



Chapter 1

History of Excavator Brand Introduction and Structure and Function

History of Excavator Brand Introduction and Structure and Function

Domestic and foreign excavator development history urgent brand introduction

Excavators have been in existence for more than 130 years. During this period, they have experienced the gradual development process from steam-driven excavators to

electric-driven/internal-combustion engine-driven excavators, and fully automatic hydraulic excavators using electromechanical-hydraulic integration technology.

The world's first excavator was produced in the United States in 1836, powered by manual steam, which marked the birth of construction machinery - excavator.

Developed by Quan Chad Dewin in 1895, the rotary mechanical power excavator.

The upper excavating mechanism of this excavator is equipped with an engine, and the lower walking body can fully rotate. This is of great significance to the development of the current excavator structure.

In 1924, diesel engines entered the field of excavator engines, and gasoline engines were gradually phased out until now.

After 1948, various manufacturers successively manufactured modern new hydraulic excavators, and gradually improved to today's level.

In 1950, the first hydraulic excavator was born in Germany, which marked the entry of excavators into a new field.

The main excavator production countries are: Japan, South Korea, the United States, Germany, the United Kingdom, Sweden, France, etc.; the main brands produced in Japan: Komatsu (PC), Kobelco (SK), Sumitomo (SH), Hitachi (EX/ZAX), Kato (HD), etc.; South Korea mainly includes: Daewoo (DH), Hyundai (R); the United States mainly includes: Caterpillar (CAT/E); Britain (JCB) Germany mainly includes: Terex (TEREX), Ogakai (O&K), Liebherr (liebherr); the main French excavator manufacturers are Poclain (poclain).

The production of excavators in my country started relatively late. Since Fushun Excavator Factory produced the first mechanical single-bucket excavator with a bucket capacity of 1m³

in 1954, it has generally experienced three stages of surveying and mapping imitation, independent research and development, and development and improvement. .

In the early days of the founding of New China, the history of excavator production in my country began with surveying and mapping imitating the W501, W502, W1001, W1002 and other mechanical single-bucket excavators of the former Soviet Union in the 1930s and 1940s. Since 1967, my country has independently developed hydraulic excavators. The products successfully developed in the early stage mainly include the WY100 type of Shanghai Construction Machinery Factory, the W4-60 type of Guiyang Mining Machinery Factory, and the WY60 excavator of Hefei Mining Machinery Factory. Later, the WY160 excavator of the Changjiang Excavator Factory and the WY250 excavator of the Hangzhou Heavy Machinery Factory appeared. They have taken an extremely important step for the formation and development of my country's hydraulic excavator industry.

The main brands of domestic excavators are: Sany, Yuchai, Liugong, XCMG, Xiangong, Sunward Intelligent, Lonking, etc.

The world's first excavator producer: the United States

The first country in the world to adopt hydraulic technology: Germany

Fastest growing country: Japan

Country with greatest demand: China

Classification of hydraulic excavators

There are many classification methods of hydraulic excavators, but there are mainly the following classification methods:

1. Classified by working quality; 2. Classified by walking form; 3. Classified by working device;

4. Excavators are classified according to power transmission mode

Classification by Quality Workload

Most excavators are crawler. There are two reasons for this:

(a) Once the excavator enters the job site, it does not move much and only travels a short distance.

(b) The ground contact area is large, and it can work in soft places. When driving on uneven ground, it can withstand severe impacts.

Wheel-type and car-type excavators, because of their rubber tires, have good mobility and are suitable for road and sewer construction in cities. But it is not suitable for operations on soft ground.

Classified by working device

Backhoe:

It is mainly suitable for digging down from the ground surface, and various operations can be performed by replacing the bucket.

Loading and unloading shovel (front shovel):

It is mainly the working device of large excavators. Mainly used for excavation above the surface.

Excavators are classified by power transmission mode

Excavators can be divided into mechanical excavators and hydraulic excavators according to the power transmission mode.

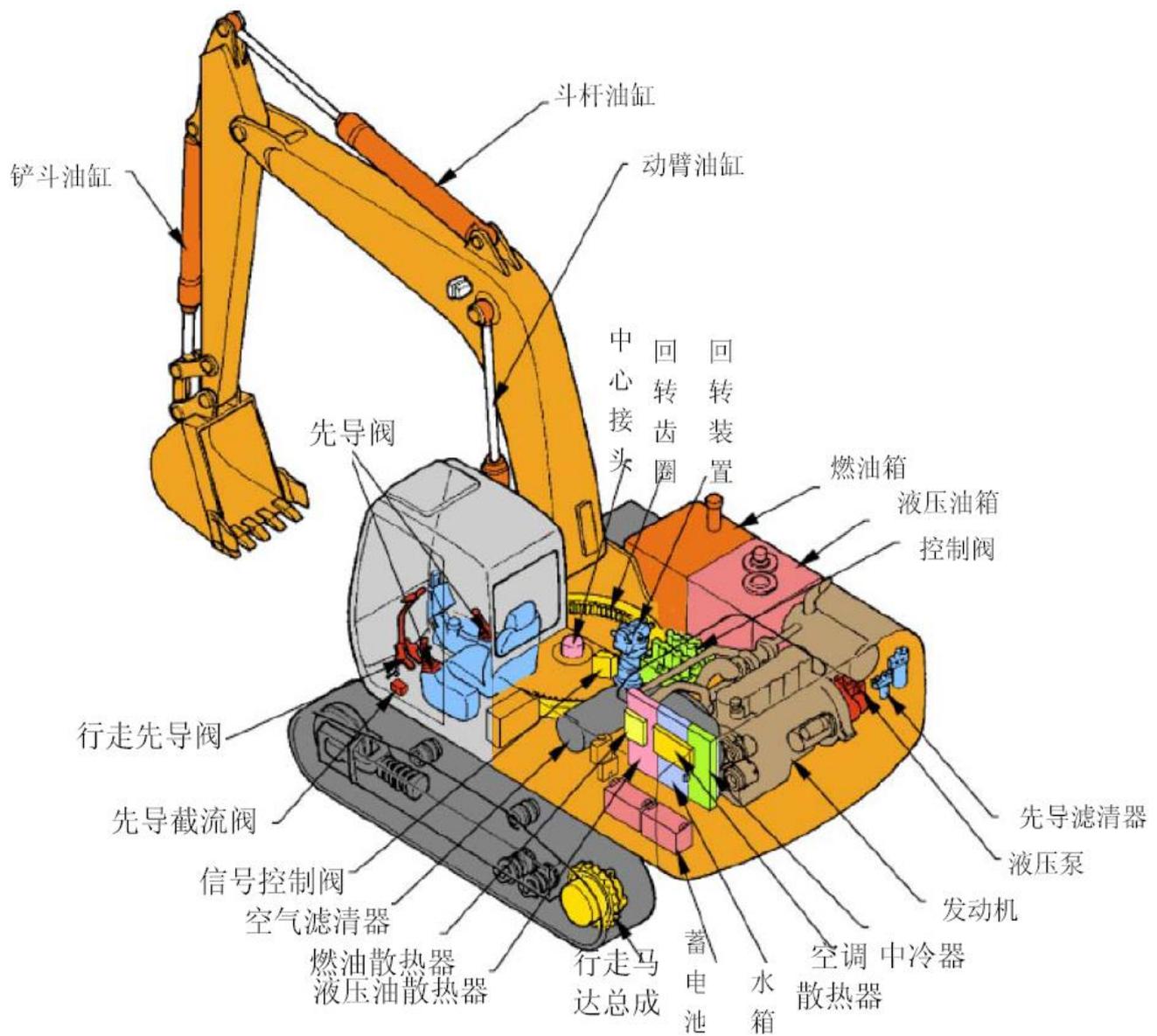
The hydraulic excavator is flexible in operation, easy to maintain, and can be equipped with various working devices. In recent years, it has become the mainstream model of excavators.

The structure of hydraulic excavator

Anthropomorphic Metaphor of Excavator

people	excavator
upper body	boarding part
lower body	get off part
waist	Slewing ring
legs and feet	Walk around the four wheels
shoe	Track shoe

The lower walking body is composed of supporting sprocket, supporting roller, driving device, guide wheel and crawler belt and a walking bracket



Excavation machinery working equipment working size terminology

Maximum digging radius A

Maximum digging depth B

Maximum digging height C

Maximum unloading height D

Minimum turning radius E

Transport height F

Total transport length G

Note: GRP plane - refers to "ground reference plane".

Take the power of a 23-ton excavator as an example:

Engine model——6BTA5.9-C

6——6 cylinders; B——engine series T——turbocharger

A——post-stage cooling (intercooler after supercharging) 5.9——51×51×3.14×120×6

Displacement liters

C - number of improvements

1. Extend the arm 2. Rotate to the right 3. Retract the arm 4. Rotate to the left 5. Lower the boom 6. Dump the bucket 7. Raise the boom 8. Scoop the bucket
9. When the joystick is released from any position, the joystick will return to the "neutral position", the movement of the upper structure will stop, and moving the joystick in a diagonal direction can realize two functions at the same time

device, driver's cab, air-conditioning system, electrical system, etc.

2. Working device: It is composed of boom, stick, bucket, linkage, rocker, oil cylinder and so on.

3. Traveling device: It is composed of frame, supporting wheel, supporting sprocket, guide wheel, tensioning device, crawler belt, traveling mechanism, rotary joint, etc.

Excavator run-in period

A newly purchased or overhauled excavator must go through a period of trial operation, which is usually called a running-in period. The purpose of running-in is to prevent early wear and tear of the excavator and prolong the service life of the excavator. The run-in period is generally 100 hours. During the run-in period of the excavator, the following regulations must be strictly implemented:

During the running-in period, the engine should be decelerated by 30%, and the load should be reduced by 20%-30% for operation

It is strictly forbidden to slam the accelerator when starting the engine. When the engine is started at low temperature, it should be warmed up for 20-50 seconds, and then start. In the first 30 or 50 hours, the loose soil should be excavated, and each time the loading is 1/2 of the bucket capacity, and the loading volume can be gradually increased in the next 70 or 50 hours, but it should not exceed 3/4 of the bucket capacity, and it should be reduced appropriately.

operating speed

During the running-in period, you should always pay attention to the operation of the various mechanisms of the excavator, and observe whether there is any leakage in the hydraulic system. For abnormal phenomena in operation, stop the machine immediately to check the cause and eliminate them. After the break-in period expires, the machine should be fully inspected, adjusted and lubricated according to the running-in period. Check the cleanliness of the hydraulic oil in the hydraulic oil tank and replace it if necessary

Chapter 2

Introduction to the use of instrument panels

Introduction to the use of instrument panels

Monitoring panel - switch control, monitoring display function

The monitoring panel has the functions of monitoring display, selection of working mode, and switch control of electrical components; it provides information transmission and feedback, and realizes man-machine dialogue

There is a central processing unit (CPU) inside, which can store, display and output data

The instrument monitoring display adopts a color LCD screen; the control switch is a flat touch switch

Monitoring panel - switch control function

Under special conditions, the corresponding numbers can be input through each digital switch

Instrument monitoring function display - when the key switch is turned on

Under normal circumstances, the start display process when the key switch is ON is shown in the figure below

When the alarm is displayed, the alarm item should be confirmed and maintained in time

Instrument monitoring function display - brightness/contrast adjustment

Press the screen brightness switch on the monitoring control board to enter the screen adjustment display

Through the number keys, directly input the number of the selected item, and then press the confirmation key to enter the adjustment state of the item; then use the up and down scroll keys to adjust the brightness or contrast; after the adjustment is appropriate, press the confirmation key to return to the previous screen

Instrument monitoring function display - color LCD screen

Instrument monitoring function display

Instrument monitoring function display - color LCD screen

Monitoring panel - working mode selection

Monitoring panel - working mode selection

Touch afterburner function

Monitoring panel - automatic speed reduction switch

Monitoring panel - walking speed switch

Monitoring Panel - Basic Inspection Items

Monitoring Panel - Note Items

Monitoring Panel - Emergency Shutdown Program

Monitoring Panel—Functional Display Items

Chapter 3

Maintenance and safe driving technology

Problems that should be paid attention to when driving an excavator

1. Excavators are fixed assets with large economic investment. In order to increase their service life and obtain greater economic benefits, the equipment must be fixed for people, machines, positions, and responsibilities. When it is necessary to transfer posts, the equipment should be disclosed.
2. After the excavator enters the construction site, the driver should first observe the geology of the working face and the surrounding environment. There must be no obstacles within the radius of rotation of the excavator to avoid scratches or damage to the vehicle.
3. After the machine is started, no one is allowed to stand in the bucket, on the shovel arm and on the track to ensure safe production.
4. When the excavator is working, no one is allowed to stay or walk within the radius of gyration or under the bucket. Non-drivers are not allowed to enter the cab to fumble around, and are not allowed to train drivers to avoid damage to electrical equipment.
5. When the excavator is shifting, the driver should first observe and whistle, and then move to avoid safety accidents caused by people beside the machine. After shifting, ensure that there is no obstacle in the space of the excavator's rotation radius, and illegal operations are strictly prohibited. .
6. After the work is finished, the excavator should be moved away from the low-lying place or the edge of the trench (ditch), parked on the flat ground, and the doors and windows should be closed and locked.

7. The driver must do a good job in the daily maintenance, inspection and maintenance of the equipment, and make a daily record of the use of the equipment. If there is a problem with the vehicle, he must not work while sick, and report the repair in time.
8. The cab must be clean and tidy, and the surface of the vehicle body must be kept clean, free of dust and oil; develop the habit of cleaning the car after work.
9. The driver should make a record of the daily shift in time, make statistics on the work content of the day, complete the formalities for odd jobs or zero items outside the project in time, and make a record for the checkout.
10. Drivers are strictly prohibited from drinking at noon and driving after drinking during work. If they are found, they will be given economic penalties, and the resulting economic losses will be borne by themselves.
11. For man-made vehicle damage, it is necessary to analyze the reasons, find out the problems, clarify the responsibilities, and impose economic penalties according to the severity of the responsibilities.
12. It is necessary to establish a high sense of responsibility, ensure safe production, do a good job in communication and service with the construction party, improve bilateral relations, establish a good work style, and work hard for the development and benefits of the enterprise.

Maintenance and safe driving technology

Filter Maintenance

The filter element plays the role of filtering impurities in the oil circuit or air circuit, preventing them from invading into the system and causing failure; all kinds of filter elements should be replaced regularly according to the requirements of the (operation and maintenance manual); when replacing the filter element, check whether there is metal attached to the old filter element. If there are metal particles found on the filter element, it is necessary to diagnose and take improvement measures in time; use a pure filter element that meets the requirements of the machine. Fake and inferior filter elements have poor filtering ability, and the surface and material quality of the filter layer do not meet the requirements, which will seriously affect the normal use of the machine.

Contents of regular maintenance

①The fuel filter element and additional fuel filter element should be replaced after the new machine has been working for 250 hours; check the clearance of the engine valve.

②Daily maintenance; check, clean or replace the air filter; clean the inside of the cooling system; check and tighten the track shoe bolts; check and adjust the anti-tension of the track; check the intake heater; replace the bucket teeth; adjust the bucket clearance; check before Window cleaning fluid level; check and adjust the air conditioner; clean the cab floor; replace the breaker filter element (optional). When cleaning the inside of the cooling system, after the engine is fully cooled, slowly loosen the water inlet cover to release the internal pressure of the water tank, and then release the water; do not clean when the engine is running, the high-speed rotating fan will cause danger; when cleaning or replacing the cooling system

When the coolant is used, the machine should be parked on a level ground; the coolant and anti-corrosion device should be replaced according to Table 3. The ratio of antifreeze to water is as required in Table 4.

Coolant type Cooling system internal cleaning and replacement cycle Anti-corrosion device replacement cycle
 AF-ACL antifreeze (super antifreeze) every 2 years or every 4000h every 1000h or when replacing the coolant
 AF-PTL antifreeze (long-term antifreeze) every year Or 2000h
 AF-PT antifreeze (winter type) every 6 months (add only in autumn)

Mixing ratio of antifreeze to water

Ambient temperature °C/capacity L	-5	-10	-15	-20	-25	-30	Antifreeze PC200	5.1	6.7	8.0	9.1	10.2					
	11.10	PC220	5.4	7.0	8.4	9.6	10.7	11.65	Water PC200	17.1	15.5	14.2	13.1	12.0	11.10	PC220	17.9
	16.3	14.9	13.7	12.6	11.65												

③ Inspection items before starting the engine. Check the liquid level of the coolant (add water); check the engine oil level, add oil; check the fuel oil level (add fuel); check the hydraulic oil level (add hydraulic oil); check whether the air filter is blocked; check the wires; Check whether the horn is normal; check the lubrication of the bucket; check the water and sediment in the oil-water separator.

④ Every 100 maintenance items. Boom cylinder head pin; boom foot pin; boom cylinder rod end; stick cylinder head pin; boom, stick connecting pin; stick cylinder rod end; bucket cylinder head pin ;Connecting pin of half-rod connecting rod; Rod end of bucket rod and bucket

cylinder; Pin shaft of cylinder head of bucket cylinder; Connecting pin of arm connecting rod;
Drain water and sediment.

⑤ Maintenance items every 250H. Check the oil level in the final drive box (add gear oil); check the battery electrolyte; replace the oil in the engine oil pan, replace the engine filter element; lubricate the slewing ring (2 places); check the tension of the fan belt, and check Adjust the tension of the air conditioner compressor belt.

⑥ Maintenance items every 500h. Carry out every 100 and 250H maintenance items at the same time; replace the fuel filter; check the height of the rotary pinion grease (add grease); check and clean the radiator fins, oil cooler fins and cooler fins; replace the hydraulic oil Filter element; replace the oil in the final drive box (only at 500h for the first time, and once every 1000h thereafter); clean the air filter element inside and outside the air conditioner system; replace the hydraulic oil vent filter element.

⑦ Maintenance items every 1000h. Carry out maintenance items every 100, 250 and 500 hours at the same time; replace the oil in the slewing mechanism box; check the oil level of the shock absorber housing (back to the engine oil); check all the fasteners of the turbocharger; check the turbocharger rotor Check and replace the tension of the generator belt; replace the anti-corrosion filter element; replace the oil in the final drive box.

⑧ Maintenance items every 2000h. First complete the maintenance items every 100, 250, 500 and 1000h; clean the filter screen of the hydraulic oil tank; clean and check the turbocharger; check the generator and starter motor; check the engine valve clearance (and adjust); check the shock absorber.

⑨Maintenance over 4000h. Increase the inspection of the water pump every 4000h; increase the replacement of hydraulic oil every 5000h.

⑩Long-term storage. When the machine is stored for a long time, in order to prevent the piston rod of the hydraulic cylinder from rusting, the working device should be placed on the ground; the whole machine should be washed and dried and stored in a dry indoor environment; The machine is parked on a well-drained concrete floor; before storage, fill up the fuel tank, lubricate all parts, replace hydraulic oil and engine oil, apply a thin layer of butter to the exposed metal surface of the piston rod of the hydraulic cylinder, and remove the negative terminal of the battery, or Remove the battery and store it separately; add an appropriate proportion of antifreeze to the cooling water according to the lowest ambient temperature; start the engine once a month and operate the machine to lubricate the moving parts and charge the battery at the same time; turn on the air conditioner and run it for 5-10 minutes. 信息条形

Excavator operation and maintenance

1. Operating technology

1. First, confirm the surrounding conditions. During slewing operation, be aware of the surrounding obstacles and terrain, and operate safely; during operation, confirm the front and rear directions of the crawler belt to avoid tipping or impact; try not to face the final drive in the direction of excavation, otherwise it is easy to damage the walking Motor or hose; when working, ensure that the left and right crawlers are in full contact with the ground to improve the dynamic stability of the machine.

2. Effective mining methods

When the angle between the bucket cylinder and the connecting rod, the arm cylinder and the arm is 90 degrees, the digging force is the largest; when the bucket tooth and the ground maintain an angle of 30 degrees, the digging force is the best, that is, the soil cutting resistance is the smallest; When digging with a stick, it should be ensured that the stick angle ranges from 45 degrees in the front to 30 degrees in the back. Using the boom and bucket at the same time can improve digging efficiency.

3. Digging for rocks

Using a bucket to excavate rocks will cause great damage to the machine and should be avoided; when it is necessary to excavate, the position of the body should be adjusted according to the crack direction of the rock so that the bucket can be smoothly shoveled in and excavated; insert the bucket teeth into the cracks in the rock In the middle, use the digging force of the stick and bucket to dig (pay attention to the slippage of the bucket teeth); the unbroken rock should be broken first and then excavated with the bucket.

4. Slope leveling operation

When performing plane trimming, the machine should be placed flat on the ground to prevent the body from shaking. It is necessary to grasp the coordination of the movement of the boom and stick, and controlling the speed of the two is very important for plane trimming.

5. Loading operation

The machine body should be in a horizontal and stable position, otherwise it is difficult to accurately control the unloading of the slewing, thereby prolonging the operation cycle time; the machine body and the truck should keep an appropriate distance to prevent the tail of the body from colliding with the truck when turning 180 degrees; try to turn left to load, so that the field of view is wide and the operation efficiency is high. At the same time, the rotation angle must be grasped correctly to reduce the time for turning; the position of the truck is lower than that of the excavator to shorten the lifting time of the boom, and the line of sight is good; first load sand and gravel, Then place large stones, which can reduce the impact on the car.

6. Work in soft areas or in water

When working in soft ground, you should understand the looseness of the soil, and pay attention to limit the excavation range of the bucket to prevent accidents such as landslides and deep subsidence of the vehicle body.

When working in water, pay attention to the allowable water depth range of the car body (the water surface should be below the center of the supporting sprocket); if the water level is high, the inside of the slewing ring will be poorly lubricated due to the entry of water, and the engine fan blades will be broken due to water impact. Damage, electrical circuit components short circuit or open circuit due to water intrusion.

7. Hoisting operation

When using a hydraulic excavator for hoisting operations, you should confirm the surrounding conditions of the hoisting site, use high-strength hooks and wire ropes, and use special hoisting devices as much as possible when hoisting; the operation method should choose the micro-operation mode, and the action should be slow and balanced; The length is appropriate, too long will make the hanging object swing larger and it is difficult to control accurately; the bucket position must be adjusted correctly to prevent the steel wire rope from slipping; the construction personnel should try not to get close to the lifting object to prevent danger due to improper operation.

8. Smooth operation method

During operation, the stability of the machine can not only improve work efficiency and prolong the life of the machine, but also ensure safe operation (put the machine on a relatively flat ground); the stability of the drive sprocket on the rear side is better than that on the front side, and It can prevent the final drive from being impacted by external force; the wheelbase of the crawler on the ground is always greater than the wheelbase, so the stability of the forward work is good, and sideways operation should be avoided as far as possible; the digging point should be kept close to the machine to improve the stability and excavator ;If the digging point is far away from the machine, the operation will be unstable due to the forward movement of the center of gravity; the lateral digging is less stable than the forward digging, if the digging point is far away from the center of the body, the machine will be more unstable, so the digging point and the center of the body should be kept appropriate distance to make the operation balanced and efficient.

9. Noteworthy operations

There is a buffer device inside the hydraulic cylinder, which can gradually release the back pressure near the end of the stroke; if it is subjected to an impact load after reaching the end of the stroke, the piston will directly touch the cylinder head or the bottom of the cylinder, which is likely to cause accidents, so when reaching the end of the stroke, try to Leave a gap.

Bulldozing operations using slewing action will cause abnormal stress on the bucket and working devices, resulting in distortion or cracking of welds, or even broken pins. Such operations should be avoided as much as possible.

Excavating with the weight of the body will cause the slewing bearing to be in an abnormal stress state, and at the same time, it will generate strong vibration and impact on the chassis, so the application of a hydraulic cylinder or hydraulic pipeline will cause greater damage.

When loading and unloading heavy materials such as rocks, the material should be unloaded close to the bottom of the truck compartment, or the soil should be loaded first, and then the rocks should be loaded, and high-altitude unloading is prohibited to reduce the impact damage to the truck.

When the track sinks deep in the mud, put a wooden board under the bucket, use the bottom end of the bucket to support the track, and then put a wooden board under the track to drive the machine out.

10. Correct walking operation

When the excavator is walking, the working device should be put away as far as possible and close to the center of the body to maintain stability; the final drive should be placed behind to protect the final drive.

Avoid driving over obstacles such as tree stumps and rocks as much as possible to prevent the track from twisting; if you must drive over an obstacle, ensure that the center of the track is on the obstacle.

When crossing the mound, always use the working device to support the chassis to prevent the car body from shaking violently or even tipping over.

Avoid running the engine idling on a steep slope for a long time, otherwise it will cause poor lubrication due to changes in the oil level angle.

