PROFILE

Autol Technology Co., Ltd. devotes itself to developing centralized lubrication system with independent intellectual property rights and core competitiveness, which provides customers all over the world with competitive and integrated lubrication solutions.

As one of the professional manufacturers for centralized lubrication system, Autol has applied for more than 40 national invention patents and several international ones. Autol is one of the chief editors on national professional standards, whose products of centralized lubrication have covered all the following fields: commercial vehicles, engineering machinery, and power equipment and heavy equipment, etc. Autol is committed to market promotion and popularization of the centralized lubrication. With continuous innovation and improvement in technologies, Autol has been providing superior quality products and satisfied service to customers.

Autol pursues the corporation concept “Integrity & multi-win, advanced technology, excellent quality, and unlimited services”, and hopes to make brilliant achievements with friends all over the world.
The Current Situation of WTG Centralized Lubrication

In practical applications, WTG centralized lubrication system has exposed many problems:

- All the systems in wind farm are in independent working condition, so centralized monitoring and management is inconvenient.
- The traditional timely and precise lubrication method can't meet the requirement of each link point, which causes some parts with bad lubricating and the other parts with excessive grease.
- The system is in uncontrollable operation condition, so lubrication abnormal state is hard to judge, which is difficult to inspect and maintain. When a fault occurs, it has resulted in heavy loss.
- Some lubrication parts leakage and leak is directly cause other lubrication parts cannot getting efficient lubrication.
- The pump with poor pumping performance can not pump high requirement grease especially in extremely cold area.
- The pump installed on the head of wind turbine is often in inverse condition, but the effect of common pump with spring pressure to supply grease isn't good, so the grease often pumps out and runs off.
- Waste oil recovery isn't completed that resulted in heavy pollution, operation inefficient and existing safety risks.
- Some long-term accumulation grease in pump is easy to harden and destruction.
- The resilience of pump interlacing grease is so big that operating is wasting time and energy.

With the technology features of high efficiency, convenient and energy-saving, centralized lubrication system will get the rapid promotion and popularization in the wind power field, and becomes the key of making sure the wind equipment in normal operation and improving the usage life of equipment. However, it also is an important measure to maintain conveniently, reduce maintenance costs and environmental pollution, and improve the economic and social effects.
Suplub-W Intelligent WTG Centralized Lubrication System
Supelub-W Intelligent WTG
Centralized Lubrication System

After long-term market research and technical innovation, Jualp pushed "new generation" Supelub-W Intelligent centralized lubrication system especially for wind turbines, which overcomes many technical limitations. Moreover it’s suitable for lubrication on main bearing, pitch bearing, yaw bearing, generator bearing, pitch drive and yaw drive.

Supelub-W system is the brand new intelligent WTG centralized lubrication solution that integrates computer, automation, wireless data communication and centralized lubrication technology, which refers the following features: wireless remote management, intelligent monitoring control, oil supply with single point single control, oil supply with more combination, safety, energy conservation and environmental protection. Therefore, it realizes the oil supply mode "self-controlled volume, timely and right amount" distribution according to needs better than "fixed and off-normal", at the same time, it significantly improves the pump mechanism of the system and solves the technology difficulties of the application of WTG centralized lubrication.

System Components

Supelub-W system consists of intelligent monitor unit, group supply unit and waste of recovery unit. Windows remote control center can be installed in wind farm headquarters to monitor the working condition of all Supelub-W systems.

Working Principle

Working process can be divided into three stages:

First Stage: When the preset interval ends, the high pressure oil module receives the signal from the programmable logic controller (PLC), and then the motor-driven gear pump is started. The grease is delivered to the online, over reaching setting point of the oil pressure. PLC measures the flow rate of oil distribution control cabinet to work point by point, and then grease begins to lubricate the bearing part after circulate metering.

Second Stage: After supplied oil to each lubrication parts, PLC gives new order to PLC measurement of distribution control cabinet, and then over time control and discharge of excess oil began to work.

Third Stage: After waste oil recovery completed, the pump module receives the instruction of stop from PLC, and then high-pressure pump stops working. After this, the system enters into the next countdown stage.

