

Accu-LubeTM

Micro-Lubrication



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Why Micro-Lubrication?

Economy



- The production costs per workpiece with conventional cooling emulsions are approximately 7-17% of the total costs. This percentage can be significantly reduced by the use of micro lubrication.
- The reduction of friction and the resulting increase of productivity will allow a more economical processing of workpieces.
- Shorter machine down time by increase of tool life.
- Reduction of disposal costs due to almost dry chips.
- No extra installation for the operation of coolants required - therefore additional saving of energy costs.

Cost effectiveness study



Consumption and cost analysis for the use of lubricant and lubricating system other than *Accu-Lube*.

Production of aluminium rims in 3 working shifts	appr. 360 rims
Oil consumption	appr. 13.320 ml
Consumption per rim	appr. 37 ml
Cost for oil (per litre)	€ 3,00
Cost for 13.320 ml	€ 39,96
Cost per day for 12 machines	€ 479,52
Cost for 12 machines (calculation based on 250 working days)	€ 119.880,00



Consumption and cost analysis for the use of ACCU-LUBE LB-5000 in combination with *Accu-Lube* micro lubrication technology

Production of aluminium rims in 3 working shifts	appr. 360 rims
Consumption of ACCU-LUBE LB-5000	appr. 1.332 ml
Consumption per rim	appr. 3,7 ml
Cost for ACCU-LUBE LB-5000 (per litre)	€ 20,20
Cost for 1.332 ml	€ 26,91
Cost per day for 12 machines	€ 322,92
Cost for 12 machines (calculation based on 250 working days)	€ 80.730,00

Savings with the use of *Accu-Lube* € 39.150,00

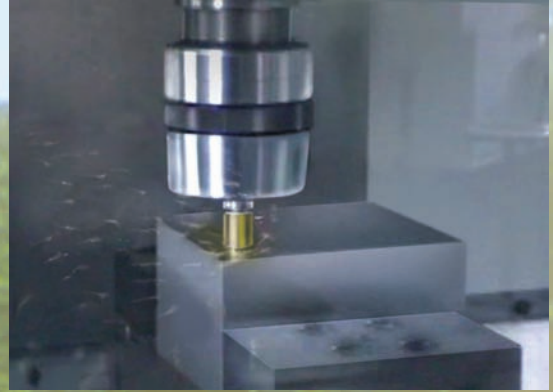


Why Micro Lubrication? Environmental Friendliness

Conventional way using coolants



Accu-Lube Minimum Quantity Lubrication



Accu-Lube lubricants harm neither operators nor the environment:

- biologically decomposable
- non-toxic
- free of EP-additives, chlorine, nitrite, sulphur, phenol, biocides
- based on natural, renewable resources
- odourless
- valuable economy of potable water

The use of ***Accu-Lube*** lubricants will stop:

- high energy costs
- delays due to machine down time
- absence of operators on grounds of allergies
- slippery floors
- dirty work places

Accu-Lube Micro lubrication technology –
Assuring economy

Accu-Lube – Your contribution to
environmental protection

Outside Lubrication

Accu-Lube applicators - assuring economy and precise application of lubricants

The **Accu-Lube** applicators enable an exact dosage of lubricant supplied to the cutting edge of the tool. Consumption is clearly measurable. Smallest droplets of the lubricant are transported by the air stream precisely to the cutting edge of the tool without producing any dangerous mists.

The approved modular system allows the **Accu-Lube** applicators to be tailor-made for every type of operation.

The use of **Accu-Lube** applicators results in:

- continuous moistening of cutting tools
- even application of lubricant
- lowest requirement of lubricant
- high cutting performance of tools by using **Accu-Lube** lubricants
- dry workpiece and tool as well as dry machine



Accu-Lube applicators for outside lubrication

A small quantity of lubricant makes the great difference between dry machining and minimum quantity lubrication. With dry machining there is no moistening of the workpiece or tool, there is no protection from heat generation and there is no great potential of increasing tool life. These issues are solved by minimum quantity lubrication with the help of a minute quantity of lubricant and the precise application of lubricant droplets to the cutting edge of the tool.

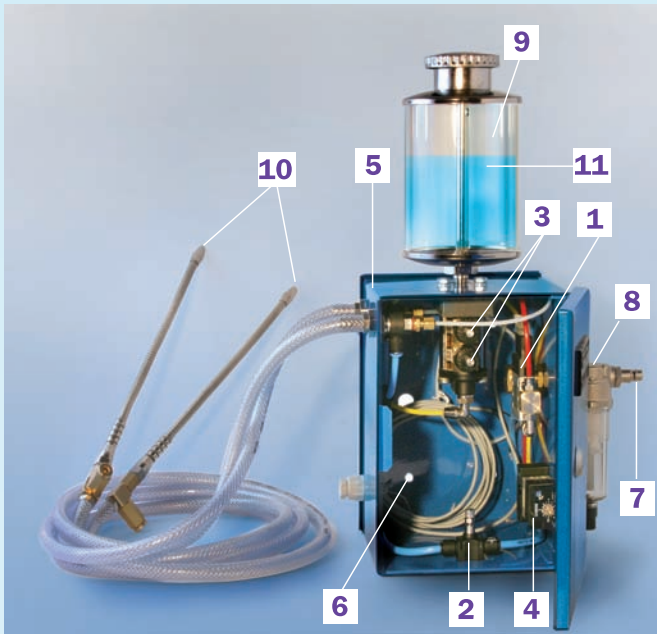
The **Accu-Lube** pump has been specially designed to ensure a continuous flow of lubricant from the moment the applicator is switched on until it is switched off. The piston pump works with a continuous precision, to supply the lubricant smoothly and continuously to the cutting edge. **Warranty is four years** on condition that **Accu-Lube** lubricants are being used.

The **Accu-Lube** piston pump requires compressed air to activate the pump cycle. With the return stroke a precisely defined quantity of lubricant is drawn into the pump chamber. The following fore stroke supplies the lubricant into the capillary tube in the inside of the air tube.

