

Nessie[®] Saw Blade Cooling and Dust Binding System Why and How to Calculate!



Optimal operation of sawing machines may be obtained with pure water as the lubrication medium. No additives required, just pure water providing both saw blade cooling and dust binding at the same time.

The guidelines described in the following pages must be followed to ensure an optimal and easy installation of nozzles and the saw blade cooling system.

The main topics are:

1. Installation at band saw or circular saw
2. Amount of sawing machines in operation
3. Nozzle positioning and nozzle size
4. Materials used like high-pressure hose and pipes.

Lubrication Example of a Saw Line

Water has often been used as a low-pressure mist or for water baths for saw blade lubrication in the wood processing industry. Today's lubrication medium is often a water/oil mixture where the oil may be kerosene or synthetically based.

As the flash point of such a lubrication medium may be low and the explosion hazard high, the use of these media may involve too high risks.

The sawdust itself can be very explosive and with pure water at a high pressure, the small droplets will stick to the dust and prevent the dust explosion.

At the same time, the high-pressure water mist will cool down the total area around the sawing machine; this effect is called adiabatic cooling and can only be obtained with a high-pressure water system.

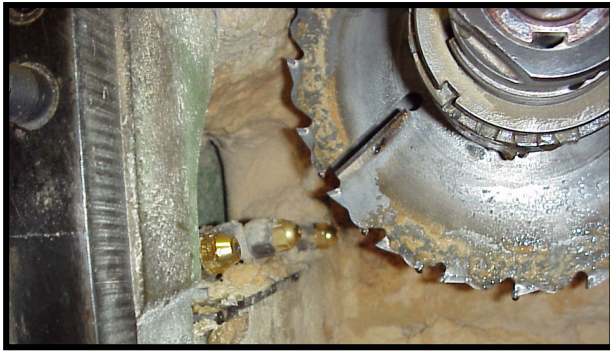
A good saw blade lubrication is crucial in most sawmills today. Several reasons speak for that.

Saw blades will get too hot due to friction between the saw blades and wood pieces, resulting in



Insufficiently or non-lubricated system in use

1. pitch sticking to saw blades
2. saw blades curving due to overheating
3. linking problems with saw blades for double shaft circular saw
4. saw blades requiring washing and cleaning after use
5. expansion of cut
6. saw blade breakages
7. too frequent saw blade changes
8. no clear cut!



Result after Installation of NWC High-Pressure Lubrication System

1. Pitch on the way to disintegrate on the saw blade 1 hour after commissioning
2. Saw blades are cooled down
3. No linking problem between saw blades
4. Longer service life (2-3 times longer are expected) than for systems not using any lubrication system.

Sawblade after Installation of NWC System

How to install a combined High-Pressure Cooling and Dust Binding System

Circular Saw Application

All saw blades must be covered by the high-pressure water mist. Distance from saw blades to nozzles is not crucial. A distance of 200 - 250 mm (8-10 inc.) is normal.

Water consumption is difficult to calculate, as the different types of species contain different amounts of pitch, and thus the friction between blades and wood will differ.

Nozzles of 11 l/h equal to 0.48 gpm and of 17 l/h equal to 0.75 gpm are normally used for cooling and dust binding.

The following calculation must be made to ensure sufficient amounts of water for all saw blades:

L= distance from nozzle to saw blade teeth

Fixed factor X for spray area = 0.5774

30 - 50% overlap from one nozzle to the other are required to secure sufficient water spray on the blades

S = spray area (width of spray cone)

$$S = L * 0.5774$$

Nozzles required = saw area / $S*0.5$ (0.5 equal to the 50% overlap)

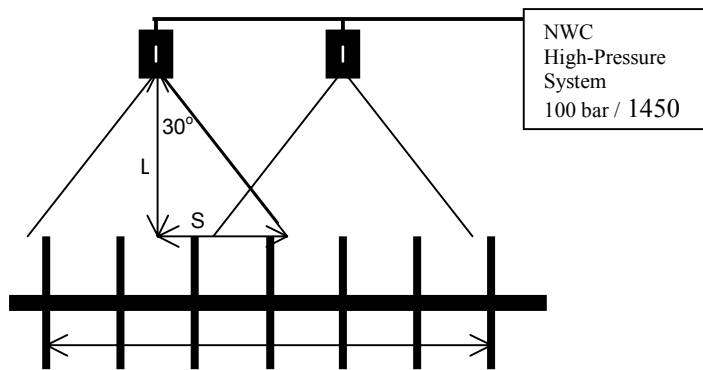
Example:

To cover a gang saw of saw blades with a sawing area of 360 mm (14.4 inch), the following calculation may be made:

Distance L between nozzle and saw teeth equal to 250 mm (10 inch) blades

$$S = 250 \text{ mm} * 0.5774 = 144 \text{ mm equal } 5.5 \text{ Inch.}$$

$$\text{Nozzles required} = 360 / (144*0.5) = 5 \text{ nozzles}$$



Following guidelines may be used:

- 1 saw blade 1 nozzle
- 2 saw blades 1 nozzle
- 3 saw blades 2 nozzles
- 4 saw blades 2 nozzles
- 5 saw blades 3 nozzles
- 6 saw blades 3 nozzles
- and so on.

