

# Dielectrics

## Overview





Philipp and Martin Storr • Managing Directors

## Your partner for cooling lubricants

oelheld is a medium-sized company, which has more than 130 years of tradition and experience. Since the foundation in 1887 by Carl Christian Held, oelheld has become an established specialist for lubricants. Partnerships, research, and human resources technology have grown as a valuable tradition of which we are proud of.

Numerous customers and machine manufacturers along with national and international universities have partnered with us to develop high quality lubricants. Through this cooperation we are able to focus intensively on meeting and adjusting to specific requirements on a wide range of different manufacturing processes. Our laboratories are equipped with state-of-the-art analytical equipment and numerous application testing systems that guarantee today's demanding requirements, and many of tomorrow's ever changing new standards.

**„Innovative product development, strengthened by continuous quality control and comprehensive customer service, is the key to the success of our products.“**



## Human Technology

### Innovations for man, environment and machines

Hutec is our main focus in the development and production of our products. It is also our mission statement in our use of resources and at oelheld always presence.

### What does this mean?

- REACH requirements are fulfilled
- Skin reviews and approvals available for most products
- Low emission and aromatics free / low aromatic products
- Products free of heavy metal
- State-of-the-art production facilities
- Environmentally friendly production processes
- Products are tested for compatibility with machine components
- Sustainability in the selection of raw materials
- Environmentally friendly and resource-saving products





## Your advantages when using our dielectrics



Odorless

Good filterability

Long service life of the dielectric

Fast processing

Lowest electrode wear

Low evaporation

Excellent surface qualities

## The right dielectric for every machine

Spark erosion is a modern, metal-removing machining process suitable for all conductive materials. The advantages over machining in high-precision and demanding machining tasks are obvious: It is suitable for all common materials and even complicated geometric shapes can be manufactured.

We distinguish between four procedures: Wire erosion, die-sinking erosion, fast-hole erosion and rotary erosion. The spark erosion process takes place in a mainly non-conductive liquid, the dielectric. The tasks of the dielectric are ionization, isolation, cooling, corrosion protection for workpiece and machine and removal of particles. Apart from the generator, the dielectric is the most important process component in this machining process. oelheld is a pioneer in this field, because more than a century ago odorous, unhealthy and environmentally harmful liquids were replaced by odorless dielectrics. In our own R&D department and in close cooperation with leading machine manufacturers, our products are constantly being enhanced in order to achieve greater productivity. The basis for this is provided by our separate technology center „Spark Erosion“, where our specialists put dielectrics through their paces.

Tell us your requirements and we will help you optimize your production process, because we have the right product for every application. Contact us!



EDM die-sinking machines  
\*  
page 7

IonoPlus IME series  
IME series  
EcoSpark



EDM wire-cutting machines  
\*  
page 10

IonoFil series



Combination machines  
\*  
page 11

IonoGrind series



EDM fast hole drilling machines  
\*  
page 12

IonoVit S  
IonoVit 0



Accessories  
\*  
page 14

ControFil 2  
LubTool 4000 / 6000

## Conclusion

By choosing the right dielectric, you will not only save time and worries, but also money.



## Manufacturer Approval:

Our products are specifically designed for use with:



### Machine Manufacturer



## IonoPlus series

### High-performance dielectric for EDM die-sinking machines

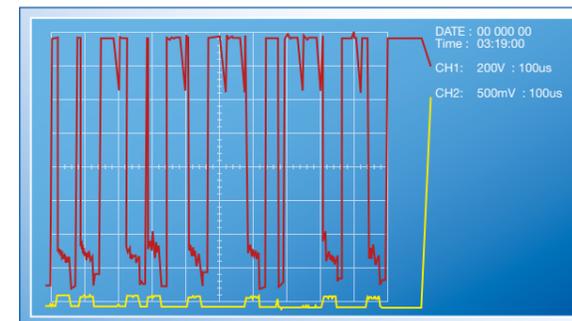
High-performance dielectrics of the IonoPlus series are suitable for all requirements during die-sinking. The almost odorless and green dielectric fulfills all requirements from finishing to roughing machining. Using a sophisticated production method, the synthetic product is manufactured in a special blending process. The IonoPlus series does not fall under the operational safety regulations and can be easily filtered with all common filtration systems. Leading machine manufacturers have adapted their generator technology to IonoPlus. IonoPlus IME-MH is predestined as an all-rounder in the product range and offers optimized flushing properties, maximum dielectric strength and a number of other unique advantages.