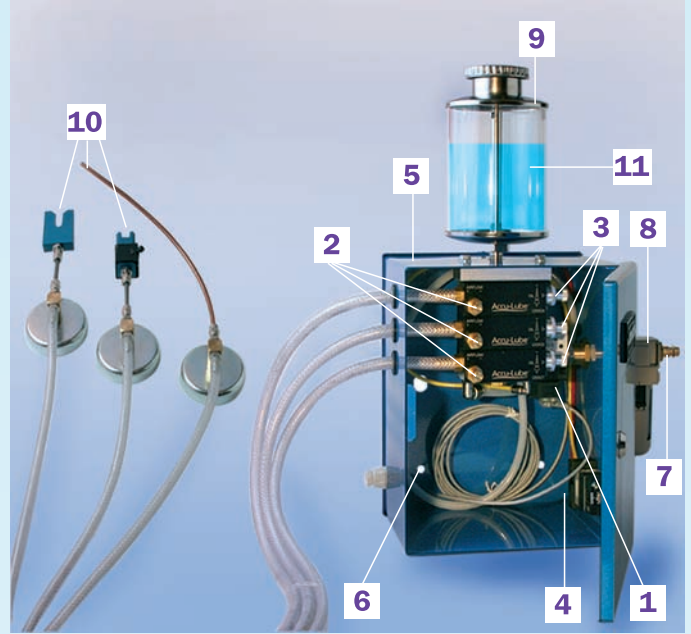
Thus all **Accu-Lube** lubricants are supplied to the cutting edge of the tool with the same performance.

Outside Lubrication

Applicator equipped with brass pumps



Applicator equipped with aluminium pumps



Components of **Accu-Lube** Applicator

1 Actuator

ON/OFF switch

Options: solenoid valve, toggle switch, roller valve, slide valve, foot pedal, air-actuated

2 Air flow valve

Regulates the air output at the nozzle. Each aluminium pump has its own air flow valve that can be operated independently

3 Adjusting scale for lubricant quantity

The adjusting screw regulates the required quantity of lubricant

4 Frequency generator

Controls the frequency at which the pump cycles

Pneumatic frequency generator: 5-180 strokes/min

Electric frequency generator: 1-128 strokes/min

Solenoid valve: freely programmable

5 Metal box

6 Mounting system

Pre-drilled holes for permanent mounting of applicator to machine tool or to fix magnetic mounts to the metal box

7 Air supply

Input pressure: min. 4 bar, max. 10 bar

8 Air filter

9 Reservoir

Sizes: 0.3 L ; 1.0 L, 2.0 L, 3.0 L also available with level indicator

10 Nozzles

Circular and band sawing nozzles, copper, steel and loc-line nozzles, flexible metal nozzles, rotative and special nozzles

11 ACCU-LUBE lubricant

Accu-Lube applicator on setting angle



This simple applicator is equipped with a 0.3 litre reservoir, 1 pump, 1 coax tube with a loc-line nozzle and can easily be fitted to any kind of metal surface with the help of a magnet.

Being connected to compressed air supply it can be operated immediately.

Operation areas: simple drilling, milling and sawing operations

Outside Lubrication

Lubricant consumption ml/h Aluminium Pump

Revolutions

Frequency generator		0,5	1	1,5	2	2,5	3	3,5	4
	0,25	2	9	19	27	34	47	54	66
	0,5	2	6	12	15	21,5	30	33	41
	0,75	1,5	4	7	10	14	18	20,5	24
	1	1,5	2	4	6,5	8,5	9,5	12	14
	1,25	0,8	1,5	3	3	5	6	7	8
	1,5	0,7	0,8	1	2	2	3	3	5
	1,75	0,6	0,7	0,8	1,5	1,5	2	2,5	3
	2	0,6	0,6	0,7	1,5	1,5	2	2,5	2,5

Brass pumps are used for lubricants other than **Accu-Lube** or for larger volumes of lubricant.

Lubricant consumption ml/h Brass Pump

Clicks

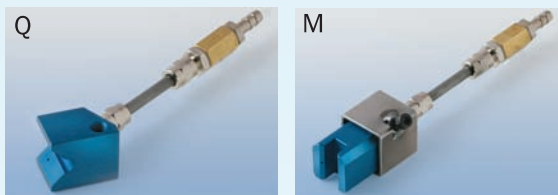
Frequency generator		38	33	28	23	18	13	8
	0,25	34	39	56	65	84	96	109
	0,5	18	25,5	35	38	48	61	65
	0,75	12,5	16	21	26	31	37	38,5
	1	8	9	12,5	15	18	20	24
	1,25	4	5	7	8,5	11	12	13
	1,5	2	3	3	4	5	7	7,5
	1,75	1,5	2	2,5	3	3	4	4,5
	2	1,5	2	2,5	2,5	3	4	4

Nozzles and Special Nozzles

Band sawing nozzles



Circular sawing nozzles



Flexible Nozzles Loc-line Nozzles



Metall Nozzles 320 or 420mm



Outside Lubrication

Copper / steel
nozzles with
adjusting block



Nozzle tips



Wide angle
nozzle No. 1



Brass nozzle
3,0mm



Brass nozzle
1,5mm



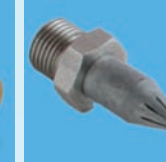
Wide angle nozzle
No. 2



Full cone
nozzle



Hollow cone
nozzle



Point nozzle

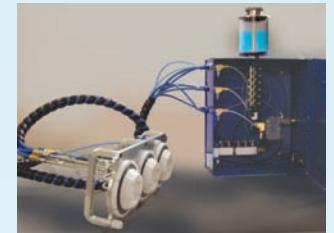
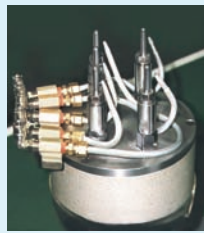


Round jet
nozzle

Rotative nozzles



Special nozzles



The selection of appropriate nozzle will ensure a precise and correctly dosed application to the cutting edge.

