Astonishing, what a millilitre can do.

The **INDU**OIL® **HL** High Performance Oils.

INDUOIL® **HL**
Minimum Quantity Cooling Lubricating Mediums





Once a pioneer, now a market leader.

AN UNBEATABLE COMBINATION.

Because minimum quantity lubrication requires an intelligent dosage system just as much as it does pressure-absorbing high performance oils, we have been working on both areas for more than 20 years now. The result is the perfect combination: **INDU**TEC® **MS** systems and **INDU**OIL® **HL** High Performance Oils.

We have always set ourselves challenging goals:

- **minimal consumption:** how do we achieve the maximum result with the minimum of material input?
- **wide scope of application:** how can the widest range of materials be machined using minimum quantity lubrication?
- **reducing costs:** whow can costs for supply, preparation and disposal be reduced?
- **protection of the environment:** can minimum quantity lubrication using biodegradable raw materials become real?

RIGHT FROM THE START.

With **INDU**OIL® **HL** 42, we developed a product which fulfilled these requirements over 15 years ago. Today, with 13 different high performance oils, we offer mediums which can be implemented with practically any application in the metal working sector and in many other industries.

That's why our customers originate from a wide range of sectors:

- Metal working
- Machinery construction
- Foodstuffs industry
- Wood processing
- Plastic production
- Assembly
- Tooling
- Glass processing
- Tobacco industry
- Medicine technology
- Tyre manufacturing



Do you have any questions?

We look forward to inform you about our high performance oils and other sprayable mediums. Call us on

+49 (0) 7331 98 78-0

We will be glad to help.

High Performance Oils for almost any Application and Material in the Metal and Plastics Industry



Materials Application	general steels	Case hardening steels	Spring steels and hardened and tempered C steels	Q & T steels	Structural steels, balls, rolls, pins and panels	V2A+V4A stainless steel and steel such as X4 CrNi X 10 CrAl7	Aluminium alloys	Copper alloys	Plexiglas
Bending annealed pipes	22/42/80/95	–	–	–	–	22/40/42/95	22/42	22	–
Drilling	6/95	6/95	–	6/95	–	4/6	2/6/95	6/80	2/3
Turning[1]	6/40/95	6/40/95	–	6/40/95	–	4/6	2/6/40/95	2/6	
Sawing	4/40/42/80/95	40/42/80/95	40/42/80/95	40/42/80/95	–	40/42/80/95	2/40/42/80/95	80	2/3
Printing/flanging	4[3]/6/20[4]/40/55	–	–	–	–	6/40/42/55	2/4/6/40/95	2/6	–
Fine blanking	42/95	–	–	–	–	42/95	–	–	–
Flow forming	40/95	–	–	–	–	95	40/95		–
Milling[2]	6/80/95	6/80/95	–	6/80	–	6/80/95	2/6/20[4]/95	2/6	2/3
Threading (all kinds)	40/42/95	40/42/95	–	40/42/95	–	40/42/95	2/20[4]/6/95	2/6	–
Engraving	22/40	22/40	–	40	–	40/42/95	2/6	2/6	–
Channelling	80	–	–	6/80	–	–	–	–	–
Embossing / joining	22	–	–	–	–	–	2/40		–
Profiling	80	–	–	–	–	2/6	2/6	2/6	–
Reaming	40/80	40/80	–	40/80	–	–	–	–	–
Planing/ precision milling	6/40/95	6/40/95	–	6/40/95	–	6/80	2/6	2/6/80	–
Stamping	20[4]/42/95	–	40/42/95	–	42/95	42/95	2/20[4]/6/40	2/6	–
Deep drilling (internal cooling)	6	6	–	6		–	6	6	–
Deep drawing	40/55	–	–	–		–	22/40	–	–
Shaping	40/95	–	95	–	42/95	42/95	2/22/40/42	2/6/40	–

1 Depends on the infeed (chip removal)
2 Depends on the material to be machined, the corresponding tool and the infeed, amongst other things (chip removal) such as, for example, feed per rotation and speed
3 Can only be implemented following successful suitable on-site trials
4 During light-duty machining and application of a small amount of medium (ensure compliance with safety provisions)