The nozzle is fixed to the machine frame and will not have to be moved if the saw blade position or quantity changes.



In this example a Linck sawing machine from Germany is equipped at Heby Saw in Sweden with the Nessie High-Pressure Lubrication and Dust Binding System.

Up to 12 saw blades of this installation can be in operation at the same time. In this case 6 nozzles are used to cover the saw area.

The double-shaft sawing machine is equipped with nozzles for both rows of saw blades.

Installation example of lubrication and dust binding system

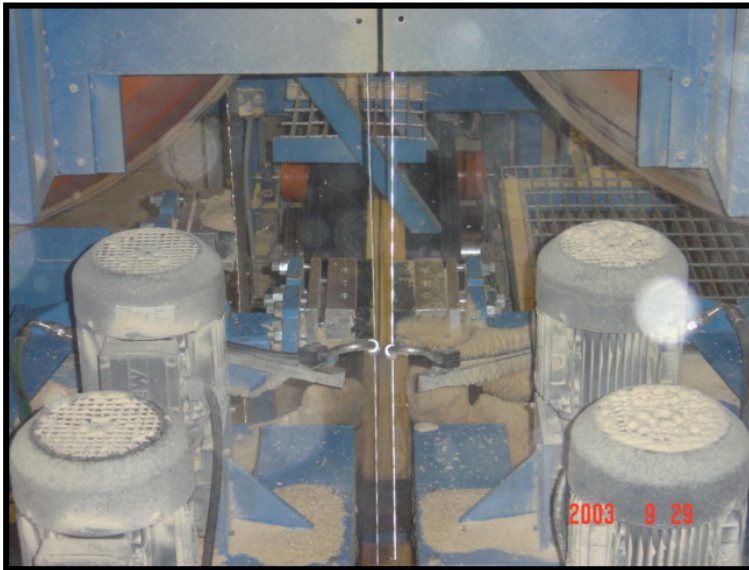


Saw line using High-Pressure Water Lubrication and Dust Binding System.

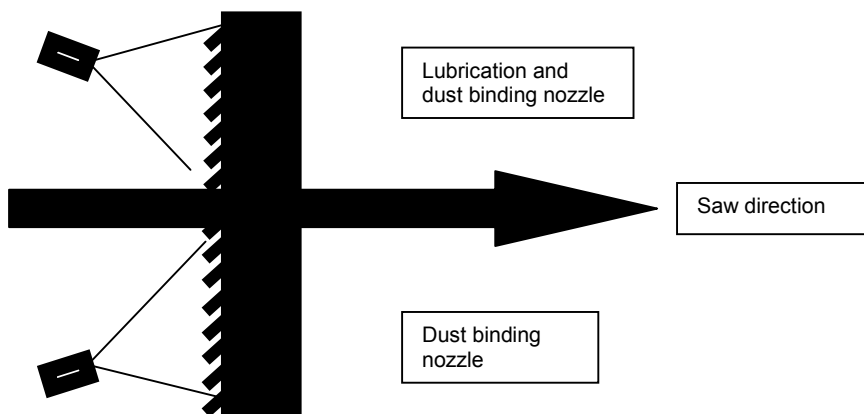
No after-cleaning before sharpening required.

Extended service life, a 2-3 times-extension has been measured.