Operating areas for **Accu-Lube Applicators**:

- band sawing
- circular nozzles
- milling
- drilling
- thread cutting
- punching
- broaching
- thread rolling
- chamfering
- stamping
- cold roll forming
- grooving
- bending
- knurling
- forming

Examples of applications



Milling



Thread rolling



Forming

Outside Lubrication



Drilling



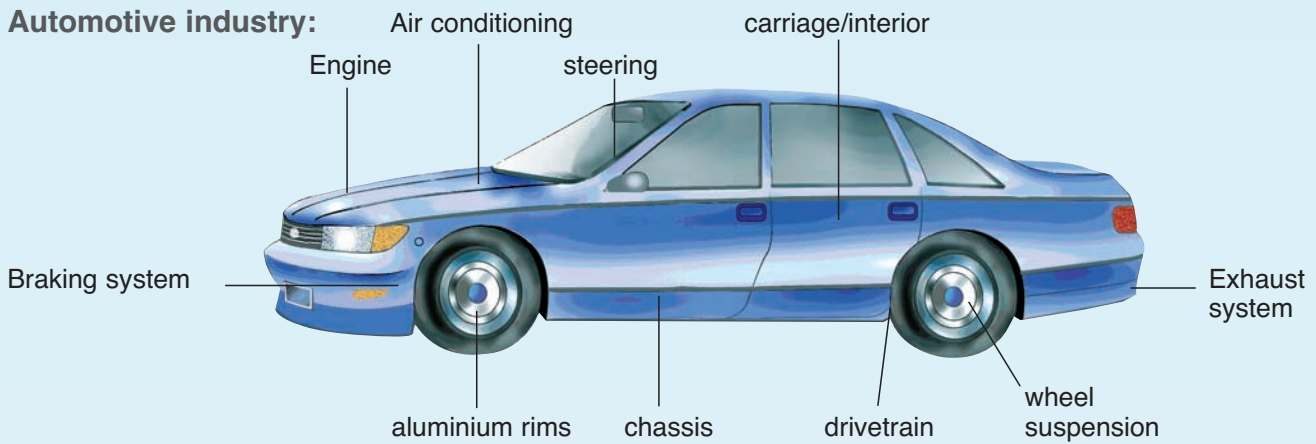
Knurling



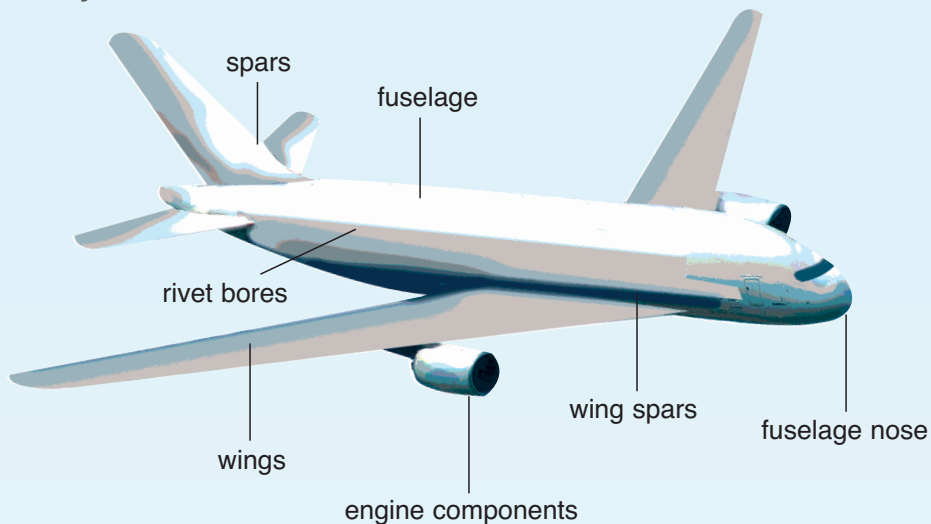
Forming

Accu-Lube Micro Lubrication is used for the production of the following components:

Automotive industry:



Aircraft industry:



And many more industries...

Some references:

- AIRBUS
- Rolls Royce
- GE
- PSA
- Adige S.p.A.
- Bisiach & Carru
- EADS
- Prowin
- Porsche
- Audi
- ZF Lemförder Fahrtechnik
- Mercedes
- ASL Lemwerder
- MT Aerospace
- RUAG

Inside Lubrication

Especially with CNC machining centres and special purpose machines it has proven, that, due to the multitude of different tools and tool lengths, external positioning of the nozzles required for minimum quantity lubrication is problematic and thus leads to additional costs.

The Accu-Lube MiniBooster has been designed for exactly these kinds of applications. Other than with the coaxial tube system (i.e. tube-in-tube system where the oil tube runs inside the air tube) used for outside lubrication, here air and lubricant are already mixed inside the Accu-Lube MiniBooster.

This lubricant-air-mixture is then transported through a tube from the Accu-Lube MiniBooster to the rotating union of the machine tool. From there the lubricant-air-mixture is led through the spindle of the machine tool and will leave the coolant fed tools in operation at their cutting edge thus enabling their optimum lubrication.



During the transport of the lubricant-air-mixture within the machine tool spindle, care must be taken to prevent any possible uncontrolled escape of the lubricant-air-mixture, as this would not lead to the desired lubrication of the cutting edge.

The Accu-Lube MiniBoosters consist of the following main components:

- Accu-Lube precision controlled volume pump(s)
- Accu-Lube frequency generator(s)
- Accu-Lube MiniBooster chamber = the core of the system; this is where air and lubricant are brought together and the lubricant-air-mixture is produced. Lubricant droplet size is $\leq 0,001\text{mm}$.
- Electronical control automatically adapting to different tool diameters with different cooling channel cross sections (only with SR-version). Time-consuming programming of lubricant and air volume for every single tool is no longer necessary.

To cover any individual case we offer a variety of ACCU-LUBE MiniBooster systems which will be described in depth on the following pages:

- Accu-Lube MiniBooster MB 2010 Mini SR
- Accu-Lube Double-MiniBooster MB 2010 Power
- Accu-Lube MiniBooster MB 2010 Power SR
- Accu-Lube MiniBooster MB 2010 Power C

Moreover, the MiniBooster systems can optionally be extended and thus adapted precisely to any of your applications.

In comparison with other systems already on the market the ACCU-LUBE MiniBooster stands out in particular for its excellent cost-performance ratio, minimum consumption of lubricant and air as well as for its easy handling.

Inside Lubrication

Accu-Lube MiniBooster for CNC machining centres

Micro-lubrication is provided when an air and lubricant mixture is transported through the machine-tool-spindle ensuring the **Accu-Lube** lubricant is delivered precisely to the cutting edge.