INDUOIL® **HL** High Performance Oils Overview

Designation	Product Description	Material	Environment
INDUOIL® **HL 1**	Totally residue-free, self-ventilating, cutting, stamping and shaping fluid based on aliphatic hydrocarbons.	Non-ferrous metals (AL, CU) electric contact materials	AS 13 02 05 WGK 1
INDUOIL® **HL 2**	A low-viscosity, totally residue-free, self venting special lubricant based on aliphatic hydrocarbons.	Non-ferrous metals (AL, CU) electric contact materials	AS 13 02 06 WGK 1
INDUOIL® **HL 3**	Low-residue hydrocarbon mix formulated with synthetic lubricating enhancers.	Non-ferrous metals (Al), non-alloy and alloy steels (ST, V2A), Plexiglas, Makrolon, plastic, wooden materials, electric contact materials, heavy metals	AS 13 02 06 WGK 1
INDUOIL® **HL 4**	Low-residue stamping, cutting and shaping coolant with excellent lubricating properties.	Non-ferrous metals (Al), heavy metals, non-alloy/alloy steels (ST, V2A), electric contact materials	AS 13 02 06 WGK 1
INDUOIL® **HL 6**	Low-viscosity, almost residue-free self venting speciallubricant based on aliphatic hydrocarbons.	Non-ferrous metals (AL, CU) electric contact materials	AS 13 02 06 WGK1
INDUOIL® **HL 20**	High performance oil based on special fatty alcohols with outstanding adhesive and lubricating properties, suited to a wide range of applications.	Non-ferrous metals (Al, Cu), heavy metals, alloy steels (ST)	AS 13 02 07 Not water polluting
INDUOIL® **HL 22**	Special cutting and shaping oil based on pharmaceutical white oils with good adhesive and pressure absorbing characteristics.	Non-alloy, alloy and high-alloy steels, Non-ferrous metals (Al, Cu, Ti), alloys (MS), cast iron/grey iron	AS 13 02 05 WGK 1
INDUOIL® **HL 40**	Mid-viscosity, vegetable-based cutting and deep drawing oil.	Non-ferrous metals (Al, Cu), non-ferrous metals, alloy steels (up to STK60), electric contact materials	AS 13 02 07 WGK 1
INDUOIL® **HL 42**	High performance cutting, stamping and shaping oil based on food safe vegetable oils, with a highly effective combination of additives and outstanding wetting and lubricating properties.	Non-alloy and high-alloy steels (see HL 95), non-ferrous metals (Al), heavy metals	AS 13 02 07 WGK1
INDUOIL® **HL 45**	Special cutting oil, highly activated with active EP agents to enhance lubrication.	Non-ferrous metals (Al), heavy metals, non-alloy/alloy steels	AS 13 02 07 WGK2
INDUOIL® **HL 55**	Fine stamping, deep drawing and shaping medium based on food safe vegetable oils, with a highly effective combination of additives.	Non-ferrous metals (Al), non-alloy, alloy and high alloy steels (ST)	AS 13 02 07 WGK2
INDUOIL® **HL 80**	Totally universal high-viscosity stamping, cutting and shaping oil with maximum possible adhesion and good pressure absorbing characteristics, based on pharmaceutical white oils. Delivers the best results, even when used with materials with a high carbon content.	Non-ferrous metals (Al), non-alloy, alloy and high alloy steels, heavy metals	AS 13 02 05 WGK 1
INDUOIL® **HL 95**	High-viscosity universal stamping, cutting and shaping oil with above average adhesion.	Non-alloy and high-alloy steels (RST 37-3, ZSTE 52, C60, CK60, 42CrMo4 and X10 and CrNiMoTi), non-ferrous metals (Al)	AS 13 02 07 WGK1

The details provided here are based on our current level of knowledge but are not guarantees of product characteristics and form no basis for contractual legal relationships.