Long-distance running of the machine will cause high temperature inside the supporting wheels and the final drive due to long-term rotation, and the viscosity of the oil will decrease and the lubrication will be poor. Therefore, it should be stopped frequently to cool down

Temperature, prolong the life of the lower body.

It is forbidden to carry out excavation work by the driving force of walking, otherwise the excessive load will cause early wear or damage of final drive, track and other off-car parts.

When walking uphill, the driving wheel should be behind to increase the adhesion of the track on the ground.

When walking downhill, the driving wheels should be in front, so that the upper track is tightened, so as to prevent the car body from sliding forward under the action of gravity when parking and causing danger.

When walking on a slope, the working device should be placed in front to ensure safety. After parking, gently insert the bucket into the ground and put a stopper under the track.

When turning on a steep slope, slow down the speed, turn the left crawler backward when turning left, and turn the right crawler backward when turning right, which can reduce the risk of turning on a slope.

risk.

11. Correct crushing operation

First place the hammer head vertically on the object to be broken. When starting the crushing operation, lift the front body about 5cm. When crushing, the crushing head should always be pressed on the crushed objects, and the crushing operation should be stopped immediately after the unbroken objects have been crushed.

When crushing, the hammer head will gradually change its direction due to vibration, so the bucket cylinder should be adjusted at any time to make the direction of the hammer head perpendicular to the surface of the broken object.

When the hammer head cannot penetrate the broken objects, the crushing position should be changed; continuous crushing in one place should not exceed one minute, otherwise not

only the hammer head will be damaged, but also the oil temperature will rise abnormally; for hard objects, it should be broken gradually from the edge .

It is strictly forbidden to break while turning, twist the hammer head after insertion, use the hydraulic hammer horizontally or upwards, and use the hydraulic hammer as a chisel.

two. Daily maintenance

The purpose of regular maintenance for excavators is to reduce machine failures, prolong machine life, shorten machine downtime, improve work efficiency, and reduce operating costs.

As long as fuel, lubricating oil, water and air are well managed, failures can be reduced by 70%. In fact, around 70% of failures are due to poor management.

1. Fuel management

Different grades of diesel oil should be selected according to different ambient temperatures; diesel oil should not be mixed with impurities, dust and water, otherwise the fuel pump will be worn out prematurely; the high content of paraffin and sulfur in inferior fuel oil will cause damage to the engine; daily work After the fuel tank is finished, the fuel tank should be filled with fuel to prevent water droplets on the inner wall of the fuel tank; open the drain valve at the bottom of the fuel tank to drain water before daily operation; after the engine fuel is used up or the filter element is replaced, the air in the road must be drained.

2. Other oil management

Other oils include engine oil, hydraulic oil, gear oil, etc.; oils of different grades and grades cannot be mixed; different types of excavator oils have different chemical or physical additives added in the production process; to ensure Clean with oil to prevent the mixing of sundries (water, dust, particles, etc.); choose the grade of oil according to the ambient temperature and usage. If the ambient temperature is high, engine oil with high viscosity should be used; if the ambient temperature is low, oil with low viscosity should be used; the viscosity of gear oil is relatively high to adapt to large transmission loads, and the viscosity of hydraulic oil is relatively small to reduce liquid flow resistance.

3. Grease management

The use of lubricating oil (butter) reduces wear on the moving surfaces and prevents noise. When the grease is stored and stored, it should not be mixed with dust, sand, water and other impurities; it is recommended to use lithium-based grease g2-l1, which has good anti-wear performance and is suitable for heavy-duty working conditions; when filling, try to squeeze out all the old oil Remove and wipe clean to prevent sand from sticking.

4. Maintenance of filter element

The filter element plays the role of filtering impurities in the oil circuit or air circuit, preventing them from invading into the system and causing failure; all kinds of filter elements should be replaced regularly according to the requirements of the (operation and maintenance manual); when replacing the filter element, check whether there is metal attached to the old filter element. If there are metal particles found on the filter element, it is necessary to diagnose and take improvement measures in time; use a pure filter element that

meets the requirements of the machine. Fake and inferior filter elements have poor filtering ability, and the surface and material quality of the filter layer do not meet the requirements, which will seriously affect the normal use of the machine.

5. Contents of regular maintenance

① The fuel filter element and additional fuel filter element should be replaced after the new machine has been working for 250 hours; check the clearance of the engine valve.

② Daily maintenance; check, clean or replace the air filter; clean the inside of the cooling system; check and tighten the track shoe bolts; check and adjust the anti-tension of the track; check the intake heater; replace the bucket teeth; adjust the bucket clearance; check before Window cleaning fluid level; check and adjust the air conditioner; clean the cab floor; replace the breaker filter element (optional). When cleaning the inside of the cooling system, after the engine is fully cooled, slowly loosen the water inlet cover to release the internal pressure of the water tank, and then release the water; do not clean when the engine is running, the high-speed rotating fan will cause danger; when cleaning or replacing the cooling system When the coolant is used, the machine should be parked on a level ground; the coolant and anti-corrosion device should be replaced according to Table 3. The ratio of antifreeze to water is as required in Table 4.

③ Inspection items before starting the engine. Check the liquid level of the coolant (add water); check the engine oil level, add oil; check the fuel oil level (add fuel); check the hydraulic oil level (add hydraulic oil); check whether the air filter is blocked; check the wires; Check

whether the horn is normal; check the lubrication of the bucket; check the water and sediment in the oil-water separator.

④ Every 100 maintenance items. Boom cylinder head pin; boom foot pin; boom cylinder rod end; stick cylinder head pin; boom, stick connecting pin; stick cylinder rod end; bucket cylinder head pin ;Connecting pin of half-rod connecting rod; Rod end of bucket rod and bucket cylinder; Pin shaft of cylinder head of bucket cylinder; Connecting pin of arm connecting rod; Drain water and sediment.

⑤ Maintenance items every 250h. Check the oil level in the final drive box (add gear oil); check the battery electrolyte; replace the oil in the engine oil pan, replace the engine filter element; lubricate the slewing ring (2 places); check the tension of the fan belt, and check Adjust the tension of the air conditioner compressor belt.

⑥ Maintenance items every 500h. Carry out maintenance items every 100 and 250 hours at the same time; replace the fuel filter; check the height of the rotary pinion grease (add grease); check and clean the radiator fins, oil cooler fins and cooler fins; replace the hydraulic oil Filter element; replace the oil in the final drive box (only at 500h for the first time, and once every 1000h thereafter); clean the air filter element inside and outside the air conditioner system; replace the hydraulic oil vent filter element.

⑦ Maintenance items every 1000h. Carry out maintenance items every 100, 250 and 500 hours at the same time; replace the oil in the slewing mechanism box; check the oil level of the shock absorber housing (back to the engine oil); check all the fasteners of the

turbocharger; check the turbocharger rotor Check and replace the tension of the generator belt; replace the anti-corrosion filter element; replace the oil in the final drive box.

⑧Maintenance items every 2000h. First complete the maintenance items every 100, 250, 500 and 1000h; clean the filter screen of the hydraulic oil tank; clean and check the turbocharger; check the generator and starter motor; check the engine valve clearance (and adjust); check the shock absorber.

⑨Maintenance over 4000h. Increase the inspection of the water pump every 4000h; increase the replacement of hydraulic oil every 5000h.

⑩Long-term storage. When the machine is stored for a long time, in order to prevent the piston rod of the hydraulic cylinder from rusting, the working device should be placed on the ground; the whole machine should be washed and dried and stored in a dry indoor environment; The machine is parked on a well-drained concrete floor; before storage, fill up the fuel tank, lubricate all parts, replace hydraulic oil and engine oil, apply a thin layer of butter to the exposed metal surface of the piston rod of the hydraulic cylinder, and remove the negative terminal of the battery, or Remove the battery and store it separately; add an appropriate proportion of antifreeze to the cooling water according to the lowest ambient temperature; start the engine once a month and operate the machine to lubricate the moving parts and charge the battery at the same time; turn on the air conditioner and run it for 5-10 minutes.

Excavator safety operating procedures

1. Pre-work preparation:

1. Carefully read the relevant instruction materials of the excavator, and be familiar with the use and maintenance of the vehicle being driven;
2. Understand the task situation of the construction site in detail, and check the solidity and stability of the soil where the excavator stops. When excavating foundation pits and trenches, check the stability of cuttings and trench slopes;
3. It is strictly forbidden for any personnel to stay in the work area, and the work site should be convenient for dump trucks to enter and exit;
4. Check the excavator's hydraulic system, engine, transmission, braking device, slewing device, and instruments and meters, and it can only work after a trial run and confirmation of normality.

2. Requirements during operation and driving:

1. A signal should be issued before the operation starts;
2. When working, pay attention to selecting and creating a reasonable working surface, and it is strictly forbidden to dig holes; it is strictly forbidden to arrange the excavator to work in two excavation surfaces at the same time;
3. During operation, it is forbidden to adjust the engine, governor, hydraulic system, and electrical system casually; it is forbidden to crush solid objects with a bucket or use a rotary mechanism; it is forbidden to jack up the excavator with a bucket rod or bucket cylinder; Use the arm of the excavator to drag heavy objects on the side; it is forbidden to excavate the working device in a sudden drop;

4. The excavator should be loaded after the car has stopped. When unloading, the bucket should be lowered as far as possible without touching any part of the car, and the bucket should not pass over the cab;

5. When the hydraulic excavator is working normally, the hydraulic oil temperature should be between 50 degrees and 80 degrees. Before using the machine, if it is lower than 20 degrees, it must be preheated; when it reaches or exceeds 80 degrees, it should be stopped to dissipate heat.

3. Post-work requirements:

1. When the excavator is walking, it should be commanded by a special person, and the distance from the high-voltage line should not be less than 5 meters. Prohibition of walking backwards;

2. When walking downhill, drive at a low speed and at a constant speed, and sliding and changing speeds are prohibited;

3. The parking position and walking route of the excavator should keep a safe distance from the road surface, ditches and foundation pits;

4. When the excavator is parked on a slope, the bucket must be placed on the ground, and all operating levers must be placed in the neutral position;

5. After the work is finished, the machine body should be turned upright, the bucket should be placed on the ground, and all operating levers should be placed in the neutral position. The brakes of each part are used for braking, and the driver can leave only after the mechanical doors and windows are closed.

Seven regulations strictly enforced during the run-in period of hydraulic excavators

A new excavator or an overhauled excavator must go through a period of trial operation, which is usually called the break-in period. The purpose of running-in is to prevent early wear and tear of the excavator and prolong the service life of the excavator. During the run-in period of the excavator, the following regulations must be strictly implemented:

- 1) The excavator that performs the run-in period should hang a signboard with the words "run-in period" at an obvious place, so that relevant personnel can pay attention to the use regulations of the run-in period, and remove it after the run-in period expires.
- 2) During the break-in period, the engine should be decelerated by 30%, and the load should be decelerated by 20%-30%. No one is allowed to remove the lead seal of the engine speed limiting device. After the break-in period expires, it can be removed under the supervision of technicians.
- 3) It is strictly forbidden to slam the accelerator when starting the engine. When the engine is started at low temperature, it should be warmed up for 20-50 seconds, and then started immediately. Run the engine at idle speed for 3-5 minutes after starting, and increase the speed and load when the cooling water temperature rises to 40 degrees.
- 4) The technical preparations before starting the engine, the technical requirements during operation, the technical work before stopping and after the flameout, etc. shall be carried out in accordance with the requirements of the general mechanical operating regulations or the engine instruction manual.
- 5) The excavator should excavate loose soil within the first 30 or 50 hours of the run-in period, and each time the loading is 1/2 of the bucket capacity, the loading volume can be gradually

increased within the next 70 or 50 hours, but it must not exceed the bucket capacity 3/4, and reduce the operating speed appropriately.

6) During the run-in period, always pay attention to the operation of the various mechanisms of the excavator, check the working temperature of the bearings, gears and friction pairs of each part, and observe whether there is any leakage in the hydraulic system. For abnormal phenomena in operation, stop the machine immediately to check the cause and eliminate it.

7) After the run-in period expires, check, adjust and lubricate all parts of the excavator according to the operating conditions during the run-in period. At the same time, check the cleanliness of the lubricating oil of each gearbox and the hydraulic oil of the hydraulic oil tank, and replace them if necessary.

8) Technicians should strengthen the technical management of the excavator's run-in period. Before the excavator's run-in period, the requirements and precautions of the excavator should be clearly explained to the operator; during the run-in period, the use and operation of the excavator should be checked. Fill in the excavator run-in use record form in detail, earnestly and truthfully. After the excavator run-in period expires, the competent technical personnel will review the record form and include it in the excavator technical file.

Selection, installation and use of hydraulic hammer for excavator

Since the hydraulic hammer came out in the 1960s, the technology has been perfected day by day. Compared with the air hammer, the hydraulic hammer has the advantages of low noise, good crushing performance, high energy utilization rate, and compact body. It can be directly installed on general-purpose self-propelled hydraulic machinery without self-contained power

device, and it is more and more widely used in demolishing old buildings and crushing roads, ores and other fields.

Excavators are the hosts with the most installed hydraulic hammers. With the increase of demolition and crushing operations, there is an increasing demand for excavators to be equipped with hydraulic hammers to realize one machine with multiple functions.

1 Reasonable matching of hydraulic hammer and excavator

A reasonable match between the hydraulic hammer and the excavator can make the hydraulic hammer more efficient and ensure the service life of the hydraulic hammer and the excavator. In general, it is mainly considered from the working weight of the main engine, the output flow and pressure of the spare valve where the hydraulic hammer is installed.

1.1 Matching of hydraulic hammer and excavator working weight and working device

You can quickly judge whether the hydraulic hammer matches the excavator through the following relationship:

In the formula, R ---maximum crushing radius, S ---half of the wheelbase of the excavator, W_b ---working weight of the hydraulic hammer, W_e ---working weight of the excavator, if the ratio calculated by the above formula is less than 0.3, It means that the hydraulic hammer is selected too small, which will cause the hydraulic hammer to be damaged quickly; if the ratio is greater than 0.5, it means that the hydraulic hammer is selected too large.

In addition, it is also necessary to consider whether the radial and axial fit clearance between the pin shaft and the pin hole connecting the hydraulic hammer and the working device is appropriate.

1.2 The matching of working flow and pressure is the same as that of other hydraulic components. Each hydraulic hammer has its rated working pressure in the required flow range. When selecting a hydraulic hammer, the flow requirement of the hydraulic hammer must match the output of the excavator's backup valve. Traffic matches. Generally speaking, the flow rate determines the working efficiency of the hydraulic hammer, that is, the number of impacts per minute, and the flow rate is proportional to the number of impacts. However, if the flow rate is greater than the required flow rate of the hydraulic hammer, the hydraulic system will generate too much heat, causing the system Excessive temperature rise will reduce the service life of components.

When selecting a hydraulic hammer, it is also necessary to consider that the working pressure of the hydraulic hammer is consistent with the limited pressure of the backup valve. If not, it should be adjusted according to the rated pressure of the hydraulic hammer within the adjustment range of the spare valve.

2 installation

Since most excavators are not equipped with pipeline accessories for hydraulic hammers when they leave the factory, they are only equipped with spare valves. Therefore, when these excavators are equipped with hydraulic hammers, they must be equipped with pipelines and accessories. Figure 2 is a schematic diagram of the pipeline connections of the main components. If the oil return pressure is too high, the impact force of the hydraulic hammer will be reduced. In order to reduce the refueling back pressure of the hydraulic hammer as much as possible, the common oil return pipeline can be directly returned to the oil tank through the oil filter (no longer through the backup valve). In order to facilitate bucket

replacement and excavation operations, a stop valve should be installed in the pipeline close to the hydraulic hammer. When installing pipelines, dirt should be prevented from intruding into the system, steel pipes and joints should be measured through a clean place, and hoses must not be twisted.

If the spare valve is not equipped with a control oil circuit. The pressure oil can be drawn from the oil supply pipeline of the pilot control system (behind the safety lock valve) by adding a three-way switch, and then the spare valve is controlled by the solenoid valve. The solenoid valve should be controlled by a switch that is easy to operate.

3 uses

3.1 Correct operation

Proper operation can improve the working efficiency of the hydraulic hammer and prolong the service life of the hydraulic hammer of the excavator. When working, pay special attention to the following points:

(1) The drill rod of the hydraulic hammer is always perpendicular to the surface of the crushed object, and the drill is used to press the crushed object tightly. Immediately stop the hydraulic hammer after crushing to prevent air strike.

(2) When breaking a particularly hard object, start beating from the edge first, and do not hammer continuously at the same point for more than one minute to prevent the drill rod from burning or the hydraulic oil from overheating.

(3) When the excavator is turning, do not let the chisel hit other objects.

(4) When working in water, only the chisel can be immersed in water. If it is really necessary to submerge all hydraulic hammers in water, you should order special hydraulic hammers for underwater work from the manufacturer.

3.2 Maintenance

Due to the harsh working conditions of the hydraulic hammer, correct maintenance will reduce the occurrence of machine failures and prolong the service life of the machine. In addition to the routine maintenance of the excavator, the following points should also be noted.

(1) Visual inspection Check the gap between the drill rod and its bushing, and check whether there is hydraulic oil seepage. If oil seeps out, it means that the low-pressure oil seepage seal is damaged, and a professional should be asked to replace it. Check whether the relevant bolts are loose, and whether the pin shaft at the service connection is worn out.

(2) Lubrication Add grease to the lubrication point of the working device at least twice a day.

(3) Replace the filter element and hydraulic oil When using a hydraulic hammer, the deterioration and pollution of the hydraulic oil are much faster than when working with ordinary buckets. Under normal circumstances, the oil filter element and hydraulic oil in the hydraulic system should be replaced according to half of the normal replacement cycle.

Cause Analysis of Low Oil Pressure of Excavator

When an excavator was working, an oil failure alarm suddenly appeared on the dashboard. The driver immediately stopped to check, and checked the oil level and viscosity through the oil dipstick. Is it normal? Remove the oil filter element to check whether the filter element is normal? The above two items of inspection results are normal, because there is no suitable

inspection tool, no further inspection is possible, the customer hopes that we can help them to do further inspections to eliminate the fault and restore the machine to normal use. What causes the engine oil pressure to be abnormal during the working process of the engine? We first do a detailed cause analysis.

The lubrication system of diesel engine is mainly composed of oil pan, oil pump, oil filter, radiator, main oil passage, oil distribution passage, low oil pressure alarm sensor, high oil temperature alarm sensor, pressure limiting valve and bypass Valve composition. The main causes of low oil pressure are as follows:

1. Insufficient engine oil

If the amount of engine oil is insufficient, the amount of oil pumped by the engine oil pump will decrease or the pump will not be able to supply oil due to air entering, causing the pressure of the engine oil to drop, and the crankshaft and bearings, cylinder liners and pistons will all aggravate wear due to poor lubrication. Therefore, the oil level in the oil pan should be checked before working every day to ensure that the oil level is normal. If it is insufficient, the same type of oil produced by the same manufacturer should be added.

2. The oil pump does not turn

If the drive gear of the oil pump and the flat key of the drive shaft are damaged or fall off; the filter is damaged and the oil pump sucks in foreign matter, and the gear is stuck, the oil pump will stop and the oil pressure will drop to zero. At this time, the damaged flat key or filter should be replaced.

3. Oil pump wear

When the gap between the pump shaft and the bushing of the oil pump, the gap between the gear end face and the pump cover, the tooth side gap or the radial gap is too large due to wear, the pump oil volume will decrease and the oil pressure will drop. At this time, the worn parts should be replaced, and the inner plane of the pump cover should be ground to restore the gap between it and the end face of the gear to the standard range.

4. The engine temperature is too high

If the engine cooling system has too much scale, poor heat dissipation, long-term overload operation or too late oil supply time of the fuel injection pump, etc., the engine will overheat, accelerate the aging, deterioration and thinning of the oil, leak from the matching gaps, and reduce the pressure. The scale should be removed, the fuel supply time should be adjusted, and the engine should work within the rated load.

5. The fit clearance between the main bearing and the connecting rod bearing increases

After the engine has been used for a long time, the matching clearance between the main crankshaft and the connecting rod bearing will gradually increase, the leakage will increase, and the oil pressure will drop. For every 0.01mm increase in the fit gap, the pressure will drop by 0.01MPa. At this time, the crankshaft can be ground, and a new connecting rod bearing and main bearing can be selected to restore its fit clearance.

6. The bypass valve is damaged

In order to maintain the normal oil pressure of the main oil passage, a bypass valve is provided. If the pressure regulating spring is softened or improperly adjusted, the matching surface between the valve seat and the steel ball is worn or stuck and the valve is not closed tightly, the oil return will increase, and the main The pressure in the oil passage will drop. At

this time, the bypass valve should be removed for inspection, and finally the pressure should be adjusted to the normal range.

7. Oil radiator leakage

External leakage will pollute the surface of the engine and the pressure will drop; internal leakage will cause the oil to enter the water tank, the cooling effect of the cooling system will become poor, the engine will overheat, the oil will become thinner, and the pressure will drop. Remove the radiator and repair or replace it to restore its function.

8. The pressure sensor fails or the oil passage is blocked

If the pressure sensor fails or the oil passage from the main oil passage to the pressure sensor is blocked and the oil flow is not smooth, the oil pressure will drop. The following checks can be done: run the engine at idle speed, loosen the oil pipe joint, observe the oil flow, determine the fault location, replace the pressure sensor or clean the oil passage.

9. The set pressure of the pressure limiting valve is too low

In the lubrication system, the oil pumped by the oil pump must ensure proper pressure before reaching the lubricating parts of the engine. If the set pressure of the pressure limiting valve is too low, the pressure regulating spring becomes soft or the sealing surface leaks, the set pressure will be too low. At this time, the pressure limiting valve should be adjusted to restore the pressure to normal.

10. The engine oil grade is not suitable

Different engines need to add different brands of oil, and the same type of engine should also use different brands of oil in different seasons. If the selected engine oil is inappropriate or inferior, the engine will leak more and the pressure will drop due to the low viscosity when the

engine is running. Engine oil should be selected correctly and reasonably to adapt to different models or seasons.

11. The oil filter is clogged

When the oil filter is clogged and unable to circulate, the bypass valve located on its base is opened, and the oil directly enters the main oil passage without being filtered. If the opening pressure of the bypass valve is set too high, when the oil filter is blocked, it cannot be opened in time, the pressure of the oil pump will increase, the internal leakage will increase, the oil supply to the main oil passage will decrease, and the oil will The pressure will drop. The oil filter should be kept clean; the opening pressure of the bypass valve should be adjusted correctly, and the damaged components or mating surfaces should be replaced or repaired in time to restore its normal working performance.

12. The filter is blocked

Under normal circumstances, the oil pressure should be higher when the throttle is large than when the throttle is small, but sometimes there will be abnormal situations. If the oil is too dirty and viscous, it is easy to block the filter. When the engine is running at a low speed with a small throttle, the main oil passage can still build up a certain pressure due to the small amount of oil absorbed by the oil pump, so the oil pressure is normal; The resistance is too large and obviously reduces, so the indication value of the oil pressure gauge decreases due to insufficient oil supply in the main oil passage. The suction filter should be cleaned, or the oil should be replaced.

Through the above analysis, we took the oil pressure gauge and oil quality analyzer to the construction site, and used the oil quality analyzer to test the quality of the oil, and found that

the viscosity and degree of pollution of the oil met the requirements. Connect the oil pressure gauge, measure the oil pressure at low speed and high speed, and find that the oil pressure is lower than 0.15MPa. Normally, the oil pressure is 0.15MPa at low speed and 0.6MPa at high speed, so you can know that the oil pressure is low. Normal pressure cannot be achieved. We checked the bypass valve on the oil filter seat according to the principle of simple to complex, from the outside to the inside. After disassembly, we found that the seal between the steel ball and the valve seat was not tight, resulting in oil leakage and pressure drop. By grinding the sealing surface, restore its sealing performance, adjust the pressure to the standard value, and the oil pressure alarm light goes out, indicating that the machine returns to normal and the fault is resolved.

By eliminating this fault, it shows that mechanical failure is not terrible. As long as you understand the working principle of the system and analyze it carefully, you will be able to eliminate the fault, but don't blindly disassemble it, otherwise, you will get twice the result with half the effort and even damage the components that work normally.

Causes and Solutions of Engine Oil Pressure Too Low

During the working process of the engine, if the pressure of the engine oil is lower than 0.2Mpa or fluctuates with the change of the engine speed, or even drops to zero suddenly, stop the machine immediately to find out the reason, and continue to work after troubleshooting, otherwise it will be damaged. Lead to major accidents such as burning tiles and pulling cylinders. Therefore, during the use of the engine, great attention must be paid to the pressure of the engine oil. The main reasons and solutions for the low oil pressure are introduced as follows:

1. Insufficient oil quantity

Insufficient oil quantity will reduce the pump oil quantity of the engine oil pump or cause no oil on the pump due to air intake, resulting in a drop in engine oil pressure, and the crankshaft and bearing, cylinder liner and piston will all aggravate wear due to poor lubrication. The oil level in the oil pan should be checked before each shift to ensure there is sufficient oil.