The **Accu-Lube MiniBoosters** consist of the following main components:

- **Accu-Lube** precision controlled volume pumps
- **Accu-Lube** frequency generator
- **Accu-Lube MiniBooster** chamber = the core of the system
- Electronic control system for automatic adjustment to different tool diameters (only with “SR” versions)

The lubricant-air mixture with droplets of $\leq 1 \mu\text{m}$ is produced in the MiniBooster chamber.

Accu-Lube MiniBooster MB 2010 “Mini” SR

Application areas:

- Turning lathes with rotating tools
- CNC-machines with different tools and different tool diameters
- For coolant fed tools with a diameter of 1 - ≤ 12 mm or up to max. 2 x 6 mm

Technical data:

Operating current:	24 V DC 2W (optionally 110 V, 230 V)
Operating pressure:	5,5 – 9 bar
Reservoir:	500 – 750 ml (optionally 950 – 1.400 ml)

Components:

- 1 Booster chamber
- 1 precision controlled volume pump
- 1 frequency generator
(optionally: solenoid valve freely programmable; 15-50 strokes / min)
- 1 pressure sensor
(optionally available without pressure sensor depending on the type of application)



The machines of the following machine tool manufacturers are equipped with this **Accu-Lube** system among others:

- Depo
- Hurco
- EMAG
- Index
- Fill

Accu-Lube Double MiniBooster MB 2010 Power

For coolant fed tools with a diameter of
1 - \leq 40 mm or max. 2 x 12 mm

Technical Data:

Operating current: 24 V DC 2W
(optionally 110 V, 230 V)
Operating pressure: 5,5 – 9 bar
Reservoir: 500 – 750 ml each
(optionally 950 – 1.400 ml
each)

Components:

- 4 Booster chambers
- 2 precision controlled volume pumps
- 2 frequency generators
(optionally: solenoid valves freely
programmable; 15-50 strokes / min)



This **Double-MiniBooster MB 2010 Power** consists of two separate systems, which are united in one box.

This **Double-MiniBooster MB 2010 Power** was developed for multi spindle heads.

Optionally available with electric control.

This system is used

- on drilling units with different tools
- for threading lugs
- for milling of parts for the automotive industry

Accu-Lube MiniBooster MB 2010 Power with Pressure Sensor

For coolant fed tools with a diameter of
1 - \leq 40 mm or max. 2 x 12 mm

Technical Data:

Operating current: 24 V DC 2W
(optionally 110 V, 230 V)
Operating pressure: 5,5 – 9 bar
Reservoir: 500 – 750 ml
(optionally 950 – 1.400 ml)

Components:

- 2 Booster chambers
- 1 precision controlled volume pump
- 1 frequency generator
(optionally: solenoid valve freely programmable;
15-50 strokes / min)

The **Accu-Lube MiniBooster MB 2010 Power** is suitable for coolant fed tools in CNC machining centres and CNC turning lathes.

The **Accu-Lube MiniBooster MB 2010 Power** allows for a safe production process.

The main advantages of the **Accu-Lube MiniBooster MB 2010 Power** are its user-friendliness, cost-effectiveness as well as its simple and quick installation.

Further advantages:

- Through the electronic control the system is adjusted automatically to the different diameters of coolant fed tools.
- After a tool change it is not necessary to program an M-function for each tool.
- The existing CNC-programs need not be changed for a special M-function for the micro lubricating system.
- Simple installation! This system requires an air supply of 5,5-9 bar and an electrical output of 24 V on the CNC-machine tool (M-function cooling-lubricant ON/OFF).
- This system is easy to operate and offers process safety especially during high volume batch production.
- The consumption of air is reduced by 20% because the system switches on only when more oil-air mixture is needed, as the lubricant is always present in the reservoir.
- Lubricant consumption is approximately 8-14 ml/h depending on the size of the tools used and the time of use of the tool.

Operating areas: Bending, drilling, deep hole drilling, milling, turning, reaming

This system is used for the production of:

- cooler tubes
- hydrants
- exhaust pipes
- compressor engine blocks
- machine components
- drive train

The machine tools of the following manufacturers are equipped with this Accu-Lube system among others:

- Crippa
- EMAG
- Chiron
- Zayer
- Fill
- Ex-Cello
- Matec
- Schwarze-Robitec
- Homag
- Weeke
- Kaltenbach



Accu-Lube MiniBooster MB 2010 Power C

This MiniBooster consists of two systems (inside and outside lubrication) in one box.

Inside lubrication

- 2 Booster chambers
- 1 precision controlled volume pump
- 1 frequency generator
(optionally: solenoid valve freely programmable;
15-50 strokes / min)

For coolant fed tools with a diameter of
1 - ≤ 40 mm or up to max. 2 x 12 mm

Outside lubrication

- 3 precision controlled volume pumps
(optionally extendable)
- 3 frequency generators
(according to number of pumps)
(optionally: solenoid valves freely programmable;
15-50 strokes / min)

There are no limits as far as the tool diameter is concerned, provided that the positioning of the nozzle can be optimised and the lubricant will reach the cutting edge of the tool.



Technical Data:

Operating current: 24 V DC 2W (optionally 110 V, 230 V)

Operating pressure: 5,5 – 9 bar

Reservoir **inside lubrication**: 500 – 750 ml
(optionally 950 – 1.400 ml)

Reservoir **outside lubrication**: 1.000 ml
(optionally 2.000 ml)

Outside lubrication for non coolant fed tools
Inside lubrication for coolant fed tools

Advantages:

- It is not necessary to replace all non coolant fed tools.
- During heavy duty operations both outside and inside lubrication can be used.

Optionally available with electronic control.

This system covers all cutting operations on a CNC machining centre.

