

Statement to general ban on PFAS-materials inside European union

Since its founding, TBT Tiefbohrtechnik GmbH + Co has specialized in the precision deep hole drilling process and is one of the world's leading specialists in this field. Our product range includes deep hole drilling machines, deep hole drilling tools and deep hole drilling services.

A process medium that is indispensable for the deep drilling process is the cooling lubricant. In addition to the classic tasks of cooling and lubricating, the cooling lubricant also transports the chips out of the bore. It is an indispensable factor for the quality of the hole (surface quality, roundness, and others).

Despite new, modern cooling lubricant concepts such as minimum quantity lubrication, there is no alternative to deep drilling oil for high drilling requirements over the decades.

Deep drilling oil is usually based on mineral oil, which leads to so-called "swelling" in many plastic and sealing materials. This means that the material grows and loses its shape under long-term exposure. At static seals this can be tolerated under certain conditions, but this has serious consequences in dynamic processes.

Materials that are highly resistant to mineral oils are therefore usually used. Here the PTFE or FKM materials impress with their excellent resistance.

We, as a manufacturer of deep hole drilling machines and deep hole drilling tools, would therefore be severely affected by a general ban on PFAS. This would also affect our customers from industries such as automotive, aircraft manufacturing, medical technology and many other industries.

Below are examples of PFAS applications in a deep hole drilling machine. The list does not fully represent the use of PFAS, but is intended to illustrate the specific applications for PFAS:

Sealings

1. Static Seals:

- In piping construction from the coolant system to the machine and within the machine, screw connections with FKM sealing rings are widely used.
- In piping construction for larger inch pipes, PTFE sealing tapes are a common variant that have almost completely replaced the previously common hemp compounds due to their easy processing and long-term sealing properties.
- Many machine components are sealed against each other with static sealing rings in order to a reliable coolant transport.
- Seals in machine components such as sensors, motors, safety brakes, etc.
- Tool adjustment screws: Within many deep hole drilling tools, adjusting screws are used to adjust the length of the tool. As deep drilling oil must be passed through the tools at high pressure, therefore a reliable sealing is required. Thread sealing rings made of special PTFE sealants are used for this. The special PTFE seals ensure multiple adjustment (after re-sharpening) and thus a long lifetime and re-usability.

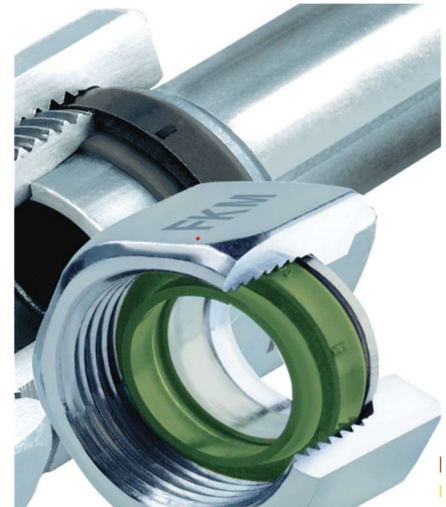


Image 1: Source Parker Hanifin: EO-Verschraubung

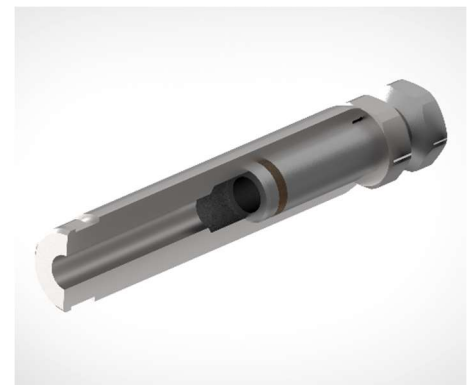


Image 2: Tool Adjusting Screw TBT

2. Rotary Seals:

Many rotating axis are installed in machine tools. The task here is to seal between rotating and stationary components. Normally, machine tools are subject to very rough operating conditions such as chips, dirt and coolant in extreme long periods of use. FKM materials have proven to be durable and reliable for that case.

3. Translational Seals:

Translational seals are used in many different functions in machine tools. In cylinders, as well as in wipers from linear guides to spindle sleeve units. Without reliable seals to prevent oil leaks and dirt from entering, the lifetime of the mentioned machine components is extremely short and unforeseen failures are most likely. FKM materials are particularly suitable due to their good media compatibility and low friction.

Summary Sealings

The most important properties of FKM materials are:

- resistance to mineral oils → low tendency to swell
- low friction
- temperature resistance

When using seals with mineral oils and chemicals, the low tendency to swell is an important factor. Many common seal materials swell too much and therefore lose their sealing effect over time or have to be completely replaced during maintenance. Especially in preventive maintenance, what many machine users do to keep machines running longtime, it means lots of wasted sealing elements.

FKM materials extend the necessary maintenance intervals and ensure that seals can be reused (example: tool adjustment screw).

Another aspect is the low friction on the sliding surfaces during rotational and translational movements. This saves energy loss and improves the tolerance accuracy of machine components due to the lower heat influence and lower abrasion.

Sliding elements

- sliding bearing bushes in pumps
- sliding bearing bushes in machine elements: versatile use due to low friction, precision and long lifetime
- Sliding coatings for linear guides:
Due to the excellent damping properties of the sliding surfaces in conjunction with low friction, PTFE sliding coatings are often integrated into guides of linear axes in machine tools. These have proven to be robust and durable over years.



Image 3: Sliding linings on machine slide TBT

Sliding guides are still state of the art in machine tools with the highest precision. They ensure excellent vibration damping in case of their large contact surfaces. The previously known disadvantages of stick-slip tendency and local welding of the friction pairings in previously common cast iron-cast iron or cast iron-steel pairings have been largely prevented by modern sliding pairs with one plastic sliding coating.

The PTFE plastics used today also significantly improve the friction behavior. This leads to big energy savings over the years of usage.

Important fact is also that these coatings are used today to retrofit used machines. With this PTFE-coatings worn out guiding surfaces could be reworked. This extends the lifetimes of the machines. In our experience deep hole drilling machines could be used by this reworks over decades of years.

Summary PFAS-Usage

PFAS materials play a key role in the modern machine tool industry. Due to their chemical resistance, long lifetime and low friction values, they are indispensable for many applications. It is entirely conceivable that many applications could be replaced by alternative materials in the long term. However, as of today it is not guaranteed that the positive properties of the materials can be achieved to the same extent.

The essential consideration of restricting the use of PFAS is comprehensible and correct, but we ask for an appropriate restriction that is proportional to the risk. Restrictions should be considered for applications that directly affect people and the environment.

However, a deep hole drilling machine tool is a self-contained unit. In the traditional and important applications of sliding and sealing, PFAS are usually used as solid material. There is no apparent risk to humans or the environment from PFAS in this application.

Lifetime and chemical compatibility make a positive contribution to environmental protection. Less durable components need to be replaced more frequently and therefore produce more waste. By retrofit of worn out guiding with PFAS the lifetime of the machines increase enormously.

The low coefficient of friction of PFAS materials ensures energy savings and therefore a better CO2 balance.

However, the economic factor should not be underestimated when considering restricting PFAS. In global competition, expensive substitutions will lead to competitive disadvantages. Machine buyers are not prepared to accept long, costly maintenance. Which on the other hand will make sales of machines from the EU more difficult.