Band Saw Application

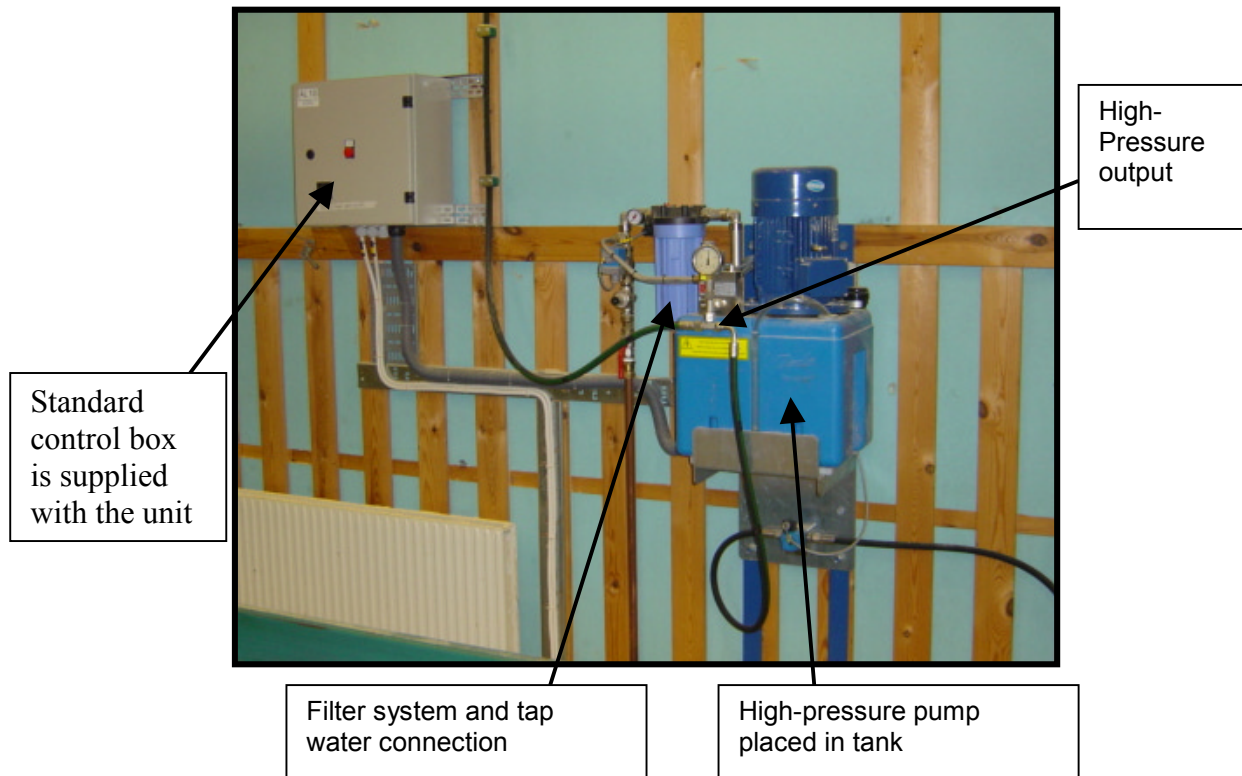


All saw blades must be covered by direct spraying on the blades. Distance from saw blades to nozzles is crucial, a distance between 50 - 70 mm (2 - 3 inches) is maximum. The nozzle for this application must be the 11 l/h equal to 0.48 gpm. The nozzles must follow the saw blade movement and be fixed to the machine frame. Two nozzles per blade are required. The nozzles placed above the saw line are for both the lubrication and dust function. The nozzles below are only for dust binding.



To prevent corrosion on the wheels and machine parts it is important to spray with an oil-lubricating medium before the saw blade stops.

Installation of High-Pressure Unit



4 connections are required for the complete system

- Tap water supply
- High-pressure output
- Power supply 3-phase, zero, earth
- Signal from saw line (optic lens)

System sizing

The NWC is available in 7 different standard sizes from 110 l/h to 2700 l/h equal to 0.57 gpm to 14.53 gpm.

As shown in the example, 5 nozzles are required, and for the test run, the 17 l/h / 0.48 gpm nozzle must be used.

The total water amount is 85 l/h equal to 0.37 gpm, consequently the smallest system is sufficient for the water amount. If more saw lines have to be operated from 1 unit, a bigger version must be selected. For further information please see our Data Sheet for the NWC system and please also see our Data Sheet for the Nessie Water Mist Nozzles.

For the external installation, standard high-pressure hoses can be used. Near the circular sawing machine and around the band-sawing machine, stainless steel high-pressure pipes must be used. Wood chips can easily damage the hose.

Each mill runs differently and processes different kinds of wood species, and it is therefore crucial that the mill manager takes part in the design, as great advantages can be obtained from using High-Pressure Water System for Lubrication and Dust Binding.

Danfoss can accept no responsibility for possible errors in catalogues, brochures and other printed material. Danfoss reserves the right to alter its products without notice. This also applies to products already on order provided that such alterations can be made without subsequential changes being necessary in specifications already agreed. All trademarks in this material are property of the respective companies. Danfoss and the Danfoss logotype are trademarks of Danfoss A/S. All rights reserved.



**DK-6430 Nordborg
Denmark**