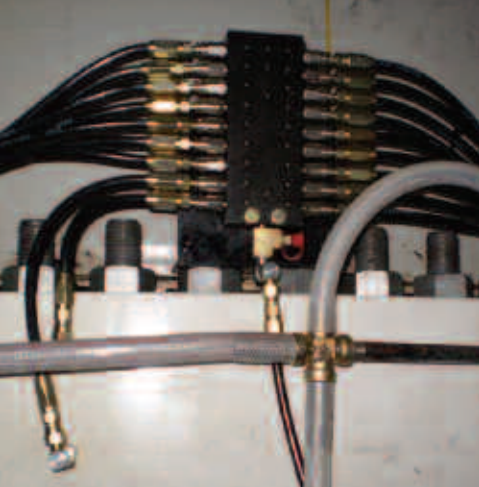


LINCOLN

Capabilities

INFORMATION FROM THE LEADER IN THE LUBRICATION INDUSTRY

Lubrication Solutions for the Wind Industry



**Helping Maintain
and Sustain the
Wind Energy Market**

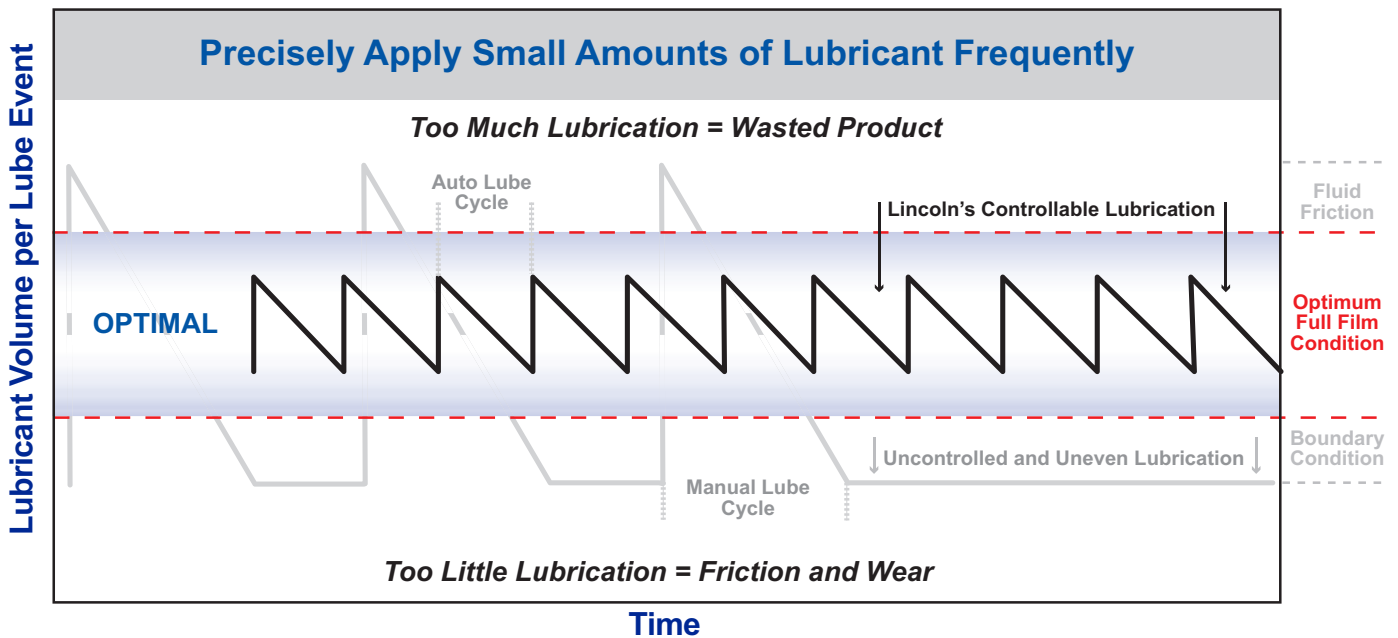
Why Use Automated Lubrication?

