are from loyal repeat customers that have appreciated the

quality and delivery reliability of "M&M" for years. In addition, M&M has not limited itself to a specific workpiece material for its machining – it processes an entire range of materials, [particularly] in the classes of free-cutting steels, brass, aluminum and, of course, stainless steel. "We manufacture stainless steel parts that are particularly important for the optics (i.e. for optical applications, and where certain optical characteristics are needed) as well as very precise turned parts with tolerances of down to ± 5 microns, and we accommodate rod diameters of $\varnothing 4-65$ mm," said Norbert Moufang. "Just a year ago, we had to deal with many problems where sometimes we did not

associate the origin of the problem with the cooling lubricant. The whole story started with the fact that we simply could not cope with the former cooling lubricant concentrate," said Moufang.

"The employees complained increasingly about skin irritation, and there was continuous tension with the personnel in connection with the filling of the machines. The schedule called for the workers to refill the machines with cooling lubricant, in a group of 4-5 machines, always at the end of a shift. The cooling lubricant was stored centrally in an IBC (Intermediate Bulk Container) and transported from there to the machines. The problem was that, at the end of the shift, people wanted to go home, and naturally as a result this work was not always carried out with the necessary care. Sometimes concentrations were too high, or too low, or the refilling simply was not done. I constantly had employees in my office complaining about the deficient performance of their colleagues. Of course, this also led to dissatisfaction and interpersonal problems in the workforce. There was a mood of retaliation, in a sense: "As you do to me, I do to you."



The cooling lubricant is supplied to the machines via the blue plastic tubes.

"Another problem was that the temperature [control] in the machine was degraded ("lost"), due to the high drawdown of cooling lubricant during the shift and the single refilling. This led to appreciable daily deviations. Therefore, the

machine had to be readjusted at the beginning of each shift. This was enormously costly. In addition, we had to manage increased foaming at low levels of the cooling lubricant, and consequent tool breakage, entailing even more costs. During that period, we needed to replace the entire emulsion after one half year or less."



The mixing station provides constant mixing ratios between the two components of the cooling lubricant that are used.

Two years ago, Norbert Moufang received a visit from an external sales representative from Sindelfingen MAW Werkzeugmaschinen GmbH, which is the company that took over the distribution of Petrofill's automatic coolant filling system in Germany from the Dutch cooling lubricant specialist Petroline International. At the time, the sales representative introduced Moufang to the Petrofill system and, from the beginning, he was enthusiastic about the concept. With the Petrofill system, a whole machine room or individual groups of machines can be supplied fully automatically with cooling lubricant, when and as needed.

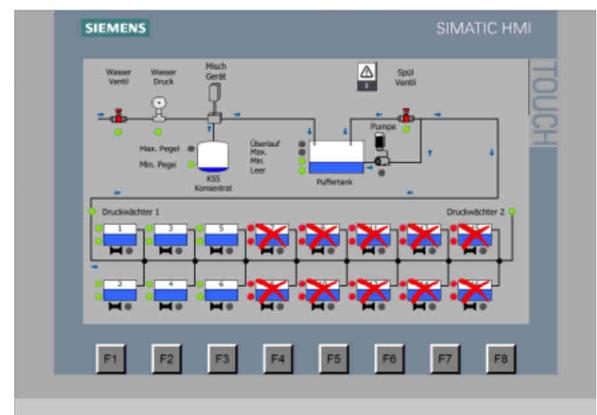


The float switch on the right serves to monitor the level of the cooling lubricant in the tank. The valve opens whenever necessary, wherewith in each instance a small amount (of the cooling lubricant) is added, to replace the amounts expended.

Norbert Moufang further stated: "The first thing we needed to do was to solve the problem with the cooling lubricant concentrate because we were genuinely displeased with it. We investigated various options and finally decided on the new coolant lubricant Bonderite L-MR 21466 from the company Henkel. We use this in a mixture together with the neutral high-performance cleaner C-NE 10466, which is also from Henkel. We provide a new formulation with this coolant lubricant concentrate, containing 2% concentrate and 2% cleaner. After refilling, the Petrofill system then has a mixture of 0.3% concentrate and 0.1% cleaner. The important thing with this 2-component coolant lubricant is that first the water is mixed with the cleaner and then this mixture is mixed with the concentrate. If you reverse it (the sequence), then it does not work. With this coolant lubricant, we can machine the entire range of materials with only one concentration."

