

AT WISPATECH ZERSPANUNG IN KALTENKIRCHEN



Up to the cutting edge of the tool

With retrofitted MQL for more productive machining

Milling and drilling thin aluminium plates is a difficult task. Absolutely necessary: vacuum clamping technology and a minimum quantity lubrication system. Wispatech achieves the best results with the KNOLL AerosolMaster.

Older machine tools also benefit from a retrofitted minimum quantity lubrication system (MQL) – especially when it comes to aerosol dry lubrication (ATS). This is also confirmed by Julian Wiegold, machining professional and owner of Wispatech in Kaltenkirchen. With the KNOLL AerosolMaster, he was able to reduce the machining time by up to 50 percent on an almost 20-year-old machine when drilling and milling vacuum-clamped aluminium plates.

Julian Wiegold is a passionate machinist. The trained aircraft engine mechanic initially practised this at home in his workshop for a few years alongside his actual job in the aircraft industry. But his machining "after-work job," which he started in 2009, attracted more and more customers, so that in 2014 he became completely self-employed and founded the Wispatech company in Kaltenkirchen. Today, Wiegold employs nine people and Wispatech manufactures sophisticated components for a wide range of industrial sectors as well as its own products, such as linear axes and vacuum clamping plates.

Understanding machining and developing solutions

What Wiegold enjoys most is dealing intensively with difficult machining tasks and optimally designing the processes.

This is where his great expertise and creativity come into play. Not least is this reflected in his Maximart VMC 105, which is particularly close to his heart. No wonder: The vertical 3-axis machining centre, built in 2004, was his first major investment and is now - it had been long since written off - a cash cow for the company. "A few years ago, we equipped them with a vacuum clamping system I developed," explains Julian Wiegold, "in order to be able to clamp thin aluminium plates without vibration." These base plates, made for an axle manufacturer, are milled and drilled with numerous holes.

But if you use vacuum clamping, you have to do without a classic cooling lubricant flooding system. The vacuum pump would suck in the emulsion and give up the ghost. That was clear to Julian Wiegold: "You can only work dry or with MQL with such a clamping system." Without further ado, he built his own MQL system - based on alcohol, since this medium is ideal for aluminium, AlMg and AlSi alloys. Wiegold explains: "We bring the alcohol to the tool from the outside via a nozzle. Due to evaporation, the tool cools down to minus 30 degrees. In addition, the alcohol should lubricate the cutting edge of the tool to increase its service life. Also: no cleaning, no degreasing. The alcohol evaporates without leaving any residue."



Extremely productive even in old age: Julian Wiegold upgraded the Maximart VMC 105 machining centre, built in 2004, with a vacuum clamping system and a KNOLL AerosolMaster. When machining aluminium plates, it now delivers maximum performance.

Alcohol MQL - a system with strengths and weaknesses

When it came to milling, the plan worked in most cases. "A clear advantage compared to dry machining," says Wiegold, who likes to push the load limits when machining. His conviction: "Machining only becomes interesting and lucrative if you exhaust the possibilities of the machine and tool." However, the alcohol MQL reaches its limits at high cutting data, with long tools for deep milling and especially when drilling. The tool cooling is available, but not a drop of alcohol gets to the cutting edge. The lubricating effect is eliminated.

Another disadvantage: Since the MQL system built by Wiegold does not generate high pressure, chips cannot be blown out of the tool channels. There is a risk that it will block the chip evacuation on the second milling path and that chips will be drawn under the cutting edge. The tool service life is then rapidly reduced, and poor surfaces can also be expected on the component.

A promising solution: aerosol dry lubrication

Wiegold went in search of a better solution, a system for cooling and for reliable lubrication of the cutting edge. His preferred tool supplier recommended that he contact KNOLL Maschinenbau and take a look at the aerosol dry lubrication (ATS) system.

No sooner said than done - and Michael Erler, Area Sales Manager at KNOLL, promptly stopped by with a colleague from Technology and an AerosolMaster test unit. This could be connected mechanically via the rotary union available for the internal coolant supply and, in terms of control, via an external control panel.

Julian Wiegold tested the system for a day and a half together with the KNOLL representatives. He carried out tests to the limits of the tool loading capacity and beyond, i.e., until it broke. His insight: "With the alcohol MQL and the same tool, we would not have come close to achieving the cutting data that was used."

ATS is also worthwhile for older machines

What was to follow was clear: order, delivery, permanent installation. But does ATS also work on a CNC machine that is almost 20 years old? Yes. It is not quite as easy as with a newer machine that has a CAN bus, but it works.

At Wispatech, the installation took two days. Additional relays had to be installed and a few other changes had to be made. Ultimately, however, the system is integrated into the existing controls in such a way that the user can choose from three different cooling-lubricating configurations in the machine program, depending on the tool.