A lack of proper lubrication can bring your valuable equipment to a standstill. Vibration, high mechanical loads, contamination and moisture are all threats to the life of your bearings.

Proper lubrication protects your machine and extends the life of its critical components. With a Lincoln automated lubrication system, you will lengthen bearing life by delivering frequent, small amounts of grease to each bearing while the machine is running.

With manual, uncontrolled lubrication, each bearing runs the risk of receiving too much or too little grease resulting in wasted grease or friction and wear. In addition, manual lubrication is tedious, expensive and often is not even possible due to the location of hard-to-reach lube points.

Controlled, exact amounts of lubrication delivered frequently keep bearings perfectly coated enabling them to perform to capacity.



Advantages of Automated Lubrication

- Lower costs for repairs, spare parts and lubricant
- Improved operating times; less costly downtime
- Longer maintenance intervals – one year or longer
- Greater bearing life from regular, exact amounts of lubrication
- Reduced safety issues associated with hard-to-reach lubrication points
- Added corrosion protection from the elements.
- No wasted lubrication

A Solution for Every Turbine Application

Regardless of the wind turbine's design, several bearings and drives require lubrication. The proper lubrication system simplifies service tasks, extends the service interval and protects from atmospheric conditions.

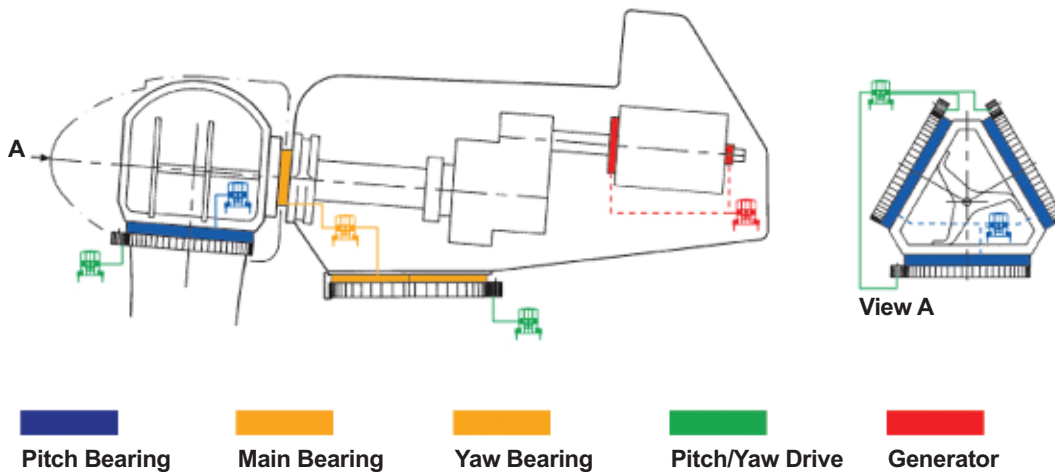
Expensive, unplanned repairs and downtime are avoided and the life span of the wind turbine is increased.

Lincoln offers lubrication system solutions that are tailored for applications on blade bearings, main bearing, yaw bearings and generators.

In addition, our product range includes spray lubrication systems and lubrication pinions for the lubrication of gear drives.

The lubricant is always reliably and consistently delivered from the pump to the lubrication point – either by means of progressive metering devices or single-line metering devices.

Schematic of a Wind Turbine



Application	Lubrication System
Pitch Bearing	Pump 203/603 with follower plate and stirring paddle Metering devices: progressive SSV/Single-line QSL
Main Bearing	Pump 203/603 with stirring paddle Metering devices: progressive SSV/Single-line QSL
Yaw Bearing	Pump 203/603 with stirring paddle Metering devices: progressive SSV/Single-line QSL
Pitch/Yaw Drive	Pump 203/603 with stirring paddle Metering devices: progressive SSV/Single-line QSL Polyurethane lubrication pinion or spray nozzle
Generator	Pump 401/203 with stirring paddle