In fall 2016, M&M decided to purchase a Petrofill Profi system, and at the turn of the year 2016/2017 it was installed in the production room by technicians from the company Petroline and employees of M&M. The Petrofill system uses two piston mixing apparatuses connected in series. This is

important to allow the two cooling lubricant components to be mixed in the correct order. The desired cooling lubricant concentration is established accurately in the piston mixing device of the system. From the mixing apparatuses, the mixed emulsion then goes into a buffer tank in which it is brought to the workshop temperature, under circulation (agitation), and has time to amply emulsify according to the manufacturer's specifications. From there, the finished cooling lubricant (formulation) is then distributed to the individual machines via a central control and piping arrangement. This takes place continuously, 24 hours a day, in response to the present need, as each machine is equipped with a float switch and an electropneumatic valve.



The display screen of the Petrofill Profi system provides a graphic representation of the machines that are connected to the system.

The automatic Petrofill cooling lubricant filling station is operated via a Siemens control system employing a touch-screen (control interface). There are currently 24 lathes connected, in the M&M system, which are supplied with fresh cooling lubricant around the clock. The system always doses only small quantities. The activities are graphically displayed on the overview screen of the control system. The Petrofill systems can also be used independently of the manufacturer of the cooling lubricant [i.e. with a cooling lubricant supplied by a different manufacturer].

Built-in safety systems prevent overfilling, and they can detect a pipe break immediately and can bring the system to a standstill in the event of an emergency.



Jochen Wagner, Norbert Moufang, and Markus Pohl, in front of a CNC-controlled lathe that will be connected to the central cooling lubricant supply system.

Since the installed Petrofill Profi system can supply up to 32 machines, it is planned to integrate a Boehringer cycle-controlled lathe, which is currently manually refilled, into the system. "That is no problem at all," says Markus Pohl, the sales representative responsible for MAW Werkzeugmaschinen. "The customer can now install the pipes itself, and we only have to supply the hardware and adapt the software to the control system."

At the end of our interview, we asked Mr. Moufang whether the investment of slightly over one hundred thousand euros was worth the expense, in his opinion, considering that it was possible for the workers to continue with the former system and just to work a little more carefully. He answered as follows: "You would not believe the benefits we got from installing the system. The workers are no longer tied up in a task that they never liked to perform." He then described the benefits in quantitative terms, as follows: "We measured our water consumption before installing the Petrofill system. It was about 16 cubic meters per month. These 16,000 liters consumed per month were transported to the machines manually, using watering cans. This amounted to about 800 liters of cooling lubricant each day, thus 80 watering cans. Today, our machine tool operators have more

time for other tasks, and can use their time more productively, like tending to the machines and supplying the materials and parts. We save about 20 working hours per week."

"Based on sensory monitoring results, our cooling lubricant system today is absolutely in good order. We have no problems with microbial contamination, and we have not needed to change the cooling lubricant on the machines for an entire year. We also noticed a savings of about 20% in the consumption of cooling lubricant concentrate. This is probably due to the fact that no more mistakes are made during mixing because the Petrofill system always mixes highly accurately. In terms of workpiece precision and wastage, we have also made tremendous progress. Our employees have also become much happier, so I can say that the Petrofill system also has a positive impact on the working climate. We finally have peace of mind concerning our coolant lubricant management."

"The advantages are still hard to believe. But after one half year of use, I can strongly recommend the Petrofill cooling lubricant filling system to anyone."

"It may sound strange, but the savings go as far as broom expenses. We used to have to buy new brooms regularly because we had a lot of moisture on the floor. Since we have had the Petrofill system, the floor is much drier, and our workers need to use brooms much less often. It is not so much the saved expenses for brooms that we are pleased about, but the associated work hours saved, of course."