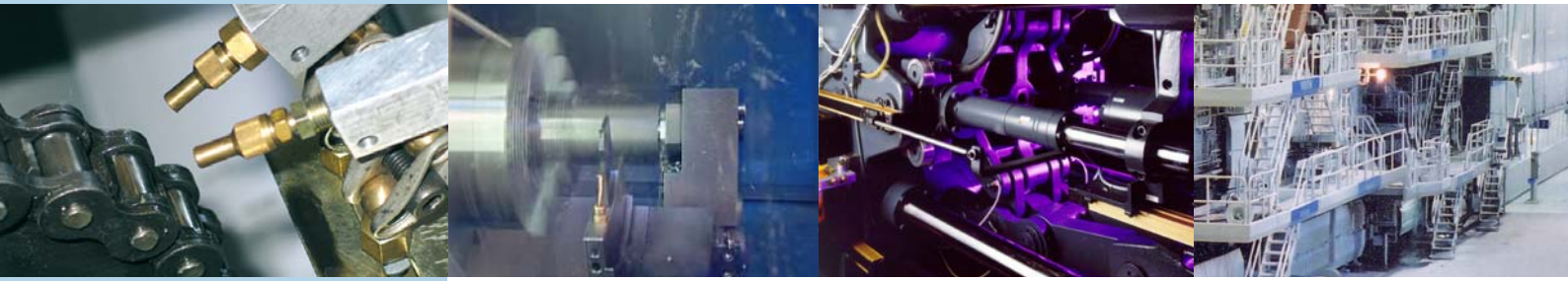
1-0109-EN

Overview of Products for Industry



Centralized lubrication and minimal quantity lubrication for machinery and systems

- Total-loss centralized lubrication systems
- Circulating oil lubrication systems
- Minimal quantity lubrication
- Chain lubrication
- Minimal quantity metering systems

A solution for every application

Your application	Centralized lubrication system								
	Total-loss systems					Circulating oil systems			
	Oil+air	Single-line[1]	Dual-line	Multi-line	Progressive	Single-line[2]	Dual-line	Multi-line	Progressive
Brick-making industry				■	■				
Centrifuges			■						
Compressors		■		■					
Construction and material machinery		■	■	■	■				
Conveyors and transport chains	■	■			■	■			
Crane installations		■	■	■	■				
Escalators	■	■				■			
Food and beverage filling systems	■	■	■	■	■				
Industry motors		■		■	■				
Large diesel engines				■	■				■
Machine tools, machining centers	■	■		■	■	■		■	■
Machine tools spindles	■	■			■				
Mining and milling machines		■	■	■	■	■			
Mixing systems (granulate, concrete, etc.)			■	■	■				
Paper, cardboard and tissue machines		■	■	■	■	■		■	■
Packaging machines	■	■		■	■	■			
Presses		■		■	■	■			■
Printing machines		■			■	■			■
Purification plants			■	■	■				
Railway vehicles	■	■		■	■				
Rolling mills	■	■	■	■	■	■			
Rubber and plastic machines		■		■	■				
Textile machinery	■	■				■			
Tunneling machines				■	■	■			■
Waste incineration plants			■	■	■				
Water turbines			■	■	■				
Wind power installations		■			■	■			
Woodworking machines		■	■	■	■				

Your application	Minimal quantity lubrication	
	Internal MQL	External MQL
Universal milling machine		■
Machine tool (drilling, milling, tapping, threadforming)	■	■
High speed tools (turning, drilling, milling)	■	

[1] *Piston distributors*
[2] *Restrictors, flow volume distributors, flow volume divider*

In this brochure, we'll give you an overview of our centralized lubrication systems for industrial applications, special solutions for chainlubrication systems as well as minimal metering installations and minimal quantity lubrication systems.

You can obtain further information and detailed leaflets from our sales and service centers in Germany, our international subsidiaries and agents, or directly from the head office in Berlin.

Our staff will be happy to advise you.

