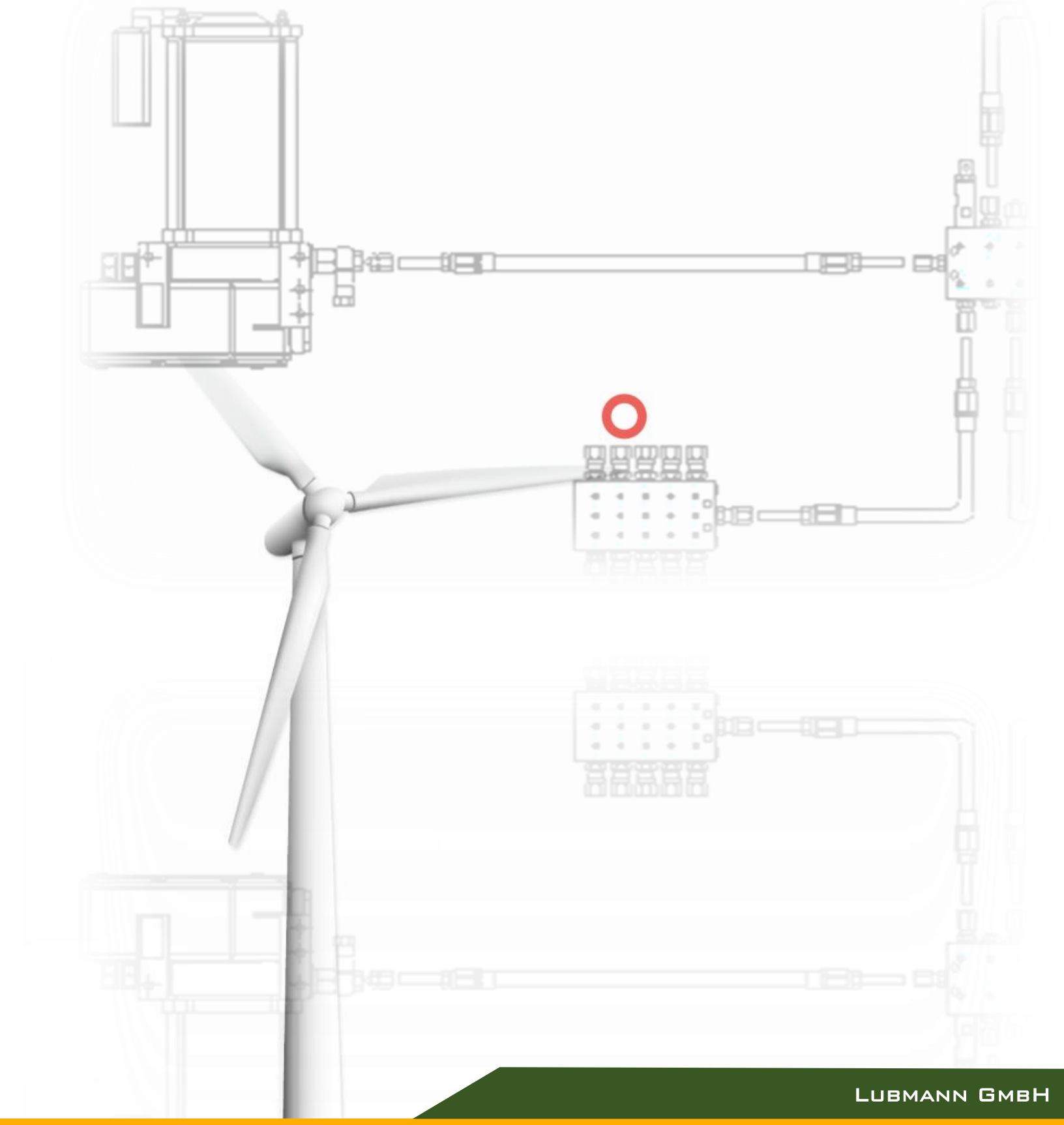
Application of CLS for Windmill



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LUBMANN
Centralized Lubrication System

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LUBMANN
Centralized Lubrication System

Introduction - Brands

Lubmann

Lubmann belongs to AUTOL Group, which locates in Duisburg, Germany since 2015 and provides you the world's leading lubrication equipment made in Germany – from manual greasing devices and tools to Automatic Lubrication Systems.

AUTOL

AUTOL is an Automatic Lubrication System Solution supplier which established in 2005 in Zhengzhou, China and provides a lot of world class's equipment/machinery manufacturers the high-performance lubrication solutions.