2. Machine temperature is too high

If the engine cooling system has serious scale, poor work, or the engine is overloaded for a long time, or the oil supply time of the fuel injection pump is too late, it will cause the body to overheat, which will not only accelerate the aging and deterioration of the engine oil, but also easily dilute the engine oil. A large loss in the fit clearance leads to a drop in oil pressure. The scale in the cooling system pipeline should be removed; the oil supply time should be adjusted; the engine should work under rated load.

3. The pump stops

If the drive gear of the oil pump and the fixed pin of the drive shaft are cut off or the mating key falls off; and the oil pump sucks foreign matter and the oil pump gear is stuck. Will make the oil pump stop running, the oil pressure will drop to zero. Damaged pins or keys should be replaced; filters should be installed at the oil suction port of the oil pump.

4. The oil output of the pump is not enough

When the gap between the pump shaft and the bushing of the oil pump, the gap between the gear end face and the pump cover, the tooth side gap or the radial gap exceeds the allowable value due to wear, the pump oil volume will decrease, resulting in a drop in lubrication

pressure. The out-of-tolerance parts should be replaced in time; the plane of the pump cover should be ground to restore the gap with the end face of the gear to 0.07-0.27mm.

5. The clearance between the shaft and the bearing is too large

When the engine is used for a long time, the fit clearance between the crankshaft and the connecting rod bearing will gradually increase, so that no oil wedge will be formed, and the oil pressure will also drop. According to the measurement, when the gap increases by 0.01mm, the oil pressure will drop by 0.01Mpa. The crankshaft can be ground, and the connecting rod bearing of the corresponding size can be selected to restore the fit clearance to the technical standard.

6. The filter is clogged

When the oil cannot circulate due to the blockage of the filter, the safety valve on the base of the filter is pushed open, and the oil directly enters the main oil passage without being filtered. If the opening pressure of the safety valve is adjusted too high, when the filter is blocked, it cannot be opened in time. Therefore, the pressure of the oil pump increases, the internal leakage increases, and the oil supply to the main oil passage decreases accordingly, causing oil pressure. Decline. Always keep the oil filter clean; correctly adjust the opening pressure of the safety valve (generally 0.35-0.45Mpa); replace the spring of the safety valve or grind the mating surface of the steel ball and the valve seat in time to restore its normal working performance.

7. Damaged or malfunctioning valve

In order to maintain normal oil pressure in the main oil passage, there is an oil return valve here. If the oil return valve spring fatigues and softens or is improperly adjusted, when the

mating surface between the valve seat and the steel ball is worn or is blocked by dirt and is not closed tightly, the oil return volume will increase significantly, and the oil pressure in the main oil passage will also decrease. The oil return valve should be overhauled and its opening pressure adjusted between 0.28-0.32Mpa.

8. Radiator or pipeline oil leakage

Leaking oil will both dirty the engine and drop oil pressure. If the pipeline is blocked by dirt, the flow of oil will also be reduced due to increased resistance, resulting in a drop in oil pressure. The radiator should be taken out, repaired by welding or replaced, and it can be used only after pressure test; the pipeline should be cleaned of dirt.

9. The meter is out of order or the tubing is blocked

If the pressure gauge fails, or the oil pipe from the main oil passage to the pressure gauge is blocked due to dirt accumulation, the oil pressure will drop significantly. When the engine is idling at low speed, slowly loosen the oil pipe joint, determine the fault location according to the oil flow, and then clean the oil pipe or replace the pressure gauge.

10. Disk blockage causes pressure gauge pointer to fluctuate.

Generally speaking, the indicated value of the oil pressure gauge should be higher when the throttle is large than when the throttle is small, but sometimes there will be abnormal situations. If the oil is too dirty and viscous, it will easily block the oil suction plate. When the engine is running at a low speed with a small throttle, the main oil passage can still build up a certain pressure due to the small amount of oil absorbed by the engine oil pump, so the oil pressure is normal; When the throttle is increased to run at high speed, the oil absorption capacity of the oil pump will be significantly reduced due to the excessive suction cup

resistance, so the indication value of the oil pressure gauge will decrease due to insufficient oil supply in the main oil passage.

The oil suction pan should be cleaned, or the engine oil should be replaced.

11. Wrong grade or unqualified quality

Different types of engines must be filled with different oils, and the same type of engine should also use different brands of oil in different seasons. If the wrong oil is used or the brand is wrong, the oil viscosity will be too low when the engine is running, which will increase the leakage and reduce the oil pressure. The engine oil should be selected correctly, and the engine oil should be selected reasonably according to seasonal changes or different regions. At the same time, diesel engines must use diesel engine oil, and gasoline engine oil is not allowed to replace it.

Common faults after installing the breaker on the excavator

1. The working principle of the hydraulic system of the excavator equipped with the breaker

For an excavator equipped with a hydraulic breaker, no matter whether the breaker is working or not, other working devices of the excavator can still work normally. the

The main reversing valve of this system generally adopts the spare valve reserved on the main working valve group of the excavator, and the pressure oil for the breaker is provided by a main pump of the excavator, and the pressure oil of the breaker is adjusted by installing a relief valve. Working pressure: A high-pressure cut-off valve must be installed at the inlet and outlet of the breaker to facilitate the adjustment and maintenance of the working system parameters. the

2. Common faults

Misoperation, nitrogen leakage of the breaker, improper maintenance and other phenomena will cause failures such as wear of the working valve of the breaker, bursting of the pipeline, and local overheating of the hydraulic oil. The reasons are, first, unreasonable technical configuration, and second, improper on-site management. the

The working pressure of the breaker is generally 20MPa and the flow rate is about 170L/min, while the system pressure of the excavator is generally 30MPa and the flow rate of the single main pump is 250L/min, so the overflow valve needs to undertake heavy diversion and unloading work. Once the overflow valve is damaged but it is not easy to be detected, the breaker will work under ultra-high pressure. First, the pipeline will burst and the hydraulic oil will be overheated locally. The hydraulic circuit controlled by the spool (the next spool pointing to the main oil circuit in the neutral position) is polluted; and because the return oil of the breaker generally does not pass through the cooler but directly returns to the oil tank through the oil filter, the circulating oil circuit may The oil temperature in the working oil circuit is too high or even too high, which seriously affects the service life of hydraulic components (especially seals). the

3. Troubleshooting measures

The most effective way to prevent the above failures is to improve the hydraulic circuit. One is to add an overload valve at the main reversing valve (the overload valve of the same type as the boom or bucket working valve can be selected), and its set pressure should be 2~3MPa higher than the overflow valve, which can effectively Reduce the impact of the system, and at the same time ensure that the system pressure will not be too high when the overflow valve is damaged; the second is to connect the oil return line of the working oil circuit to the front of

the cooler to ensure timely cooling of the working oil return; the third is when the flow of the main pump exceeds the maximum breaking hammer. When the flow rate is 2 times, a diverter valve is installed in front of the main reversing valve to reduce the load on the relief valve and prevent overheating caused by a large amount of oil supply passing through the relief valve.

Things to pay attention to when driving an excavator

1. Operation technology

First, check the surrounding conditions. During slewing operation, be aware of the surrounding obstacles and terrain, and operate safely; during operation, confirm the front and rear directions of the crawler belt to avoid tipping or impact; try not to face the final drive in the direction of excavation, otherwise it is easy to damage the walking Motor or hose; when working, ensure that the left and right crawlers are in full contact with the ground to improve the dynamic stability of the machine.

2. Effective mining methods

When the angle between the bucket cylinder and the connecting rod, the arm cylinder and the arm is 90 degrees, the digging force is the largest; when the bucket tooth and the ground maintain an angle of 30 degrees, the digging force is the best, that is, the soil cutting resistance is the smallest; When digging with a stick, it should be ensured that the stick angle ranges from 45 degrees in the front to 30 degrees in the back. Using the boom and bucket at the same time can improve digging efficiency.

3. Digging for rocks

Using a bucket to excavate rocks will cause great damage to the machine and should be avoided; when it is necessary to excavate, the position of the body should be adjusted

according to the crack direction of the rock so that the bucket can be smoothly shoveled in and excavated; insert the bucket teeth into the cracks in the rock. In the middle, use the digging force of the stick and bucket to dig (pay attention to the slippage of the bucket teeth); the unbroken rock should be broken first and then excavated with the bucket.

4. Slope leveling operation

When performing plane trimming, the machine should be placed flat on the ground to prevent the body from shaking. It is necessary to grasp the coordination of the movement of the boom and stick, and controlling the speed of the two is very important for plane trimming.

5. Loading operation

The machine body should be in a horizontal and stable position, otherwise it is difficult to accurately control the unloading of the slewing, thereby prolonging the operation cycle time; the machine body and the truck should keep an appropriate distance to prevent the tail of the body from colliding with the truck when turning 180 degrees; try to turn left to load, so that the field of view is wide and the operation efficiency is high. At the same time, the rotation angle must be grasped correctly to reduce the time for turning; the position of the truck is lower than that of the excavator to shorten the lifting time of the boom, and the line of sight is good; first load sand and gravel, then place large stones, which can reduce the impact on the car.

6. Work in soft areas or in water

When working in soft ground, you should understand the looseness of the soil, and pay attention to limit the excavation range of the bucket to prevent accidents such as landslides and landslides and deep subsidence of the vehicle body.

When working in water, pay attention to the allowable water depth range of the car body (the water surface should be below the center of the supporting sprocket); if the water level is high, the inside of the slewing ring will be poorly lubricated due to the entry of water, and the engine fan blades will be broken due to water impact. Damage, electrical circuit components short circuit or open circuit due to water intrusion.

7. Hoisting operation

When using a hydraulic excavator for hoisting operations, you should confirm the surrounding conditions of the hoisting site, use high-strength hooks and wire ropes, and use special hoisting devices as much as possible when hoisting; the operation method should choose the micro-operation mode, and the action should be slow and balanced; The length is appropriate, too long will make the hanging object swing larger and it is difficult to control accurately; the bucket position must be adjusted correctly to prevent the steel wire rope from slipping; the construction personnel should try not to get close to the lifting object to prevent danger due to improper operation.

8. Smooth operation method

During operation, the stability of the machine can not only improve work efficiency and prolong the life of the machine, but also ensure safe operation (put the machine on a relatively flat ground); the stability of the drive sprocket on the rear side is better than that on the front side, and It can prevent the final drive from being impacted by external force; the wheelbase of the crawler on the ground is always greater than the wheelbase, so the stability of the forward work is good, and sideways operation should be avoided as far as possible; the digging point should be kept close to the machine to improve the stability and excavator ;If the

digging point is far away from the machine, the operation will be unstable due to the forward movement of the center of gravity; the lateral digging is less stable than the forward digging, if the digging point is far away from the center of the body, the machine will be more unstable, so the digging point and the center of the body should be kept appropriate distance to make the operation balanced and efficient.

9. Noteworthy operations

There is a buffer device inside the hydraulic cylinder, which can gradually release the back pressure near the end of the stroke; if it is subjected to an impact load after reaching the end of the stroke, the piston will directly touch the cylinder head or the bottom of the cylinder, which is likely to cause accidents, so when reaching the end of the stroke, try to leave a gap.

Bulldozing operations using slewing action will cause abnormal stress on the bucket and working devices, resulting in distortion or cracking of welds, or even broken pins. Such operations should be avoided as much as possible.

Excavating with the weight of the body will cause the slewing bearing to be in an abnormal stress state, and at the same time, it will generate strong vibration and impact on the chassis, so the application of a hydraulic cylinder or hydraulic pipeline will cause greater damage.

When loading and unloading heavy materials such as rocks, the material should be unloaded close to the bottom of the truck compartment, or the soil should be loaded first, and then the rocks should be loaded, and high-altitude unloading is prohibited to reduce the impact damage to the truck.

When the track sinks deep in the mud, put a wooden board under the bucket, use the bottom end of the bucket to support the track, and then put a wooden board under the track to drive

the machine out.

10. Correct walking operation

When the excavator is walking, the working device should be put away as far as possible and close to the center of the body to maintain stability; the final drive should be placed behind to protect the final drive.

Avoid driving over obstacles such as tree stumps and rocks as much as possible to prevent the track from twisting; if you must drive over an obstacle, ensure that the center of the track is on the obstacle.

When crossing the mound, always use the working device to support the chassis to prevent the car body from shaking violently or even tipping over.

Avoid running the engine idling on a steep slope for a long time, otherwise it will cause poor lubrication due to changes in the oil level angle.

Long-distance running of the machine will cause high temperature inside the supporting wheels and the final drive due to long-term rotation, the viscosity of the oil will decrease and the lubrication will be poor. Therefore, it should be stopped frequently to cool down and prolong the life of the lower body.

It is forbidden to carry out excavation work by the driving force of walking, otherwise the excessive load will cause early wear or damage of final drive, track and other off-car parts.

When walking uphill, the driving wheel should be behind to increase the adhesion of the track on the ground.

When walking downhill, the driving wheels should be in front, so that the upper track is tightened, so as to prevent the car body from sliding forward under the action of gravity when

parking and causing danger.

When walking on a slope, the working device should be placed in front to ensure safety. After parking, gently insert the bucket into the ground and put a stopper under the track.

When turning on a steep slope, slow down the speed, turn the left crawler backward when turning left, and turn the right crawler backward when turning right, which can reduce the danger when turning on a slope.

11. Correct crushing operation

First place the hammer head vertically on the object to be broken. When starting the crushing operation, lift the front body about 5cm. When crushing, the crushing head should always be pressed on the crushed objects, and the crushing operation should be stopped immediately after the unbroken objects have been crushed.

When crushing, the hammer head will gradually change its direction due to vibration, so the bucket cylinder should be adjusted at any time to make the direction of the hammer head perpendicular to the surface of the broken object.

When the hammer head cannot penetrate the broken objects, the crushing position should be changed; do not continue crushing in one place for more than one minute, otherwise only the hammer head will be damaged, and the oil temperature will rise abnormally; for hard objects, it should be broken gradually from the edge .

It is strictly forbidden to break while turning, twist the hammer head after insertion, use the hydraulic hammer horizontally or upwards, and use the hydraulic hammer as a chisel.

Excavator safety operating procedures

1. Excavator drivers should abide by the general safety technical regulations.

2. Before the excavator works, the following preparations should be done:

1. Understand the construction conditions and tasks from the construction personnel. The content includes: the height and depth of filling and excavation, the height of slopes and wires, underground cables, various pipelines, tunnels, graves and the situation and location of various obstacles. After the excavator enters the site, the driver should abide by the relevant safety rules of the construction site.

2. When the excavator is working in rocky soil or frozen ground, blasting should be carried out before excavation.

3. Inspect, maintain, adjust, and fasten the excavator according to the daily routine maintenance items.

4. Check whether the fuel, lubricating oil and cooling water are sufficient, and add them if they are insufficient. Smoking and approaching open flames are strictly prohibited when adding fuel, so as not to cause a fire.

5. Check whether the insulation of the electric line and the contacts of each switch are in good condition.

6. Check the hydraulic system pipelines and operating valves, working cylinders, oil pumps, etc., for leaks and abnormal movements.

7. Check whether the wire rope and the clips for fixing the wire rope are firm and reliable.

8. Put the main clutch control lever in the "neutral" position, and start the engine (if you start by hand, pay attention to the counterattack of the crank and hurt people; if you start by pulling the rope by hand, don't wrap the rope around your hands). Check whether all instruments, transmission mechanisms, working devices, and braking mechanisms are

normal, and start working after confirming that they are correct.

9. After the engine is started, no one is allowed to stand in the bucket, on the boom, on the track or on the hangar.

3. When the excavator is working, the following safety items should be paid attention to:

1. When the excavator is working, it should be parked on a solid and flat ground. The outriggers should be topped up on the tire excavator.

2. The excavator should be in a horizontal position when working, and the running mechanism should be braked. If the ground is muddy, soft and there is a danger of subsidence, sleepers or planks should be used and properly padded.

3. When digging with the bucket, the soil should not be too deep each time, and the bucket should not be lifted too hard, so as not to damage the machine or cause an overturning accident. When the bucket falls, be careful not to impact the track and frame.

4. Those who cooperate with the excavator to clean the bottom, level the ground, and repair the slope must work within the turning radius of the excavator. If it is necessary to work within the slewing radius of the excavator, the excavator must stop turning and brake the slewing mechanism before it can work. At the same time, people on and off the plane must take care of each other and cooperate closely to ensure safety.

5. Vehicles and pedestrians are not allowed to stay within the range of excavator loading activities. When unloading materials on a car, wait until the car stops and the driver leaves the cab before turning the bucket and unloading materials on the car. When the excavator is turning, try to avoid the bucket from passing over the top of the cab. When unloading, the bucket should be lowered as much as possible, but be careful not to hit any part of the car.

6. When the excavator is slewing, the slewing clutch should be used to cooperate with the slewing mechanism brake to rotate smoothly, and sharp slewing and emergency braking are prohibited.
7. Before the bucket leaves the ground, it is not allowed to turn, walk and other actions. When the bucket is fully loaded and suspended in the air, it is not allowed to lift the boom and walk.
8. During the dragline operation, when the shovel is full, it is not allowed to continue shoveling to prevent overloading. When dragline digging ditches, canals, foundation pits, etc., the distance between the machine and the convenient slope should be determined in consultation with the construction personnel according to the depth, soil quality, slope, etc.
9. When backhoeing, you must wait for the boom to stop before shoveling soil to prevent the bucket handle from colliding with both sides of the boom groove.
10. When the crawler excavator is moving, the boom should be placed in the forward direction of travel, and the height of the bucket from the ground should not exceed 1 meter. And brake the slewing mechanism.
11. When the excavator goes uphill, the driving wheel should be at the back and the boom should be at the top; when the excavator is going downhill, the driving wheel should be at the front and the boom should be at the back. The up and down slope shall not exceed 20°. When going downhill, you should drive slowly, and do not shift gears or slide in neutral on the way. When the excavator passes through the track, soft soil, and clay road, it should pave the backing board.
12. When excavating loose-grained soil on a high working surface, larger stones and other sundries in the working surface should be removed to avoid accidents caused by collapse. If

the soil is dug into a suspended state and cannot collapse naturally, it needs to be handled manually, and it is not allowed to smash or press it down with a bucket to avoid accidents.

13. No matter whether the excavator is working or walking, it should not be close to the overhead transmission line. If it is necessary to work or pass near the high and low voltage overhead lines, the safety distance between the machine and the overhead lines must comply with the dimensions specified in Schedule 1. In thunderstorm weather, it is strictly forbidden to work near or under overhead high-voltage lines.

line voltage level	Vertical safety distance (m)	Horizontal safety distance (m)
1KV 以下	1.5	1.5
1-20KV	1.5	2.0
35-110KV	2.5	4.0
154KV	2.5	5.0
220KV	2.5	6.0

14. When working near the underground cable, the direction of the cable must be found out and displayed on the ground with white powder, and a distance of 1 meter should be kept for excavation.

15. The excavator should not be too hasty when walking and turning. If the curve is too large, it should be turned in stages, within 20° each time.

16. Since the flow rate of the steering vane pump is directly proportional to the engine speed

of the tire excavator, when the engine speed is low, the turning speed will slow down accordingly, so special attention should be paid when turning while driving. Especially when going downhill and making a sharp turn, you should shift to a low gear in advance to avoid a sharp drop in engine speed due to the use of emergency braking, making the steering speed unable to keep up and causing accidents.

17. When the electric excavator is connected to the power supply, the capacity breaker on the switch box must be taken out. It is strictly forbidden for non-electricians to install electrical equipment. When the excavator is walking, the cables should be moved by staff wearing pressure-resistant rubber shoes or insulating gloves. And pay attention to prevent the cable from scratching and leakage.

18. When the excavator is working, it is strictly forbidden to carry out repair, maintenance, fastening and other work. If there are abnormal noises, peculiar smells, excessive temperature rise, etc. during the work, stop the machine immediately for inspection.

19. When maintaining, overhauling, lubricating and replacing the pulley at the top of the boom, the boom should be dropped to the ground.

20. When working at night, the working area and cab should have good lighting.

4. After the excavator is working, the machine should be driven away from the work area and placed in a safe and flat place. Turn the fuselage to the right, make the internal combustion engine face the sun, put the bucket on the ground, put all the joysticks in the "neutral" position, brake all the brakes, and turn off the engine (the cooling water should be drained in winter). Carry out routine maintenance in accordance with the maintenance procedures.

Doors and windows must be closed and locked before leaving.

5. When the excavator can do short-distance self-transfer, the general crawler excavator's self-distance should not exceed 5 kilometers. Wheeled excavators can be unrestricted. However, no long-distance self-transfer is allowed.

6. When the excavator can be transferred by itself in a short distance, the running mechanism should be fully lubricated. When driving, the driving wheel should be at the rear, and the running speed should not be too fast.

7. When the excavator is loading and unloading the truck, it should be directed by an experienced loading and unloading worker. During loading and unloading, it is strictly forbidden for the excavator to turn or turn on the ramp. If a dangerous situation occurs during loading, the bucket can be lowered to assist in braking, and then the excavator will slowly retreat.

Excavator safety operating procedures

1. Pre-work preparation:

1. Carefully read the relevant instruction materials of the excavator, and be familiar with the use and maintenance of the vehicle being driven;
2. Understand the task situation of the construction site in detail, and check the solidity and stability of the soil where the excavator stops. When excavating foundation pits and trenches, check the stability of cuttings and trench slopes;
3. It is strictly forbidden for any personnel to stay in the work area, and the work site should be convenient for dump trucks to enter and exit;
4. Check the excavator's hydraulic system, engine, transmission, braking device, slewing device, and instruments and meters, and it can only work after a trial run and confirmation of

normality.

2. Requirements during operation and driving:

1. A signal should be issued before the operation starts;
2. When working, pay attention to selecting and creating a reasonable working surface, and it is strictly forbidden to dig holes; it is strictly forbidden to arrange the excavator to work in two excavation surfaces at the same time;
3. During operation, it is forbidden to adjust the engine, governor, hydraulic system, and electrical system casually; it is forbidden to crush solid objects with a bucket or use a rotary mechanism; it is forbidden to jack up the excavator with a bucket rod or bucket cylinder; Use the arm of the excavator to drag heavy objects on the side; it is forbidden to excavate the working device in a sudden drop;
4. The excavator should be loaded after the car has stopped. When unloading, the bucket should be lowered as far as possible without touching any part of the car, and the bucket should not pass over the cab;
5. When the hydraulic excavator is working normally, the hydraulic oil temperature should be between 50 degrees and 80 degrees. Before using the machine, if it is lower than 20 degrees, it must be preheated; when it reaches or exceeds 80 degrees, it should be stopped to dissipate heat.

3. Post-work requirements:

1. When the excavator is walking, it should be commanded by a special person, and the distance from the high-voltage line should not be less than 5 meters. Prohibition of walking backwards;

2. When walking downhill, drive at a low speed and at a constant speed, and sliding and changing speeds are prohibited;
3. The parking position and walking route of the excavator should keep a safe distance from the road surface, ditches and foundation pits;
4. When the excavator is parked on a slope, the bucket must be placed on the ground, and all operating levers must be placed in the neutral position;
5. After the work is finished, the machine body should be turned upright, the bucket should be placed on the ground, and all operating levers should be placed in the neutral position. The brakes of each part are used for braking, and the driver can leave only after the mechanical doors and windows are closed.

Single Bucket Excavator Safety Operating Regulations

1. The operation and walking site of the single-bucket excavator should be flat and firm, and the soft ground should be padded with sleepers or backing boards. The swampy area should be treated with roadbed first, or the special wetland track shoes should be replaced.
 2. Before using the tire excavator, the outriggers should be supported and kept in a horizontal position. The outriggers should be placed in the direction of the working surface, and the steering drive axle should be placed behind the working surface. For excavators with hydraulic suspension, the two suspension hydraulic cylinders should be locked. The driving wheels of the crawler excavator should be placed behind the working surface.
 3. The structure of the bucket is only suitable for digging. If it is used to sweep or tamp the ground, the bucket and boom will be damaged and deformed due to improper force.
- Therefore, when leveling the work site, do not use the bucket to sweep or Compact the

ground with a bucket.

4. The bucket cannot excavate more than five types of rocks and frozen soil, so it is necessary to take measures to blast or break rocks and frozen soil, otherwise the machine and the bucket will be seriously damaged. Therefore, when excavating rock, blasting should be carried out first. When excavating frozen soil, ice hammer or blasting method should be used to break up the frozen soil layer.