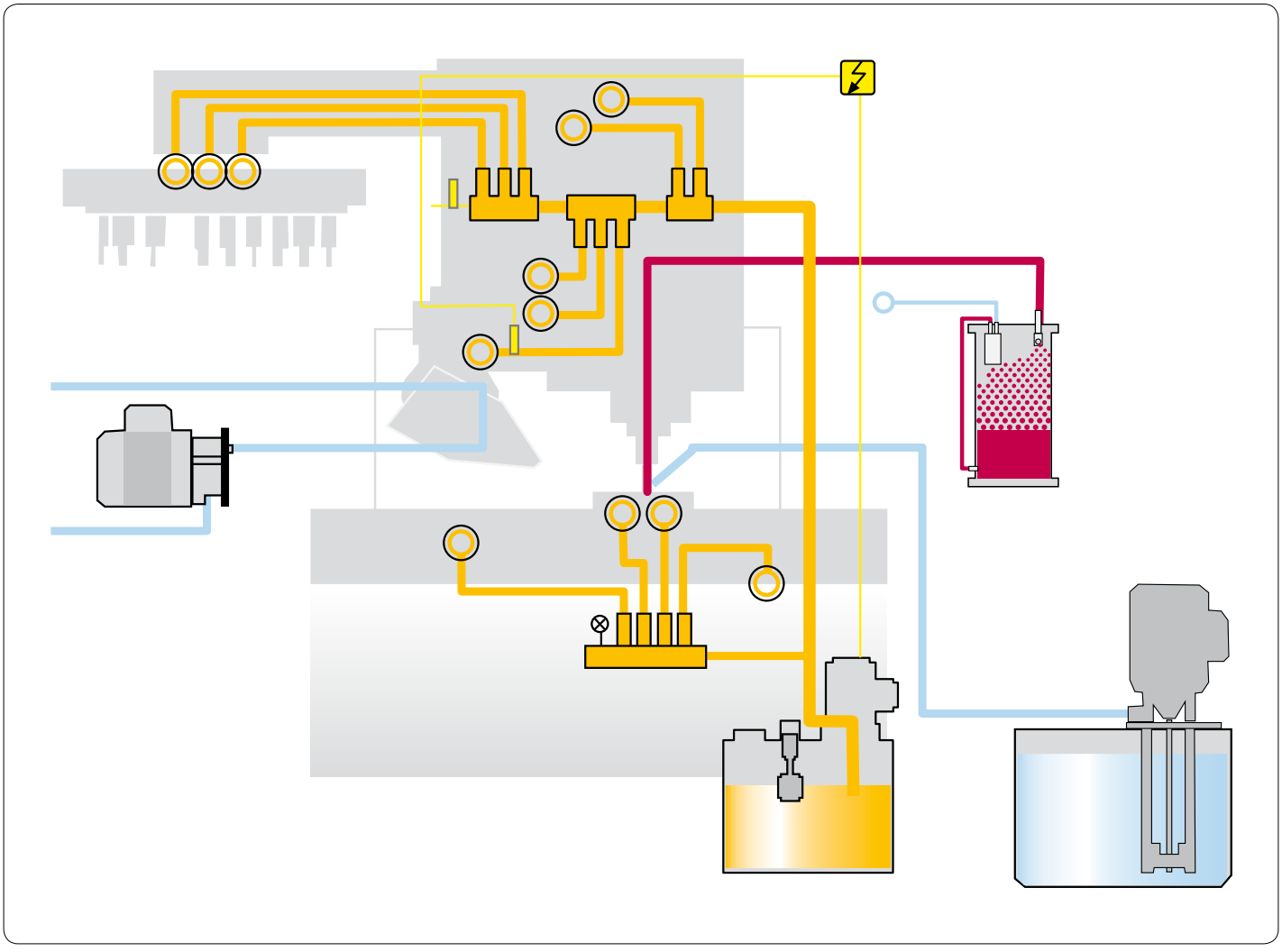
We think in systems

Friction and wear are constant companions of systems and machines. So every year, valuable resources are lost to nature, while billions of dollars are lost to the economy.

Lubrication systems help protect both: the environment and scarce resources.