AUTOL Group

Both AUTOL and Lubmann systems are available through our global network of lubrication experts, offering you world-class installation and ongoing support on a local level – today and into the future With the power of this network, and more than 200 years of combined friction management experience, we can help you improve machine reliability, reduce maintenance, increase productivity, enhance safety and optimize manpower resources

In this document, we present the contents only for Lubmann products, including specifications, order information and so on. Any information from AUTOL products please ask your local AUTOL/Lubmann dealer.

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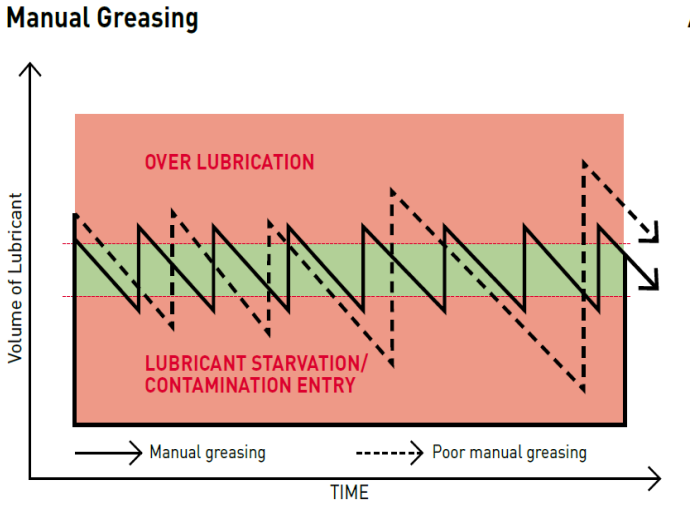
LUBMANN
Centralized Lubrication System

Introduction - General Knowledge of Automatic Lubrication System

Manual Lubrication

- **Interval:** long and irregular.
- **Grease used:** too much per time and easy to degrade.
- **Friction pairs:** either grease excess or grease starvation.
- **Manual labor:** intensive and uncontrollable.
- **External dirt:** easy to enter lube points.
- **Operation time:** machines stop.
- **Point location:** some are not easy to access.

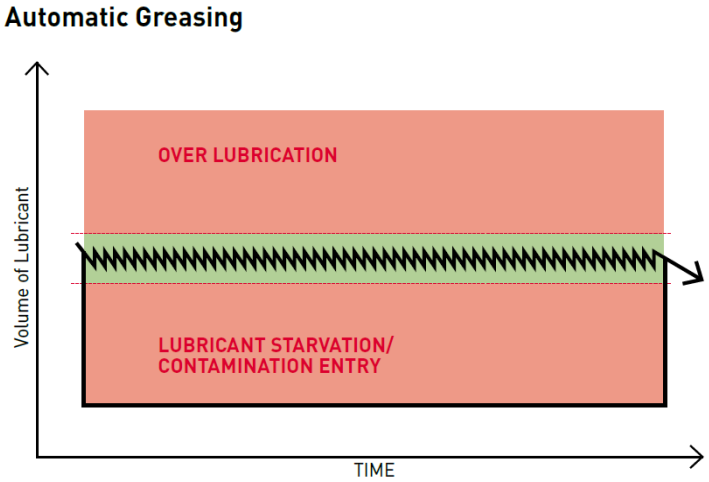


Results

- **Components' life:** greatly shortened.
- **Downtime:** unavoidable.
- **Environment:** polluted for excess grease.
- **Lubrication effect:** no guarantee.

Automatic Lubrication

- **Interval:** short and regular.
- **Grease used:** as required every time, fresh and clean.
- **Friction pairs :** under adequate grease condition.
- **Manual labor:** save 95%, and actual effect is guaranteed.
- **External dirt:** a closed system, no dirt entrance.
- **Operation time:** the machine is running.
- **Point location:** regardless of location or ease of access



Results

- **Components' life:** greatly extended.
- **Downtime:** greatly reduced
- **Environment:** protected.
- **Lubrication effect:** guarantee.
- **Investment:** returned quickly

Save time, save grease, save labor, reduce maintenance cost.

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Centralized Lubrication System

System Overview - Progressive

The progressive centralized lubrication system connects all levels of distributor (main block, secondary blocks) in turn by lubricating pump, conveys the grease to each lubricating point parallelly, and lubricates the friction pair.