#### Your advantages:

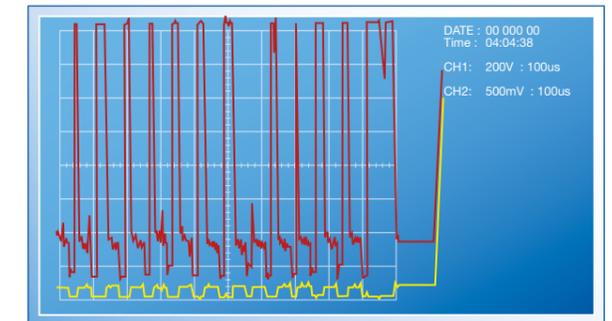
- Almost odorless
- Increased removal rate
- Wear reduction
- Excellent surface qualities
- Lower refill quantities
- Longevity

#### Shorter erosion times, as shown in the following diagram:

Irregular ignition during fine machining



Regular ignition for fine machining with IonoPlus IME-MH



As can be seen in the diagram above, more regular ignitions per time unit can be achieved by switching from a conventional dielectric to IonoPlus. This means more discharges and therefore shorter eroding times. The secret are finely distributed satellite electrodes in the liquid, which favor the faster build-up of the discharge bridge and enable an effective spark penetration.

#### The following product versions are available:

Product name	Density at 15°C (g/cm³)	Viscosity at 40°C (mm²/s)	Flash point (°C)	Application
IME-ET	0,77	1,4	63	EDM machining in the finest finishing applications with smallest spark gap (micro work)
IME-ZK	0,79	2,0	82	EDM machining in roughing and finishing applications
IME-MH	0,79	2,5	107	EDM machining in roughing and finishing applications
IME-GL	0,82	3,8	125	EDM machining in the roughing sector. In the finishing sector it can only be used under optimum flushing conditions

## IME series

### Dielectric for EDM die-sinking machines

The dielectrics of the IME series have been tested in extensive trials and have proven to be effective in practice for decades. The series is explicitly recommended by leading manufacturers of electrical discharge machines. IME dielectrics have the highest dielectric strength, are clear and almost odorless. Their color does not change during erosion. They reach the purity level of pharmaceutical white oils and are practically free of aromatic compounds. Whether in rough cut applications or for use in fine operations, the dielectric must meet the specific requirements of each application. The high-performance dielectrics for use in electrical discharge machining are manufactured on a synthetic basis and are therefore particularly resistant to ageing.

#### Your advantages:

- High degree of metal removal performance
- Good surface quality
- Transparent/clear
- Odorless
- Long service life of the dielectric
- Very good cooling and flushing properties

#### The following product versions are available:

Product name	Density at 15°C (g/cm <sup>3</sup> )	Viscosity at 40°C (mm <sup>2</sup> /s)	Flash point (°C)	Application
IME 56	0,77	1,3	56	EDM machining for finest applications and EDM drilling
IME 63	0,77	1,3	63	EDM machining in finest application with the smallest spark gap
IME 82	0,77	2,0	82	EDM machining in fine finishing and rough cut applications
IME 110	0,78	2,5	110	EDM machining in fine finishing and rough cut applications
IME 126	0,82	3,6	114	EDM machining in rough cut applications with optimal flushing conditions

## EcoSpark 105

### Dielectric for EDM die-sinking machines

EcoSpark provides an efficient EDM process and combines a high removal volume with low electrode wear. This guarantees a wide range of applications from precision machining to heavy roughing work with high generator power. It is particularly suitable for applications where a minimum flash point of 100 degrees Celsius is required. In addition, the high boiling point significantly reduces steam formation during the spark ignition process. Filtration is easily possible with all filters commonly used in spark erosion.