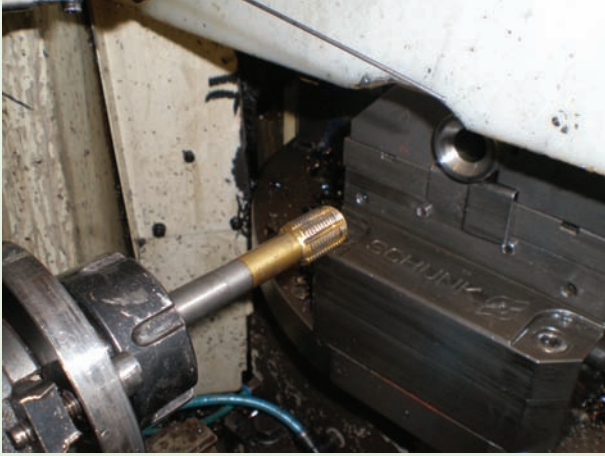
This system is used for the production of:

- forged aluminium rims
- threaded pins
- hinges
- transverse links for F1
- cast aluminium crankcases

The machine tools of the following manufacturers are equipped with this **Accu-Lube** system among others:

- Matec
- Homag
- Suhner
- Chiron
- Kaltenbach
- Fill
- EMAG

Applications using Inside Lubrication



Thread moulding



Drilling



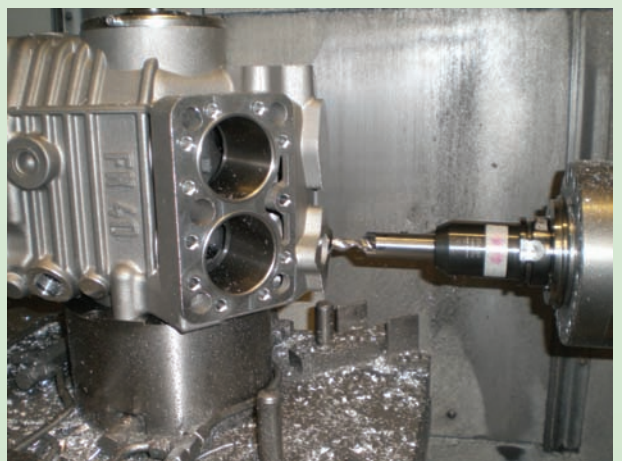
Drilling



Bending



Drilling



Drilling

Accu-Lube Applicators and Accu-Lube MiniBoosters for special applications



8 pumps for outside lubrication
8 pumps for inside lubrication
8 pumps for additional lubrication



6 pumps for outside lubrication
timer valve



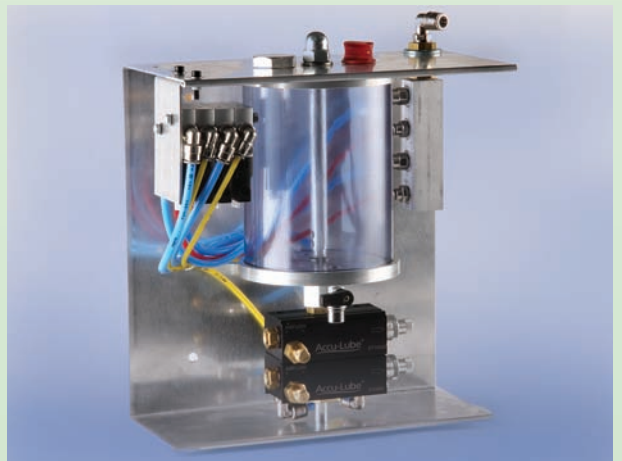
6 pumps for outside lubrication
4 pumps for inside lubrication



2 pumps for inside lubrication



6 pumps for outside lubrication
6 pumps for inside lubrication
6 pumps for additional lubrication



2 pumps for outside lubrication

Accu-Lube Lubricants – harm neither operators nor the environment

Accu-Lube lubricants are manufactured of non-toxic, renewable, vegetable resources. They are environmentally friendly and biologically decomposable. In addition to the environmental aspects these lubricants can be used for safe processing of all metallic materials.

Improvement of machining processes

In comparison with conventional coolants **Accu-Lube lubricants** show a clear improvement of lubricity leading to a reduction of friction in metal processing. This results in an increase of both tool life as well as surface quality.

Economy as well is increased by the use of **Accu-Lube lubricants**. Maintenance and cleaning costs are reduced, costs for monitoring the water mixable coolants are completely dropped.

Water saved – no disposal required

Within a period of 6 months an average **Accu-Lube** customer can replace 220 litres of coolant concentrate – this is equivalent to approximately 4000 litres of cooling emulsion – by only 20 litres of **Accu-Lube lubricant**.



4000 litres of cooling emulsion

20 litres of **Accu-Lube**

Accu-Lube lubricants are used up during the cutting process, disposal is not necessary and any possible post treatment is significantly facilitated.

Accu-Lube Lubricants – harm neither operators nor the environment

Accu-Lube lubricants which do not leave any stains on the material after post heat treatment.

Lubricant	LB 5000	LB 6000	LB 5500	LB 4500	LB 4000
Processing areas					
All metallic materials	✓	✓	✓	✓	✓
Pin+V-Block lubricity test	1.000	1.250		900	1.250
Flash point	>160°C	214°C	>160°C	168°C	214°C
Pour point	5°C	-40°C	<-40°C	4°C	-40°C
Viscosity at 40°C	18,0	8,9	20	7,3	8,9
Suitable for Booster system	✓	✓	✓	-	✓
Item-no.	Item-no.	Item-no.	Item-no.	Item-no.	Item-no.
Quantity	LB 5000	LB 6000	LB 5500	LB 4500	LB 4000
1 litre	805001	805130	805170	805400	805110
5 litres	805006	805135	805175	805405	805115
20 litres	805011	805140	805180	805410	805120
205 litres	805016	805145	805185	805415	805125

Characteristics of these lubricants:

LB 5000	For medium to heavy cutting operations
LB 6000	For light to medium-heavy cutting operations Accu-Lube LB 6000 is manufactured out of natural, vegetable resources.
LB 5500	For light to medium-heavy cutting operations
LB 4500	For light cutting operations. Accu-Lube LB 4500 consists of natural ingredients. It is especially appropriate for working in aluminium. Accu-Lube LB 4500 is conditionally suitable for post heat treatment.
LB 4000	For light to medium-heavy cutting operations Accu-Lube LB 4000 is based on natural fatty acids.



Accu-Lube Lubricants – harm neither operators nor the environment

The following **Accu-Lube lubricants** are especially appropriate for processing of ferrous material. Should these ACCU-LUBE lubricants be used on non-ferrous material, it must be degreased prior to post heat treatment in order to avoid stains on the material.