Centralized lubrication
A pump delivers grease or oil from a central reservoir through lines to the friction points and machine elements, and it does so fully automatically. As often as necessary and in the right amounts. All connected lube points are provided with an optimal supply of lubricant. Friction and wear are reduced. That considerably increases the service life of machine elements while reducing the consumption of lubricant.

Minimal quantity lubrication
With minimal quantity lubrication it's possible to achieve effective lubrication of the cutting process with extremely small quantities of oil. The result is not only higher productivity due to faster cutting speeds, but also longer tool life and savings on cooling lubricants.



Total-loss centralized lubrication systems

Single-line systems for oil or NLGI grades 000, 00 grease

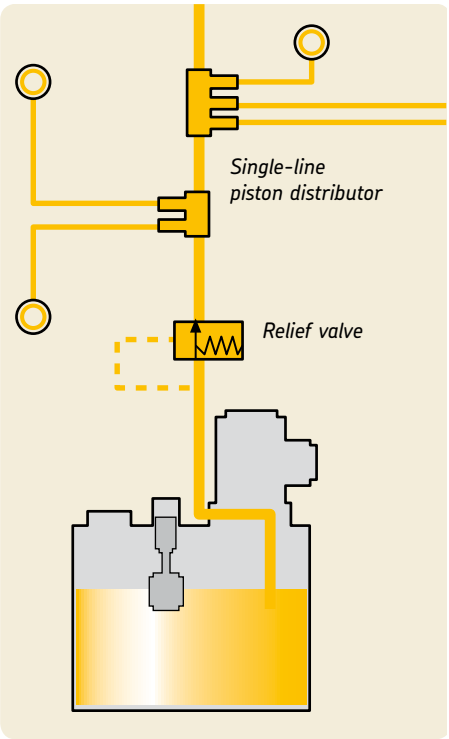
Applications
Machine tools, printing machines, textile machines, packaging machines, wind turbines, off-road, mining and more.

Principle
Single-line (total-loss) centralized lubrication systems are designed to feed a machine's lube points with relatively small amounts of lubricant conforming to lubricant needs. They work intermittently, that means with intervals. Singleline systems can be designed for oil or grease (NLGI grades 000, 00).

Automatic systems can be controlled on a time or load basis. Exchangeable metering nipples on the distributors make it possible to deliver the required amount of lubricant with every stroke or work cycle of the pump. The metering range runs from 0.01 to 1.5 cm^3 per lube pulse and lube point.

Components
- Pump unit (piston pump or gear pump)
- Piston distributors
- Metering units
- Control and monitoring unit depending on the system configuration.

Advantages
- Simple system planning
- Modular system
- Expandability



Choice of products

Manually operated piston pump

Gear pump unit

Compact gear pump unit for oil with integrated control system

Total-loss centralized lubrication systems

Dual-line systems for oil or grease up to NLGI grade 3

Applications
Dual-line systems are usually used to lubricate machines and machinery installations with a large number of lube points, long lines and rough operating conditions.

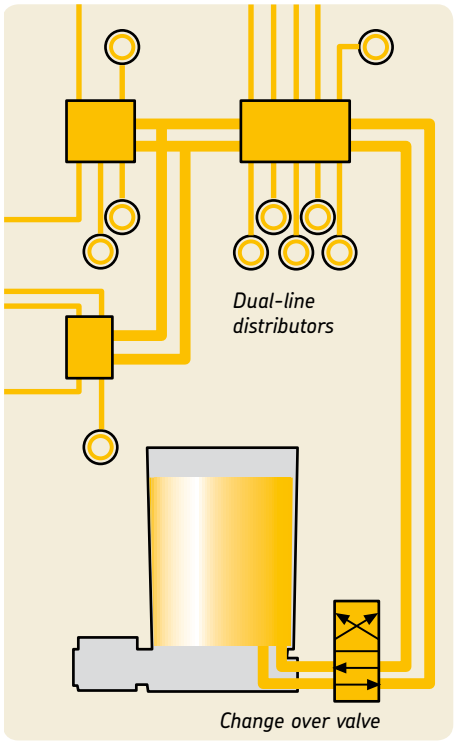
This includes locations such as coking plants, steel plants, continuous casting plants, hot and cold rolling mills, finishing lines, brown coal strip mining, coal-fired power plants, cement factories, deck cranes, etc.