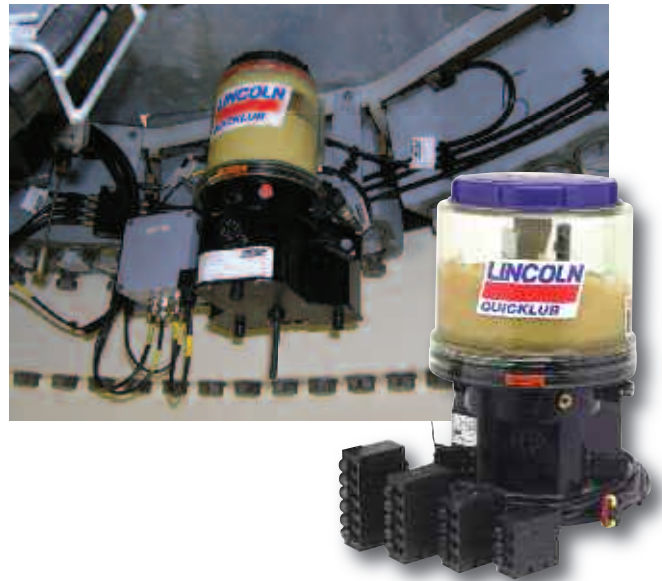
Quicklub Progressive Systems

Quicklub 203

Lincoln's Quicklub system gives you the ability to supply a precise amount of grease to each and every wear point on your equipment while it's operating. The heart of the system is the rugged, one-piece Quicklub SSV divider valve. This valve, utilizing unique internal pistons, "divides" the grease and sends the appropriate amount to each lubrication point.

As a system is designed for a specific application, multiple divider valves are used, each one configured to meet the unique lubrication requirements of every lubrication point on the machine.

The pump that powers the system is programmed to activate at regular intervals while the equipment is running.



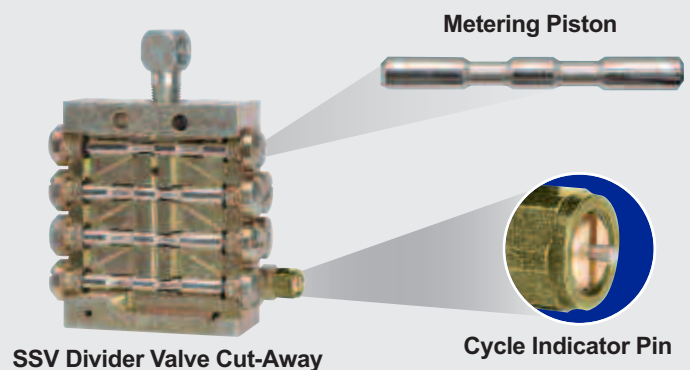
Quicklub 401

The QLS 401 is a complete lubrication system that includes all necessary monitoring and control functions. All components including an internal pressure relief valve are part of this complete package. The integrated, all-in-one system concept reduces installation time and costs. Up to 18 lubrication points can reliably be supplied directly from the pump and monitored at an affordable price.



The Quicklub patented **SSV divider valve** is more than a simple drilled manifold. Positive displacement allows internal metering pistons to distribute precisely measured amounts of grease to each lube point – every time.

The **cycle indicator pin** on the primary valve provides a visual confirmation that the divider block is working properly.



Single Line Parallel Systems

P603S

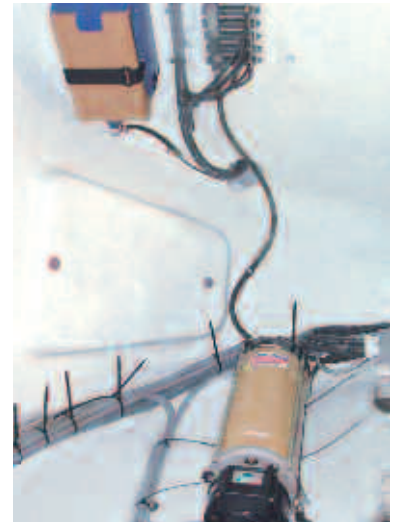
The pump P603 incorporates an internal connection of the lubricant quantity from one to three pump elements. With a delivery of 4 cm³/min for each pump element, sufficient lubricant is available for the supply of the connected metering devices.