#### Your advantages:

- High degree of metal removal
- Wear reduction
- Wide range of applications
- Small refill quantities
- High flash point of >100 °C (212 °F)
- Good cooling and flushing properties

#### The following product versions are available:

Product name	Density at 15°C (g/cm <sup>3</sup> )	Viscosity at 40°C (mm <sup>2</sup> /s)	Flash point (°C)	Application
EcoSpark 105	0,81	2,3	105	EDM machining in fine finishing and rough cut applications



## IonoFil series

### Dielectric especially for wire eroding

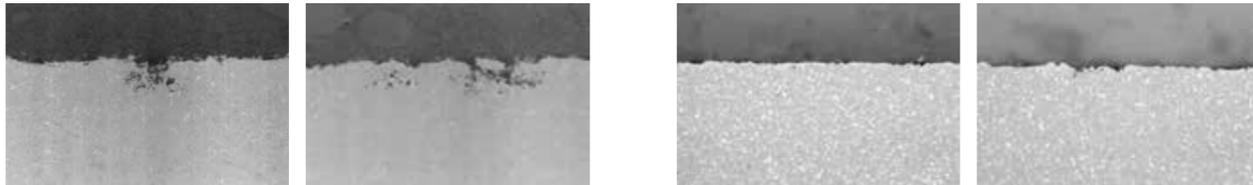
Cobalt leaching is a problem that is difficult to get under control, especially when machining carbide. This is why oelheld, together with leading companies in the erosion industry and the University of Leuven (Belgium), has decided on a research project to develop a hydrocarbon-based dielectric that is directly adapted to wire cutting technology. The result is IonoFil.

Particularly the service life of carbide punches can be enormously extended by eliminating cobalt leaching. This development makes costly and time-consuming deionization of the water with resins, corrosion protection (before, during and after processing) as well as frequent changes of the medium a thing of the past. As a dielectric, IonoFil enables smaller spark gaps, which allow for smaller inner radii with the same wire diameter. The quality of the surfaces also increases to the same extent, which can be achieved with a coarseness of up to RA 0,01 much faster and more easily than with water.

#### Your advantages:

- No cobalt leaching with carbide
- Better surface quality
- No corrosion of work pieces and machines
- Better precision machining thanks to smaller spark gaps
- No microbiological contamination
- Reduced thermal shock and less thermal cracking

#### Surfaces:



The upper pictures clearly show the areas where water has significantly damaged the surface due to leaching of cobalt.

Undamaged surface, machined with IonoFil

#### The following product versions are available:

Product name	Density at 15°C (g/cm <sup>3</sup> )	Viscosity at 40°C (mm <sup>2</sup> /s)	Flash point (°C)	Application
IonoFil 80	0,78	2,1	>90	Spark erosion wire processing
IonoFil 100	0,79	2,9	>115	Spark erosion wire processing
IonoFil 2776	0,78	2,1	>90	Spark erosion wire processing
IonoFil 2788	0,79	3,6	>100	Spark erosion wire processing

## IonoGrind series

### Dielectric for rotary erosion and grinding

Innovative technology makes one out of two: grinding and rotary eroding in one machine. This saves time and money. That's why oelheld developed a fluid especially adapted to this process: IonoGrind.

IonoGrind is a multifunctional fluid that is equally suitable for spark erosion and as a grinding oil. It was designed for use in combination machines (two in one) and combines the advantages of a high-performance dielectric for the extremely high removal rate and surface quality with a low-foaming and low-evaporation grinding oil. IonoGrind is the right medium for eroding and grinding PCD (polycrystalline diamonds), HSS and tungsten carbide, as its special composition prevents the release of cobalt. By using special high-pressure additives, IonoGrind also achieves maximum grinding performance.

#### Your advantages:

- High removal rates
- Optimized surface quality
- No cobalt leaching
- Increased oil longevity

#### The following product versions are available:

Product name	Density at 15°C (g/cm <sup>3</sup> )	Viscosity at 40°C (mm <sup>2</sup> /s)	Flash point (°C)	Application
IonoGrind	0,84	7,3	>155	For universal grinding and EDM machines
IonoGrind 105	0,78	2,3	>106	For universal grinding and EDM machines
IonoGrind 165	0,82	7,5	>165	For universal grinding and EDM machines
IonoGrind X160	0,82	6,0	>160	For universal grinding and EDM machines



## IonoVit S

### Dielectric for EDM fast hole drilling

IonoVit S is a high-performance dielectric for economical and fast operation with an electrode diameter starting at 0,5 mm (0,0196"). It is also suitable for machining aluminium. Workpieces made of ferrous metals are temporarily protected from corrosion. IonoVit S is a ready-to-use product, so mixing is not required. The concentration is determined by means of a hand-held refractometer and is 7,0% Brix.