Components

Standard:

Piston pump: 1 piece (Progressive, Plunger)

Primary distributor: 1 piece (Block Type/Progressive)

Secondary distributor: Optional (Block Type/Progressive)

Monitor: Integrated in Pump/External

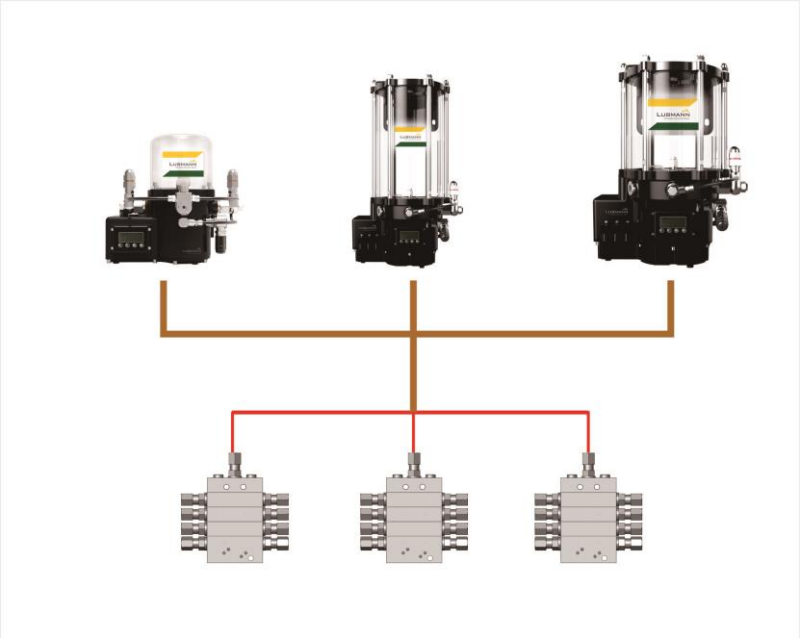
Optional:

Indicator Rod

Grease Level Sensor

Pressure Sensor

Flowrate Sensor



Accessories: Hoses and Fittings for connecting the whole system

Product	Function Principle	Grease Thickness till	Metering Quantity per Pump Element ml/Min	Reservoir Liter	Operating Max. Pressure in bar	Operating Max. Pressure in psi	Power Supply	Max. Pump Elements
LEP	Piston Pump/Paddle Mode	Up to 2	1.5-4.5	1-2	350 bar	5075	12/24 V DC 220V AC	3
LRMP	Piston Pump/Paddle Mode	Up to 2	1.5-4.5	2-8	350 bar	5075	12/24 V DC 220V AC	3
LRBP	Piston Pump/Paddle Mode	Up to 2	1.5-4.5	4-20	350 bar	5075	12/24 V DC 220V AC	4
LIGP	Piston Pump	Up to 2	400	60/100	400 bar	5800	220/380 AC	1
LIMP	Piston Pump/Spring Mode	Up to 2	1.5-4.5	2-8	350 bar	5075	12/24 V DC 220V AC	3
LIBP	Piston Pump/Spring Mode	Up to 2	1.5-4.5	4-20	350 bar	5075	12/24 V DC 220V AC	4

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System Overview - Single Line

The Single Line centralized lubrication system connects all levels of distributor (main block, secondary blocks) in turn by lubricating pump, conveys the grease to each lubricating point in series, and lubricates the friction pair.

Components

Standard:

Piston pump: 1 piece (Single Line, Plunger)

Single Line Distributor: X pieces in Series

Monitor: Integrated in Pump/External

Optional:

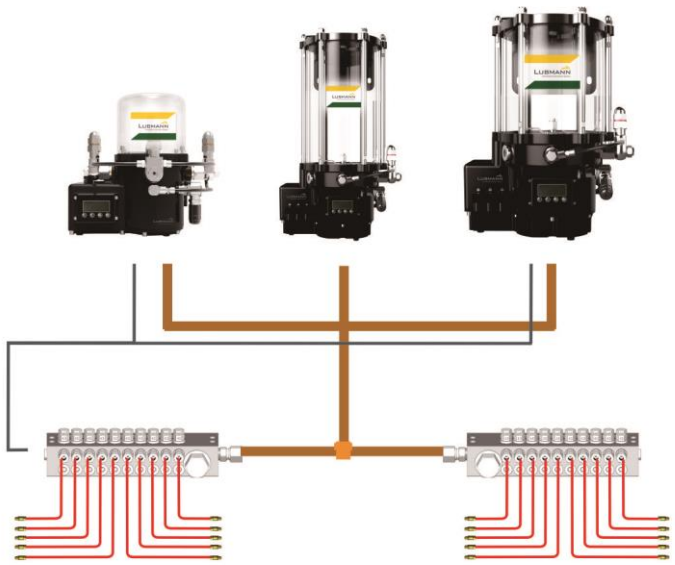
Grease Level Sensor

Pressure Sensor

Flowrate Sensor

Accessories:

Hoses and Fittings for connecting the whole system



Product	Function Principle	Grease Thickness till	Metering Quantity per Pump Element ml/Min	Reservoir Liter	Operating Max. Pressure in bar	Operating Max. Pressure in psi	Power Supply	Max. Pump Elements
LIMS	Piston Pump/Spring Mode	Up to 2	1.5-4.5	2-8	350 bar	5075	12/24 V DC 220V AC	3
LIBS	Piston Pump/Spring Mode	Up to 2	1.5-4.5	4-20	350 bar	5075	12/24 V DC 220V AC	4

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Centralized Lubrication System

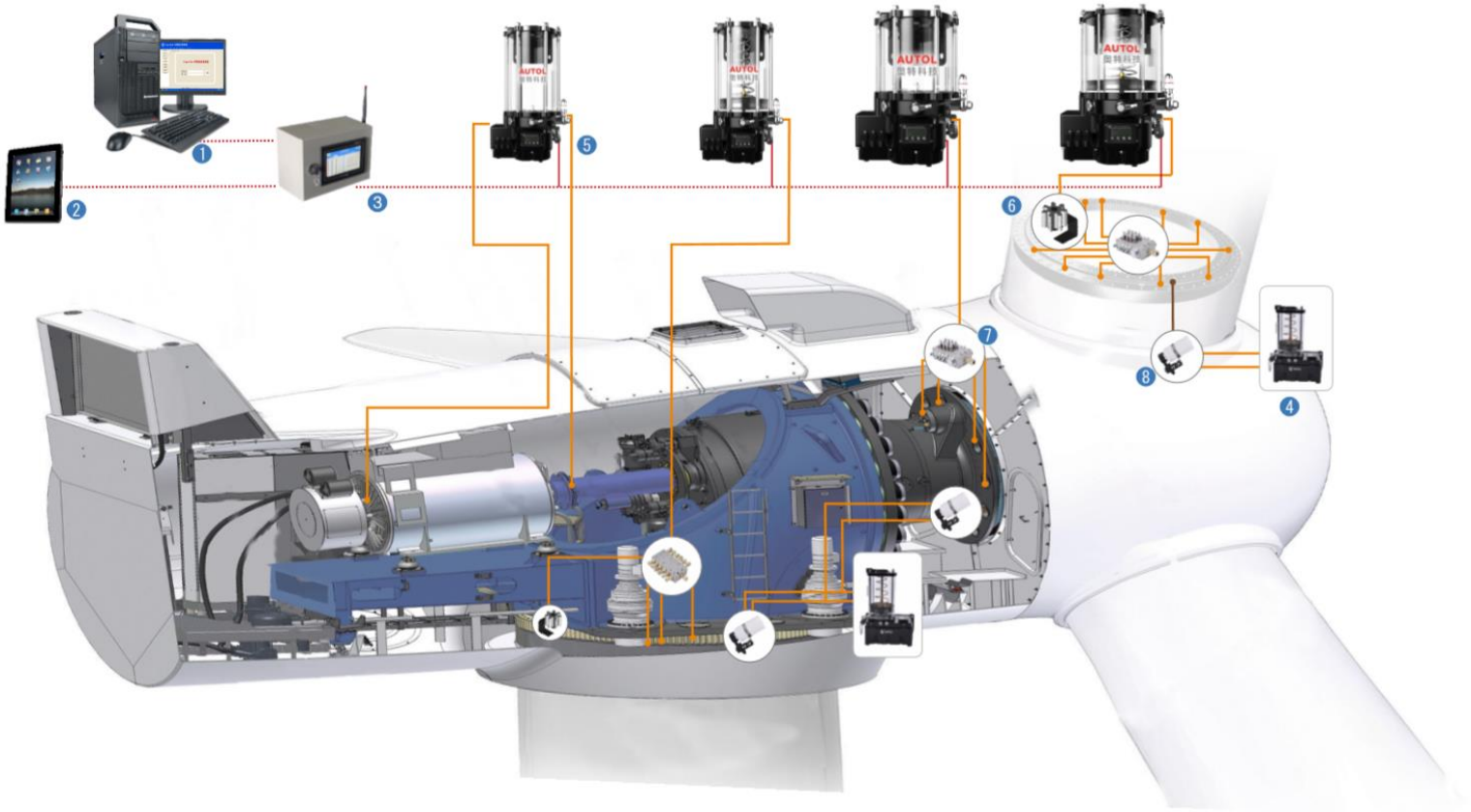
Grease Exchange System - (CLS+WGCS)