Application	Viscosity	Flash Point	Degreasing
During very light-duty non-machining operations such as stamping, shaping and bending and for chip-cutting machining operations such as turning, milling, drilling, etc. and for high-speed machining (HSC). Also used as a lubricant (e.g. when pressing in rubber eyes, metal bushes) and as a cleaner.	1,0mm²/s at 40°C	› 65°C	Evaporates to leave no residue.
Non-diluted by spraying, rolling, daubing, shaping or in the drop procedure. Not suitable for cyclic or mechanical lubrication!	1,4mm²/s at 40°C	› 56°C	Evaporates to leave no residue.
Turning, milling, copy-milling, thread cutting, sawing and drilling, but also high-speed cutting (HSC), stamping and shaping thinwalled electric contact materials. When machining Plexiglas, no stress cracks or adhesion arises, cutting edges remain clear.	1,5mm²/s at 40°C	› 56°C	Evaporates leaving virtually no residue when used as intended.
During light-duty non-machining (i.e. shaping) operations, such as stamping, bending, shaping, drawing, deep drawing, but also during chip-cutting machining such as milling, turning, drilling, sawing and tapping, and during internal cooling for MQL.	2,5mm²/s at 40°C	105°C	Evaporates leaving virtually no residue when used as intended.
During light- or medium-duty non-mechanical shaping such as stamping, shaping and bending, but also during chip-cutting machining such as turning, milling, drilling, etc. as well as for high-speed-cutting (HSC).	1,4mm²/s at 40°C	› 56°C	Evaporates leaving virtually no residue when used as intended.
During light-duty non-mechanical (i.e. shaping) operations, such as stamping, shaping and bending and for chip-cutting machining such as turning, milling, drilling, etc. and for highspeed cutting (HSC).	20mm²/s at 40°C	› 140°C	**INDU**OIL® **HL** 20 to 95: Minimum residue when used as intended. For further machining (painting, powder coating etc.), grease can be removed by means of spray, ultrasonic or immersion cleaning using efficient neutral or alkaline cleaners as well as most organic solvents.
Chip-cutting machining with defined cutting edge with all metals, thread shapes and rollers as well as internal cooling.	22mm²/s at 40°C	200°C	
During light-duty non-mechanical (i.e. shaping) operations, such as stamping, bending, shaping, drawing, roll forming, but also during chip-cutting machining such as milling, turning, drilling, sawing and tapping.	35mm²/s at 40°C	› 200°C	
During non-machining (i.e. shaping) operations such as stamping, bending, shaping, drawing, roll forming, but also during chipcuttingmachining such as milling, turning, drilling, sawing and tapping.	39mm²/s at 40°C	› 200°C	
Particularly suited to internal cooling and machining under high pressure because of slight foaming.	44mm²/s at 40°C		
Fine stamping, stamping, deep drawing and shaping.	50mm²/s at 40°C	› 200°C	
During non-machining (i.e. shaping) operations such as stamping, bending, shaping, drawing, roll forming, but also during chip-cutting machining such as milling, turning, drilling, sawing and tapping.	81mm²/s at 40°C	› 200°C	
During non-machining (i.e. shaping) operations such as stamping, bending, shaping, drawing, roll forming, but also during chip-cutting machining such as milling, turning, drilling, sawing and tapping, also best suited to flow forming.	100mm²/s at 40°C	› 200°C	

Depending on the usage profile, if in any doubt, practical tests will be required on site.


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For all, who want even more.

The MENZEL Services.



Enhancing the Perfect.



EXPERIENCE IS WHAT MAKES THE DIFFERENCE

With a MENZEL **INDU**TEC® **MS** system, you are making a choice for state-of-the-art process-safe minimum quantity cooling and lubricating technology. You will benefit in economic terms and in terms of the environment as a result, even with the most challenging of manufacturing jobs.

In this respect, the most important factor for optimum productivity is, and always will be, experience. It is therefore worth consulting an experienced MENZEL applications engineer concerning the interplay between the medium and the system, especially if the processes involved are challenging. They will be by your side right from the start in the planning of your production system.

GUARANTEE HIGH PERFORMANCE

An **INDU**TEC® **MS** system requires no maintenance. Although your system had an optimal set-up from the start, even the best spraying technology can suffer under constant loads in the uncompromising everyday life of industry. Not to mention the possibility of incorrect operational routines which can creep in over time.