5. When the excavator is shoveling, except for loose soil, its maximum excavation height and depth should not exceed the performance regulations of the machine itself. During dragline or backhoe operation, the distance between the track and the edge of the working face should be greater than 1.0m, and the distance between the tire and the edge of the working face should be greater than 1.5m. And test each brake, after confirming that it is normal, it can work.

6. The key inspection items before operation shall meet the following requirements:

- (1) The lighting, signal and alarm devices are complete and effective;
- (2) The fuel oil, lubricating oil and hydraulic oil meet the requirements;
- (3), each hinge part is connected reliably;
- (4) There is no leakage in the hydraulic system;
- (5) The tire pressure meets the requirements.

7. Before starting, the main clutch should be disengaged, each joystick should be placed in neutral position, and the internal combustion engine should be started in strict accordance with the internal combustion engine starting procedure.

8. The purpose of no-load operation after the machine is started and before the operation is

to test whether the hydraulic system and various working mechanisms are normal. At the same time, the water temperature and oil temperature are increased to create conditions for safe operation. After starting, connect the power output, make the hydraulic system cycle from low speed to high speed for 10-20 minutes without load, there is no abnormal noise such as air suction, and the work is effective, and check the indication values of each instrument, and then engage the main clutch after the operation is normal. Carry out no-load operation, operate each working mechanism in sequence and test each brake, and work only after confirming correctness.

9. During operation, the fully loaded bucket needs to be raised, raised and rotated, the machine will vibrate, and the center of gravity will also change accordingly. Therefore, the excavator should be kept in a horizontal position, and the tracks or tires should be wedged tightly with the ground to maintain stability under various working conditions. The excavator should be kept in a horizontal position, the traveling mechanism should be braked, and the tracks or tires should be wedged tightly.

10. When encountering large hard stones or obstacles, they should be removed before excavation. Do not use buckets to break stones or frozen soil, or use single-sided bucket teeth to gnaw hard.

11. The bucket of the excavator moves according to a certain circular arc. When excavating soil under a cliff, there is a danger of landslides if there are umbrella edges and loose large rocks, so it is required to deal with it immediately. When excavating cliffs, protective measures should be taken. Umbrella edges and loose large rocks should not be left on the working surface. When a landslide danger is found, the excavator should be dealt with immediately or

withdrawn to a safe area.

12. Digging when the fuselage is not stationary, or turning the bucket before it leaves the working surface, will cause the bucket arm to be twisted due to lateral force; when the machine is turned, it is reversed to brake, and the impact force caused by inertia will be caused. and damage the steering mechanism. When working, you should wait for the machine body to stop before digging. When the bucket has not left the working surface, you must not perform actions such as turning or walking. When slewing braking, the slewing brake should be used, and the steering clutch should not be used for reverse braking.

13. During operation, each operation process should be smooth, and emergency braking is not suitable. The bucket should not be raised and lowered too violently, and it must not collide with the frame or track when it is lowered.

14. When the bucket arm is raised and turned, it must not touch the wall of the hole, the side of the groove or other objects.

15. When loading the earth-moving vehicle, it is advisable to lower the digging bucket to reduce the unloading height, and it is not allowed to load sideways or smash the carriage.

16. During the operation, when the expansion and contraction of the hydraulic cylinder will reach the limit position, it should move smoothly and not collide with the limit block. Do not load the car until the car has not stopped or the bucket needs to pass over the cab and the driver has not left.

17. During operation, when braking is required, the transmission valve should be placed in the low-speed position, because braking at low speed can reduce the impact force caused by inertia.

18. There are many reasons for the sudden change of the digging force. If you do not check the cause and rely on adjusting the pressure of the distribution valve to restore the digging force, not only cannot eliminate the fault that caused the sudden change of the digging force, but will cause overheating due to the increase in the load of the hydraulic pump. , During operation, when a sudden change in the digging force is found, the machine should be stopped for inspection, and it is strictly forbidden to adjust the pressure of the distribution valve without identifying the cause.

19. Do not turn on the switch of the pressure gauge during operation, and do not place the control handle of the working condition selection valve in the high gear position.

20. During backhoe operation, the bucket arm should stop firmly before digging. When digging, the bucket handle should not be too long, and the bucket should not be lifted too hard.

twenty one. During operation, when the crawler excavator is walking for a short distance, the driving wheel should be behind, the bucket arm should be parallel to the track in front, the slewing mechanism should be braked, and the bucket should be 1m above the ground. The uphill and downhill slopes must not exceed the maximum slope allowed by the machine itself, and the downhill should be driven at a slow speed. It is not allowed to shift gears and slide in neutral on slopes.

twenty two. Before driving the tire excavator, the outriggers should be retracted and fixed, and the monitoring instruments and alarm lights should be in the normal display state. The pressure of the barometer should meet the regulations, the working device should be in front of the driving direction, and the bucket should be 1m above the ground. When driving for a

long distance, the slewing platform should be locked with a fixed pin, and the slewing brake plate should be stepped on and locked.

twenty three. When walking on a slope and the internal combustion engine is turned off, brake immediately and wedge the tracks or tires, and continue walking after restarting.

twenty four. After the operation, the excavator shall not be parked near the high slope or in the filling area, but shall be parked in a solid, flat and safe area, retract the bucket and place it flat on the ground, place all control levers in the neutral position, close the control room and hangar.

25. The crawler excavator should be transported on a flatbed trailer when it is transferred to the construction site. When moving by itself in a short distance, slow down at a low speed, and check and lubricate the running mechanism every 500-1000m.

26. When maintaining or overhauling the excavator, in addition to checking the running status of the internal combustion engine, the internal combustion engine must be turned off, the hydraulic system must be unloaded, and the bucket must be grounded.

27. When the excavator is overhauled, the bucket can be used to lift one end of the excavator with the ground as the fulcrum by using the telescopic cylinder of the stick. If it is not padded after jacking up, there will be a danger of falling due to hydraulic pressure changes. When using a bucket to jack up the chassis for maintenance, the raised tires should be padded with wooden chocks, and the ground tires should be wedged with wooden wedges, and then the hydraulic system should be unloaded, otherwise it is strictly forbidden to work under the chassis.

Excavator safety operation rules and matters needing attention

1. When the excavator is working, it should be parked on a flat ground and the crawler walking mechanism should be braked.
2. No obstacles such as machinery and tools shall be piled up on the passageway of the excavator.
3. No one is allowed to stay within the working range of the excavator.
4. During the operation of the excavator, if underground cables, pipelines or other underground structures are found, the work should be stopped immediately and the relevant units should be notified immediately.
5. When the excavator is working, the driver should wait for the driver to brake the car and then turn to the car to dump the soil. When turning, it is forbidden to pass the bucket over the cab. hit any part of the car.
6. During operation, the shovel should not be too deep, and the lifting bucket should not be too strong. The excavation height cannot be higher than 4 meters at a time.
7. When shoveling, no one is allowed to stay or work under the suspended bucket.
8. When the excavator stops working, the bucket must not be suspended in the air. The driver's feet must not leave the pedals.
9. When the bucket is fully loaded, the inclination of the boom must not be changed.
10. During the excavation work, the "four prohibitions" should be achieved:
 - ① It is forbidden to turn the bucket when it has not left the working surface.
 - ② Rapid rotation is prohibited.
 - ③ It is forbidden to use the side of the bucket to scrape the mound.
 - ④ It is forbidden to use a bucket to impact the working face sideways.

11. The rotation range of the excavator arm should be controlled between 45°-60°, and the inclination angle should be controlled between 30°-45°.

12. When the excavator is going uphill, the track driving wheel should be at the back. When going downhill, the track driving wheel should be at the front, and the boom is at the back. The boom is parallel to the tracks. The slewing mechanism should be in a braking state, and the bucket should not exceed 1 meter from the ground. The up and down slopes should not exceed 20°C, and the downhill should be at a low speed, and variable speed sliding is prohibited.

13. It is forbidden to arrange the excavator to operate in the upper and lower mining sections (surfaces) at the same time; when the working surface rotates at the same time, the flat ground should be selected and obstacles in the passage should be removed. If moving on soft ground, it must be under the walking device. Pad square wood.

14. It is forbidden to work under high-altitude erected objects such as wires, and it is not allowed to work under the shutdown, and it is not allowed to stay in the space for a long time with a fully loaded bucket.

15. When the excavator needs to be parked on a slope, the bucket must be lowered to the ground, all control levers should be placed in the neutral position, the brake should be stopped, and wedges should be placed on the rear of the track or tire.

Precautions when excavators work in winter

When the temperature is extremely low, the drill degree of various oils increases, the engine will become difficult to start, and if the coolant freezes, it will damage the engine and water tank.

(1) Use diesel oil, engine oil and hydraulic oil with low box density.

(2) When using the machine in cold winter, the proportion of antifreeze added to the cooling system should be the proportion at the lowest temperature. Antifreeze based on methanol, ethanol or propanol is prohibited. Whether used alone or mixed with antifreeze, be sure to avoid the use of anti-leak agents. Do not mix one antifreeze with another antifreeze of a different brand: For permanent antifreeze, it does not need to be replaced within one year. If permanent antifreeze is not available, only glycol-free antifreeze without anti-corrosion agents is permitted in winter. In this case, the cooling system should be cleaned twice a year (in spring or autumn), and antifreeze should only be added in autumn, and no antifreeze should be added in spring.

(3) After the temperature drops, the capacity of the battery to allow electricity will decrease and may freeze. The battery should be covered or removed from the machine, put it in a warm place, and reinstall it before the next day's work. Seven. If it is found that the battery electrolyte level is too low, you should add distilled water before work the next morning, not after the day is finished, to prevent freezing at night.

(4) In order to prevent the machine from freezing due to mud and water, the machine cannot be started the next morning. The mud and water on the body must be completely removed to prevent mud or dirt from dripping into the sealing ring with water and damage the sealing device.

(5) Retract the piston rod of the hydraulic cylinder into the hydraulic cylinder barrel to prevent mud and water from sticking to the piston rod and damaging the hydraulic cylinder sealing ring.

(6) Park the machine on a hard and dry ground. If there is no condition, you can park the machine on a plank soil and drive away the next day.

(7) Open the drain valve to drain the water accumulated in the fuel system to prevent freezing.

(8) After the machine works in muddy water, the muddy water on the vehicle must be removed according to the following method. With the engine running at low speed, the upper unit is turned around so that the unit turns to the side of the track. Slowly press the unit toward the ground to slightly float the track and allow the track to idle to remove muddy water from it. The other side track also removes muddy water in this way.

(9) Since electrical equipment is particularly sensitive to water vapor, electrical equipment should be avoided from contacting water vapor when washing the car or encountering rain or snow. Since electrical components such as controllers and monitors are installed in the cab, snow and water must not be allowed to invade the cab.

Safe Use and Maintenance of Excavator Hydraulic System

The hydraulic system is widely used in construction machinery due to its advantages of compact structure, stable operation, easy operation and labor saving. However, if it is not properly used and maintained, it will greatly increase the failure rate and seriously affect the reliability and service life of the machine. How to use and maintain the hydraulic system correctly.

1 Correctly choose and use hydraulic oil to ensure the cleanliness of hydraulic oil and hydraulic system

2 Prevent the oil temperature from overshooting

3 Prevent the hydraulic system from entering the air

Correctly implement the operating procedures, prevent rough operation and random operation, and prevent contamination and impurities from mixing into the hydraulic oil

(1) Hydraulic oil and oil barrels should be installed in a clean and safe place, and management should be strengthened. The oil barrels, oil filter units, oil funnels, oil pipes, etc. used should be kept clean. The oil drums carrying hydraulic oil must be cleaned in advance, and the oil drums must be dedicated and not mixed with other oil drums.

2) The hydraulic machinery should always be kept clean. In order to prevent dust and debris from falling into the oil, the oil tank should be sealed with a cover.

(3) The oil in the oil tank should be replaced regularly according to the working conditions. When changing the oil, the dirt and impurities accumulated at the bottom of the fuel tank should be removed, and the fuel tank should be cleaned.

Prevent air from entering the hydraulic system In order to prevent air from entering the hydraulic system, the following points should be noted during use and maintenance:

(1) Check the oil level in the oil tank frequently to keep enough oil.

(2) During the working process, the oil will be lost, and new oil of the same specification must be replenished in time.

(3) Even at the lowest oil level, the oil suction pipe 1:3 and the oil return pipe opening should be kept below the oil level.

Excavator Maintenance

1. Fuel management

Different grades of diesel oil should be selected according to different ambient temperatures; diesel oil should not be mixed with impurities, dust and water, otherwise the fuel pump will be

worn out prematurely; the high content of paraffin and sulfur in inferior fuel oil will cause damage to the engine; daily work After the fuel tank is finished, the fuel tank should be filled with fuel to prevent water droplets on the inner wall of the fuel tank; open the drain valve at the bottom of the fuel tank to drain water before daily operation; after the engine fuel is used up or the filter element is replaced, the air in the road must be drained. Minimum ambient temperature 0°C -10°C -20°C -30°C Diesel grade 0# -10# -20# -35# .

2. Other oil management

Other oils include engine oil, hydraulic oil, gear oil, etc.; oils of different grades and grades cannot be mixed; different types of excavator oils have different chemical or physical additives added in the production process; to ensure Clean with oil to prevent the mixing of sundries (water, dust, particles, etc.); choose the grade of oil according to the ambient temperature and usage. If the ambient temperature is high, engine oil with high viscosity should be used; if the ambient temperature is low, oil with low viscosity should be used; the viscosity of gear oil is relatively high to adapt to large transmission loads, and the viscosity of hydraulic oil is relatively small to reduce liquid flow resistance. Table 2 Oil Selection for Excavators Outside

Temperature of Container	°C	Oil Type	Replacement Period h	Replacement Volume L	Engine
Oil Pan	-35-20	CD SAE 5W-30	250	24	-20-10
		CD SAE 10W -20-40			CD SAE 10W -30 -15-50
		CD SAE 15W-40			0-40
Swing Mechanism Box	-20-40	CD SAE 30	1000	5.5	Shock Absorber
Housing	CD SAE 30	6.8	Hydraulic Oil Tank	CD SAE 10W 5000	PC200:239 PC220 :246
		CD SAE 10W-30			CD SAE 15W-40
Final drive	CD SAE90		1000	5.4	

3. Grease management

The use of lubricating oil (butter) reduces wear on the moving surfaces and prevents noise.

When the grease is stored and stored, it should not be mixed with dust, sand, water and other impurities; it is recommended to use lithium-based grease G2-L1, which has good anti-wear performance and is suitable for heavy-duty working conditions; when filling, try to squeeze out all the old oil Remove and wipe clean to prevent sand from sticking.

4. Maintenance of filter element

The filter element plays the role of filtering impurities in the oil circuit or air circuit, preventing them from invading into the system and causing failure; all kinds of filter elements should be replaced regularly according to the requirements of the (operation and maintenance manual); when replacing the filter element, check whether there is metal attached to the old filter element. If there are metal particles found on the filter element, it is necessary to diagnose and take improvement measures in time; use a pure filter element that meets the requirements of the machine. Fake and inferior filter elements have poor filtering ability, and the surface and material quality of the filter layer do not meet the requirements, which will seriously affect the normal use of the machine. the

5. Contents of regular maintenance

①The fuel filter element and additional fuel filter element should be replaced after the new machine has been working for 250 hours; check the clearance of the engine valve.

②Daily maintenance; check, clean or replace the air filter; clean the inside of the cooling system; check and tighten the track shoe bolts; check and adjust the anti-tension of the track; check the intake heater; replace the bucket teeth; adjust the bucket clearance; check before Window cleaning fluid level; check and adjust the air conditioner; clean the cab floor; replace the breaker filter element (optional). When cleaning the inside of the cooling system, after the

engine is fully cooled, slowly loosen the water inlet cover to release the internal pressure of the water tank, and then release the water; do not clean when the engine is running, the high-speed rotating fan will cause danger; when cleaning or replacing the cooling system In case of liquid, the machine should be parked on level ground.

③ Inspection items before starting the engine. Check the liquid level of the coolant (add water); check the engine oil level, add oil; check the fuel oil level (add fuel); check the hydraulic oil level (add hydraulic oil); check whether the air filter is blocked; check the wires; Check whether the horn is normal; check the lubrication of the bucket; check the water and sediment in the oil-water separator.

④ Every 100 maintenance items. Boom cylinder head pin; boom foot pin; boom cylinder rod end; stick cylinder head pin; boom, stick connecting pin; stick cylinder rod end; bucket cylinder head pin ;Connecting pin of half-rod connecting rod; Rod end of bucket rod and bucket cylinder; Pin shaft of cylinder head of bucket cylinder; Connecting pin of arm connecting rod; Drain water and sediment.

⑤ Maintenance items every 250H. Check the oil level in the final drive box (add gear oil); check the battery electrolyte; replace the oil in the engine oil pan, replace the engine filter element; lubricate the slewing ring (2 places); check the tension of the fan belt, and check Adjust the tension of the air conditioner compressor belt.

⑥ Maintenance items every 500h. Carry out every 100 and 250H maintenance items at the same time; replace the fuel filter; check the height of the rotary pinion grease (add grease); check and clean the radiator fins, oil cooler fins and cooler fins; replace the hydraulic oil Filter element; replace the oil in the final drive box (only at 500h for the first time, and once every

1000h thereafter); clean the air filter element inside and outside the air conditioner system; replace the hydraulic oil vent filter element.

⑦Maintenance items every 1000h. Carry out maintenance items every 100, 250 and 500 hours at the same time; replace the oil in the slewing mechanism box; check the oil level of the shock absorber housing (back to the engine oil); check all the fasteners of the turbocharger; check the turbocharger rotor Check and replace the tension of the generator belt; replace the anti-corrosion filter element; replace the oil in the final drive box.

⑧Maintenance items every 2000h. First complete the maintenance items every 100, 250, 500 and 1000h; clean the filter screen of the hydraulic oil tank; clean and check the turbocharger; check the generator and starter motor; check the engine valve clearance (and adjust); check the shock absorber.

⑨Maintenance over 4000h. Increase the inspection of the water pump every 4000h; increase the replacement of hydraulic oil every 5000h.

⑩Long-term storage. When the machine is stored for a long time, in order to prevent the piston rod of the hydraulic cylinder from rusting, the working device should be placed on the ground; the whole machine should be washed and dried and stored in a dry indoor environment; The machine is parked on a well-drained concrete floor; before storage, fill up the fuel tank, lubricate all parts, replace hydraulic oil and engine oil, apply a thin layer of butter to the exposed metal surface of the piston rod of the hydraulic cylinder, and remove the negative terminal of the battery, or Remove the battery and store it separately; add an appropriate proportion of antifreeze to the cooling water according to the lowest ambient temperature; start the engine once a month and operate the machine to lubricate the moving

parts and charge the battery at the same time.

Talking about the maintenance knowledge of second-hand excavators

For fully hydraulic second-hand excavators, it can be said that the hydraulic system is like the blood of the human body? The ring system spreads throughout the entire excavator. It includes hydraulic oil tanks, main pumps, multi-way valves, various pipelines and various actions Hydraulic cylinders, motors and other components, these hydraulic components are all precision machined, they have high requirements for the maintenance of the hydraulic system, if the maintenance is not done properly or not maintained, it will lead to failures, cause the machine to stop, and give You bring loss.

Three main points to keep the hydraulic system clean

Cleanliness is the primary concern when hydraulic oil enters the hydraulic system for operation. It prevents dirt and other impurities from entering the system.

When tiny foreign particles get into a hydraulic system, they can scratch pumps, jam valves, clog ports and cause machine failure.

How to keep hydraulic system clean?

There are three main points: keep the hydraulic fluid clean; keep the system clean; keep the work area clean.

Keep hydraulic oil clean

Store the oil in a clean place, and care must be taken when changing or refueling the oil. Only use a clean funnel fitted with a fine mesh strainer to pour oil from the container into the tank.

Of course, the hydraulic oil you use must be the genuine type.

keep the system clean

(1) Regularly replace hydraulic oil and filters

A good hydraulic oil contains a variety of additives that prevent the oil from deteriorating. However, these additives lose their effectiveness after a period of time. The oil should therefore be changed regularly to ensure that the additives do their job. Filters can only absorb a limited number of dirt particles and other impurities from the oil. For various series (medium-sized) machines, please replace the oil return filter of the hydraulic oil tank every 1000 working hours, and clean the oil suction filter of the hydraulic oil tank when changing the hydraulic oil, so as to keep the system clean.

When replacing the hydraulic oil filter, please check whether there are metal particles or debris at the bottom of the filter; if there is iron powder or iron filings, it indicates that the hydraulic pump, hydraulic motor or valve may be damaged or will be damaged, such as rubber, it indicates that the hydraulic cylinder is sealed parts are damaged.

(2) Drain the dirt from the oil tank regularly: It is very important to discharge the water and sediment in the oil tank regularly to remove impurities in the oil, but it is also very important to replace the hydraulic oil in the entire hydraulic system regularly. This is the only reliable way to completely remove system impurities, oxidized hydraulic fluid and other harmful impurities. Then, clean hydraulic fluid should be refilled into the hydraulic system.

Please clean the hydraulic oil tank storage tank for dirt every 250 working hours.

(3) Cleaning: If the hydraulic oil is contaminated, especially when the pump or cylinder or motor is damaged, all hydraulic oil must be replaced and the oil tank must be cleaned.

keep the work area clean

When topping up or refilling hydraulic oil into the tank, make sure the area around the filter

box cover is clean.

Use only clean funnels or containers. Never bring dirt into the system. When maintaining the hydraulic system, use only clean plastic plugs to seal the ends of the lines. When maintaining hydraulic components, the workbench must be absolutely clean. Check the condition of the used jobs, they should also be very clean.

Causes of hydraulic hose assembly failure

(1) When the hydraulic hose assembly is crimping the joint, the crimping pressure is too high, and the inner rubber layer of the hose will be damaged, resulting in oil leakage.

(2) When the hydraulic hose assembly is crimping the joint, the crimping pressure is not enough, resulting in oil leakage, oil leakage and pull-off.

(3) The processing accuracy of the joints is not up to standard, resulting in oil leakage and oil leakage at the joints.

(4) The use method is incorrect, resulting in reduced service life.

Excavator inspection before starting the engine

Machine operation and control

◆ Before starting the engine

● Perform inspection

◇ Before starting the engine, inspect the machine and its underside. Look for loose bolts or nuts, oil, fuel or coolant leaks, and check the condition of the working equipment and hydraulic system. Also check for loose wires near heat, for gaps and dust buildup.

· When carrying out inspection and maintenance, be sure to open the engine rear cover and dust cover to the position where they can be fixed by the stopper. For cooling covers, set the lever in the locked position to hold the cover in place.

· Remove flammable materials around the battery, engine muffler or other hot engine parts. Leakage of fuel or oil can cause the machine to catch fire. Check carefully and repair any abnormalities or contact your Komatsu dealer.

· Check that the floor is securely held in place by the bolts (1). Failure to do so can result in serious personal injury.

◇ If the machine is tilted, re-adjust to a horizontal position before inspection. Before starting the engine every day, carry out the following inspection and cleaning.

1. Check working equipment, cylinders, connecting rods, hoses for damage, wear or play.

Check working equipment, cylinders, connecting rods or hoses for cracks, excessive wear or play. If any abnormality is found, repair it.

2. Remove dirt and dust from around the engine, battery and radiator.

Check for dirt or dust that has accumulated around the engine or radiator. Also check for flammable materials (dried leaves, twigs, etc.) around the engine muffler or other hot engine parts. Remove dirt, dust and flammables.

3. Check for water or oil leaks around the engine.

Check the engine for oil leaks and the cooling system for water leaks. If any abnormality is found, repair it.

4. Check the hydraulic device, hydraulic oil tank, hoses and joints for oil leakage.

Check that there should be no oil leakage. If any abnormality is found, repair the oil leak.

5. Check the lower walking body parts

Check the track shoes, sprockets, guide wheels, and guards for damage, wear, loose bolts or oil leakage from the rollers, etc. If a fault is found, it must be repaired.

6. Check Handrails and Steps

Check handrails and steps for damage or loose bolts, and if so, repair damaged parts and tighten loose bolts.

7. Check whether the instruments and monitors are abnormal.

Check that the instruments and monitors in the cab should be normal. If any abnormality is found, replace the parts. Remove foreign matter from the surface.

8. Seat belts and securing clips.

Check seat belts and restraints for damage or wear. If damaged, replace with new parts.

9. Check floor tilt locking bolts

· Open the rear cover of the engine and check whether the floor tilt lock bolts (1) are firmly tightened. Cab Specifications: 4 If any bolt is loose, tighten it.