#### Your advantages:

- Temporary corrosion protection
- No cobalt leaching
- Free of heavy metals and chlorine
- No foam formation
- No machine contamination
- Use in spark erosive fast hole drilling system
- Shorter processing time
- Low wear and tear

#### Your advantage over water

Machine: Madra, Electrode: Copper Multichannel, Diameter 1,5 mm

	Tungsten carbide, height 20mm, grade: CF-H40 HIP			Tungsten carbide, height 70mm, Tungsten Carbide embedded in cobalt		
	Duration [min:sec]	Wear [mm]	Feed rate [mm/min]	Duration [min:sec]	Wear [mm]	Feed rate [mm/min]
Deionized water*	03:52	160	5,17	15:34	537	4,50
IonoVit S	02:20	105	8,57	09:10	296	7,64
Advantage with IonoVit S	<b>39,7%</b>	<b>34,4%</b>	<b>65,8%</b>	<b>41,1%</b>	<b>44,9%</b>	<b>69,8%</b>

	Tool steel, height 100mm, grade: CF-H40 HIP			Inconel, height 100mm, nickel-base alloy		
	Duration [min:sec]	Wear [mm]	Feed rate [mm/min]	Duration [min:sec]	Wear [mm]	Feed rate [mm/min]
Deionized water*	03:38	152	27,5	03:15	157	30,8
IonoVit S	01:58	54,7	50,8	01:14	63	81,1
Advantage with IonoVit S	<b>45,9%</b>	<b>64,0%</b>	<b>84,7%</b>	<b>62,1%</b>	<b>59,9%</b>	<b>163%</b>

#### Refractometer

Refractometer 7% Brix, dilute with deionized water only

#### Water treatment

Dielectric aggregate with filter

Integrate the cooling spiral into the existing cooling circuit – recommended for reproducible quality (option)

Normal electrode quality sufficient. Do not use resin cartridges.

## IonoVit 0

### Dielectric for EDM fast hole drilling

This water-based product with proper additives guarantees the production of reproducible and high-quality drillings for electrode diameters starting from 0,1 mm. IonoVit 0 is a ready-to-use product, so mixing is not necessary. The Brix value is in a range of 5% – 7%. A dielectric aggregate (water treatment) is required which, in combination with a mixed resin cartridge, ensures good quality and keeps the water conductance at less than 10 uS/cm. If the water conductance increases, the mixed resin cartridge must be replaced. The medium should also be cooled, because otherwise no constant performance can be achieved.

#### Your advantages:

- Temporary corrosion protection
- No cobalt leaching
- Free of heavy metals and chlorine compounds
- No foam formation
- No machine contamination
- Dielectric for precision holes
- High-quality precision drilling of small diameters of 0,5 mm possible

For this product it is recommended to integrate a cooling spiral into the existing cooling circuit (recommended for reproducible quality).

#### Refractometer

Refractometer 5% – 7% Brix only to be diluted with deionized water

Conductivity meter: Conductivity 0 – 10  $\mu$ S/cm

pH value test strips 5 –7

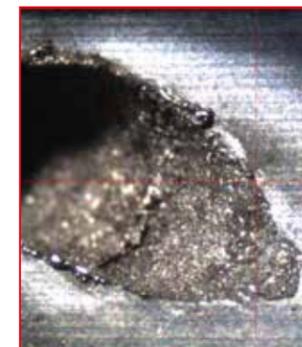
#### Water treatment

Dielectric unit with filter and deionized resin – absolutely necessary

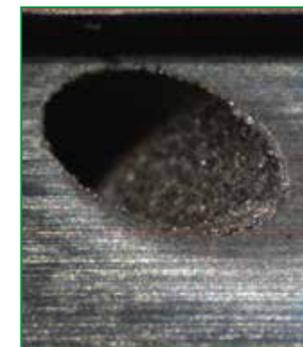
Integrate cooling coil into the existing cooling circuit = recommended for reproducible quality (option)

Good electrode quality (electrode with bar)

Comparison of entry holes in different material, electrode and dielectric pairings:



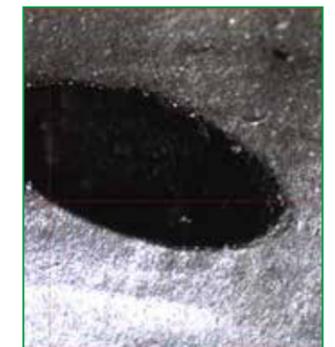
Deionised water  
Material: PCD  
Electroden: copper



IonoVit 0  
Material: PCD  
Electroden: copper



Deionised water  
Material: steel  
Electroden: brass



IonoVit 0  
Material: steel  
Electroden: brass



### Test strips

- Monitoring of the coolant
- Cobalt, nitrite, pH value measurement
- Review of harmful substances for protection of employees
- Check service life



### Hand refractometer

- Important instrument for emulsion and grinding solution control
- Fast control of the emulsion concentration
- Increased tool life expectancy
- Avoidance of rust due to low emulsion content
- Cost reduction



### LubTool 4000

- Highly effective universal cleaner which is extraordinarily efficient against a wide variety of soilings due to the combination of several active cleaning agents
- Particularly suitable for the removal of resin oil and grease residues, many lacquers, paints and coloured pencil markings, as well as general soiling on engines and machines
- Ideal also for the preparation of bondings or coatings



### LubTool 6000

- Forms a thin protective film on the workpiece
- Reliable corrosion protection is maintained even after prolonged storage and heavy use
- Does not resinify and can be easily removed even after long-term storage
- Sprayed parts can easily be wire-cut on your machine



### CoverSkin – Skin protection agent

- Universally applicable barrier cream that protects the skin
- Forming an elastic, breathable and invisible protective film
- Quickly absorbed into the skin
- Complies with the current provisions of the EU Cosmetics Regulation
- Silicone- and paraben-free



### ControFil 2

- Anti-corrosion agent for spark erosive wire cutting
- Good option to prevent or minimize rusting





## Service analytics and technical advice for your all-round service

- We accompany you right from the start with our technical service on site and our service analysis.
- With us each customer has a direct technical service contact person, who provides advice and support.

The combination of service analytics and technical service in particular offers our customers added value and the security of receiving the appropriate service for the product.

Our service analytics offer a wide range of methods and state-of-the-art analytical instruments, which are used specifically for the requirements of our customers. With this know-how we can provide assistance in troubleshooting and optimize production processes. Employees in these areas take part in training courses and exchange knowledge with each other. This systematic transfer of knowledge ensures that know-how continues to grow and plays an important role in future product developments.

**Contact us to learn more about our role for future service!**

## Seminar courses

**oelheld offers free seminars all year round, which teach the correct handling of dielectrics. Through this, the best possible application can be guaranteed.**

Registration is possible at any time. For larger groups oelheld offers separate seminars.

### **Registration:**

Current dates can be found on our website: <https://www.oelheld.com/en/service/seminars/>

We are looking forward to seeing you!





# Process optimization

You want your machine to be more efficient?