The internal pressure switch monitors the pressure build-up and venting in the system, and the internal vent ensures proper relief of the mainline during the pause interval.

4-, 8-, 15- or 20-liter reservoir capacity is available. For rotating operation, the reservoir is equipped with a follower plate and stirring paddle. For stationary applications, a stirring and fixed paddle assembly is sufficient.

The P603S pump is easy to install. The pump's internal controller is easy to program and operates any system using Lincoln Centro-Matic grease injectors including SLV, SLV-XL, SL-1, SL-32, SL-33 and QSL.

The innovative design contains the pump, controller, vent valve and pressure switch or transducer conveniently in one unit.



Suction Elements

The suction element ASE1 is a direct-operating, single-line unit. It serves to externally remove and transport used lubricant out of a bearing and into a separate collection canister – i.e., the AFB 10 used grease container.

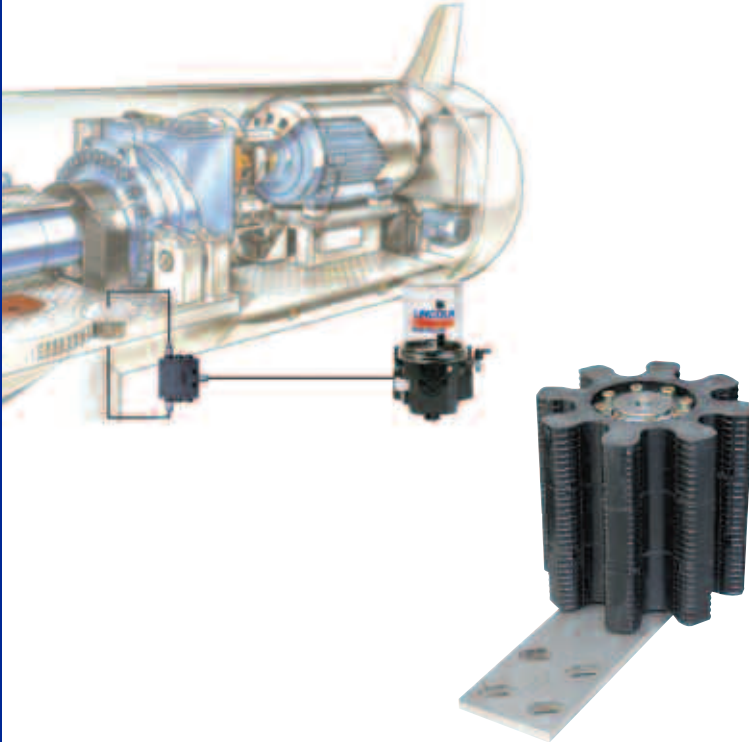
During the pressurization phase, the connected single-line pump P603S transports the pre-metered used lubricant from the bearing via the separate disposal connection to the AFB 10 used lubricant container. When the P603S single-line pump vents, the vacuum created in the suction side pulls in the used lubricant into the metering chamber which is transferred on during the next pressurization phase.

The External Suction Element ASE1 was especially developed for single line lubrication systems in wind turbines to cleanly remove used grease from a bearing. The used lubricant is collected in a used grease container AFB 10 with a 10-liter capacity, and can be reused for the lubrication of pinion gears.



As a result, the problem of used grease in bearings is reduced. The lubricant does not force its way through seals and keeps the area around the bearing clean and safe. Likewise, the recycling of the used grease lessens the environmental impact and conserves resources.

