KRL-10H Dual Function Testing Machine Cone Roller Bearing Shear Testing Machine+extreme pressure four ball machine

Product Proposal

Jinan Hengxu Testing Machine Technology Co., Ltd

Technical information should not be disseminated

One、 Product Introduction

1.Dual function testing machine - KRL test:

(1). Using a conical roller bearing test machine, under test conditions similar to a gearbox, the lubricating oil is subjected to mechanical shear stress, causing permanent viscosity loss. The viscosity shear safety of the lubricating oil is expressed based on the decrease rate of the kinematic viscosity before and after the lubricating oil test.

The shear test (KRL) for tapered roller bearings is one of the widely used shear test methods in domestic and foreign standards. Compared with other shear tests, this method has the characteristics of more obvious shear effect and higher test severity, making it an ideal test method for evaluating the shear stability of heavy-duty oil products. This experiment was conducted under extreme pressure conditions of 5000N, and the tested oil was subjected to 20 hours of shear using SKF32008XQ tapered roller bearings at a speed of 1475 rpm. The shear stability of the oil was evaluated by measuring the viscosity loss of the oil before and after shear.

(2). Test method

◇ NB/SH/T 0845-2010

Measurement of viscosity and shear stability of transmission lubricants - Cone roller bearing testing machine method

◇ CEC L-45-A-99

Sensitivity Shear Stability of Transmission Lubricants

◇ DIN 51350-6

Testing of lubricants - Testing in the Shell four ball tester - Part 6: Determination of shear stability of lubricating oil containing polymers

In the KRL test with a load of 5000N, the actual load fluctuation does not exceed 50N, which meets the standard requirements of NB/SH/T 0845-2010 Measurement of viscosity shear stability of transmission lubricants - Cone roller bearing testing machine method, and also meets the design requirements of the force

application structure of the four ball machine.

2. Dual function testing machine - four ball test:

(1). The four ball testing machine evaluates the load-bearing capacity and wear resistance of lubricants (lubricating oil, grease, etc.) under point contact extreme pressure conditions in the form of sliding friction. It measures important quality indicators such as the maximum non biting load PB value (representing oil film strength), sintering load PD value (representing the extreme working capacity of the lubricant), comprehensive wear value ZMZ (an index of the lubricant's resistance to extreme pressure), and analyzes the temperature characteristics of the lubricant, as well as the influence of temperature and time on the lubricant's lubrication performance (friction).

(2). Testing methods

GB/T12583-98, Determination of Extreme Pressure Performance of Lubricants (Four Ball Machine Method);

GB3142-2019, Method for determining the load-bearing capacity of lubricants (four ball method);

SH/T0189-92, Determination of Wear Resistance of Lubricating Oils (Four Ball Machine Method);

SH/T0202-92, Determination of Extreme Pressure Performance of Lubricating Greases (Four Ball Machine Method);

SH/T0204-92, Determination of Wear Resistance of Lubricating Greases (Four Ball Machine Method)

ASTM D 4172-94R04E1 Test Method for Friction and Wear of Lubricating Oils (Four Ball Method)

The appearance reference image is shown in the following figure

KPL-10HA fully automatic dual function testing machine (superior to lever type)

KPL-10HG fully automatic dual function testing machine (lever type)

Two、 Main technical parameters

1. Main technical parameters of the dual function testing machine KRL test project:

NO	Technical projects	function
1	Driving method	direct drive
2	Loading method	**Fully automatic loading**
3	Test load	98~9800 [N]
4	Spindle radial runout	≤ 0.01 [mm]
5	power	servo motor
6	Motor power	2 [KW]
7	Spindle speed [r/min]	50-3000;
8	Axis operation control mode	Manual control, time control, limited friction force, limited friction coefficient
9	Heating and cooling circulation temperature control system equipment	Thermostatic equipment, temperature controlled at 0.02 ℃
10	KRL oil cup heating range [℃]	-10~120 ℃

2. Main technical parameters of the dual function testing machine - four ball machine:

Number	Technical projects	Function
1	★Evaluation indicators	Mixing PB, PD, ZMZ, and long grinding D values does not affect the test results
2	▲ Relative error of test force indication	± 1%
3	★ Clamp	There is a pre tightening force, which needs to be matched with a pin shaft and a tightening nut for locking
4	Heating range of four ball oil cup	Room temperature~200 [℃]
5	Friction process curve	Friction force and friction coefficient curve
6	Wear spot measurement accuracy	0.01 [mm]
7	★ Evaluation method	Wear spot measurement combined with friction coefficient, fast speed