· If there is a vertical play in the floor frame or a play in (A) (normal: 0mm), the lock bolt (1) may be broken or loose, so check the lock bolt (1). If any abnormalities are found, be sure to have them repaired and ask your Komatsu dealer for repairs. When tightening the loose bolts, also tighten the 2 bolts on the inside of the triangular cover on the left side of the engine. For details on the tightening procedure, see How to Open or Close the Floor, "When Closing (Tilt to Close)"

10. Inspect the hooked bucket (if equipped) for damage.

Check the hook, guide or hook block for damage

Abnormal oil pressure fault analysis of excavator

When an excavator was working, an oil failure alarm suddenly appeared on the dashboard. The driver immediately stopped to check, and checked the oil level and viscosity through the oil dipstick. Is it normal? Remove the oil filter element to check whether the filter element is normal? The above two items of inspection results are normal, because there is no suitable inspection tool, no further inspection is possible, the customer hopes that we can help them to do further inspections to eliminate the fault and restore the machine to normal use. What causes the engine oil pressure to be abnormal during the working process of the engine?

We first do a detailed cause analysis.

The lubrication system of diesel engine is mainly composed of oil pan, oil pump, oil filter, radiator, main oil passage, oil distribution passage, low oil pressure alarm sensor, high oil temperature alarm sensor, pressure limiting valve and bypass Valve composition. The main causes of low oil pressure are as follows:

1. Insufficient engine oil

If the amount of engine oil is insufficient, the pump oil volume of the oil pump will be reduced or the pump will not be filled with oil due to air entering, so that the oil pressure will drop, and the crankshaft and bearings, cylinder liners and pistons will all aggravate wear due to poor lubrication. Therefore, the oil level in the oil pan should be checked before working every day to ensure that the oil level is normal. If it is insufficient, the same type of oil produced by the same manufacturer should be added.

2. The oil pump does not turn

If the drive gear of the oil pump and the flat key of the drive shaft are damaged or fall off; the filter is damaged and the oil pump sucks in foreign matter, and the gear is stuck, the oil pump will stop and the oil pressure will drop to zero. At this time, the damaged flat key or filter should be replaced.

3. Oil pump wear

When the gap between the pump shaft and the bushing of the oil pump, the gap between the gear end face and the pump cover, the tooth side gap or the radial gap is too large due to wear, the pump oil volume will decrease and the oil pressure will drop. At this time, the worn parts should be replaced, and the inner plane of the pump cover should be ground to restore the gap between it and the end face of the gear to the standard range.

4. The engine temperature is too high

If the engine cooling system has too much scale, poor heat dissipation, long-term overload operation or too late oil supply time of the fuel injection pump, etc., the engine will overheat, accelerate the aging, deterioration and thinning of the oil, leak from the matching gaps, and reduce the pressure. The scale should be removed, the fuel supply time should be adjusted, and the engine should work within the rated load.

5. The fit clearance between the main bearing and the connecting rod bearing increases

After the engine has been used for a long time, the matching clearance between the main crankshaft and the connecting rod bearing will gradually increase, the leakage will increase, and the oil pressure will drop. For every 0.01mm increase in the fit gap, the pressure will drop by 0.01MPa. At this time, the crankshaft can be ground, and a new connecting rod bearing and main bearing can be selected to restore its fit clearance.

6. The bypass valve is damaged

In order to maintain the normal oil pressure of the main oil passage, a bypass valve is provided. If the pressure regulating spring is softened or improperly adjusted, the matching surface between the valve seat and the steel ball is worn or stuck and the valve is not closed tightly, the oil return will increase, and the main The pressure in the oil passage will drop. At this time, the bypass valve should be removed for inspection, and finally the pressure should be adjusted to the normal range.

7. Oil radiator leakage

External leakage will pollute the surface of the engine and the pressure will drop; internal leakage will cause the oil to enter the water tank, the cooling effect of the cooling system will become poor, the engine will overheat, the oil will become thinner, and the pressure will drop. Remove the radiator and repair or replace it to restore its function.

8. The pressure sensor fails or the oil passage is blocked

If the pressure sensor fails or the oil passage from the main oil passage to the pressure sensor is blocked and the oil flow is not smooth, the oil pressure will drop. The following checks can be done: run the engine at idle speed, loosen the oil pipe joint, observe the oil flow, determine the fault location, replace the pressure sensor or clean the oil passage.

9. The set pressure of the pressure limiting valve is too low

In the lubrication system, the oil pumped by the oil pump must ensure proper pressure before reaching the lubricating parts of the engine. If the set pressure of the pressure limiting valve is too low, the pressure regulating spring becomes soft or the sealing surface leaks, the set pressure will be too low. At this time, the pressure limiting valve should be adjusted to restore the pressure to normal.

10. The engine oil grade is not suitable

Different engines need to add different brands of oil, and the same type of engine should also use different brands of oil in different seasons. If the selected engine oil is inappropriate or inferior, the engine will leak more and the pressure will drop due to the low viscosity when the engine is running. Engine oil should be selected correctly and reasonably to adapt to different models or seasons.

11. The oil filter is clogged

When the oil filter is clogged and unable to circulate, the bypass valve located on its base is opened, and the oil directly enters the main oil passage without being filtered. If the opening pressure of the bypass valve is set too high, when the oil filter is blocked, it cannot be opened in time, the pressure of the oil pump will increase, the internal leakage will increase, the oil supply to the main oil passage will decrease, and the oil will The pressure will drop. The oil filter should be kept clean; the opening pressure of the bypass valve should be adjusted correctly, and the damaged components or mating surfaces should be replaced or repaired in time to restore its normal working performance.

12. The filter is blocked

Under normal circumstances, the oil pressure should be higher when the throttle is large than when the throttle is small, but sometimes there will be abnormal situations. If the oil is too dirty and viscous, it is easy to block the filter. When the engine is running at a low speed with a small throttle, the main oil passage can still build up a certain pressure due to the small amount of oil absorbed by the oil pump, so the oil pressure is normal; The resistance is too large and obviously reduces, so the indication value of the oil pressure gauge decreases due to insufficient oil supply in the main oil passage. The suction filter should be cleaned, or the oil should be replaced.

Through the above analysis, we took the oil pressure gauge and oil quality analyzer to the construction site, and used the oil quality analyzer to test the quality of the oil, and found that the viscosity and degree of pollution of the oil met the requirements. Connect the oil pressure gauge, measure the oil pressure at low speed and high speed, and find that the oil pressure is lower than 0.15MPa. Normally, the oil pressure is 0.15MPa at low speed and 0.6MPa at high speed, so you can know that the oil pressure is low. Normal pressure cannot be achieved. We checked the bypass valve on the oil filter seat according to the principle of simple to complex, from the outside to the inside. After disassembly, we found that the seal between the steel ball and the valve seat was not tight, resulting in oil leakage and pressure drop. By grinding the sealing surface, restore its sealing performance, adjust the pressure to the standard value, and the oil pressure alarm light goes out, indicating that the machine returns to normal and the fault is resolved.

By eliminating this fault, it shows that mechanical failure is not terrible. As long as you understand the working principle of the system and analyze it carefully, you will be able to eliminate the fault, but don't blindly disassemble it, otherwise, you will get twice the result with half the effort and even damage the components that work normally.

Excavator diesel engine dirt removal method

After the diesel engine has been working for a period of time, carbon deposits will be generated in the combustion chamber, intake and exhaust valves, intake and exhaust manifolds and exhaust pipes due to incomplete combustion; Grease scale; for water-cooled diesel engines, a certain thickness of scale will condense in the cooling water cavity. Too much dirt will reduce the performance of the diesel engine, increase the fuel consumption, increase the engine temperature, destroy the normal fit clearance of parts, accelerate the wear and corrosion of parts, and even cause some failures. Therefore, the dirt must be removed in time. In addition, when the diesel engine is being maintained and repaired, it is also necessary to remove carbon deposits, oil stains and scales to reduce the failure rate of the diesel engine, prolong its service life, and maintain its good working condition.

1. Cleaning method of diesel engine dirt

The method of removing dirt from diesel engine parts is mainly related to the type, material, size and quantity of the parts, the requirements for automatic removal, and the overall impact on subsequent operations.

1.1 Mechanical removal

Use a steel brush, sandpaper or an abrasive nylon roller to remove the metal on the surface of the part. This method is more commonly used.

1.2 Solvent wipe

Wipe with absorbent material dampened with solvent, commonly used solvents are petroleum and chlorinated solvents. Many solvents are flammable and can cause fires, so non-flammable solvents should be used. In addition, the type of metallic material to be removed shall be specified to keep the removed parts free from corrosion

1.3 Emulsion removal

Emulsion removal is the use of organic solvents suspended in water. Effectively removes grease and other contaminants and leaves a thin film of rust preventive oil on metal surfaces. Since this removal method uses a solvent, there is a fire hazard and the spent solvent should be handled with care.

1.4 semi-water removal

There are two main ways to remove semi-water: one is the above-mentioned emulsion removal; the other is to wipe with solvent first, and then rinse in water. Commonly used solvents are terpenes,

Esters and hydrocarbons.

1.5 alkaline washing

Alkali metal salts (caustic alkali, silicate and carbonate) mixed with surfactants prepared according to the appropriate ratio are very effective for removing metal dirt, dissolved in hot water and sprayed on dirty parts, generally Can remove most of the dirt on the metal surface, its cost is the lowest, it is a suitable method for batch automatic removal.

1.6 pickling

Inorganic acids are usually used, but organic acids can also be used. The purpose of rust removal and descaling can be achieved by adding a wetting agent in the acid solution.

1.7 Vapor degreasing

Vapor degreasing uses chlorinated solvents or freons and is used only for oil removal. Its main advantage is that it can achieve degreasing and drying effects in one step, that is, it does not need to be rinsed and dried, and it can be automated. But the cost is high, and the escaped solvent is a harmful substance that seriously affects people's health and destroys the ozone layer.

2. Reasonable selection of cleaning methods

In the process of removing dirt from diesel engine parts, it is generally not limited to a certain method, but a combination of several methods. Therefore, in the process of use, attention should be paid to the reasonable selection of these methods.

2.1 Removal of carbon deposits

Carbon deposits are usually removed mechanically, that is, different tools are selected according to the material of the machine part and the surface shape and quality requirements of the part. Commonly used tools include spatulas, scrapers, copper wire brushes, copper-aluminum metal sheets, and sandpaper. For parts with smooth surfaces such as aluminum-copper alloys, care should be taken not to leave scratches when cleaning, because scratches will make carbon deposits more likely to adhere and accumulate.

2.2 Grease removal

(1) Solvent wipe. The solvents used usually include light diesel oil, lamp kerosene, solvent kerosene, washing kerosene, industrial gasoline and aviation washing gasoline. Diesel is used to remove general parts, and the cleaned parts will not rust quickly. However, the evaporation rate of diesel oil is slow, and it should be dried with compressed air as soon as possible after cleaning to prevent dust pollution in the air; kerosene and industrial gasoline are used to remove precision parts; aviation washing gasoline has strong evaporation and is only used to remove special precision parts.

Solvent wiping is easy to operate and has high removal accuracy, but it is not economical, and fire prevention measures must be taken when using it.

(2) Chemical removal method. The method steps for metal parts to be removed by chemical removal method are:

a. Select a cleaning solution with an appropriate formula;

- b. Heat the cleaning solution to 70-90°C;
- c. Soak the parts in the lotion for 10-15 minutes, and remove them with a brush;
- d. Rinse with clean water;
- e. Blow dry with compressed air.

Rubber, cowhide and other parts (such as cups, leather rings, etc.) should be cleaned with alcohol, not with alkaline solution, otherwise, the rubber parts will swell and deteriorate and become invalid.

2.3 Scale removal

When the scale is exposed on the surface of the part, it is generally removed by hand; when it is inconvenient to remove it by hand, chemical removal can be used. The method is: put the removed part in an alkaline solution

(10-15% sodium hydroxide solution) or acidic solution (4-6% hydrochloric acid solution), heat to 60-70°C, soak for 2-3 hours, the scale can be decomposed, and then rinse with clean water.

3. Examples of comprehensive application of cleaning methods

3.1 Removal of dirt from the fuel tank

(1) Purging method. That is to keep part of the diesel in the fuel tank, and then pass the compressed air of 19.6-29.4KPa into the bottom of the fuel tank through a plastic pipe to make the diesel churn for cleaning, and constantly change the position and direction of the lower end of the air pipe to clean the entire fuel tank. Immediately after purging, discharge the diesel oil in the fuel tank, so that the impurities suspended in the oil flow out with the diesel oil. If the outflowing diesel oil is dirty, use the above method to clean it again until the outflowing oil is free of impurities.

(2) Steam method. Drain the diesel oil, remove the fuel tank, then fill half of the tank of water into the diesel tank, guide the steam into the water from the filler port, and make the water in the diesel tank boil for about 1 hour. In this way, the colloid and residual diesel molecules adhering to the inner wall of the tank can be dissolved in water. Lightweight dirt floats to the surface and is washed away. In this way twice in a row, the diesel tank can be rinsed clean.

(3) Solvent method. Clean the diesel tank with hot water, then blow it dry with compressed air to remove the diesel vapor inside, and finally put the diesel tank into the aqueous solution containing 10% sodium hydroxide for immersion. Rinse the inside and outside of the diesel tank with clean water after soaking. If any rust is found on the outside, clean it with a wire brush.

3.2 Cleaning of dirt in the cooling system

Inject 15% sodium hydroxide solution into the system, run the diesel engine after 8-12 hours, stop the engine when the water temperature rises to 80-90°C, and release the washing solution immediately to prevent the scale suspended in the solution from clogging the waterway, and then use clean water Flush the system until it is clean.

If the cylinder head of the diesel engine is made of aluminum alloy, the cleaning liquid can be prepared according to the ratio of 50g of sodium silicate, 20g of liquid soap, and 10kg of water, and then add it to the cooling system. Rinse with water.

Excavator Diesel Use Skills

Use diesel oil after 48 hours of precipitation

Practice has proved that most of the impurities in diesel oil are soil particles, lime sand, rock powder and tiny dust. The main components of these impurities are sulfur and alumina. If diesel oil is directly used in the fuel system without purification treatment such as sedimentation and filtration, even small impurities will be treated like abrasives under high pressure and high speed after entering the plunger pair, oil delivery valve, and fuel injector. Grinding the surface of precision parts, destroying their finish and fit clearance. If things go on like this, the combustion process of the engine will deteriorate, the exhaust will emit smoke, carbon deposits will be produced, the engine oil will age and deteriorate, and the lubrication effect will be weakened, thereby changing the technical state of the machine and affecting the work of various parts of the engine. Therefore, before the diesel oil is added to the fuel tank, it should settle for at least 48 hours, so that most of the various particles in the diesel oil will settle to the bottom layer. When the diesel oil is about 20 cm away from the bottom of the barrel, it should be poured into a closed container, and after sufficient precipitation, take the middle and upper layer oil and add it to the fuel tank.

Don't run out of fuel in the tank

When the fuel is about to run out, the impurities in the fuel will enter the coarse and fine filters of the diesel, which will easily cause blockage. In addition, air is easy to enter the low-pressure oil circuit, which makes it difficult to start the engine. Even if it can be started, the speed is unstable during operation.

Do not mix old and new engine oil

At present, in order to reduce operating costs, a small number of machine operators leave some waste engine oil when changing the engine oil, and add half or most of the new engine oil to mix it. As everyone knows, this approach is not worth the candle. Because waste engine oil contains a lot of oxidizing substances, colloidal carbon particles, and many iron filings, etc., it will greatly shorten the service life of fresh engine oil and increase the speed of sports wear. ACCIDENT.

Do not add spoiled oil to the gearbox

In order to save maintenance costs, some operators add the waste engine oil in the oil pan to the gearbox, which is not worth the candle. Because the deteriorated engine oil contains a lot of mechanical impurities, adding it to the gearbox will cause the moving parts to wear faster. In addition, after the waste engine oil is added, the gear oil will become thinner and the gear wear will be aggravated. However, the replaced used oil can be added to the air filter oil pan to save fresh oil.

It is strictly forbidden to use gasoline engine oil instead of diesel engine oil

Gasoline engine oil has low viscosity and is suitable for use under light loads. Diesel engine oil has a high viscosity and is suitable for use under heavy loads. These two kinds of engine oil additives and anti-oxidation properties are different. If they are substituted, the service life of the bearing bush will be greatly reduced.

Engine oil must be used after 96 hours of precipitation

Fresh engine oil contains a certain amount of mechanical impurities. Before use, it must settle for more than 96 hours, and then take the upper part of the clean engine oil for use. In addition, it is forbidden to refuel in dusty places, and special refueling tools such as refueling barrels and hand oil pumps must be wiped clean.

The oil level must not exceed the upper mark line

If the oil level of the engine oil exceeds the upper mark line, it will not only increase the oil consumption, cause the engine oil to burn, generate carbon deposits in the cylinder, increase the carbon particles in the engine oil, but also accelerate the wear of the cylinder and other parts and shorten the service life. In addition, the excess engine oil is sucked into the cylinder, which is easy to cause a speeding phenomenon.

Precautions for excavator maintenance

1. Don't just add oil but don't change it

Engine oil is essential in the use of diesel engines, mainly for lubrication, cooling, cleaning and other functions. Therefore, many drivers will pay attention to check the amount of lubricating oil and add it according to the standard, but they ignore the inspection of the quality of the lubricating oil and the replacement of the deteriorated oil, resulting in the moving parts of some engines always being in poor lubricating conditions. Operating in the environment, thereby accelerating the wear and tear of various parts. Under normal circumstances, the loss of engine oil is not large, but it is easily polluted, thus losing the role of protecting the diesel engine. During the operation of the diesel engine, many dirt (soot, carbon deposits and fouling generated by incomplete combustion of fuel) will enter the engine oil. For new or overhauled machinery, there will be more impurities after trial operation. If you just add it without changing it, you are eager to put it into use, which will easily cause accidents such as tile burning and shaft holding. In addition, even if the engine oil is changed, some drivers will not thoroughly clean the oil passage due to lack of maintenance experience or to save trouble, so that mechanical impurities still remain in the oil pan and oil passage. the

2. Avoid using butter indiscriminately

(1) Apply butter to the cylinder head gasket. Butter is a grease commonly used in the repair of construction machinery, which can play the role of lubrication and sealing. Therefore, some repairmen will put a layer of butter on the cylinder gasket when installing the cylinder gasket, thinking that this can increase the sealing of the diesel engine. As everyone knows, doing so will affect the working performance of the diesel engine. Cylinder gasket is the most important seal between the cylinder block and the cylinder head of a diesel engine. It can not only seal the high-temperature and high-pressure gas generated in the cylinder, but also seal the cooling water and lubricating oil in the cylinder head and cylinder body. Therefore, in

When disassembling the cylinder gasket, pay special attention to its sealing quality. If butter is applied to the cylinder gasket during installation, when the cylinder head bolts are tightened, part of the butter will be squeezed into the cylinder water channel and oil passage, and the butter remaining between the cylinder gasket will flow due to the high temperature when the cylinder is working. The other part remains on the joint surface between the cylinder block and the cylinder head, so that there is a gap between the cylinder gasket, the cylinder head and the plane of the body, and the high-temperature and high-pressure gas can easily impact the cylinder gasket from here, destroying the cylinder gasket and causing leakage. gas. In addition, when the butter is at high temperature for a long time, it will also produce carbon deposits, which will cause premature aging and deterioration of the cylinder pad. Therefore, do not apply butter when installing the cylinder head gasket. the

(2) Grease the tire nuts. In order to tighten the nuts easily and prevent corrosion, many repairmen oil the bolts and nuts of tires. In fact, this is a wrong approach. Because after the tire nut is tightened, the thread has a self-locking feature. This is because the thread helix angle is smaller than the equivalent friction angle between threads. In a given bolt connection, the helix angle is a certain value, while the equivalent friction angle changes with the friction state between threads. Obviously, the equivalent friction angle between threads decreases after oiling, and the self-locking performance of bolted connection becomes worse. Therefore, never apply grease or drip lubricating oil on the bolts and nuts of the tire. Doing so will loosen the nuts and even cause accidents. the

3. Avoid installing new cylinder liners and pistons without matching.

When replacing cylinder liners and pistons, it is considered that the new cylinder liners and pistons are standard parts and are interchangeable, so they can be used after installation. In fact, the dimensions of the cylinder liner and the piston have a certain tolerance range. If the cylinder liner of the largest size is matched with the piston of the smallest size, the matching clearance will be too large, resulting in weak compression and difficulty in starting. Therefore, it is necessary to check the size group code of the standard cylinder liner and piston when changing the assembly. The size group code of the standard piston and the standard cylinder liner must be the same for the cylinder liner and piston used. Has a standard fit clearance. In addition, when each cylinder is equipped with the cylinder liner and piston of the same group code, it is also necessary to pay attention to the inspection of the cylinder plug gap before installation. In order to ensure the assembly standard, an inspection should be carried out before installation to prevent fake and inferior products from being installed. . the

4. Do not check the plunger stroke allowance

During the commissioning of the plunger fuel injection pump, many maintenance personnel do not pay attention to check the stroke allowance of the plunger. The so-called stroke margin of the plunger refers to the amount of movement that the plunger can continue to move upward after it is pushed to the top dead center by the cam on the camshaft. After adjusting the oil supply start time, the reason for checking the stroke margin is because the stroke margin of the plunger is related to the wear of the plunger and the sleeve. After the plunger and the sleeve are worn out, the plunger has to move up for a while to start the oil supply, thus delaying the start time of the oil supply. When the adjusting bolt is unscrewed or a thicker adjusting pad or gasket is replaced, the lowest position of the plunger will move up, so that the stroke allowance of the plunger will be reduced. Therefore, when repairing and debugging the fuel injection pump, the stroke margin should be checked first to determine whether the fuel injection pump is still allowed to be adjusted. During the inspection, the following different methods should be adopted according to the different structures of the fuel injection pump: a) Turn the camshaft, push the plunger to the top dead center, remove the oil outlet valve and valve seat, and measure with the depth vernier. b) After the plunger is pushed to the top dead center, use a screwdriver to pry up the spring seat of the plunger spring to make the plunger rise to the highest point. Then insert a thickness gauge between the lower plane of the plunger and the tappet adjustment bolt to measure. The standard stroke allowance of the plunger is about 1.5mm, and the limit stroke allowance after wear should not be less than 0.5mm. the

5. Avoid inaccurate cylinder clearance measurement

When measuring the cylinder clearance, it cannot be measured in the direction where the piston skirt is perpendicular to the piston pin hole, but in other directions. The structural feature of the aluminum alloy piston is that the top is small and the bottom is big, which is a cone, and the cross-section of the skirt is elliptical, so the cylinder clearances along the circumferential direction are not equal. When measuring, it is stipulated that the clearance in the direction of the long axis of the ellipse shall prevail, that is, the clearance of the piston skirt perpendicular to the direction of the piston pin hole shall be measured. In this way, the measurement is more convenient and accurate, and in the reciprocating motion, the direction of the piston skirt perpendicular to the piston pin hole wears a lot due to the side pressure. Therefore, when measuring the cylinder clearance, the piston skirt should be perpendicular to the piston pin hole. Orientation measurement of the pin hole.

6. Avoid heating the piston with an open flame

Since the piston and the piston pin are interference fit, when installing the piston pin, the piston should be heated and expanded first. At this time, some maintenance personnel will directly heat the piston on an open flame. This is very wrong, because the thickness of each part of the piston is uneven, and the degree of thermal expansion and contraction will be different. Open flame heating will cause uneven heating of the piston, which is easy to cause deformation; carbon dust will also adhere to the surface of the piston, which will reduce the service life of the piston. If the piston cools naturally after reaching a certain temperature, its metallographic structure will be damaged and the wear resistance will be greatly reduced, and its service life will also be significantly shortened. When installing the piston pin, the piston can be heated evenly in hot oil to make it expand slowly, and it must not be heated directly with an open flame. the

7. Do not use emery cloth to polish the bearing bush

For some inexperienced repairmen, scraping tiles is a difficult job. Because the tile scraping technology is difficult to master, it is difficult for the bearing tiles to meet the technical requirements. The contact area of the crankshaft is polished with emery cloth instead of scraping tiles. This method is extremely inadvisable in actual maintenance, because the abrasive grains on the emery cloth are relatively hard, while the bearing alloy is soft, so the sand grains are easily embedded in the alloy during grinding, and the wear of the journal will be accelerated when the diesel engine is working. shortened crankshaft life. the

8. Avoid tightening the bolts too tightly

During the disassembly and assembly process of construction machinery, the bolts of many parts have specified torque requirements, such as the transmission box, cylinder head, wheel hub, connecting rod and front axle. Feel free to change. But many users mistakenly believe that tightening is safer, but tightening too much can cause the screw or bolt to break, and it may also cause failure due to thread slippage. the

9. Avoid high tire pressure

The tire inflation pressure of wheeled construction machinery is an important factor in determining its service life and work efficiency. Too high or too low tire pressure will affect its service life, and it is not conducive to safe driving, especially in hot summer. The scientific inflation standard should be: take the standard air pressure of the tire as the benchmark, and adjust the tire air pressure slightly as the temperature changes. For example: summer should be 5%-7% lower than winter, because the temperature in summer is high, the gas is heated, and the pressure increases. On the contrary, it must reach the standard air pressure or slightly lower in winter. the

10. Avoid boiling the water tank and adding cold water suddenly

Overloading of the engine, poor heat dissipation or lack of water in the water tank will cause the water tank to boil. If cold water is added immediately at this time, the cylinder head and cylinder block will burst. Therefore, once the water tank is found to be boiling during use, emergency measures should be taken to stop the operation so that the cooling water of the diesel engine can cool down by itself.