Key Features of Supelub-W Leading Technology

- Wireless remote real-time monitoring all of the centralized lubrication system in wind farm is achieved, and the management of equipment is high efficiency, safety, convenience and fast.
- Oil supply and lubrication interval time can be adjusted at any times according to the status of each lubrication part, and then an advanced lubrication mode "multi-lubrication point, independent timely and right amount and self-controlled volume" is achieved. Moreover, it can realize grease saving and environmental protection (Patent No.201610381543.4)
- Our system can collect and store operating data in real time, check related lubrication data such as lubrication time, oil supply amount, breakdown or any time and adjust operating parameter timely. Moreover, with abnormal situation, the system can give an alarm, position accurately, supply to check the position and eliminate the fault.
- Our new designed point by point oil supply control technology enables other lubrication part is not affected when some lubrication part is broken. The system shows high efficiency and stability (Patent No. 201610381543.4)
- Our intelligent temperature control technology guarantees to pump high viscosity grease smoothly in severely cold area.
- Our pioneering pressure tank technology guarantees to pump high viscosity grease MGO265 smoothly to each lubrication parts in severely cold climate and under the situation of wind blades rotating (Patent No.2011200035146.3, 2011200035147.1, 2011200035146.8, 2011200035146.6)
- Our intelligent waste oil recycling system enables the used oil recycling completely, which is more convenient, safe, high-efficiency and environmental protection (Patent No. 2011200035146.3)
- The grease getting distributed "five in first one" solves the difficulties of the grease transporting and starvation.
- Our newly designed pumping station makes lubrication process more efficiently.
**Superlub-W Intelligent Monitor Unit**

Superlub-W intelligent monitor unit consists of computer in remote control center, PLC, AVM measurement of distribution control cabinet, sensor and fine accessories.

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**Computer in Remote Control Center**

The system is configured by using WICOM and in networking via Ethernet cables. Computer in remote control center can achieve centralized management of dispersed lubrication systems by wind farms, which detects monitors and adjusts the status of greasing supply to each windmill in real-time. Moreover, in case of loosening and leak, it can present in the form of text, voice or visual, and run monitoring through acoustic-optic alarms, and supply to check the problem and eliminate the fault.
ALM Cabinet of Measurement Distribution Control

ALM cabinet of measurement distribution control which consists of intelligent controller, flow sensor and magnetic valve is the executing organization of the system.

According to the setting parameter, PLC, through controlling all circuit oil drum and supplying oil to corresponding lubrication parts, can be implemented by ALM cabinet of measurement distribution control. When reciprocating and extracting oil, the equipment of waste oil collection and extraction implement the function of absorbing and extracting waste oil by controlling magnetic valve alternatively. ALM cabinet of measurement distribution control is the main detection parts of processing of SUPPLAB system control, and then sends information to PLC, which achieves incoordinate closed-loop control. According to the need of each lubrication parts, SUPPLAB, adjusting interval time and oil supply of lubrication, experiences difference lubrication time timely and right amount, self-control of valve can be achieved independently.

Magnetic Valve

Two-position & Three-way magnetic valve is used for on and off switch oil circuit.

Two-position & Four-way magnetic valve is used for automatic changeover switch of waste oil power pipeline.

Sensor

Flow sensor is used for the accurate measurement of grease supply viscosity.

Barometric pressure sensor gives an early warning when the pressure of control air chamber is too low.

Oil pressure sensor will alarm and the machine will stop when the pressure in main pipe exceeds the set value of the relief valve.

Oil Level sensor makes sure to give the early warning when the mount of oil consumes to the set level level. Moreover, it automatically alarm and the machine will working once exceeding the set running limit.
SUPERLUB-W

Suoplub-W Grease Supply Unit

Suoplub-W grease supply unit consists of ALP high pressure pump, progressive feeder, lubrication pipes and accessories. Some parts supply oil directly by ALP cabinet of measurement distribution control, instead of progressive feeder.

Working Principle

1. According to the preset procedure, the system runs periodically. After receiving the signal of supplying oil by ALP cabinet of measurement distribution control, the magnetic valve opens, and then the flow sensor measures accurately the amount of supply oil and feeds back the information to PLC.
2. Closing the magnetic, stopping the oil supply and sending the information to PLC, when the oil supply meets the demand of lubrication parts.
3. It is judged by PLC whether supplying the next lubrication part and sending indication to ALP cabinet of measurement distribution control or not.
4. The made oil suction and discharge is implemented by magnetic valve on/off regulation, when PLC sends indication, the oil absorption and extraction to ALP.