Ensuring trouble-free operation, minimizing unexpected downtime

Lubmann CLS for wind turbines are intelligent systems which realize remote, real time, on-line monitoring of lubrication state of bearings through system transmission ports. Autol waste grease collection system (hereinafter, WGCS) can maximize the reliability and stability of bearings and improve the safety of operation staff working in hubs. While getting a more intelligent and controllable lubrication state by WGCS, the bearing damage and electricity loss caused by poor grease drainage are greatly reduced. Thus, Autol CLS and WGCS prolong the service life of bearing and minimize the breakdown frequency and downtime of wind turbines

Simplifying maintenance, prolonging maintenance intervals

To get better lubrication effect, the waste grease in bearings should be cleared up timely. At a wind farm in Inner Mongolia, before installing Lubmann patented Suplub-W WGCS, the seals of pitch bearings showed serious grease leakage. After installing WGCS and CLS for nine months, the waste grease sucked out was as much as the fresh grease into bearings. The grease leakage stoped and the environmental pollution was prevented. After installing CLS and WGCS on bearings, better lubrication can be gotten by periodical operation. Intelligent grease lubrication and drainage simplify the maintenance and prolong maintenance intervals.



Main Parts

1. Remote centralized control computer 2. Mobile control terminal 3. Main control box 4. Hydraulic pump
5. Grease pump 6. Grease pinion 7. Distributor 8. Grease suction and discharge unit

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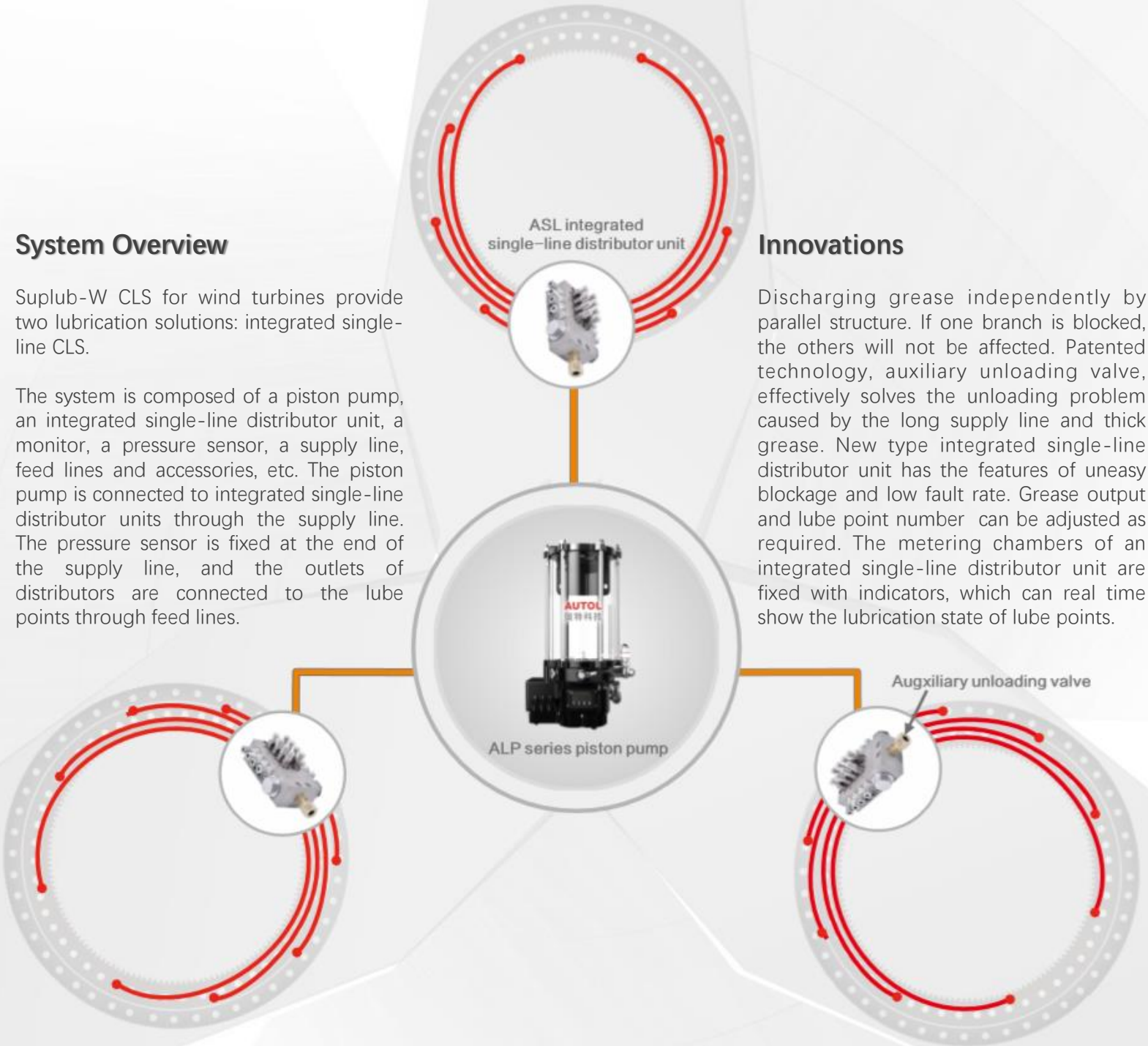
Suplub-W - CLS for Windmill

System Overview

Suplub-W CLS for wind turbines provide two lubrication solutions: integrated single-line CLS.