General knowledge of excavator safety operation

Both the driver and the on-site staff must fully grasp the operating procedures and operate strictly in accordance with the operating procedures to prevent accidents and eliminate hidden dangers of accidents:

1. Common sense of safe operation that needs to be paid attention to at any time

(1) When operating and maintaining, be sure to read the safety regulations, precautions, operating procedures and instructions in the product instruction manual.

(2) It is forbidden to wear loose, damaged and oily clothes, jewelry and long hair on the job site. During operation or maintenance, safety helmets, protective glasses, masks, gloves, and working shoes should be worn.

(3) There should be a fire extinguisher on board and know how to use it. A first aid kit should be available in the storage area, as well as the telephone number of the emergency contact person in case of an emergency.

(4) When leaving the driver's seat, be sure to put the safety lock lever firmly in the locked position. Before leaving the machine, fully lower the bucket to the ground, lock the safety lock lever, turn off the engine, lock all equipment with the key, and put the

Carry the key with you.

(5) Diesel, hydraulic oil, engine oil and antifreeze will burn when exposed to an open flame, especially diesel, which is highly flammable, so do not let fireworks get close to the machine.

When refueling, turn off the engine and prohibit smoking. Tighten the caps of diesel, hydraulic oil and engine oil tanks. Do not jump on or off the machine during application operation, and never board or leave the moving machine suddenly. When getting on and off the machine,

always face the machine, and always keep your hands in contact with the handrails, ladders, and crawlers at least 3 points. Wipe off the oil and dirt on the handrails, ladders (or steps) and track kernels at any time.

(6) Avoid opening the cover for inspection during work. When the operation has just stopped, the temperature and pressure of engine coolant, engine oil, hydraulic oil, etc. are very high. At this time, if you open the cover to check or replace the filter element, it will cause serious burns. Be sure to wait for the temperature to drop, and then check according to the prescribed steps.

(7) Special attention should be paid when there are asbestos fibers on the parts:. Do not use compressed air to clean parts, do not brush asbestos fiber substances, wash with water, operate against the wind as much as possible, and wear a protective mask if necessary.

(8) Do not enter the human body, and do not put hands, arms or a certain part of the body between moving parts, such as between the working device and the hydraulic cylinder, between the machine body and the working device.

(9) Protective covers should be installed at appropriate locations to prevent falling or flying objects from hurting people and protect the driver. When using a hydraulic hammer or doing demolition or breaking work, install a protective cover on the front window seven, install a top guard on the top of the cab, and install laminated safety glass on the window. When working in mines, tunnels or other dangerous places with falling objects, install falling object protection devices and laminated glass: When performing the above work, all personnel except the aircraft should be out of the danger zone.

(10) For machines equipped with accumulators, after the engine is turned off, the safety lock

lever should be placed in the locked position, and the pedal of the accessory device should be locked with the lock pin. The accumulator is filled with high-pressure nitrogen gas, which is very dangerous if not handled properly. Therefore, it is forbidden to drill holes in the accumulator or expose it to an open flame. Do not weld any bosses on the accumulator soil, and do not discharge from the accumulator without authorization.

Notice

1. Swivel the upper slewing platform so that the drain plug at the bottom of the hydraulic tank is between the tracks.
2. Retract the stick and bucket cylinders, then lower the boom so the bucket teeth touch the ground.
3. Lower the dozer blade to the ground.
4. Set the safety lock lever to the locked position (I) and switch off the engine.
5. Open the dust cover (1) all the way until it snaps into place. (For details on opening and closing the lid with a lock, see the "Example of Engine Flap and Dust Cover")
6. Loosen the bolts (2) and move the plate (3) to the outside.
7. Remove the cap from the filler port (f) and relieve the internal pressure.
8. Place the oil receiving container under the drain plug located on the bottom of the machine. Use a wrench to remove the drain plug (p) and drain the oil. Check o-ring fitted on plug (p), replace o-ring if damaged. After draining the oil, tighten the drain plug (p). Tightening torque: 68.6 ± 9.81 n m (7 ± 1 kgf m, 50.6 ± 7.2 ibft)
 - Be careful not to get oil on yourself when removing the drain plug (p).
9. Loosen the hose clamp (4), remove the hose (5), then remove the bolt (6) and take out the

filter (7).

10. Remove the dirt attached to the filter case (7), and then rinse the filter screen with clean diesel oil or flushing oil. If the filter (7) is damaged, replace it with a new one.

11. Secure the strainer (7) with the bolts (6), then install the hose (5) and hold the hose in place with the hose clamp (4).

12. Open the engine rear cover and cooling cover. See the "Cooling cover)" section for details.

13. Fill the replacement oil through the oil filling port (f). Check that the oil level is between the h and l lines on the sight gauge.

14. Fully extend the boom, stick, and bucket cylinders as shown at right. Remove the filler cap, then replace the cap and pressurize the inside of the tank.

Notice

◇ Be sure to pressurize the fuel tank. If not pressurized, the pump will suck in air, which will have a detrimental effect on the equipment.

15. After oil change, put each joystick in the neutral position, run the engine at low idle speed for 2 to 3 minutes, and then start normal operation.

Operation method and maintenance of excavator breaker

1. Operation method: Correct operation can improve the working efficiency of the breaker and prolong its service life. Operation precautions are as follows:

(1) Every time you use it, you should first check whether the high-pressure or low-pressure oil pipe of the breaker is loose; at the same time, for the sake of caution, you should check whether there is oil leakage in other places at any time, so as to avoid the oil pipe falling off due to vibration, resulting in failure. the

(2) When the hammer is working, the drill rod should always be kept perpendicular to the surface of the broken object. And make the drill rod press the broken object tightly, and stop the work of the breaking hammer immediately after breaking to prevent air strikes.

Continuous aimless impact will cause damage to the precursor of the breaker and loosening of the main body bolts, and in severe cases, the main machine itself can be injured. the

(3) When performing crushing, do not shake the chisel, otherwise the main body bolts and chisel may break; And damage the breaker or the host. the

(4) Do not carry out crushing operations in water or muddy ground. Except for the drill rod, other parts of the hammer body should not be immersed in water or mud, otherwise the piston and other parts with similar functions on it will be stained due to the accumulation of mud. And cause the breaker to wear out prematurely.

(5) When breaking a particularly hard object, start from the edge first, and do not continuously beat on the same point for more than 1 min to prevent the drill rod from burning or the hydraulic oil from overheating. the

(6) Do not use the guard plate of the breaker as a tool for pushing heavy objects. Since backhoe loaders are mainly small machines, they are light in weight. The boom broke, and even the main engine rollover accident occurred. the

(7) Do not work when the hydraulic cylinder is fully extended or fully retracted, otherwise the shock and vibration will be transmitted to the hydraulic cylinder and then to the main engine. the

2. Maintenance: Since the working conditions of the breaker are very harsh, correct maintenance can reduce machine failures and prolong the service life of the machine. In

addition to timely maintenance of the host machine, the following points should also be noted:

(1) Visual inspection. Check whether the relevant bolts are loose; whether the connecting pins are excessively worn; check whether the gap between the drill rod and its bushing is normal, and whether there is oil seepage in between, indicating that the low-pressure oil seal is damaged and should be replaced by a professional. the

(2) Lubrication. For the lubrication point of the working device, it should be lubricated before operation and after each continuous operation for 2 to 3 hours.

(3) Replace the hydraulic oil. The change of hydraulic oil quality is different due to different working environments. The simple way to judge whether the oil is good or bad is to observe the color of the oil. Fill the oil tank and oil filter with new oil. the

(4) The main body of the breaker is a set of precision parts including a hydraulic circulation system. Generally, factories without special equipment should not disassemble it by themselves, but must entrust it for maintenance.

Maintenance and maintenance of hydraulic system of excavator, method of eliminating abnormal noise of main pump of excavator

The hydraulic excavator walks slowly and is weak. Troubleshooting All actuators are weak; z7 d# t2 q, W. Y

(1) Operate the control handle. If the sound of engine refueling is not heard, you can turn on the data output of the automatic control system maintenance program (you can also pull out the pressure relay connector, manipulate the control handle, and check the pressure relay with a multimeter. If it is normal, it should be connected.), operate the control handle, check

whether the pressure relay is invalid, if it is invalid, replace it, otherwise check the engine speed, if the speed is abnormal, check and repair the engine;

(2) Check whether there is air in the system, and if so, exhaust it;

(3) Check whether the oil suction filter is blocked, replace the filter if it is blocked; 7 h4 b: L* M, Y- p* P\$?5 @, i

(4) Check whether the oil outlet pipe of the pump is unobstructed;

(5) Check the pilot pressure: Connect a 60bar pressure gauge to the pilot pressure measuring point to see if the pressure meets the regulations (standard is 34.5bar). If not, adjust the pilot pressure control valve. If it cannot be adjusted, check the pilot pressure. Control valve:

Whether the spool is worn (replace or repair), the adjustment spring (standard length is 53.8mm) is fatigued or broken (replace the spring), whether it is stuck (remove foreign matter), if it is normal, the pilot gear pump may be faulty, repair or replace gear pump;

(6) Check the pressure of the safety valve: connect two 600bar pressure gauges to the pressure measuring ports of the two pumps, then block the track, and operate the walking pilot handle. If the pressure of the pump is abnormal (standard 343bar), adjust the main safety valve. If the pressure reaches the specified value, if the pressure cannot be increased, check and eliminate the failure of the main safety valve, mainly including: A, the conical surface of the safety valve core is stuck in the open position by foreign objects (remove foreign objects); B, the adjustment spring is fatigued or broken (replace the spring); C, the sealing cone of the safety valve is severely worn and does not close tightly (repair or replace); D, the damping hole is blocked (remove the blockage), if the pressure of the pump is normal, proceed to the next step; , @8 G9 S4 x

(7) Check the shift pressure: If the shift pressure is too high, the flow of the pump will be too small, resulting in slow and weak movement. You can connect a 60bar pressure gauge to the shift pressure pressure measuring port, start the maintenance program, and watch the display Whether the displayed data is normal, and whether it is equal to the reading of the pressure gauge. If it is not normal, it can be adjusted through the maintenance program. If it cannot be adjusted, check and clean the proportional valve to eliminate the fault of the proportional valve. If the proportional valve is normal, the shift pressure cannot be adjusted. Then carry out troubleshooting of the electrical system; 4 P7 d% W: 8) Check whether the two reverse flow control oil pipes are blocked (or whether the hydraulic control piston is stuck), and if it is blocked, clear it (remove the blockage);

(9) Check the flow rate of the pump: the engine speed is 1800rpm, the output pressure is 9800kpa, the flow rate of the pump is 180l/min, and the service limit is 170l/min. If the flow rate is too small, you can adjust the flow rate adjustment bolt of the pump to adjust the flow rate. If the requirements are met, it may be A, the mating surface of the oil distribution plate and the copper cylinder is worn (grinding the mating surface); B, the compression spring is fatigued or broken (replace the spring); C, the gap between the plunger and the hole is too large (maintenance or replacement) Plunger and copper cylinder); D, the pump servo piston is stuck in the small flow position (remove foreign matter); E, servo valve hairpin (remove foreign matter); F, servo valve spring fatigue or broken (replace);) e2 U\$

Only the walking mechanism is weak

(1) Operate the walking control handle and listen to the sound of the engine. If you do not hear the sound of engine refueling, you can turn on the data output of the automatic control

system maintenance program (you can also pull out the pressure relay connector, operate the walking control handle, and check the pressure with a multimeter. Relay, should be connected normally), operate the travel control handle, check whether the pressure relay fails, if it fails, replace it, otherwise check and repair the engine; 9 ~4 k3 X2 e9 i) N) n

(2) Low pressure of the walking pilot oil: Check the walking pilot pressure, unscrew the screw plug on the walking pressure switch joint, connect the 60bar pressure gauge, and operate the walking pilot handle (push it to the end should be greater than 30bar, and some should be around 18bar) If it is abnormal, check and repair or replace the pilot valve, mainly: the stroke is not enough (adjustment), the pressure regulating spring is too soft (replacement), the valve stem is stuck or worn (remove the blockage or repair, replace);

(3) Check the pressure of the cross-injection relief valve: connect a 600bar pressure gauge to the pressure measuring port of the front and rear pumps, block the track, and operate the walking joystick. The normal pressure should be 368bar. If the pressure is abnormal, try to adjust the cross-injection valve. If the overflow pressure of the type relief valve cannot be adjusted, check the mutual injection relief valve, mainly check whether the pressure regulating spring is fatigued (replaced) and the sealing cone surface (grinded). If it is stuck by foreign matter, remove the foreign matter. If the inter-injection relief valve is normal but the pressure cannot be increased, proceed to the next step; ~5 E; K2 p# g

(4) Check the leakage of the central rotary joint: Disassemble the two high-pressure pipe joints on the left (right) side and plug them with plugs, and operate the walking joystick. If a large amount of oil flows out of the two oil ports of the rotary joint, It means that the leakage is serious, repair and replace the seal (or rotary joint), if it is normal, go to the next step; 8 W. W9

E, ~5 f% U' K6 v

(5) Check the motor leakage: Disassemble the motor oil drain pipe, connect an oil pipe from the oil drain port to a container, and operate the travel joystick. If the leakage is serious, repair and replace the motor; the motor leakage is under 200bar pressure, every The distribution does not exceed 15l; (you can also check this way: disassemble the high-pressure oil pipe of the motor, block it with a plug, and read the pressure value. If the pressure is higher than the original, it means that the motor is leaking);

(6) Check the multi-way valve: If the valve stem of the multi-way valve is stuck in the semi-closed position or the fit gap is too large and the leakage is serious, it will cause weak movement. The former can be removed by removing foreign objects, and the latter needs to be repaired Stem valve sleeve; (The following methods can also be used to check the leakage of the multi-way valve: remove the reverse flow control pipe joint of the pump, connect the three-way joint and the 60bar pressure gauge, and push the travel control handle to the bottom. According to my experience, It is still normal if the pressure gauge reading is less than 2-4bar, this method is only for comparison); (7) Incomplete brake release: The main reasons for incomplete release are: A, the brake pilot valve is stuck by foreign matter (remove); B, the brake cylinder oil seal is damaged and leaked (replace the seal); C, the balance valve has reached Brake pilot valve passage blocked (clear). If everything is normal, the motor bearing or the reduction mechanism may be stuck, check and remove foreign matter. (o! _6 q! @2 u We have encountered such a situation in maintenance practice, walking weak and the engine tends to stall, according to (1) in the 1st and (4) in the 2nd, we checked and found that the pressure relay failed and the seals of the rotary joint were all broken Rotten, the oil suction

filter was blocked by the debris of the seal, after replacing the seal and cleaning the hydraulic system, it worked normally; another example: there was such a situation with a CAT320 excavator, when it was stuck in the mud and turned, it could not be turned. , everything else is normal, F(T* S" g* T

After inspection, we found that the pressure was normal. Later, we learned that due to the rupture of the high-pressure oil pipe, the maintenance personnel on the construction site could not buy genuine parts for a while and replaced them with other parts. After that, this failure occurred. We think it may be that the flow area of the oil pipe is slightly small. , other movement changes are not obvious, turning and climbing on flat ground are also normal, but when encountering a turn with a lot of resistance, it will not turn, and the work is completely normal after replacing the original oil pipe. ; u" u0 }# J-A

Elimination method of abnormal noise of excavator main pump0 A9 B" Y; P0 x f

After a PC200-6 full hydraulic excavator is started, the working device can realize various actions, but the main pump makes abnormal noise. According to preliminary analysis, it is considered that the pump is sucked empty or air is mixed in the oil circuit. Therefore, adjust the working device to the oil level detection position first, and check that the oil level of the hydraulic oil tank is below the low level of the oil mark, which is a position of lack of oil. After asking the driver, the sealing ring of the high-pressure oil pipe leading to the rodless chamber of the stick cylinder was replaced due to oil leakage during work, but the oil level was not checked in time after the replacement. Therefore, first fill up the hydraulic oil tank to the standard oil level, and the test machine shows that although the abnormal noise has been reduced, it still exists; then, after exhausting the main pump through the main pump exhaust

valve, the test machine is retested, and it is found that the abnormal noise still exists , indicating that this noise cannot be entirely caused by pump suction. .S: W2 x+ P0 s) W# \

Next, both the oil suction filter element and the oil return filter element of the hydraulic oil tank were inspected, and it was found that the oil suction filter element turned black and had sludge, and brown metal particles stuck to the oil return filter element, so the above filter element was replaced; considering the oil return filter element There were brown metal particles sticking on it, so the oil of the main pump was released and checked, and brown metal particles were found; at the same time, when the main pump was disassembled and inspected, it was found that there was no damage to the piston, flow plate, swash plate, etc. The shoe wears out. After it was replaced, it was assembled in strict accordance with the requirements, the hydraulic system was cleaned and the oil was changed. When the test machine was started again, the abnormal noise disappeared, and the fault had been eliminated. Usually, the possible causes of abnormal noise around the main pump are as follows: 9 X/ e4 V) |: q+ [/ w

Insufficient hydraulic oil causes the main pump to suck air; the oil suction pipeline is mixed with air; the oil suction filter element is blocked and the main pump sucks empty; the internal wear of the main pump causes abnormal noise in the operation of the main pump.]) F3 Y4 y C/ y* n' f

In this example, the abnormal noise is caused by insufficient hydraulic oil and the wear of sliding shoes in the main pump. The reason is: the oil level was not checked in time after the seal was replaced, resulting in insufficient hydraulic oil, which caused the main pump to cause air suction; when the oil mixed with air flowed through the main pump, the sliding shoe could

not float or float in some moments Insufficient, resulting in the failure to form a good lubricating oil film between the sliding shoe and the swash plate, causing the sliding shoe to wear, and finally causing the main pump to produce abnormal noise.

Maintenance and maintenance of excavator hydraulic system. t: N0 x' {1 {+ i% U3 f+ w

A variety of construction machinery is active on the construction site, and the hydraulic excavator is one of the most important equipment of these construction machinery, and the hydraulic system is one of the most important systems of these equipment. /11 H\$ Z, v; U F1 }

For a fully hydraulic excavator, it can be said that the hydraulic system is spread throughout the entire excavator like the blood circulation system of the human body. It includes a hydraulic oil tank, a main pump, a multi-way valve, various pipelines and cylinders that perform various actions, Motors and other components, these hydraulic components are all precision machined, they have high requirements for the maintenance of the hydraulic system, if the maintenance is improper or not maintained, it will lead to failure, cause the machine to stop, and bring you loss. " _9 P E8 ^1 L4

j Three main points to keep the hydraulic system clean

Cleanliness is the primary issue when hydraulic oil enters the hydraulic system for operation.

Dirt and other foreign matter should be prevented from entering the system.

When tiny foreign particles get into a hydraulic system, they can scratch pumps, jam valves, clog ports and cause machine failure.

How to keep hydraulic system clean? There are three main points: 5 ` |5 L, j" X\$ E4 g

Keep the hydraulic oil clean;

keep the system clean;

Keep the work area clean; % F

"Keep hydraulic oil clean ' X) K' [0 D8 W* o* w, g\$ W8 L9 F\$ d

Store the oil in a clean place, and care must be taken when changing or refueling the oil. Only use a clean funnel fitted with a fine mesh strainer to pour oil from the container into the tank. Of course, the oil you use must be the type recommended by Hitachi Construction Machinery.

keep the system clean

(1) Regularly replace hydraulic oil and filters;

Good hydraulic fluids contain various additives that keep the oil from going bad; however, these additives lose their effectiveness over time. The oil should therefore be changed regularly to ensure that the additives do their job.

Filters can only absorb a limited number of dirt particles and other impurities from the oil.

For Hitachi Construction Machinery ZX series (medium-sized) machines, please replace the oil return filter of the hydraulic oil tank every 1000 working hours, and clean the oil suction filter of the hydraulic oil tank when changing the hydraulic oil, so as to keep the system clean. 6

s\$ }& d1 m% o2 F8 C

When replacing the hydraulic oil filter, please check whether there are metal particles or debris at the bottom of the filter; if there is copper or iron filings, the hydraulic pump, hydraulic motor or valve may be damaged or will be damaged, and if there is rubber, it means the hydraulic cylinder Seal damaged. m7 z"

(2) Regularly discharge the dirt from the fuel tank Regularly release the water and sediment in the fuel tank:

It is very important to remove impurities in the oil, but it is also very important to replace the

hydraulic oil in the entire hydraulic system regularly. This is the only reliable way to completely remove system impurities, oxidized hydraulic fluid and other harmful impurities. Then, clean hydraulic oil recommended by Hitachi Construction Machinery should be refilled into the hydraulic system.

Please discharge the dirt from the oil storage tank of the hydraulic oil tank every 250 working hours.

(3) Wash

If the hydraulic oil is contaminated, especially when the pump or cylinder or motor is damaged, all hydraulic oil must be replaced and the oil tank cleaned.

KEEP WORK AREA CLEAN When replenishing or refilling the reservoir with hydraulic fluid, make sure the area around the filter box cover is clean; use only a clean funnel or container. Never bring dirt into the system.

When maintaining the hydraulic system, use only clean plastic plugs to seal the ends of the lines.

When maintaining hydraulic components, the workbench must be absolutely clean.

Check the condition of the tools used, they should also be very clean.

Excavator hydraulic oil selection and hydraulic system maintenance

Selection of hydraulic oil and maintenance of hydraulic system

1. Reasonable selection of hydraulic oil

(1) Viscosity of hydraulic oil

The principle of determining the viscosity of hydraulic oil is to make the viscosity of hydraulic oil (for components such as pumps and motors) in the optimum range ($16-36 \times 10^{-6} \text{mm}^2/\text{s}$)

under the premise of considering the operating temperature and efficiency of the hydraulic circuit; The temperature corresponding to the short-term cold start viscosity is $\leq 1000 \times 10^{-6} \text{mm}^2/\text{s}$; and the viscosity corresponding to the short-term maximum allowable leakage oil temperature of 90°C is $\geq 10 \times 10^{-6} \text{mm}^2/\text{s}$.

(2) Viscosity index (VI)

This index more directly reflects the nature of the oil viscosity changing with the temperature change, (that is, the viscosity-temperature characteristics of the oil). The higher viscosity index of the oil indicates that the viscosity of the oil changes less with the temperature change; Conversely, larger. The viscosity index of anti-wear hydraulic oil of well-known foreign manufacturers (such as Mobil, Shell, etc.) is $\text{VI} \geq 110$, and the viscosity index of domestic high-grade anti-wear hydraulic oil is about 95. The viscosity index of high viscosity index hydraulic oil (HV) and multi-grade engine oil produced abroad is $\text{VI} > 140$. This point must be paid special attention to users who use domestic hydraulic oil (or use engine oil as hydraulic oil) for large imported hydraulic excavators. The reduction of the viscosity index will reduce the environmental temperature range that the oil can adapt to. If it is necessary to use it, you should inquire about the relevant information from the oil manufacturer, and you must make appropriate adjustments to the range of use of the oil. If necessary, you should also change the relevant settings of the equipment (Such as extreme temperature, etc.).

(3) Other comprehensive properties

Due to the high working pressure of the hydraulic system of modern large hydraulic excavators ($\geq 32 \text{MPa}$), the maximum allowable working oil temperature of the hydraulic oil is also high (about 90°C), so in order to ensure that the hydraulic system can work normally

during the normal oil change cycle , It is required that the oil selected for the system has good quality in terms of lubricity, oxidation stability, anti-wear, anti-rust and anti-corrosion, anti-emulsification, anti-foaming, anti-shear stability and extreme pressure load.

2. Good hydraulic oil cooling system

For the improvement of the hydraulic oil cooling system (more precisely, the hydraulic oil temperature control system) of large hydraulic excavators, although the specific methods adopted by various manufacturers are different, the basic idea is the same, which can make the hydraulic oil temperature In continuous operation, the balance is within an ideal range, and the hydraulic system can heat up rapidly (reaching the normal working temperature range of the oil) when it is put into work in a cold state. Under the premise of using qualified hydraulic oil, when the hydraulic oil is overheated, the inspection steps for the hydraulic oil cooling temperature control system are as follows:

(1) Whether the hydraulic oil radiator is blocked by dirt, resulting in a decrease in heat dissipation efficiency, and clean the radiator if necessary.