ALP Series High Pressure Lubricating Pump

ALP series high pressure pump has got a number of technology patents, which is suitable for pitch bearing, main bearing, yoke bearing, generator bearing, pitch drive and yoke drive.

In accordance with sub-structures, it can be divided into ALP100W and ALP103 series.

The reservoir capacity of lubricating oil for multi-high series has three types: 3L, 4L, and 5L, which is suitable for less lubrication parts and less lubrication demand parts, such as generator bearing. The reservoir capacity of ALP103W is 3.5L, which is suitable for more lubrication parts and more lubrication demand parts, such as pitch bearing, main bearing and yoke bearing.

According to the adjusting temperature, it can be divided into high pressure pump type and high cold pressure type. High cold pressure pump is adapted to a variety of cold temperature resistance materials, which is suitable for severely high cold environment.

Key Features of Our Leading Technology

- Our company has advanced technology to pump high viscosity grease to each lubrication point at its need, based on precise oil delivery and lower contamination of misleading bore head.
- In the high pressure and low temperature control system, key technology breakthroughs are achieved. Oil transferring system and oil lubrication system becomes cold resistant.
- The newly designed pumping station makes the grease get distributed “first in first out”, and preventing the grease from backing up and further contamination.
- Electronic system is installed in high pressure reservoir and making injecting process more efficiently.

APPLE Series High Pressure Lubricating Pump Technical Parameter

<table>
<thead>
<tr>
<th>Model</th>
<th>Control Model</th>
<th>Motor Type</th>
<th>Rotation Speed</th>
<th>Outlet Pressure</th>
<th>Capacity</th>
<th>Length</th>
<th>Diameter</th>
<th>Gross Weight</th>
<th>Temperature</th>
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<tbody>
<tr>
<td>ALP100W</td>
<td>PLC</td>
<td>0.25kW</td>
<td>2,000 rpm</td>
<td>150 bars</td>
<td>20L</td>
<td>560mm</td>
<td>200mm</td>
<td>40 kg</td>
<td>-50°C-60°C</td>
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</table>
Supalub-W Waste Oil Recycle Unit

Waste oil recycle unit consists of pressure control circuit, waste oil recycle circuit and cooler. The pressure control circuit consists of a magnetic valve and two-way manual valve, and then the discharge oil is circulated through the cooler.

Working principle diagram
When the system is activated, the pump begins to work. By controlling the magnetic valve to operate, AUX cabinet of measurement distribution control pressure the collected waste oil of the wash and discharge equipment to recycle source.
When the magnetic valve shifts to another direction, waste oil in the discharge outlet is pumped, and then the oil recovery process is completed.

Waste oil recycle source is equipped with load push plates in needle cylinder type, which is convenience to clean the cover and to discharge the waste oil.

Key Features of Our Leading Technology
- Our new design waste oil recovery patent technology with rotary suction and discharge collecting, which is a new highly efficient and environmentally protective technology.
- Waste oil is pumped to cover directly, which has convenient cleaning and safety operation.
**Electric Grease-feed device**

From design and reasonable structure, Electric grease-feed device can be easily all-filling from grease barrel with 15-35kg.

**Technical Parameter**

- Voltage: DC12V/150W
- Output Pressure: 3MPa
- Feed Rate: 0.5-1.5L/min
- Grease: 0', 1', 2', 3'

**Grease Gun**

This device with the characteristics of stable performance, rapid grease maintenance and widely using is a portable grease gun.

**Lubricating Expertise**

Consistency is the same meaning of the hardness of grease, which is in terms of penetration consistency and divided into grades. This is the notion that the distance of a standard needle or cone penetrates vertically into a sample of the material under prescribed conditions of loading, time and temperature. Unit is millimeters of a cone.

The smaller penetration consistency is, the greater the consistency of the grease. The higher the intensity of all-filling, the longer lubrication will be.

<table>
<thead>
<tr>
<th>NLGI class</th>
<th>Penetration Consistency</th>
<th>State</th>
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<tbody>
<tr>
<td>NLGI-001'</td>
<td>450-775</td>
<td>Fluid</td>
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<tr>
<td>NLGI-00'</td>
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<td>Good</td>
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<tr>
<td>NLGI-6'</td>
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<td>Extra Hard Fluid</td>
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