The system is composed of a piston pump, an integrated single-line distributor unit, a monitor, a pressure sensor, a supply line, feed lines and accessories, etc. The piston pump is connected to integrated single-line distributor units through the supply line. The pressure sensor is fixed at the end of the supply line, and the outlets of distributors are connected to the lube points through feed lines.



Innovations

Discharging grease independently by parallel structure. If one branch is blocked, the others will not be affected. Patented technology, auxiliary unloading valve, effectively solves the unloading problem caused by the long supply line and thick grease. New type integrated single-line distributor unit has the features of uneasy blockage and low fault rate. Grease output and lube point number can be adjusted as required. The metering chambers of an integrated single-line distributor unit are fixed with indicators, which can real time show the lubrication state of lube points.

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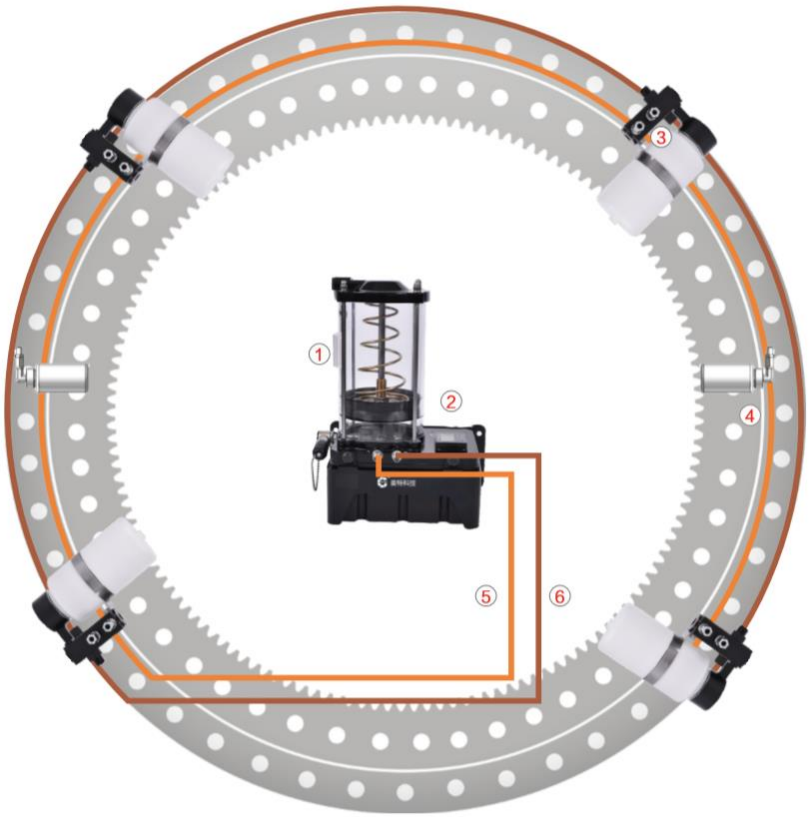
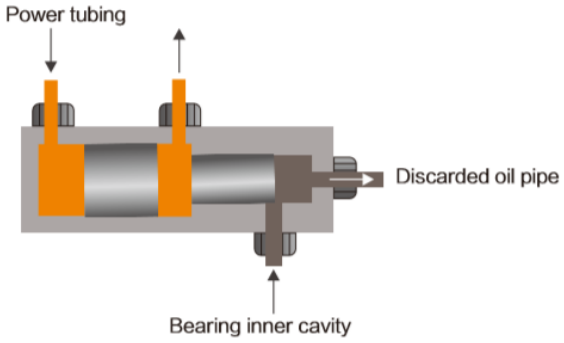
Suplub-W - WGCS for Windmill

System Overview

A Suplub-W WGCS is mainly composed of a hydraulic pump, a reversing valve, a grease suction and discharge unit, a waste grease collector, a monitor, sensors and accessories, etc.