(2) Detect the actual working pressure of the fan speed system under extreme conditions to determine whether the hydraulic parts of the circuit are faulty, whether the oil temperature sensor or the control circuit is working normally. At this time, both the fan speed and the system working pressure should be at the maximum value; otherwise, the corresponding parameters of the system should be adjusted or the damaged components should be replaced.

3. Inspection of relevant hydraulic parameters in the system

At present, there are two main control methods for working pumps of large hydraulic

excavators: limit load regulation (GLR) and load sensing regulation (LS) with pressure cut-off function (that is, CUT-OFF function). The function of the CUT-OFF function is that when the working pressure of the system reaches the set value, the swash plate deflection angle of the variable displacement pump decreases, so that the pump can only maintain the "residual" flow state required to maintain the pressure to avoid overflow. Flow valve relief produces overheating. To achieve this, the system parameters are matched to make the setting of the CUT-OFF valve lower than the setting of the primary pressure valve in the circuit according to the technical requirements; otherwise, the opening of the primary pressure valve will cause the overflow to overheat.

At the same time, check whether the secondary valve is working normally. This work must be carried out in strict accordance with the technical requirements, and the relevant parameters of the system should be adjusted if necessary.

4) Exclude abnormal internal leakage

It mainly refers to the abnormal internal leakage caused by the sticking of the directional valve and pressure valve due to the contamination of the hydraulic oil in the system. Checking method: measure pressure, check function, or listen to whether there is abnormal noise ("throttling flushing sound" caused by lax valve opening) or touch to check whether the temperature is locally too high.

5) Prevent the volumetric efficiency of components from decreasing

Both abnormal wear and normal wear should be paid attention to. The former may occur in a very short period of time, and can be judged by checking the quality of the oil and combining the function of the system (such as whether the actuator is operating normally, whether the

speed has dropped, etc.); the latter should follow certain rules and should be integrated Investigate and take timely measures.

Excavator safety operation rules and matters needing attention

1. When the excavator is working, it should be parked on a flat ground and the crawler walking mechanism should be braked.

2. No obstacles such as machinery and tools shall be piled up on the passageway of the excavator.

3. No one is allowed to stay within the working range of the excavator.

4. During the operation of the excavator, if underground cables, pipelines or other underground structures are found, the work should be stopped immediately and the relevant units should be notified immediately.

5. When the excavator is working, the driver should wait for the driver to brake the car and then turn to the car to dump the soil. When turning, it is forbidden to pass the bucket over the cab. hit any part of the car.

6. During operation, the shovel should not be too deep, and the lifting bucket should not be too strong. The excavation height cannot be higher than 4 meters at a time.

7. When shoveling, no one is allowed to stay or work under the suspended bucket.

8. When the excavator stops working, the bucket must not be suspended in the air. The driver's feet must not leave the pedals.

9. When the bucket is fully loaded, the inclination of the boom must not be changed.

10. During the excavation work, the "four prohibitions" should be achieved:

① It is forbidden to turn the bucket when it has not left the working surface.

- ② Rapid rotation is prohibited.
- ③ It is forbidden to use the side of the bucket to scrape the mound.
- ④ It is forbidden to use a bucket to impact the working face sideways.

11. The rotation range of the excavator arm should be controlled between 45°-60°, and the inclination angle should be controlled between 30°-45°.

12. When the excavator is going uphill, the track driving wheel should be at the back. When going downhill, the track driving wheel should be at the front, and the boom is at the back. The boom is parallel to the tracks. The slewing mechanism should be in a braking state, and the bucket should not exceed 1 meter from the ground. Uphill and downhill slopes must not exceed 20°, downhill slopes should be at low speed, and variable speed sliding is prohibited.

13. It is forbidden to arrange the excavator to operate in the upper and lower mining sections (surfaces) at the same time; when the working surface rotates at the same time, the flat ground should be selected and obstacles in the passage should be removed. If moving on soft ground, it must be under the walking device. Pad square wood.

14. It is forbidden to work under high-altitude erected objects such as wires, and it is not allowed to work under the shutdown, and it is not allowed to stay in the space for a long time with a fully loaded bucket.

15. When the excavator needs to be parked on a slope, the bucket must be lowered to the ground, all control levers should be placed in the neutral position, the brake should be stopped, and wedges should be placed on the rear of the track or tire.

Lower walking maintenance

The composition of the lower walking body and the functions of each part

The composition of the lower walking body

Tracks (including track links, track shoes), drive wheels

Guide wheel

Rollers

Support sprocket

The function of each part of the lower walking body

Crawler: Complete the walking function of the machine.

Drive wheel: accept the output torque of the travel motor, and convert the output torque into power to drive the crawler.

Guide wheel: adjust the tension of the track through the track tension mechanism.

Track rollers: Support the weight of the whole machine and play the role of transmitting the running of the track.

Supporting sprocket: the main function is to ensure the smooth running of the track and support the upper track to avoid sagging.

Maintenance method of the lower walking body (1)

Frequently remove the sludge on the lower walking body

After working every day, please clean the sludge on the lower walking body and check and maintain the following items.

Are the bolts loose?

Are the carrier sprockets and track rollers unable to turn?

Whether the supporting sprocket, supporting roller and driving wheel are leaking oil

Maintenance method of the lower walking body (2)

Properly adjust track tension

If the track is stretched too tight, the walking speed and driving power will decrease, resulting in a decrease in working efficiency, and it will cause abnormal wear of the pins and bushings.

If the track is adjusted too loosely, the track will rest loosely on the driving wheel and the supporting sprocket, causing greater wear or damage.

Adjustment of crawler tension under different working conditions The crawler should be adjusted slightly looser on soft ground to prevent abnormal stress on the rail chain links due to soil adhesion. When on the pebble ground, the track should also be adjusted slightly looser to avoid bending of the track shoe. It is best to adjust the track slightly tighter on firm and flat ground.

Maintenance method of the lower walking body (3)

Considerations for reducing wear

If it is found that some supporting sprockets and rollers cannot operate, they must be repaired immediately. Avoid possible wear of rollers and rail links.

Avoid walking on slopes and making sudden turns as much as possible. Straight-line travel and large turns can effectively prevent the wear on the side of the rail chain link and the side of the drive wheel and guide wheel.

Maintenance method of the lower walking body (4)

Bolts and nuts should be carefully inspected

When the machine works for a long time, it is easy to cause the bolts and nuts on the lower walking body to loosen. Continuing to run the machine at this time will cause a gap between the bolts and the track shoe, causing the track shoe to crack.

Therefore, the following parts should be inspected and tightened regularly: track shoe bolts; mounting bolts for rollers and support rollers; mounting bolts for drive wheels; running piping bolts, etc.

Analysis on Repair and Maintenance Technology of Excavator

Modern excavators generally adopt the electromechanical-hydraulic integrated control mode.

The common faults are the engine speed drops, the working speed slows down, and the excavation is weak and some other faults in daily use. This article briefly introduces the fault judgment and maintenance technology of the excavator in these types of faults, and also

introduces the daily maintenance technology of the excavator to ensure the normal operation of the excavator.

excavator; maintenance; maintenance

With the advancement of science and technology, modern excavators generally adopt the electromechanical-hydraulic integrated control mode. When we troubleshoot some faults, we mostly solve the matching problems of the engine, hydraulic pump, distribution valve, and external load. Generally, in excavator operations, these aspects cannot be matched, and it often manifests as: engine speed drops, working speed slows down, weak excavation and some common problems.

1. The engine speed drops

First of all, the output power of the engine itself should be tested. If the output power of the engine is lower than the rated power, the cause of the failure may be poor fuel quality, low fuel pressure, wrong valve clearance, a certain cylinder of the engine does not work, wrong fuel injection timing, fuel incorrect volume settings, air leaks in the intake system, faulty brakes and their control levers, and carbon deposits in the turbocharger. If the output power of the engine is normal, it is necessary to check whether the flow of the hydraulic pump does not match the output power of the engine.

The speed of the hydraulic excavator is inversely proportional to the load during operation, that is, the product of the flow rate and the output pressure of the pump is an invariant, and the output power of the pump is constant or approximately constant. If the pump control

system breaks down, the optimal load matching state of the engine, pump and valves in different working conditions cannot be achieved, and the excavator will not work normally. Such failures should start with the electrical system, then check the hydraulic system, and finally check the mechanical transmission system.

2. Work slows down

The slowdown of the excavator's working speed is mainly due to the wear and tear of the parts of the whole machine, which causes the engine power to drop and the hydraulic system to leak. The hydraulic pump of the excavator is a plunger variable pump. After working for a certain period of time, the internal hydraulic components (cylinder, plunger, flow plate, nine-hole plate, turtle back, etc.) of the pump will inevitably produce excessive wear and tear, which will cause internal leakage. The data of each parameter is not coordinated, resulting in insufficient flow, high oil temperature and slow working speed. At this time, it is necessary to overhaul the whole machine, and repair and replace the parts that are worn out. But if it is not that the excavator that has been working for a long time suddenly slows down, the following aspects need to be checked. First check whether the circuit fuse is open or short-circuited, then check whether the pilot pressure is normal, then check whether the servo control valve-servo piston is stuck and whether the confluence of the distributor is faulty, etc., and finally disassemble the hydraulic pump for data measurement to confirm the problem of the excavator .

3. The excavator is weak

Digging weakness is one of the typical faults of excavators. Weakness in excavation can be divided into two situations: one is weakness in excavation, the engine does not hold the car, and the load is very light; the second is weakness in excavation, when the boom or stick is extended to the bottom, the engine is severely held back, and even the engine is turned off .

① Digging is weak but the engine does not hold back. The size of the digging force is determined by the output pressure of the main pump, and whether the engine stops depends on the relationship between the oil pump absorption torque and the engine output torque. The fact that the engine does not stall means that the oil pump absorbs less torque and the engine load is light. If there is no obvious abnormality in the working speed of the excavator, it should focus on checking the maximum output pressure of the main pump, that is, the system overflow pressure. If the relief pressure measurement value is lower than the specified value, it indicates that the setting value of the overload relief valve of the hydraulic circuit of the mechanism is incorrect, causing the mechanism to overflow prematurely and work weakly. Then the machine can be adjusted by turning the adjusting screw.

②Excavation is weak, and the engine is suffocated. Engine stalling indicates that the absorption torque of the oil pump is greater than the engine output torque, resulting in engine overload. This kind of failure should first check whether the engine speed sensing system is normal, and the inspection method is similar to the engine inspection method mentioned above. After the above detailed inspection and troubleshooting, the engine speed sensing system returns to normal function, the phenomenon of engine stalling disappears, and the digging force will return to normal.

4. Common faults during excavation operations

Some common failures that often occur in excavators during construction operations, such as: excavator walking deviation, the reason may be that the walking distribution oil seal (also known as the center rotary joint oil seal) is damaged; the flow of the two hydraulic pumps is different; has a problem. If the hydraulic cylinder drains rapidly, it may be that the safety relief valve is not tightly closed, or the cylinder oil seal is seriously damaged, etc.

5. Daily maintenance of the excavator In order to prevent the failure of the excavator, it is necessary to pay great attention to the maintenance of the excavator during daily use.

Routine maintenance includes checking, cleaning or replacing the air filter element; cleaning the inside of the cooling system; checking and tightening the track shoe bolts; checking and adjusting the back tension of the track; checking the intake heater; replacing the bucket teeth; adjusting the bucket clearance; checking the front window Clean the liquid level; check and adjust the air conditioner; clean the floor in the cab; replace the filter element of the breaker (optional). When cleaning the inside of the cooling system, after the engine is fully cooled, slowly loosen the water inlet cover to release the internal pressure of the water tank, and then release the water; do not clean when the engine is running, the high-speed rotating fan will cause danger; when cleaning or replacing the cooling system In case of liquid, the machine should be parked on level ground.

At the same time, before starting the engine, it is necessary to check the liquid level of the coolant (add water); check the engine oil level, add oil; check the fuel oil level (add fuel); check the hydraulic oil level (add hydraulic oil); check the air filter Whether it is blocked; check the

wires; check whether the horn is normal; check the lubrication of the bucket; check the water and sediment in the oil-water separator. There are still many faults encountered by excavators in daily work. Here we only introduce the maintenance methods for several common types of faults. In order to reduce the occurrence of faults, the daily maintenance of excavators is very important. Only by achieving the double protection of maintenance and maintenance can the excavator work better and normally.

Chapter 4

Simple Fault Discussion

Simple Fault Discussion

1. What is OLSS system?

The OLSS system is an open center load sensing system for Komatsu excavators. It is an energy-saving system that reduces fuel consumption by controlling the inclination angle of the swash plate of the swash plate type variable plunger pump. During operation, due to the function of this system, the hydraulic loss can be reduced to increase the fine-tuning control and reasonably control the output of the oil pump.

2. What is a Nozzle Sensor?

When the distribution valve is in the middle position, all the hydraulic oil returns to the tank through this sensor. There is a throttle valve A and relief valve B in the sensor, the overflow pressure of the relief valve is 1.6Mpa, that is to say the pressure of Pt is 1.6Mpa, Pd communicates with the fuel tank, and its pressure is basically zero. When the distribution valve is working, the oil circuit is cut off, and the Pt pressure drops to zero instantly. The variable system uses this pressure difference signal to realize the variable.

3. How does Pt pressure that is too high and too low affect the variable system?

Common faults are that the Pt pressure of the sensor is abnormal, and sometimes the pressure can reach 5Mpa or even higher. The reason is that the pressure relief valve is stuck by foreign matter. Once the Pt pressure is too high, the flow rate of the plunger pump will become very small, and the excavator will have no power to work. If the Pt pressure is too low, the plunger pump flow will become too large, and if the pressure drops to zero, the engine will stall when the excavator starts.

4. What is the structure and working principle of TVC valve?

The TVC valve is controlled by the balance spring force after the discharge pressure Pp1, Pp2 of the main pump and the output pressure Pc2 of the TVC valve.

When the load of the main pump is small (when the transfer switch is turned on in the L state), the discharge pressures Pp1 and Pp2 of the main pump are low. Therefore, the slide valve 2 is pushed to the lower end by the spring 1. As a result, the discharge pressure Pc of the control pump and the output pressure Pt2 of the TVC valve become the same. At this time, the output pressure Pt2 of the TVC valve becomes the maximum, and the servo valve makes the plunger pump inclination angle large, and the flow rate is also maximum.

When the load of the main pump is large (when the transfer switch is turned on in the S state), due to the increase of the discharge pressure Pp1 and Pp2 of the main pump, the outside of the piston is pushed, and the slide valve 2 moves upward. The oil is throttled, and the openings of holes b and c (drain holes) become larger. Therefore, at this time, the output pressure Pt2 of the TVC valve drops, and the servo valve makes the inclination angle of the plunger pump smaller, and the flow rate also decreases accordingly.

When the transfer switch is turned on in the L state, the solenoid valve 7 is powered on, and the shaft 6 pushes the piston 5 to move upwards, so as to achieve the effect of raising the spring 1.

When the solenoid valve circuit on the TVC valve fails, the machine will lose the function of fine-tuning during operation, and there is no automatic function. When the solenoid valve circuit fails, how will the work of the excavator be affected. 7. How does the electronically controlled OLSS automatic deceleration system work?

When the joystick of the operating mechanism is in the middle position, it can automatically reduce the engine speed, and when the operating mechanism starts to work, that is, when the joystick is turned to the working position, the engine speed can be automatically accelerated to the working position of the crude oil valve without moving the throttle handle. speed.

Turn the automatic deceleration switch to ON, and when the working mechanism and the connecting rod of the traveling mechanism are not moved (in the middle position), a signal is sent from the control box microcomputer to activate the solenoid valve, extend the hydraulic cylinder, and the engine speed will decrease to 4 seconds later. 1150r/min, the position of the throttle handle remains unchanged at this time. If the operating mechanism starts to work, the solenoid valve will be closed immediately, the hydraulic lever and governor lever will automatically return to the original handle position, and the rotating speed will automatically return to the original speed.

5. How should the adjustment screw on the TVC valve be adjusted?

The manufacturer has adjusted the machine before leaving the factory, and ordinary users cannot adjust it arbitrarily.

If you want to adjust, the method is to install pressure gauges on the oil outlets of the two plunger pumps, adjust the oil pressure of the two pumps within the specified value (32Mpa), and then unscrew the adjusting screw of the TVC valve a little. Increase the throttle, raise the boom to overflow the relief valve of the boom overload valve, and observe the change of engine speed. If the engine load is not heavy, you can screw in some more adjusting screws (about half a turn of the thread, not too much). Use the same method to raise the boom again, and observe the changes in engine load and speed. If there is still no change, screw in the adjusting screw a little more until the engine feels a load when the boom is lifted. There will be a noticeable drop.

6. What is the difference between Komatsu PC200, PC300, PC400, PC600 excavator TCC valve and TVC valve?

The function of the TVC valve is just more electronic control. If the electronic control part is broken, it is the same as the TCC valve. It can be seen from Figure 2 and Figure 3 that the TVC valve only uses one 2-position 3-way valve to regulate the Pc oil pressure, while the TCC valve uses two 2-position 3-way valves to regulate the Pc oil pressure. They all function the same. Structurally speaking, the TCC valve is more complicated and has many faults. Because there are many parts, be careful when disassembling. Because many users do not have a part diagram, one piece is missing, or they are installed in the wrong direction and do not know.

7. The engine will stop when the boom is raised, and the engine will also stop when starting to walk. Is this related to the TVC valve screw adjustment?

There is a lot to do, sometimes the problem is here, but not always. If the flameout occurs when starting, you can try to unscrew the adjustment screw a little bit, if there is no response, you should adjust the screw back to the original position.

8. What is the function of the CO valve? What is its structure and working principle?

The CO valve is a split power regulator. When the oil discharge pressure of the main oil pump is lower than the overload pressure of the pressure regulator, the slide valve 2 is pushed down by the spring 1, so that the a hole and the b hole are connected to each other, so that T. V. C valve output pressure P_t is equal to CO valve output pressure P_{c0} . At this time, the output pressure P_{c0} of the CO valve becomes the maximum, and the servo valve maximizes the inclination angle of the main oil pump. Therefore, the pump flow rate is also maximum. When the discharge pressure of the main oil pump is close to the overload pressure of the pressure regulator, P_{p2} pushes the piston 3, plus the pressure of P_{c0} pushes the piston 4. The thrust of the two exceeds the elastic force of the spring 1, and the slide valve 2 moves upward. Due to the action of the slit on the slide valve, the oil passage from hole a to hole b becomes narrower, and the discharge hole from hole b to hole c becomes wider, so the output pressure of the CO valve drops, and the servo valve makes the plunger pump tilt angle smaller, The pump flow rate also decreases accordingly. The CO valve is a power-divided regulating valve, that is to say, it can only regulate the flow of one of its own plunger pumps.

9. What is an NC valve? What is the structure of the NC valve?

The NC valve is evolved from Komatsu's early PNC variable system. It also uses the oil return pressure difference signal of the distribution valve in the middle position and the non-middle

position to control the NC valve to move up and down, so as to achieve the purpose of controlling the P_c oil pressure.

The NC valve is controlled by the sum of the output pressure P_t of the jet sensor and the output pressure P_i of the NC valve, which is balanced with the sum of the spring force of the NC valve and the output pressure of the jet sensor.

The jet flow sensor checks the flow of oil returned to the oil tank after flowing out of the control valve to obtain the signal pressure P_t and P_d of the NC valve.

10. What is the relationship between the jet sensor and the NC valve?

The NC valve works by the signal sent by the jet sensor. The relationship between the jet sensor and the NC valve is shown in Figure 15. Its working principle is: when the control valve is in the middle position, the pressure of the jet sensor reaches the maximum value (1.6MPa). In this way, the thrust of the piston by the output pressure P_t of the jet sensor is greater than the sum of the force of the spring and the other output pressure P_d of the jet sensor, so the slide valve is pushed down. At this time, the channel between hole c and hole b is narrowed, and the channel (discharge hole) between hole b and hole d is widened, so that the output pressure P_i of the NC valve becomes the minimum. The servo valve makes the plunger pump tilt angle smaller. The pump flow rate also becomes smaller. When the operating lever is pulled, the pressure difference ($P_t - P_d$) of the jet sensor decreases and reaches the minimum value. The differential pressure can be equal to zero. The spool valve is then reset upwards. The channel between hole c and hole b becomes wider, the output pressure of the NC valve increases, and the servo valve increases the inclination angle of the plunger pump and increases the pump flow.

Komatsu PC200-2, PC300-2 and PC400-2 excavator NC valves have different structures, but the working principle is the same.

Because the structure of the NC valve is relatively simple, there are not many faults. Many small faults are man-made, such as not being assembled properly during assembly, not being cleaned thoroughly during cleaning, and even some oil pipes are connected incorrectly.

Therefore, it is necessary to understand the two oil pipe connectors of the NC valve, one is the Pt port and the other is the Pd port. Once the connection is reversed, the load of the excavator will be heavy, and black smoke will be emitted when the boom is lifted. Refer to Figure 14 for the Pt port and Pd port of the NC valve of the PC200-5 excavator.

11. Are servo valves important in variable variable systems?

It can be said that its role is very important, because its operating frequency is relatively high, so most of the faults appear in this part. When the input signal pressure P_i acts on the cavity C of the control piston from hole d, the pressure P_c of the control pump is transmitted to hole b. If P_i rises slightly, the oil pressure acting on chamber C also rises slightly. Therefore, the control piston pushes against the spring and moves to the left, and the lever arm pivots to the left with the servo valve piston as the fulcrum, causing the pilot valve to move to the left. Due to the movement of the pilot valve, hole b is connected to hole a, and the pressure P_c of the control pump is transmitted to the B cavity of the servo valve piston, which pushes the servo piston to move to the left, making the plunger pump tilt angle larger and the flow rate increased.

When the arm rotates clockwise with the pin as the center, the pilot valve moves to the right, blocking the b hole and a hole, as well as the c hole and the discharge circuit, and the oil discharge equivalent to the input signal pressure R is increased.

Here, the situation when the servo piston moves to the right is briefly described as follows: Assuming that the servo piston is in balance at a certain position, when the pressure P_i drops, the control piston moves to the C cavity, and the lever arm swings to the right with the servo piston as the fulcrum, so that The guide slide valve moves to the right, and due to the movement of the guide slide valve, the circuit between hole b and hole a is cut off, while hole c is connected to the discharge circuit. In addition, the b hole is connected with the c hole, and the oil flows into the A chamber of the servo cylinder, pushing the servo piston to the right, making the plunger pump inclination angle smaller and the pump flow rate smaller. At this time, the lever arm rotates counterclockwise with the pin as the center, so the guide slide valve moves to the left again, and the gap between hole b and hole c and between hole a and the discharge hole are cut off. In this way, it is equivalent to the reduction of the oil discharge amount of the input signal residue.

12. How should the servo valve adjustment screw be adjusted?

The adjustment screws of the servo valve have been adjusted before leaving the factory, and the user should not adjust them arbitrarily. For those machines that have been used for a long time, adjustments should be made on the front pump and the rear pump respectively. First lift up the track on the side where the walking is weak, and then proceed with the corresponding front pump or rear pump servo valve. Keep the track on the jacked up side constantly turning to observe the effect of the adjustment. First unscrew the adjusting screw

half a turn. If the original adjustment is improper, when the screw is unscrewed half a turn, the track speed will change. Then unscrew the inner adjustment screw by half a turn, and you can also unscrew the inner and outer adjustment screws a little more.

If both the inner and outer adjustment screws are adjusted, the track still rotates very slowly. This is either the servo valve stem arm is broken or the latch has fallen out.

13. After adjusting the servo valve, the track rotation on both sides has been accelerated, but it still does not meet the requirements. What is the reason?

The reason is that the apertures of chamber A and chamber B of the servo valve become larger due to wear, and the matching clearance with the servo piston is too large.

The worn inner hole generally has obvious steps and out-of-roundness. When repairing, first bore the hole round, then grind it, and then match the piston according to the repaired hole size. The hole diameter has been enlarged after repairing, and the size of the piston repair should be determined according to the hole diameter. The matching gap between the hole and the piston is about 0.10mm. After the piston is repaired, the surface is heat treated.

14. After repairing, the size of the piston has changed, will it affect the driving force of the piston?

There will be an impact, but it is not very obvious. The solution is to lower the oil pressure of the control pump.

