VIBRACO
Charmont
01400 NEUVILLE LES DAMES
Phone: +33 4 74 55 69 25

The principles of microlubrication

What is microlubrication, minimum quantity lubrication (MQL)?

Microlubrication, also named minimum quantity lubrication (MQL) is a technology which deposits accurate amounts of liquid mainly in a process.

Amounts of liquid

Amonunts of liquid are delivered by volumetric micropumps. The capacity of most micropumps is adjustable. Operation cycles and the capacities of micropumps determine liquid flow. The liquid flow may be adjusted from 77 mm^3 to more than 1.4 litre per hour.

The use of liquids

The liquid supplied by micropumps may be transferred:

- by pipes towards points to soak felts or to fall down drop after drop
- by pipes towards spray nozzles
- and sprayed inside machining spindles or pipes.

Two technologies

Nozzles are connected to micropumps by hoses, sometimes by rigid pipes or quick couplings.

Single pipes carrying a mist	**Coaxial pipes carrying liquid and compressed air without mixing them**
A micropump can supply many nozzles.	Each nozzle is associated with a micropump.
- It is impossible to control the distribution of liquid between the nozzles associated with a micropump. - It is difficult to control the condensation of the mist. The mist may condense in the pipe or too late and so generate some dirt and pollution. - Suction devices are often requested.	- The thinness of spraying is adjustable. - The control of the liquid distribution is perfect. The liquid flow is adjustable on each nozzle. - Normally these devices do not generate atmospheric pollution. Mist generation is rarely required.

Micropumps

Most micropumps used in microlubrication devices are volumetric pumps. They are fitted with a hydraulic piston which carries out the liquid through a directional valve. A pneumatic piston moves the hydraulic piston. If this feature exists, the hydraulic piston takes adjustable quantities of liquid by setting:

- its movement
- its position

The management of micropumps

In a microlubrication device, must be managed:

- the air supplying of nozzles
- the activation of micropumps

Device type	Management of micropumps	The air supplying of nozzles
		Do not pay attention to this column if the liquid is delivered without using compressed air to spray it.
Pulse devices	Micropumps deliver amounts of liquid each time the device is activated.	Nozzles are supplied with compressed air each time the device is activated.
Continuous devices	A sequencer puts rhythm to the micropumps during all device activations.	Noozles are supplied with compressed air during all device activations.
Free devices	Users manage micropumps.	Users manage the compressed air supplying of nozzles.
Devices with integrated complex management	Management by automatism	Management by automatism

The functions of nozzles and compressed air

When a liquid falls down from a hole, the size of drops is managed by the **superficial tension phenomena**.

Nozzles must carry the liquid to the final destination with the accurate form (geometric, spraying thinness,...) maybe using compressed air.

Nozzles with compressed air must spread the liquid out over time.

the amount of liquid delivered at a hole each time the micropump is activated is:	Natural behaviour	To extract the liquid each pulse	To spread the liquid out over time
bellow a drop	A drop falls down from time to time but not each time the micropump is activated	It's necessary: - to suck the liquid up by capillary action (for example with a felt) - to suck the liquid up with compressed air and nozzles.	Use of compressed air and a nozzles
equal to a drop	A drop falls down each time the micropump is activated		Use of compressed air and a nozzles
more than a drop	A drop falls down each time the micropump is activated. Other drops falls down from time to time.		Use of compressed air and a nozzles

Some specific features of ACOVAL microlubrication systems

ACOVAL microlubrication devices are fitted with:

- flexible hoses when liquid is deposited without been sprayed.
- coaxial hoses when liquid is spayed.

ACOVAL microlubrication devices are fitted with micropumps whose capacities are adjustable:

- half capacity micropumps
- single capacity micropumps
- double capacity micropumps
- large capacity micropumps

VIBRACO builds microlubrication devices with all sort of management described before.

Each microlubrication device is designed in accordance with its use (viscosity, lubricant, environmental conditions).