Principle
These lubrication systems work with two main lines that are alternately pressurized and/or relieved. They are designed for ISO VG oil with a service viscosity of more than 50 mm²/s and also for grease up to NLGI grade 3.

Dual-line systems are customarily designed as total-loss lubrication systems for intermittent operation.

Components
Dual-line systems consist mainly of a pump with reservoir, changeover valve, control unit, dual-line distributors and two main lines as well as the respective lube-point lines and fittings.

Advantages
- High functional reliability thanks to measurement of the differential pressure at the end of the line (upstream of the last dual-line distributor) with simultaneous monitoring for leakage in the main lines
- Great flexibility when it comes to adjusting the metered quantity to lubricant needs
- Systems with more than 1000 lube points are possible within a range of 100 m (effective line length) around the pump
- High lubricating reliability at the lube points is achieved with pressures of up to 400 bars



Choice of products

Dual-line pump

Electrical and hydraulic control units

Dual-line distributor

Total-loss centralized lubrication systems

Progressive systems for oil or grease up to NLGI grade 2

Applications
Machine tools, printing machines, beverage filling plants, construction machinery, wood-working machines, presses, wind turbines, etc.

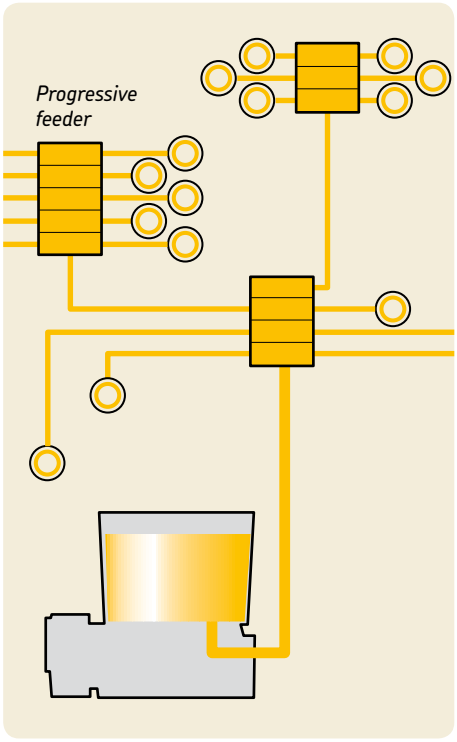
Principle
These systems deliver oil or grease up to NLGI grade 2 in intermittent operation, with or without central monitoring. The lubricant delivered by the pump is fed to the lube points after being divided up by the individual progressive feeders in keeping with the number of pistons and metered quantities.

The quantities are apportioned and the lubricant passed on to one lube point after another by positively actuated pistons that move back and forth. The piston diameter and travel determine the delivery rate per lube point.

Each piston can only discharge its lubricant after the previous one has ejected its metered quantity. Every piston has two lubricant outlet ports at the two end positions of the piston's travel.

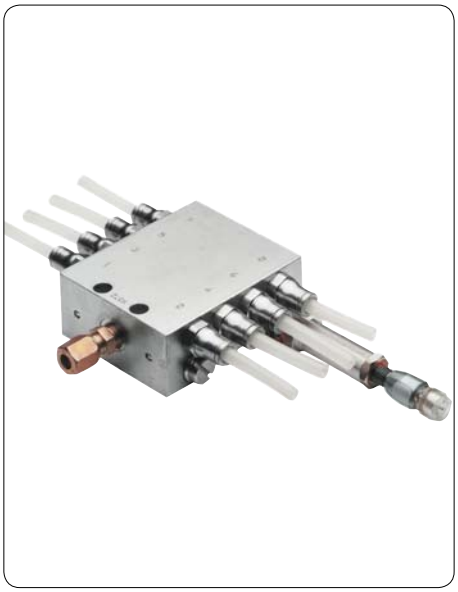
Components
A progressive system consists mainly of a pump, feeders and control system. Pneumatically or manually operated piston pumps as well as electrically driven ones are used in these systems.