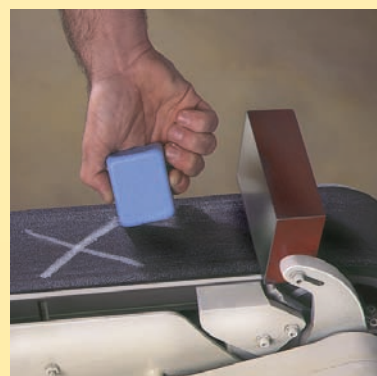
Lubricant	LB 2000	LB 8000	LB 10000
Processing areas			
All metallic materials	✓	✓	✓
Pin+V-Block lubricity test	1.750		1.750
Flash point	320°C	310°C	320°C
Pour point	-20°C	-17°C	-20°C
Viscosity at 40°C	37	37	37
Suitable for Booster system	-	(✓)	-
Item-no.	Item-no.	Item-no.	Item-no.
Quantity	LB 2000	LB 8000	LB 10000
1 litre	805000	805240	805150
5 litres	805005	805245	805155
20 litres	805010	805250	805160
205 litres	805015	805255	805165

Characteristics of these lubricants:

LB 2000	For light to heavy cutting operations Accu-Lube LB 2000 - is manufactured out of natural, highly refined triglycerids.
LB 8000	For light to medium-heavy cutting operations Accu-Lube LB 8000 - is a mixture of natural ingredients.
LB 10000	For light to medium-heavy cutting operations is manufactured out of natural, refined triglycerids.

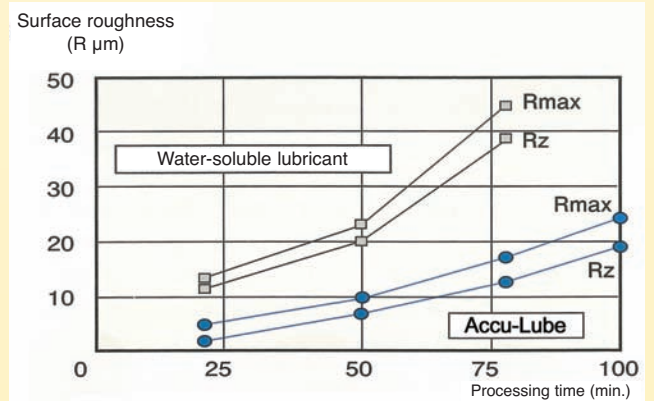
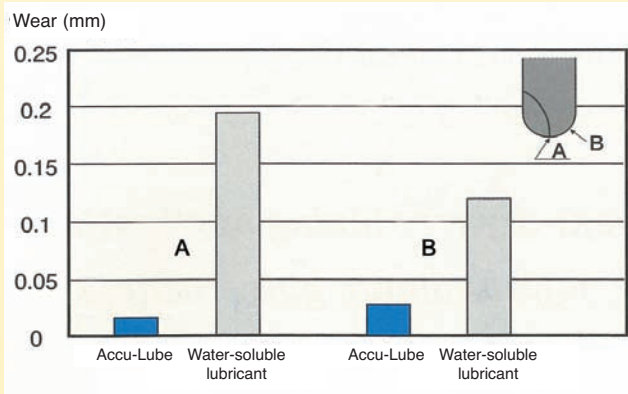
The following **Accu-Lube lubricants** in solid and paste-like form are especially appropriate for manual application:

Item no.	Description
805 021	ACCU-LUBE LB 5000 Paste (gel 226 g)
805 020	ACCU-LUBE LB 5000 Paste (solid 226 g)
805 035	ACCU-LUBE LB 5000 Solid Block (71 g)
805 040	ACCU-LUBE LB 5000 Solid Stick (62 g)
805 041	ACCU-LUBE LB 5000 Solid Stick (368 g)
805 076	ACCU-LUBE LB 2000 Spray (222 g)
805 078	ACCU-LUBE LB 4000 Spray (222 g)
805 075	ACCU-LUBE LB 5000 Spray (222 g)
805 082	ACCU-LUBE LB 5500 Spray (222 g)
805 077	ACCU-LUBE LB 10000 Spray (222 g)



Accu-Lube Micro Lubrication in comparison with conventional systems

Milling

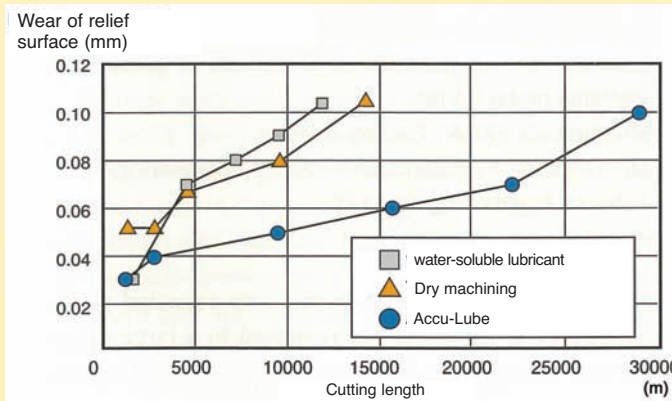


Wear with ball-end milling

Material: hardened steel 30-38 HRC
 Tool: Solid carbide ball-end mill R3x6
 Rotation speed: 10.000 rpm
 vf= 2.000 mm/min.