Julian Wiegold is enthusiastic: "Working with the AerosolMaster works fantastically and is absolutely reliable. The acquisition costs and the installation effort were definitely worth it. In most cases, we are now able to reduce machining times by up to 30 percent and, above all, have much higher process reliability." The latter is primarily ensured by the compressed air with which the ATS system works (also see info box). "The 8 bar compressed air, which expands at the tool outlet, blows the chips away quickly and effectively so that we always have chip-free channels. This works much more efficiently than with 25 bar of coolant pressure.



The special feature of aerosol dry lubrication is that a fine aerosol, with an average droplet size of 0.25 µm, is generated. For this reason, unmixing of the aerosol is hardly to be expected, even at high speeds and over long distances.

Even more efficient thanks to additional shaft cooling

In some cases, Wispatech also uses - in addition to the KNOLL AerosolMaster – the existing alcohol MQL to cool the tool shaft. Julian Wiegold explains: "After a fundamental success was visible, we set about optimizing the processes and the tools. That is fundamentally important if you want to fully exploit the possibilities."



Even with older CNC machines that do not yet have a CAN bus, the subsequent integration of the KNOLL AerosolMaster is not a problem. However, additional relays must be installed and a few other changes must be made.



After the integration of the ATS system on the Maximart VMC 105, company boss Julian Wiegold dedicated himself to process optimization, which also includes a targeted tool selection.

How the KNOLL AerosolMaster™ works

The heart of the AerosolMaster™ system is a pressure vessel containing an MQL oil, such as the lubricating oil ATS Lubricant, which is transformed into a fine aerosol with a droplet size of 0.1 µm to 0.4 µm (average size 0.25 µm) with the carrier medium air via a special Venturi nozzle. Patented control and regulation technology ensures that aerosol generation and transport can be adjusted according to the particular application. Even at high speeds and over long distances, unmixing of the aerosol is hardly to be expected because of the extremely fine particles. Nor is there any risk of film breakage. In addition, the ATS medium blows the dry chips immediately out of the machining zone.

He gives an example: "We clamped 120 parts on a vacuum plate. That used to mean twelve hours of milling time. With the ATS, the additional alcohol shaft cooling and the optimal milling cutter, we are down to two hours." Such extreme savings cannot be generalized, but according to Wiegold, 50 percent time savings are often possible with optimized processes.

ATS with cryogenic cooling technology

In the presence of KNOLL representative Michael Erler, Wiegold expressed another thought: If only the alcohol cooling could be replaced now, because the procurement of the medium is always problematic... And Erler promptly had an answer ready: cooling with CO₂.

For cases in which pure aerosol dry lubrication reaches its limits, for example in the heavy-duty machining of titanium and other poorly heat-conducting materials, KNOLL combines the ATS with cryogenic cooling technology. This means that, in addition to the normal AerosolMaster, liquid CO₂ is fed in a second channel to the machining contact zone, which can be cooled down to a temperature of -78 degrees Celsius. "In principle, it works like the alcohol MQL, only with liquid CO₂ from the gas bottle and even more effective temperature reductions," explains Michael Erler.

"Worth a try," says Julian Wiegold, "we'll test that at the next opportunity." He is now completely convinced of the quality of the "basic" KNOLL AerosolMaster. His conclusion: to order a second system, which he wants to use for two more machines: "We will install it in such a way that I can switch between the two as needed."

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On-site advice: KNOLL Area Sales Manager Michael Erler (left) helped Julian Wiegold with the selection and integration of the KNOLL ATS AerosolMaster system.

Promising prospects

The planned machining centres are, on the one hand, a three-axis POSmill E 1100, which is equipped with a removable vacuum plate. With the AerosolMaster, Wispat-ech achieves real redundancy with the Maximart.

On the other hand, the AerosolMaster should supply the POSmill H 800 U 5-axis machining centre, which Wispat-ech prefers to use for trochoidal milling. "We machine, among other things, rocker arms for large engines on this high-performance machine. From the 25 kg steel blank, a finished part of only 5 kg remains. Pure air cooling is not enough. I am convinced that, with the AerosolMaster, we will significantly increase our productivity."



KNOLL Maschinenbau GmbH

KNOLL is the leading provider of conveyor systems, filtration units and pumps for metalworking. These transport and separate chips and cooling lubricants. The comprehensive product range offers systems for decentralised or centralised applications. Its Automation Division deals with solutions for challenging assembly and logistics tasks. These include stationary transport systems with chain and roller conveyors. The integration of handling units (robots, cobots) and transport robots (AGVs) enables flexible systems to be created from a single source.

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Wispat-ech Zerspanung – Machining service provider for tricky parts

Wispat-ech is a service company for demanding CNC machining. The focal points of the offer include precision milled parts, housing adaptations, prototypes, zero point/vacuum clamping systems, as well as the reworking of standard parts. Wispat-ech machines cast iron, steel, aluminium, non-ferrous metal and titanium alloys, as well as lead, plastics and much more - up to a workpiece weight of 1.5 tons. For surface and heat treatments, the company works with reliable, regional partners. The offer also includes contract measurements and the reengineering of spare parts that are no longer available from the original manufacturer.

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