Advantages
- Universally applicable in regard to their mode of operation (continuous / intermittent) and lubricants
- Central monitoring of all feeder functions is possible at little expense



Choice of products

Electrically operated piston pumps for grease



Progressive feeder

Progressive feeder

Circulating oil lubrication systems

Progressive systems

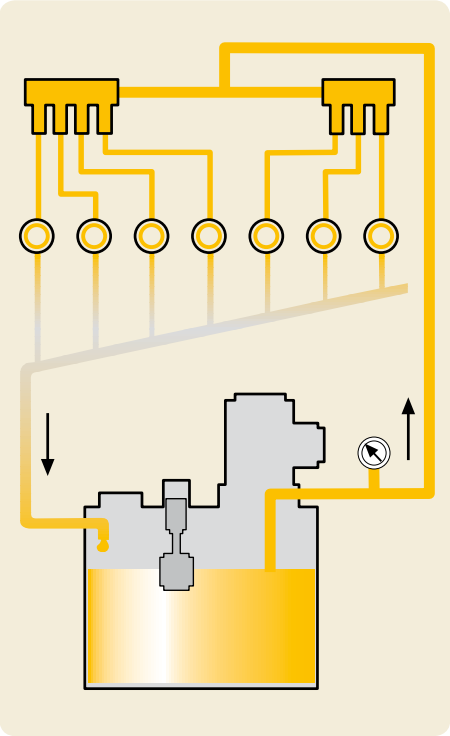
Applications
Forming machines (presses), paper machines, printing machines, fan lubrication etc.

Principle
A continuous flow of oil produced by a pump and then divided up is required for machines or installations that use large amounts of oil for lubricating and cooling purposes.

The lubricant for the lube points is apportioned by flow limiters, flow controllers, flow meters and/or progressive feeders.

Components
- Screw or gear pumps
- Flow limiters, flow controllers and/or flow meters
- Progressive feeders

Advantages
- Individual adjustment of the volumetric flow
- Dynamic monitoring and viscosity-independent volumetric measurement of the flow
- Modular design and combinability
- Easy to service
- Simple, leakage-free monitoring of feeder functions



Choice of products

Pressurized oil station of a large circulating system

Flow meter

Progressive feeder

Multi-line oil lubrication systems
Hydrostatic lubrication systems

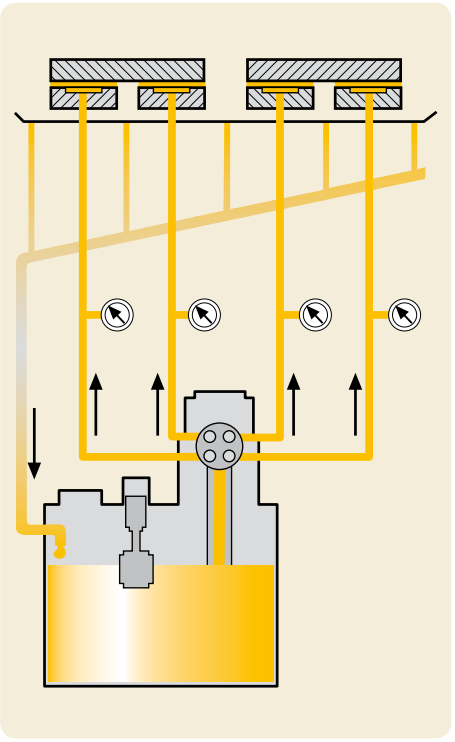
Applications
Machine tools.

Principle
A multicircuit pump with a number of outlet ports delivers a constant flow of oil to the lube recesses on the workpiece slide. The discharged oil forms an extremely thin film of lubricant, thus providing for almost frictionfree sliding. The workpiece slide is lifted a few µm and literally floats across the machine's bed.