1. Hydraulic pump
2. Monitor
3. Grease suction and discharge unit
4. Waste grease inspection bottle
5. Hydraulic power pipe A
6. Hydraulic power pipe B



Grease suction and discharge unit

System Features

Clearing up the waste grease timely is beneficial to the heat dissipation of bearings and reduces bearing friction and wear largely. Relieving high grease pressure in bearings makes the bearing cavities smooth and ensures fresh grease can be easily discharged into bearings. Ensuring the tight sealing of bearings, preventing environmental pollution caused by grease leakage. Matched with CLS, the serious blockage inside bearings is effectively resolved. The proper amount of grease inside is beneficial to forming and maintaining the grease film. Thus, the service life of bearings is prolonged greatly . Reducing mechanical friction strength, decreasing fault rate, saving maintenance cost, and enhancing the efficiency and productivity of wind turbines.

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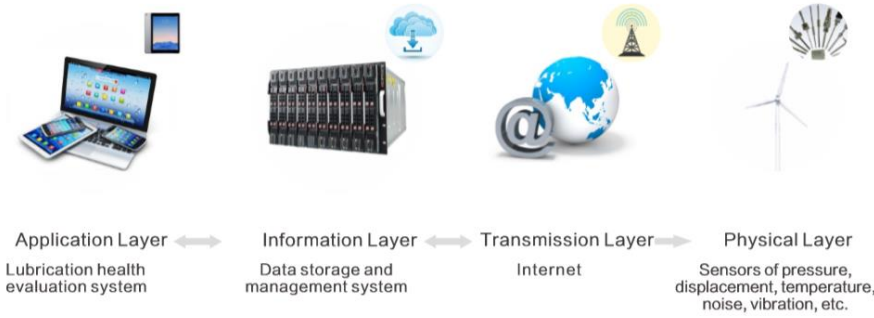
Equipment Health Management System

The system consists of centralized lubrication system server, wireless receiver-transmitter, Web client, centralized lubrication system, SMS service, and smart mobile phone client.

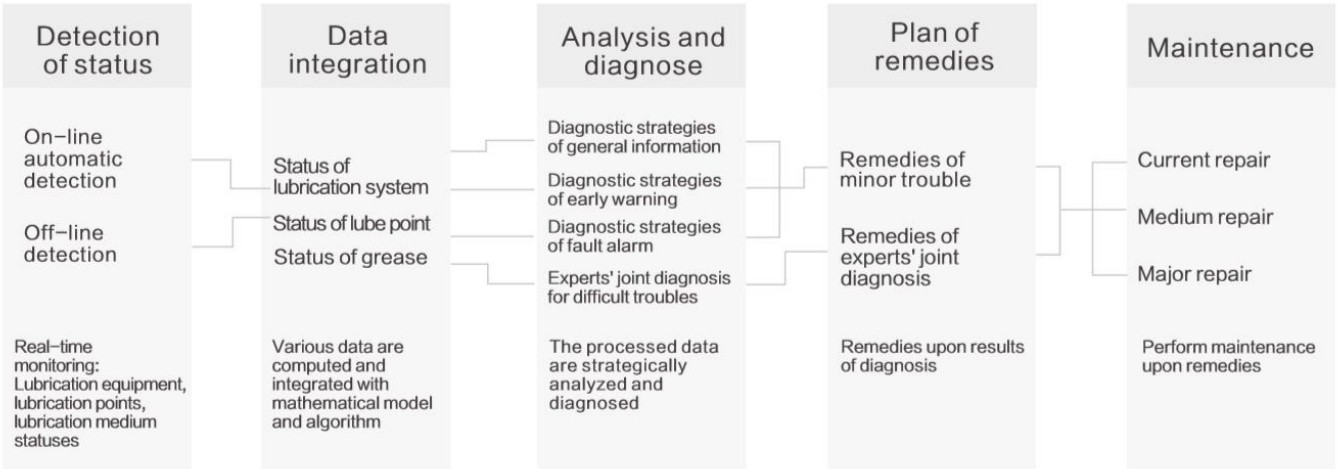
1. It supports mobile phone SMS inquiry function to know lubrication conditions at lube points whenever and wherever possible.
2. The Web client allows for checking operating conditions of the whole lubrication system, user management, lubrication parameters, and lubrication report.
3. Application of modern networking technology to network the distributed lube points. The personnel responsible for management and maintenance may know the lubrication operating conditions whenever possible.
4. The wireless remote monitoring system allows for checking lube points information on faults, without troubleshooting point by point, with less labor intensity of maintenance personnel.
5. The level information of every set of lubrication system and the operating condition of every distributor may be checked in a timely manner.
6.With the wireless remote monitoring system, the lubrication parameters of lube points can be set and checked.