15. Insufficient pressure, is the control pump damaged?

We can't draw conclusions like this, because the control pump has a pressure regulating valve, if the regulating valve is faulty, the pressure of the control pump will also not increase. The conclusion can only be reached after the pressure regulating valve is disassembled and

carefully inspected. The structure of the pressure regulating valve of the Komatsu excavator is the same. This pressure regulating valve is a pilot-operated pressure regulating valve. There is a small damping hole in the middle of the piston. When checking, carefully check whether the small damping hole is blocked. It is the main cause of stress elevation. There are also springs, the integrity of the cone valve and the spring 2 on the cone valve, all of which have an impact on the pressure of the pressure regulating valve. After the pressure regulating valve has been inspected, it can be installed and debugged. If the pressure of the control pump still cannot reach the specified value, it can be judged that the control pump is damaged.

16. What is the reason why the whole machine is still working weakly when the pressure of the control pump reaches the specified value?

For the above situation, check the following steps. Use two 58.8MPa oil pressure gauges and install them on the pressure measuring ports of the outlets of the two main oil pumps. Then increase the throttle to fully extend the piston rod of the bucket cylinder, so that the overload relief valve is in the overflow state. At this time, one oil pressure gauge should have a higher value, and observe whether it reaches the specified value. PC200 excavator is 26MPa, PC300 excavator and PC400-2 excavator are 26MPa, PC400-3, PC400-5 and PC400-6 are 32MPa, use the same method, and then look at the pressure of another pressure gauge. If the pressure is insufficient, and the adjustment on the two pressure regulating valves still has no effect, the main pressure regulating valve (also called the main safety valve) should be removed for inspection. The inspection method is the same as that of checking the pressure regulating valve of the control pump. If no fault is found in the pressure regulating valve, proceed to the third step of inspection. That is, check the oil pump for internal leakage.

17. When measuring the pressure, it can reach the specified value at the beginning, but it will soon drop to 20MPa, is this normal?

unusual. Generally speaking, as long as the overload relief valve is still overflowing, the pointer reading should not drop, and if it drops, it means that there is internal leakage.

18. How to check for internal leakage?

Machines with internal leakage are generally old machines, with severe wear of parts, large gaps, and synchronous wear. In the daily work of the machine, we can find that the machine with internal leakage has relatively loud noise and rapid temperature rise. Internal leakage can be checked by the following methods. Drain the hydraulic oil in the oil pump, remove the two high-pressure oil outlet pipes, and then pour diesel oil into the nozzle. If the oil level drops quickly, it means that the oil pump has internal leakage; if it is a PC200-1 and PC200-2 machine, In addition to indicating that the oil pump has internal leakage, the seal between the oil pump outlet and the oil pipe will also leak.

19. How much wear does the plunger pump plunger cause internal leakage?

Theoretically, the gap between the plunger and the plunger hole should not be greater than 0.05mm. Due to the small hole diameter, it is difficult to measure. Generally, the following method can be used to check, that is, the small hole of the plunger ball head is sealed with fingers, and the plunger hole is also sealed with hands at the same time, and then the plunger is pulled back. If the plunger cannot be pulled and there is strong suction, it means that the fit clearance is good, otherwise it should be replaced with a new one.

20. How does a slipper work in a swash plate?

The ball head of the plunger is in contact with the inner spherical surface of the slide shoe and can rotate in any direction, while the plane of the slide shoe is in contact with the swash plate. In addition, through the small hole f of the plunger and the small hole g on the sliding shoe, the pressure oil is introduced to the chamber A , so that a layer of oil film is formed between the sliding shoe and the swash plate, that is, a hydrostatic bearing is formed. When the pump is working, the pressure oil P acts on the plunger, which produces a normal pressing force N on the sliding shoe, making the sliding shoe press against the surface of the swash plate, while the oil pressure P' of the oil chamber A and the gap between the sliding shoe and the swash plate. The liquid pressure of the fluid pressure gives the slide shoe a reverse thrust F , and when the reverse thrust F is equal to the pressing force N , the slide shoe is in a balanced state.

The balance process of the sliding shoe is like this, when the pump starts to work, the sliding shoe is close to the swash plate, because the oil in the oil chamber A does not flow, so it is in a relatively static state, at this time $P'=P$, in this state The reverse thrust F is greater than the pressing force N , so that the sliding shoe is gradually pushed away, resulting in a gap h , and the oil in chamber A leaks through the gap and forms an oil film. At this time, the oil in chamber A is in a flowing state, so the pressure The oil P passes through the damping holes f and g to the chamber A . Due to the resistance loss of the damping holes f and g , P' is smaller than P until the reverse thrust F is equal to the pressing force N , so that the swash plate of the sliding shoe maintains a certain oil film Thickness, and in a new state of equilibrium.

twenty one. What is the reason why the high-pressure rubber hoses of the two plunger pumps vibrate so much when the excavator is working?

If the oil pressure gauge is installed on the pressure measuring port of the oil pump outlet, you can see that the oil pressure gauge swings up and down greatly. This is because the contact surface between the valve plate and the cylinder body is not smooth. Most of them are ground with a grinder or manually during maintenance, and the quality of the grind is problematic. The key is to check whether the verticality between the center line of the cylinder body and the plane of the cylinder body has changed, and whether the verticality between the center line of the valve plate and the end face of the valve plate has changed. On the other hand, because the machine is old, the oil pump has been repaired many times, the plunger cylinder has been grinded many times, and the spring force on the cylinder has decreased, or the butterfly spring is less installed, etc. The compression force between the cylinder body and the valve plate can be insufficient. When the oil pressure exceeds the pressing force, high-pressure oil will leak from between the valve plate and the cylinder block, causing oil pressure fluctuations. When the throttle is increased, the fluctuation is greater, and the oil pipe jumps more violently. The way to get rid of it is, if the surface grinding is biased, regrind; the spring is not strong enough, you can add a gasket; the size of the pressing force can be checked by hand, that is, you need to hold the shaft head of the oil pump with both hands to twist it. Compression force is enough. However, it should also be noted that the pressing force should not be too tight, because if it is too tight, a certain thickness of oil film cannot be established between the cylinder block and the valve plate, and the plane is easy to overheat and burn out.

The roughness of the distribution plate plane is very high, and the geometric dimensions of the shape cannot exceed the tolerance. It is best to grind it by hand. twenty two. The

excavator works normally at the beginning, but suddenly one side of the track cannot move and the excavating arm is weak. What is the reason?

Most of the reasons are that the hydraulic oil circuit is not clean, and tiny dirt blocks the damping hole in the middle of a small piston in the safety valve. The safety valve can be removed for cleaning, and the blockage of the orifice can be removed.

twenty three. Why does the blockage of the damping hole have such a big impact?

This is a common failure, and it is also a failure that has a great impact on the hydraulic system. To clarify the truth, it is necessary to introduce the working principle of the pilot safety valve. The pressure oil P passes through the existing damping hole and enters the C cavity. At this time, the pressure of the C cavity is equal to the P pressure of the system. Due to the action of a small spring, the piston is always pressed to the right valve seat. When the C cavity oil pressure rises to a certain value. That is to say, when the pressure of the poppet valve rises to the regulating value, the poppet valve is pushed open, and the oil in cavity C returns to the oil tank through the poppet valve. At this time, the pressure in chamber C drops sharply. Due to the damping effect of the damping hole, chamber C loses balance with the system pressure, so the small piston moves backward and left, and the system pressure overflows back to the fuel tank through the small piston. When the system pressure drops to a certain value, the poppet valve resets, and the small piston also moves to the right to reset. Repeat this process to adjust the system pressure. If the nipple hole in the middle of the small piston is blocked, the C chamber cannot get pressure oil, and the pressure in the C chamber is much lower than the system pressure, so the small piston is always in the left-shift position. No matter the

system pressure is high or low, it is also in overflow state. So once a small damping hole is blocked, the impact will be great. Therefore, for hydraulic oil circuit one

twenty four. After checking that the damping hole is not blocked, why the pressure of the safety valve still cannot be adjusted?

Most of this situation is due to the poor closure of the poppet valve and the valve seat, so that the oil pressure in the C cavity cannot be established.

25. What should be paid attention to when grinding the end face of the gear?

After the gear of the gear pump is worn out, it must be ground with a high-precision grinding machine, and a responsible master should be found to operate it. For example, the grinding machine table must be absolutely clean, and dust is not allowed on the platform. Because the table is slightly unclean, the ground plane will deviate from the vertical line of the bearing hole.

26. How to know that the verticality between the ground gear plane and the bearing hole has changed?

It can only be found when assembling the gear pump, because the gap between the end faces is very small, generally around 0.05mm. If the perpendicularity between the end face and the bearing hole changes, the gear shaft cannot move after the pump is assembled. If the locking screw is loosened a little, but the rotation is still not smooth, then the gear pump is disassembled and inspected, and there are scratches on the end surface. This is due to the non-perpendicularity between the end face plane and the bearing hole.

27. What should be paid attention to when assembling the gear pump?

The wear of the pump casing will be a little more in the oil inlet chamber. If the pump casing is symmetrical, it can be turned 180. reuse. For passive gears, the two ends cannot be replaced, and marks should be made when removing them. Because the gear will wear on one side. The active gear is integrated with the rotating shaft and cannot be turned over; turning over the passive gear can change the contact point of the meshing line of the two gears. After the pump is assembled, it should be rotated by hand after adding a little lubricating oil, and the hand feel should be smooth.

28. Should the bearings on the end faces be replaced at the same time during assembly?

Be sure to replace them at the same time. Because of the wear of the end face of the pump, it is mainly caused by the excessive bearing clearance and the swing of the gear during rotation.

29. One track can only move forward but not backward. What is the reason?

It is caused by the overload relief valve core in the travel motor being stuck. In order to protect the safety of the system, the travel motor has installed two overload relief valves in the system. If one of the overload relief valve spools is stuck in the overflow position, the system pressure will be lost.

30. One side of the crawler is moving very slowly, but if it makes a turning action at the same time, the crawler can speed up. What is the reason?

This failure occurs on many excavators. This is due to insufficient flow to the travel motor plunger pump. When the excavator does another action at the same time, it is equivalent to adding the flow of a plunger pump. The flows of the two pumps will be merged in the Komatsu 200-2 excavator control valve, and the Komatsu 200-3 to PC200-6 excavator will be merged on the straight travel valve.

Insufficient flow rate of the plunger pump is not necessarily due to the damage of the pump, but mostly due to the improper adjustment of the flow control valve.

31. What is the reason for the feeling of heavy (almost unmovable) when pulling the travel control handle of the excavator?

Walking distribution valves are different from other distribution valves. The travel distribution valve of most machines is not hydraulically controlled, but directly pulled manually through a mechanical pull rod. Because the machine is old, or the distribution slide valve has been worn, the matching gap between the travel slide valve and the hole becomes larger, and the high-pressure oil will leak from the oil passage through the slide valve gap to the end with the spring, and the spring is tightly covered by the spring cover. As a result, high pressure is formed in the cover, causing the distributing valve to move to the side with the spring, and the joystick is very heavy (it is lighter in the other direction).

32. When the excavator is started by operating the walking joysticks of the two crawlers at the same time, the engine speed will drop instantly or even turn off. What is the reason?

This failure is more common. This is mainly due to a problem with the variable mechanism of the plunger pump. When the machine is idling, the plunger pump still has a large flow.

33. The walking oil motor has just been repaired, and the track moves faster when the accelerator is small, but it will not move when the accelerator is large. What is the reason and what is the remedy?

This is because the valve plate has been ground during maintenance and the amount of grinding is too much, so that the pressing force between the valve plate and the plane of the cylinder body is not enough. When the throttle is small, the oil pressure is small, and leakage

between planes is not easy to occur; when the throttle is large, the oil pressure increases, and overflow occurs between the planes, causing the track to not move when the throttle is large. The remedial method can be to add a gasket to the spring, if it is a butterfly spring, you can add a piece of butterfly spring.

34. What is the fault that prevents the excavator from walking in a straight line?

Generally, it is caused by the difference in the oil pressure entering the oil motor on both sides. The side with the higher oil pressure will naturally move faster. During the inspection, two oil pressure gauges can be installed on the pressure measuring ports of the traveling oil motors on both sides. If the pressure difference is large, the side with the lower pressure can be adjusted a little higher on the safety valve. If the pressure is the same on both sides, it means that the oil flow rate delivered by the two plunger pumps is different (how to adjust the pump flow rate is specially introduced in Part 2). If the type 3 and type 5 machines cannot walk in a straight line, check their linear control valves.

35. Why can't the excavator stop on the slope?

In general, the excavator can stop on the slope, because the excavator walking pump itself has a braking device, as long as no liquid is supplied

Press the motor to supply oil, and the brake device will act as a brake, and there are also a pair of shuttle valves installed in the two motor circuits in the system. Before the hydraulic oil P enters the travel motor, one way of oil enters the A end of the reciprocating valve first, so that the reciprocating valve is displaced to B; the pressure oil P has one way of oil passing through the reciprocating valve to the brake spool valve, and the brake spool valve moves toward the spring. The direction is shifted so that the hydraulic oil reaches the motor braking

device and the motor starts to rotate. The brakes are also released, almost simultaneously. When the oil supply to the motor stops, both the reciprocating valve and the brake valve reset automatically, the motor brakes at the same time, and the reciprocating valve cuts off the flow of oil in the pipeline. Since the oil cannot flow, the shuttle valve also acts as a brake. If the excavator cannot stop on the slope, it is necessary to check the leakage of the shuttle valve.

36. Why does the PCA00-3 excavator not have a fast gear?

The control oil of the variable speed slide valve comes from the control pump. There is an electromagnetic switch for controlling the speed in the cab. The control oil must pass through the solenoid valve controlled by this switch to reach the variable speed slide valve. If the solenoid valve is broken, the speed cannot be changed. When the fast gear is turned on, the 2-position 4-way solenoid valve moves to the right, the control oil reaches the lower end of the spool valve through the solenoid valve, the spool valve moves up, and the high-pressure oil entering the upper cavity of the servo valve is cut off, at the same time, the control oil from the solenoid valve also enters the lower cavity of the servo valve, and pushes up the servo valve piston to make the motor variable.

37. What is the reason why the rotary motor of the turntable cannot rotate?

For Komatsu excavators type 3 to type 6, the turntable is equipped with a parking brake device. If the brake solenoid valve is faulty or its control circuit is faulty, it will cause the motor brake device to fail to open.

46. If the turntable is turned back, the shift brake solenoid valve is broken. What are the emergency measures?

The function of the solenoid valve is mainly to move the 2-position 3-way valve left and right, thereby cutting off or connecting the control oil circuit. We can connect the hose A directly to the joint of the hose B, temporarily without the solenoid valve, the motor can rotate.

38. Why is it difficult to stop at the desired stop position when the turntable is turning?

This is the deterioration of the locking function of the swing motor.

39. Is the structure and working principle of the swing motor the same as that of the travel motor?

It is basically the same, except that the travel motor has an automatic braking device and the swing motor does not.

40. What does the turntable stop on?

When the oil supply to the motor was stopped, the inlet and outlet oil passages of the motor were all blocked by the distribution valve. At this time, the motor cannot rotate no matter which side it is. Only when the two overload valves are faulty or the pressure is adjusted too low, the hydraulic oil will overflow in the overload valve, and the motor will fail to stop.

41. Why can't the turntable turn a full circle?

The large ring gear of the turntable has broken more than 2 teeth.

42. What is the reason for the hydraulic oil rushing up from the refueling port of the turntable?

It is the oil seal of the rotary motor shaft head that is damaged.

43. What is the reason for the fatigue of the excavator when the boom is raised and the turntable is turned at the same time?

This happens only on Komatsu Type 1 and Type 2 machines. When the machine is going to rotate, it will send a hydraulic signal to the total power regulator of the two plunger pumps to reduce the flow rate of the plunger pumps so that the power can be compensated. If the control valve is faulty, it cannot transmit the signal sensitively, which makes it difficult for the boom to move with the turntable

44. Why does the dial go faster in one direction and slower in the other when operating the dial?

This phenomenon does not occur on models that do not use hydraulic excavation. It is generally caused by a fault in the overload valve on the slow side, or the length of the tie rods of the distribution valve is different.

45. In the Komatsu series of excavators, are the variable mechanisms of Type 1, Type 2, Type 3 and Type 5 machines the same?

Type 1 excavator adopts the early PNC system with a relatively simple structure. If there is black smoke when the boom is lifted, the variable mechanism must be removed for inspection.

The focus of the inspection is the small pistons in piston holes 1, 2, 3 and 4. Check to see if the piston is stuck in the piston bore.

46. Why the above four small pistons are stuck. Will it increase the load on the engine?

Because the high-pressure oil of the front pump and the high-pressure oil of the rear pump enter holes 1, 3 and 2, 4 respectively, push the four small pistons in the holes to move to the right, and when the small pistons move to the right, push the piston to move to the right, and the piston moves The journal of the plunger pump is connected with the rocking frame of the

plunger pump, thereby driving the rocking frame to move to the right. The rocking frame is mechanically connected with the front and rear pumps, so when the rocking frame moves to the right, it drives the front and rear pump body to swing to the right, the pump swing angle decreases, and the pump exhaust The amount is also small, which increases the load on the engine.

47. After checking that the four small pistons can move, but the engine still emits black smoke, how should the fault be eliminated?

You can gradually loosen the adjusting screw at the right end until it can be unloaded.

48. Komatsu PC300-3 and PC400-5 excavators are lifting the boom. What is the reason for the black smoke from the engine?

It is caused by the loss of control of the variable mechanism. The variable mechanism of Komatsu 3 and 5 machines is relatively complicated, and they use the OLSS system. Later products add a microcomputer to the system, which is called the electronically controlled OLSS system (the Chinese full name is open center load sensing system). In addition to adjustment, the OLSS system should also be checked for faults.

49. What should be paid attention to when repairing the cylinder?

In addition to the fact that the length must be accurate, when the cylinder flange is welded, the center line of the flange hole and the inner diameter of the cylinder must be aligned, otherwise the piston rod will be deviated.

50. Why does the bucket arm stay for a while when it is lowered to a position perpendicular to the ground?

This is caused by insufficient oil supply to the large cavity of the bucket arm cylinder. When the bucket arm is lowered to the vertical position, the large cavity of the cylinder tube has already been short of oil. During maintenance, check whether the bucket arm throttle valve is installed backwards, or whether the flow rate of the plunger pump is sufficient.

51. Why does the PO400-3 excavator not need to pull the joystick, but the bucket arm will automatically extend?

This is caused by the bucket arm acceleration distribution valve spool being stuck in one direction. PCA00-3 excavator bucket arm distribution valve spool has 2 pieces, one is on the other valve group, so it is not easy to be found.

52. It has been confirmed that the boom cylinder oil seal is damaged, but how to confirm which oil seal it is?

The temperature of the oil cylinder with damaged oil seal will be higher than that of the undamaged one, which can be judged by touching it with hands. Another method is to put down the two cylinders, remove the oil pipes on the small chambers of the two cylinders, and then enter the oil from the large chamber. When the piston goes to the extreme, the oil pipe head of the good cylinder will stop oil flow, while the cylinder with damaged oil seal will continue to have oil flow out of the pipe head.

53. Why does the Komatsu PCA00-2 excavator pull the boom joystick to raise the boom, or pull the travel joystick, the turntable will automatically turn in one direction?

For the turntable to rotate, the distribution valve of the turntable must not be in the neutral position. This must first be confirmed clearly, and at the same time, it must be confirmed that the distribution valve slides normally. Next check again, in P. 0. When the C pilot control valve

is not working, is there a large amount of pilot oil entering the two ends of the distribution valve. If the inspection conclusion is normal, it can be determined that the fault is in the rotary flow control valve. Rotate flow control valve A. When there is no control rotation, the A valve core is in the middle position, and the hydraulic oil with zero pressure from the Pd port of the jet valve passes through the pump 1N. The upper end of the C valve then flows through the A valve, and then reaches the fuel tank. Once the A valve is stuck and the A spool is not in the middle position, the Pd pressure oil cannot return to the oil tank, and the oil pressure may rise. Because the A spool is not in the middle position, the openings of pump 1, pump 2 and the control oil circuit of the rotary distribution valve are opened, and the Pd oil pressure from the Pd port of the jet valve flows into the control oil circuit of the rotary distribution valve, pushing the distribution valve to a Move sideways. Cause the turntable to automatically rotate.

54. For Komatsu PC200-5 and PC200-6 excavators, the piston rod of the arm cylinder and the piston rod of the middle arm cylinder will have the phenomenon of discoloration of the flange (the local oil temperature is too high). What is the reason?

Because PC200-5 and PC200-6 excavators have a boom holding valve installed between the bottom of the boom cylinder and the distribution valve, which can prevent the boom from falling automatically. PC200-6 type excavator also installs a middle arm holding valve between the piston rod side of the middle arm cylinder and the distribution valve. Prevent the middle arm from lowering automatically.

Since the holding valve is set in the oil circuit, the hydraulic oil entering and leaving the oil cylinder increases resistance, especially when the back pressure of the slide valve is not well

released, the opening of the slide valve is not enough, which makes the flow resistance of the hydraulic oil greater. The greater the resistance, the greater the temperature generated by friction, resulting in too high a local oil temperature. Komatsu other models do not have this phenomenon.

55. The plunger, plunger body and valve plate of Komatsu PCA00-3 excavator have been replaced with new parts, and the contact surface between the valve plate and the plunger body is burned within half a day. What is the reason?

There are many reasons. It may be that the purchased parts are unqualified, and the fuel tank and pipeline are not cleaned well. Except for the above reasons, the key is that the plunger body and the valve plate have not been run-in. The newly purchased plunger body and the distribution plate are in arc surface contact (PC400-3 and PC400-5 types), and the contact surface must be run-in before it can be put into normal work. The running-in method can be manually running-in first, and then run-in after installing the machine. First use a small throttle for about 4 hours, and then use a medium throttle for 4 hours.

56. The working pressure of the Komatsu PC400-3 excavator is normal. The output pressure of the control pump and the jet valve pressure are also normal. Why work tired?

This requires careful inspection of the servo valve. It should be checked from two aspects: first, disassemble the valve parts, check the color of the spool and slide valve, if there is a black part, it means that this part is leaking oil, and new parts need to be replaced. Secondly, check whether there is any abnormal color. If there is, it is likely that the slide valve is not adjusted properly, so that the oil inlet B and the oil outlet C are connected.

57. How to judge whether the overload valve and distribution valve are damaged?

Judgment method for overload valve failure: Remove the plug of the walking distribution valve and replace it with the overload valve. If the boom does not drop, it indicates that the overload valve is faulty; judgment method for distribution valve failure: pull out the distribution valve core, Observe its color, if the spool is black, it means leakage has occurred.

Maintenance case of black smoke from excavator

Causes and solutions of several common faults of "black smoke from excavator": poor atomization of fuel injection by the injector; excessive fuel injection; uneven fuel injection; oil entering the combustion chamber; poor quality of diesel oil. Insufficient cylinder pressure Insufficient; Excavator black smoke "causes and solutions of several common faults: poor atomization of fuel injection by the injector; excessive fuel injection; uneven fuel injection; oil entering the combustion chamber; diesel quality is too poor. Insufficient cylinder pressure and insufficient combustion; construction machinery maintenance solution: check and adjust the injector in time to keep the atomization good without dripping oil. Reduce the resistance of the engine intake system, clean the air filter element in time, and ensure the correct gas distribution phase. Correctly adjust the fuel injection pump on the test stand, and adjust the fuel supply advance angle. Use fuel that meets specifications. It is required to use diesel oil with a higher cetane number, the cetane number is 45-60, and the sulfur content should be low.

Refuel evenly and operate correctly while driving. If the engine is running normally and the accelerator is suddenly stepped on, black smoke will also appear from the exhaust. Keep the airtightness of the cylinder. If the piston ring is severely worn, the piston ring should be

replaced; if the piston and cylinder liner are also severely worn, they should also be replaced; if the valve is not closed well, it should be ground.

Although the above is relatively concise, it has covered most of the causes of "black smoke from the excavator engine". But because the excavator is a high-precision machine integrating "mechanical, electrical and hydraulic". Some failures must rely on professional precision instruments to detect the internal reasons

How to deal with the high oil temperature of the excavator, many old excavators are often at a loss when the oil temperature is high. After the maintenance experience of some maintenance masters, the following points are summarized here:

- 1 The main pump is severely worn, replace the rocker arm assembly, pump liner, plunger, etc.;
- 2 Replace the repair kit for the distribution valve, stop the leakage of oil. Replace the repair kit for the walking oil separator;
- 3 Lathe small engine belt pulley, increase the air intake. Cut off the bottom plate on one side of the radiator and replace the mesh plate;
- 4 Wrap the liquid oil tank with heat insulation pad;
- 5 Check the hydraulic circuit back pressure valve;
- 6 If the engine slows down, the engine temperature will also be high.