A choice of lube recess sizes makes it possible to keep the pressure in the recesses within desired limits. Oil with an average viscosity is used, with the exception of a few special tasks. In the case of bearing assemblies that are subjected to strong fluctuations in pressure, it is possible to use a proportioning pressure valve to adjust the admission pressure to the respective pressure of a characteristic recess.

Components
- Multicircuit gear or gerotor pumps
- Safety valves
- Distributors
- Main and secondary lines

Advantages
- Backlash-free bearings
- Jerk-free motion
- Low running noise
- Wear-free



Choice of products

Pump unit with reservoir

Gerotor pump unit

Multicircuit pump unit

Special solutions:
Chain lubrication

Applications
Drive chains and conveyor chains used in the automobile industry: painting lines, kilns, surface finishing and assembly installations, conveyor systems foodstuffs industry: sterilization systems, baking ovens, slaughterhouses, kilns construction industry, woodworking industry, etc.

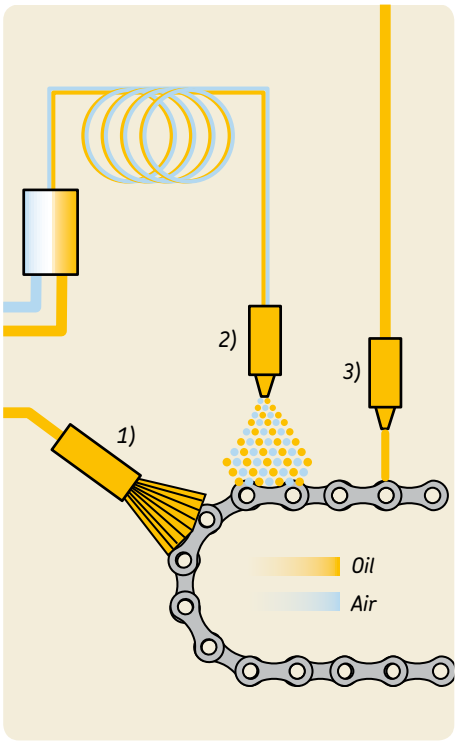
Principle
In the case of chain lubrication, oil is applied from the outside (**UC systems**), with the help of a traveling system grease is injected into the chain studs (**GVP systems**) or an aerosol is sprayed onto the lube point (**Vectolub**). The lubrication system's control unit ensures an exact positioning of the lubricating fixture, even when the chain is in motion.

UC systems: A magnetic piston pump supplies spray nozzles with oil. They spray precisely metered quantities of oil (20, 40 or 60 mm^3) exactly onto the lube points.

GVP systems: An injection head supplied by a pump engages with the passing chain. The grease (0.35 to 1 cm^3) is injected directly into the stud via a lube nipple. VISIOLUB software is available for electronic process control and diagnosis when GVP systems are used.

Vectolub: Metered lubricant is swirled with compressed air in a spray nozzle. That produces microdroplets that make their way to the friction point together with the carrier air without forming any mist.

Advantages
- Fully automatic chain lubrication without production interruptions
- Precise volumetric metering of lubricant
- Customized management of lubrication processes
- Precise, ecofriendly lubrication

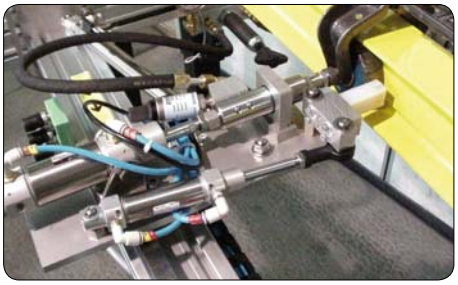


1) Spreading the lubricant
2) Spray on the lubricant (with air)
3) Sputtering the lubricant

Choice of products

Minimal quantity lubrication system Vectolub

UC system with magnetic piston pump



GVP traveling lube system

Minimal quantity metering systems: Oil+air lubrication systems (OLA)

Applications
High-speed tool spindles, bed ways, linear guides, chains.