Surface quality with ball-end milling

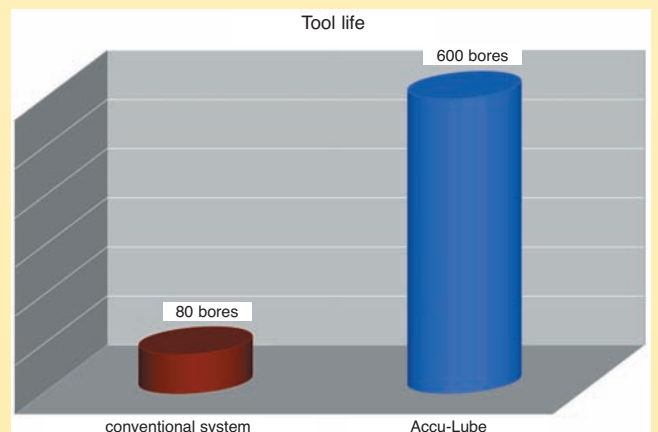
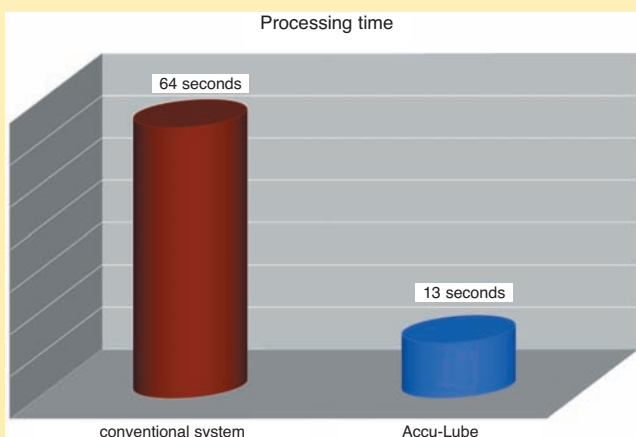
Material: hardened steel 29-30 HRC
 Tool: Solid carbide ball-end mill Ø 12 mm



Wear of relief surface

Material: hardened steel 62,5 HRC
 Tool: Solid carbide end mill Ø 10mm, 6 blades
 vc= 30 m/min.
 vf= 214 mm/min
 Wear limit= 0,1 mm

Drilling



conventional system:

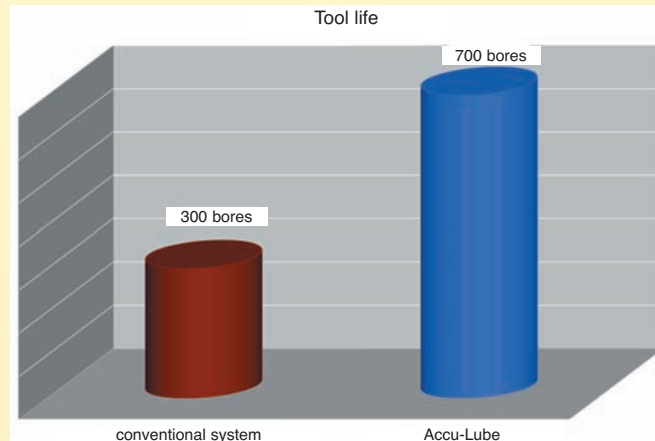
HSS drill and water-soluble coolant, 13 steps, vc=18 m/min, fn=0,095 mm

Accu-Lube:

Solid carbide drill and Accu-Lube, no steps, vc=100 m/min, fn=0,08 mm

Accu-Lube Micro Lubrication in comparison with conventional systems

Deep hole drilling



Conventional system:

Solid carbide drill and water-soluble coolant, $v_c=80\text{m/min}$, $f_n=0,05\text{mm}$

Accu-Lube:

Solid carbide drill and ACCU-LUBE lubricant, $v_c=80\text{m/min}$, $f_n=0,15\text{mm}$



Different chip shapes with the change of feed of a solid carbide slot drill operated with minimum quantity lubrication.

Turning

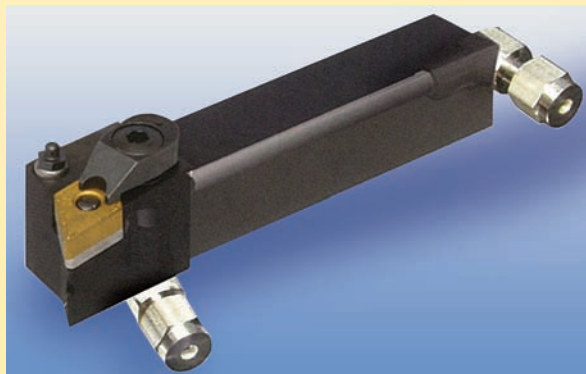
Material: Steel St 44-2

Operation time of insert: 53 min

Cutting speed: 200m/min

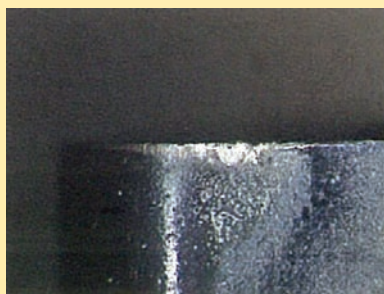
Feed: 0,25mm/rev

Infeed: 1,5 mm



Toolholder: Mircona MDJNR2525-15-EB (toolholder with cooling channels)

Cutting insert: DNMG150412



Micro lubrication



Coolant

Result: With the help of minimum quantity lubrication tool life of the cutting insert was increased by 1,5 times (wear mark 0,194 mm) in comparison with the use of cooling emulsion (wear mark 0,302mm).

Accu-Lube Micro Lubrication in comparison with conventional systems

Band sawing

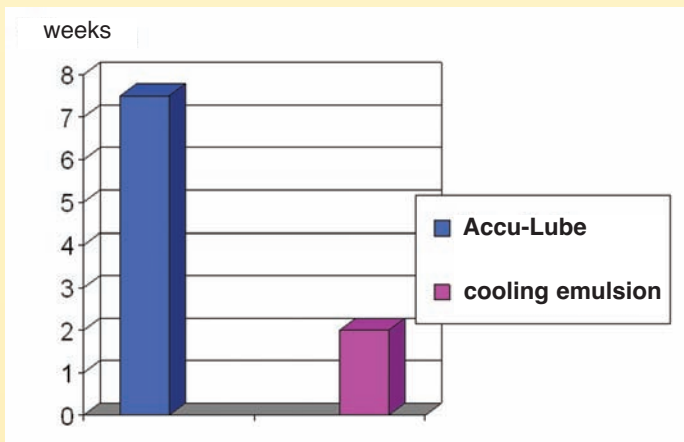
Band sawing machine: AMADA HK-800
 Work piece: Tube
 Material: Steel St52-3

Lubricating system: **Accu-Lube Applicator**
 equipped with 3 pumps for outside lubrication

Lubricant: **Accu-Lube LB-2000**

Lubricant consumption: 16ml/h

Result: Tool life of band saw
 7,5 weeks per band saw with **Accu-Lube lubricant**
 2 weeks per band saw with **cooling emulsion**