Wireless Remote Monitoring System

Equipment Health Management System



Health Management Business Mode



Note: It is active when the mobile phone signal (3G/4G) is available under fibre-optical network conditions.

General Solution - Windmill

Type of Bearing	Solutions		Extra Components Recommended
	CLS	WGCS	
Yaw Bearing	**Compact Solu.:** LIMP Serie Pump + LR-SSVA Blocks **High Perf.:** LIBS Serie Pump + LR-SLA Blocks/LIMP Serie Pump + LR-SSVA Blocks for Pinions.	**Compact Solu.:** - **High Perf.:** LWCP Pump + LWC-SDDA Blocks.	Grease Level Sensor / Pressure Sensor / Indicator Rod / Manual or Electrical Grease Refilling Device
Pitch Bearing	**Compact Solu.:** LIMP Serie Pump + LR-SSVA Blocks **High Perf.:** LIBS Serie Pump + LR-SLA Blocks/LIMP Serie Pump + LR-SSVA Blocks for Pinions.	**Compact Solu.:** - **High Perf.:** LWCP Pump + LWC-SDDA Blocks.	Grease Level Sensor / Pressure Sensor / Indicator Rod / Manual or Electrical Grease Refilling Device
Main Bearing	**Compact Solu.:** LIMP Serie Pump + LR-SSVA Blocks, **High Perf.:** LIMS Serie Pump + LR-SLA Blocks.	**Compact Solu.:** - **High Perf.:** LWCP Pump + LWC-SDDA Blocks.	Grease Level Sensor / Pressure Sensor / Indicator Rod / Manual or Electrical Grease Refilling Device
Generator	**Compact Solu.:** LIMP Serie Pump + LR-SSVA Blocks, **High Perf.:** LIMS Serie Pump + LR-SLA Blocks.	**Compact Solu.:** - **High Perf.:** LWCP Pump + LWC-SDDA Blocks.	Grease Level Sensor / Pressure Sensor / Indicator Rod / Manual or Electrical Grease Refilling Device

Show Cases - Windmill Application

CLS and WGCS of Pitch Bearing

Manufacturer:Mingyang Electric
Wind turbine: MY1.5SE
Installation Date: 2016.10
Project for: Pitch Bearing (CLS+WGCS)

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Show Cases - Windmill Application

CLS and WGCS of Pitch Bearing

Manufacturer: Gold Wind
Wind turbine: 1.5 MW
Installation Date: 2018.07
Project for: Pitch Bearing (CLS+WGCS)

① The location of pump
② The location of Power pump
③ The location of monitor
④ The location of distributor
⑤ The location of tube and wire harness
⑥ Suction & Discharge Device
⑦ Waste grease collection
⑧ Lube points

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Grease Gun/Grease Refilling Device

Grease Gun (Portable Grease Device)

Product Model (Ordering Codes)	Working Principle	Grease	Operating Pressure Max.	Discharge Max.		Reservoir	Attached Accessories
		NLGI	Mpa	ml/Min	ml/Stroke	cc	
AMG1000	Manual	Up to 2	10		2	500	Nipple, Hose
AMG2000	Manual		10		2	500	Nipple, Hose
AMG3000	Manual		10		500 (only for CLS pump)	500	Nipple, Hose
APG1000	Pneumatic		6-8	70		600	Nipple, Hose
APG2000	Pneumatic		6-8	70		400	Nipple, Hose, one rechargeable cartridge
AEG1012	Electrical		45	60		500	Nipple, Hose, Battery
AEG1018	Electrical		57.5	70		500	Nipple, Hose, Battery
AEG1024	Electrical		70	80		500	Nipple, Hose, Battery

Grease Refilling Device (Pump)

Product Model (Ordering Codes)	Working Principle	Grease	Operating Pressure Max.	Discharge Max.		Reservoir	Attached Accessories
		NLGI	Mpa	ml/Min	ml/Stroke	L	
AMP1000	Manual	Up to 2	20-25		5	16	Nipple, Hose
AMP2000	Manual		20-25		5	12	Nipple, Hose
APP1000	Pneumatic		30-40	850		12	Nipple, Hose
APP2000	Pneumatic		30-40	850		30	Nipple, Hose
AEP1012T	Electrical 12V		40	350		18	Nipple, Hose
AEP1024T	Electrical 24V		40	350		18	Nipple, Hose
AEP1220T	Electrical 220V		40	350		18	Nipple, Hose
AEP1012B	Electrical 12V		40	350		18	Nipple, Hose
AEP1024B	Electrical 24V		40	350		18	Nipple, Hose




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