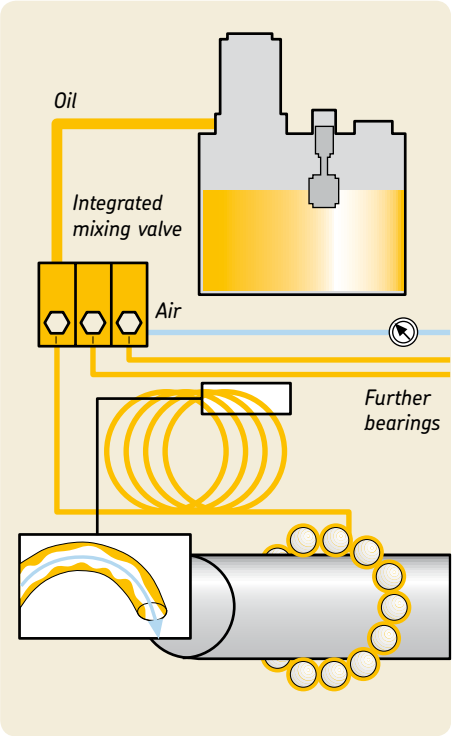
Principle
Oil+air lubrication is a kind of minimal quantity lubrication. A stream of air in a narrow tube pulls a droplet of oil apart, thereby forming a streak that is fed in the direction of the lube point. The bearing is continuously supplied with fine droplets of oil via the outlet nozzle. The carrier air escapes from the bearing nearly oil-free.

The compressed air constantly emerging from the bearing also works as a barrier against particles of dirt. As a result, oil+air systems are also suitable for use on bed ways or linear guides when dirt poses a risk.

Components
Compact unit with gear pump or gear pump unit, oil+air metering unit with built-in piston distributors, pressure control valve for air, pressure gauge for the air pressure, pressure switch for minimum air pressure, set of valves, oil pressure switch, float switch, control unit, oil streak sensor.

The components can be purchased, either as a unit (type OLA) or individually. The purchase of individual elements is advisable when, for reasons of space, the complete unit cannot be mounted on the machine.

Advantages
- Higher machining performance due to better speed characteristics
- Better operating reliability due to cleaner bearings – bearings protected from penetration by dirt
- Low consumption due to metering in line with the needs of every friction point



Choice of products

Oil+air system

Oil streak sensor

Mixing valve

Metering systems for minimal quantity:

Applications
Pneumatic tools, cylinders and systems, cutting tools, welding electrodes, feed units, rolling bearings, linear guides, assembly processes.

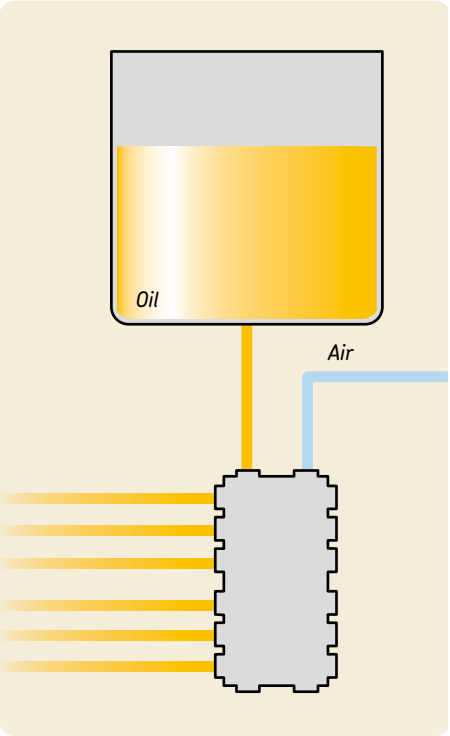
Possible uses are spot or brush lubrication:
- Compressed air oiling (assembly tools)
- Oiling / greasing of small parts (assembly support)
- Chain lubrication

Principle
Injection oilers and micropumps meter out and deliver the lubricant. Injection oilers are used whenever suitable pulses of compressed air or hydraulic are available for their actuation and preparations have been made for the oiling process – either by mixing via mixing valves or by a direct feed of oil via mixing heads.