Other Lubrication Options

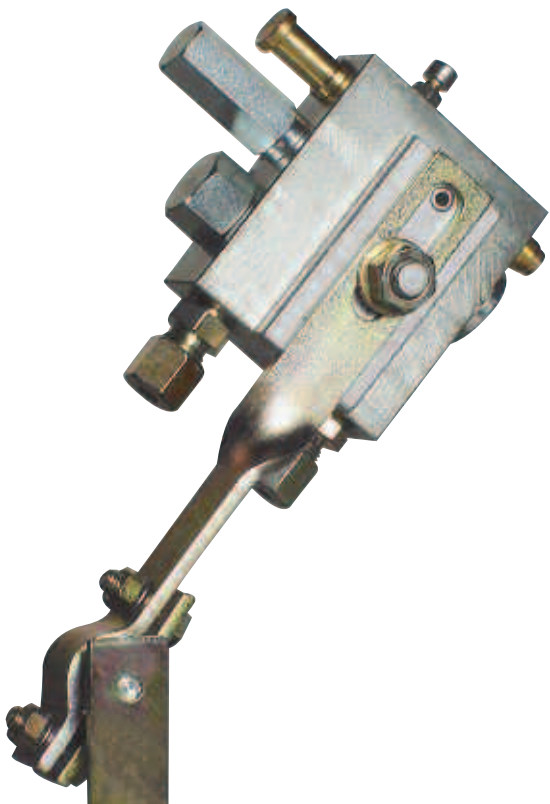


Pinion Gear

Lincoln has nearly a century of experience in the lubrication of open gears. For wind turbines Lincoln currently uses a mechanical lubricant application method.

A specially developed lubrication pinion wheel provides a 100 % lubrication film to the gear tooth. The new PU pinion only applies lubricant to the loaded area of the tooth flank and not over the entire tooth or root.

The Lincoln progressive system or single-line system can be used to supply lubrication to the pinion.



Spray Lubrication

Our HSA spray lubrication uses compressed air and provides an alternative to mechanical application methods.

A unique controlled spray nozzle sprays the lubricant directly on the tooth before it engages. Only 1/10th of the lubricant is required for proper coverage when compared to mechanical applications.

The supply of lubricant to the nozzle is accomplished with our dependable progressive system with monitoring possibilities.

Advantages:

- Even, constantly renewed, ultra-thin lubrication film
- Direct spraying of the tooth that is about to engage
- Corrosion protection
- No affixation of dirt particles
- Good adhesion resulting from minimal lubricant quantity
- Electrical monitoring of spray function

Lubrication Tools and Equipment

120-volt Electric PowerLuber

New to the PowerLuber family of grease guns, the electric PowerLuber was designed specifically for the wind energy market.

Turbines require large volumes of grease to be dispensed during each lubrication maintenance visit. Tower heights and tight working spaces present unique challenges to maintenance workers.

Cordless guns operate well, but the high grease volume requirements means frequent battery changes. Hauling multiple batteries to the top of the tower is ineffective and costly.

Unlike any grease gun on the market, This tool provides endless run times and is more energy efficient than air-operated grease guns.

Features:

- 2-speed transmission – high volume (medium pressure) or high pressure (standard volume)
- Stroke indicator pin
- Air cooled 120v motor
- Patented transmission design
- Variable-speed trigger
- Six-foot power cord
- 6,500 psi pressure relief valve
- UL approved



Manual Grease Filler Pump – Quick Filling

The manual grease filler pump comes with a special adapter for Quickclub pumps. Filling of the pump reservoirs takes just a fraction of the time that would normally be required using conventional manual grease guns.

Electric Filling Pump – QTP

When filling reservoir type pumps up to 20 kg capacity, the new Quickclub transfer pump (QTP) with an output of 2l/min. and a pressure of 50 bar, offers the ideal solution. The QTP is suitable for 25, 50 and 200 kg drum - either mobile or stationary.





Celebrating Our First Century In Business



Approaching 100 Years of Innovative Solutions

Lincoln has been the lubrication solution provider for almost a century. Our commitment to innovation is illustrated by us having been awarded more U.S. patents for lubrication equipment than all other competitors combined.

Local Distribution is Here to Help!

Lincoln's network of full-service distributors is the best in the industry. From system design, and inventory, to installation, warranty and repair, their highly skilled

sales and servicemen are trained to take care of all your needs in a timely manner.

Contact Your Local Distributor

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