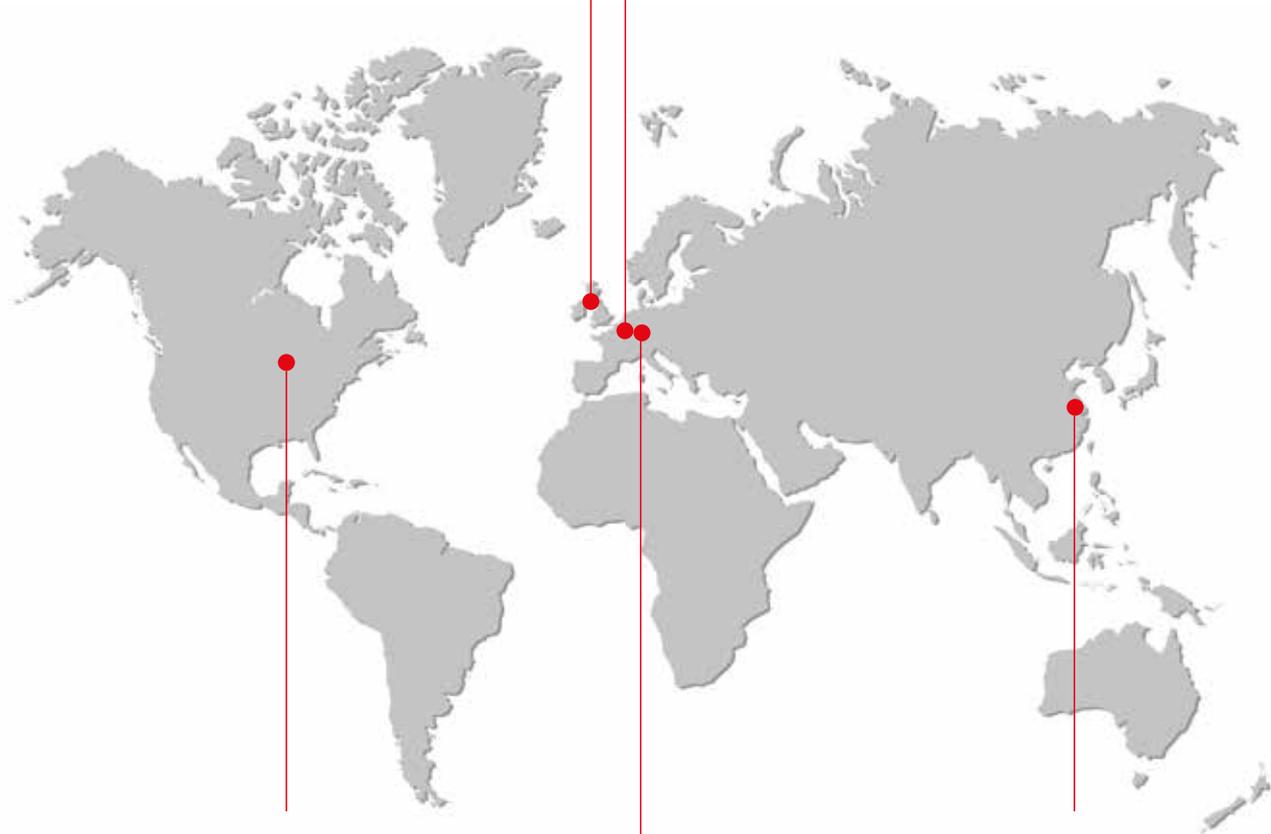
# High-tech products for machines – worldwide!

## oelheld UK Ltd.

Unit 16, Colomendy Business Park, Erw Las  
Denbigh, LL16 5TA. • United Kingdom  
Phone: +44 1745 814-777  
E-mail: sales@oelheldgroup.co.uk  
Internet: www.oelheld.com

## oelheld technologies SAS

Technopôle de Forbach-Sud  
140, Avenue Jean-Eric Bousch,  
57600 Oeting • France  
Phone: +33 387 90 42 14  
E-mail: hutec-fr@oelheld.com  
Internet : www.oelheld.com



## oelheld U.S., Inc.

1100 Wesemann Dr  
West Dundee, IL 60118 • USA  
Phone: +1 847 531 8501  
E-mail: hutec-us@oelheld.com  
Internet: www.oelheld.com

## oelheld GmbH

Ulmer Strasse 133–139  
70188 Stuttgart • Germany  
Phone: +49 711 168 63-0  
E-mail: hutec@oelheld.de  
Internet: www.oelheld.com

## oelheld innovative fluid technology (Taicang) Co., Ltd

No. 5 Suzhou Road, Jiangsu  
215400 Taicang • China  
Phone: +86 512 8278 0027  
E-mail: services@oelheld.com.cn  
Internet: www.oelheld.com

## Representatives worldwide

Argentina • Austria • Australia • Belarus • Belgium • Bosnia and Herzegovina • Brazil • Bulgaria • Canada • Chile • Croatia • Czech Republic  
Denmark • Estonia • Finland • Greece • Hungary • India • Indonesia • Israel • Italy • Japan • Kazakhstan • Latvia • Lithuania • Malaysia • Mexico  
New Zealand • Netherlands • Norway • Poland • Portugal • Romania • Russia • Serbia • Singapore • Slovakia • Slovenia • South Africa • South Korea  
Spain • Sweden • Switzerland • Taiwan • Thailand • Turkey • Ukraine



**oelheld**<sup>®</sup>  
innovative fluid technology

oelheld GmbH • Ulmer Strasse 133–139 • 70188 Stuttgart • Germany  
Phone: +49 711 16863-0 • Fax: +49 711 16863-3500  
E-mail: hutec@oelheld.de • Internet: www.oelheld.com