Circular sawing

Circular sawing machine
 Tool: circular saw blade Ø 300mm
 Work piece: piston
 Material: aluminium

Lubricating system: **Accu-Lube Applicator**
 equipped with 3 pumps for outside lubrication

Lubricant: **Accu-Lube LB-5000**

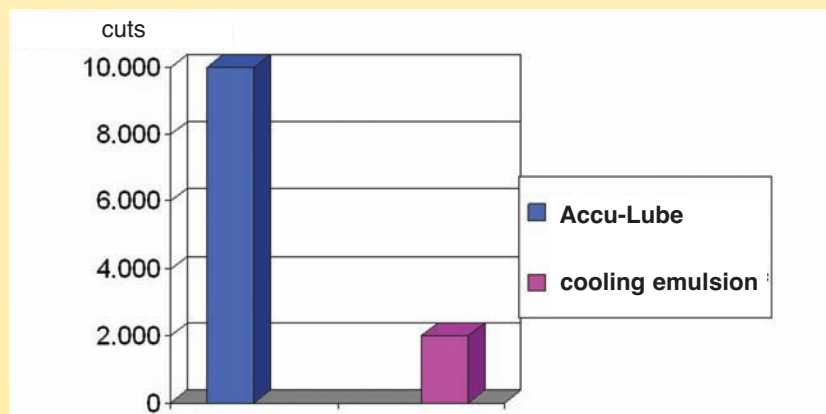
Lubricant consumption: 15 ml/h

vc= 30 m/min

vf= 214 mm/min

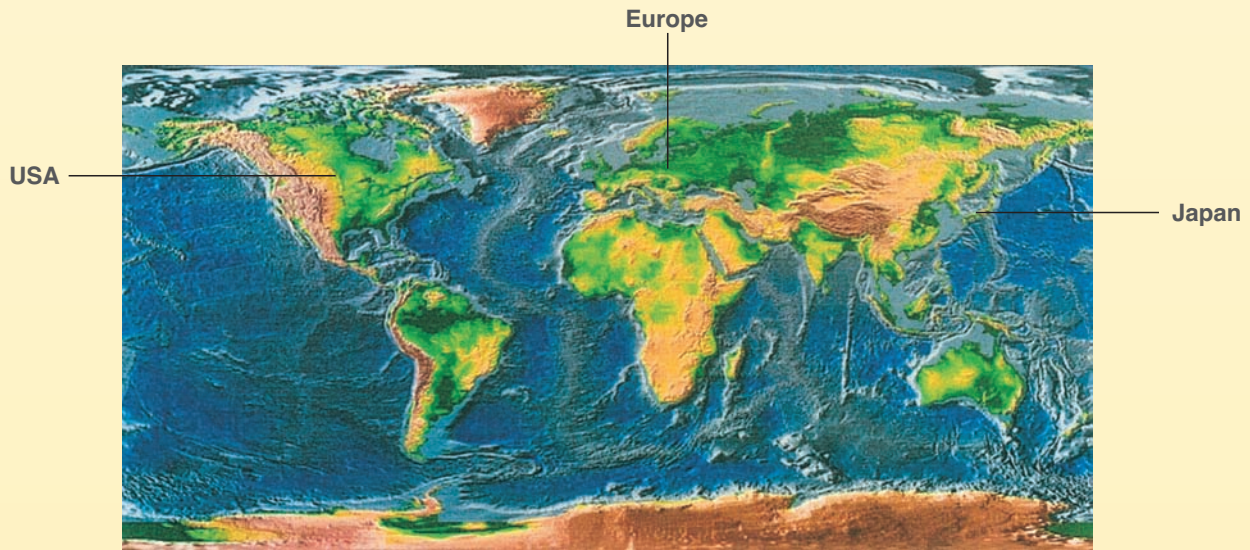
Result: Tool life of circular saw blade
 appr. 10.000 cuts with **Accu-Lube lubricant**
 appr. 2.000 cuts with **cooling emulsion**

Another advantage is that the chips can be re-melted immediately without any drying time (in the present case it was 2-3 days).



Accu-Lube - always at your disposal

Three production plants world wide



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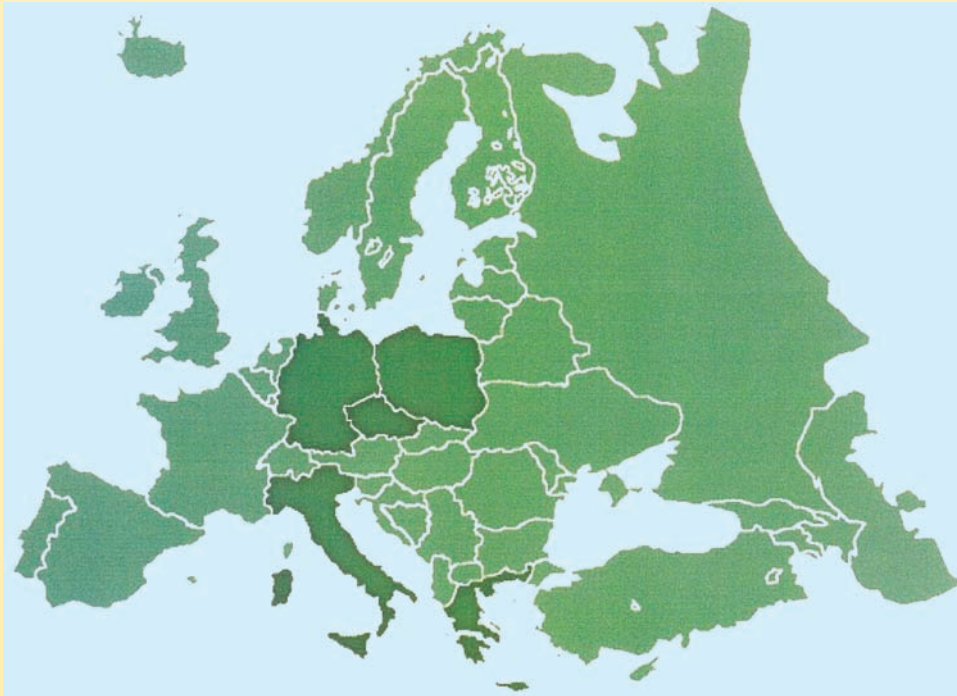
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