Get your **INDU**TEC® **MS** system checked and optimised on a regular basis. For the purposes of this, MENZEL has put together comprehensive service packages which guarantee the optimum performance of the system:

- Inspecting your system
- Carrying out fine technical adjustments to your system
- Training your employees

Service Packages

Keep your **INDU**TEC® **MS** MQL system right up to date::

- Inspection of the functions of the device and the spraying head
- Inspection of the pressure vessel for dirt and subsequent cleaning
- Inspection of the hoses to the spraying head and cleaning of the medium hose
- (Replacement up to 2m hose length per spraying head)
- Inspection of the medium settings and optimisation of the settings
- On-site instructions concerning the function and the settings

We will gladly prepare you an individual offer for this service package and others. We will be glad to help if you have any further questions. Call us on

+49 (0) 7331 98 78-0

We look forward to your call.

One of many Challenges.

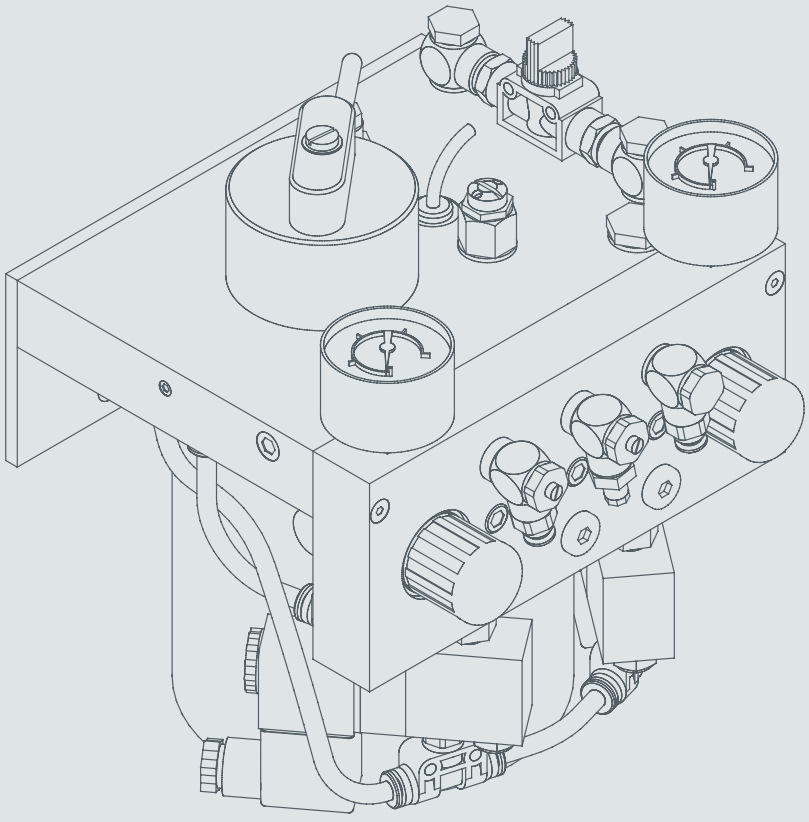
New Materials Little Space Long Distances Usage of Special Mediums Unreachable Chipping Points Spraying around the Corner Short-time Moistening without Residue mobile Systems Food Industry Purposes Controlling Flow Rates Uninteruptible Processing 24/7

WE KNOW ABOUT NEW FRONTIERS

In technology like the minimum quantity cooling and lubrication many cases lead to new frontiers. The demands regarding materials, production facilities and processes are mostly that specific, that only practical tests on site lead to an ideal solution.

Often new solutions are required for a variety of circumstances. The application engineers at MENZEL are specialists to find or even develop such solutions.

You can find an example right here: for a saw carrying along the pressure vessel on a mobile slide, a special compact systems was developed. Only one of many challenges, we look forward to face every day.



The answer to space problems: The extra small and compact version of a 1-Litre **INDU**TEC® **MS** Standard System built to customer's requirements