A micropump can be used for a lot of lubricating tasks. In particular, it can be used to spray oil by means of compressed air.

Components
Injection oiler, micro pumps, oil reservoir. When used for only a few lube points, it is possible to combine injection oilers with different reservoirs.

Advantages
- Optimal metering for each lube point regardless of line lengths and cross sections
- Lubricant supplied from a central reservoir, also via a central pressurized-oil line in the case of injection oilers
- Metering elements can be actuated individually or in groups
- Fast pulse sequence
- Space-saving design
- Ecofriendly: no oil in the exhaust air



Choice of products

Injection oiler

Injection oiler with reservoir

Micro pump

Internal minimal quantity lubrication (MQL)

LubriLean

Applications
Milling, rolling, shell end milling and form cutting, face milling, high speed cutting, hobbing, drilling, boring, tapping, buzz and band saws, forming and broaching.

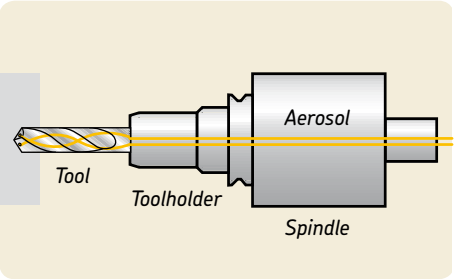
Principle
With internal MQL, an aerosol is produced in the equipment's reservoir and fed through the rotating spindle to the tool. The oil supplied is completely used up with no residue being left when the optimum setting is used.

Components
An overall MQL system of the single duct type consists of harmonized components that work together to lubricate the cutting area (spindle construction, choosing tools, optimizing processes). The MQL units of the LubriLean DigitalSuper and LubriLean Vario groups can be integrated easily in turning machines with tool turrets.

System LubriLean DigitalSuper
Individual control of the aerosol quantity by stored-program control (SPC) of the machine tools.

System LubriLean Vario
The required aerosol quality is set by manual regulation of the air pressure and lubricant quantity.

Advantages of the LubriLean range of products
- Can be used especially in production processes, though they're specially suitable for small tools and high cutting speeds
- Short response times after tool changes
- No moving parts (wear-free)
- Easy to integrate in machine-tool systems



Choice of products

LubriLean Vario

LubriLean VarioSuper

LubriLean DigitalSuper 1

External minimal quantity lubrication (MQL)
LubriLean, VectoLub

Applications
Cutting and forming tools;
buzz and band saws.

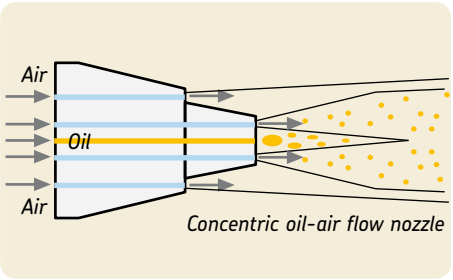
Principle
With external MQL, lubricant and air are fed to the active area between the tool and workpiece via tubing and nozzles that are not part of the machine's design. The nozzle has to be adjusted to the respective application. The metered lubricant is atomized by compressed air in a concentric oil-air flow nozzle. That produces microdroplets that are carried by air to the friction point without the formation of mist.

This relatively rigid system is suitable for machining operations in which the tools used are similar and the workpiece contours do not change. It can also be used for series-produced parts.

Product families:
LubriLean Smart and Basic
The compressed air fed to the system pressurizes the lubricant reservoir. As a result, the lubricant is transported to the spray nozzle via a system of passages and lines.

Vectolub
A pneumatically actuated micro positive-displacement pump feeds the lubricant through the internal capillaries of a coaxial tube to a spray nozzle.

Advantages
- Retrofitting of conventional machine tools is inexpensive
- No dripping nozzles after shutdown
- Large spray distances possible (up to 300 mm)
- Small amount of jet spray thanks to special nozzle



Concentric oil-air flow nozzle

Choice of products

LubriLean Basic

LubriLean Smart

VectoLub VTEC

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