Number	Technical projects	Function
8	Adaptation standards	GB, ASTM, SH/T, ISO, DIN, etc
9	★ Collect maximum value	Collect the maximum values of friction force and coefficient of friction, and determine whether the oil film has ruptured.
10	★ Pressure sensor	2kg and 50kg, fixed on the machine simultaneously
11	Friction measurement [N]	0-500N; 0~10000N, two separate detections

Three. Product advantages

This model of friction and wear testing machine adopts new balanced loading technology, force retention technology, and new control technology. The test force is applied smoothly and reliably, and the magnitude of the test force can be set by the operator on the computer interface; The parameters of the spindle, such as rotational speed, number of revolutions, test force, friction torque, friction pair temperature, and test time, are all controlled by a computer. Real time test data can be collected and corresponding test curves can be drawn. Test data or curves can be stored, accessed, and printed out at will. The analysis of product advantages is as follows:

1. **Loading method:** This type of testing machine is our company's first introduction of **servo motor loading** in the industry, with strong **controllability** and low **failure rate**. After years of continuous improvement, its performance is stable and reliable. The **double floating bearing technology**, **clearance free** guidance **technology,** and **buffering cross balance technology** are all guarantees of accurate and stable testing force, reducing system errors and ensuring the accuracy of real-time tracking and measurement of testing force and friction force;

2. **Main structure**: During the friction test, the impact of motor and accessory component vibration on wear marks should be minimized as much as possible. Therefore, we adopt an **integral main body**, thickened support plate, and Taiwan Dongyuan **servo motor to drive the** main shaft. The related transmission components also use **imported precision bearings**;

3. **Electrical part**: The equipment adopts an independent **embedded industrial controller**, an **industrial metal touch screen**, and an independent analysis module for data collection, effectively ensuring the impact of high-speed or oil film rupture and severe vibration on the performance of the control part of the equipment;

4. **Wear spot measurement**: It can conveniently **capture** wear spots, **measure and analyze** friction surface **morphology**, and directly **save wear spot images;**

5. **Control software**: Generally, software can achieve real-time collection, but we are a self-developed **specialized software** (for the modification of universal material testing machines) that can establish **professional test plans** according to different standards, and can also determine Pb values based on the size of wear spots. It has the function of saving and exporting data tables.

6. **Service Team**: We not only produce this equipment (some workshops are assembled according to outdated drawings), but also have an independent technical service department (more than 100 research institutes have cooperated with universities for years to develop friction and wear testing machines). We can analyze and solve specific problems in real time. At the same time, our Hengxu Testing Machine Research and Exhibition Center, which is invested and constructed in the national new materials industry park, has been put into operation, providing a stable base for the company's later research and development expansion (temporary leasing of factory buildings, unlicensed production, safety hazards, quality and service cannot keep up).

Four.The main components of the dual function testing machine

The testing machine consists of a spindle drive system, an oil box and heater, a testing force sensor, a friction measurement system, a fully automatic loading system/lever loading system, a computer control system (including units for setting, controlling, and alarming various main parameters), a constant temperature and humidity oil bath system, and other parts. They are all installed in a frame with a welded base as the main body.

4.1 Spindle and its drive system

The spindle is driven by a servo motor through a speed control system, with stepless speed regulation. The power of the motor is transmitted to the spindle through the arc toothed synchronous belt speed control system.

The installation and debugging of the spindle system of the testing machine is technically difficult, so do not easily disassemble and clean it. This spindle transmission system can operate normally within the range of 10-2000r/min. Due to the application of a servo control system, it has high transmission torque at low speeds. This machine is controlled by a servo motor. When a large friction torque suddenly occurs during the high load test, the spindle torque increases rapidly. The frequency converter is protected by overcurrent, and the spindle immediately stops automatically; This machine is equipped with a timing unit (preset minutes and seconds), and an automatic parking system for exceeding the preset time.

Hengxu's specially designed extended spindle can be used to design other forms of specialized friction couples and fixtures to expand the scope of use of four ball friction testing machines.

4.2 Friction measurement and oil box

During the experiment, all four contact points of the balls must be immersed in lubricant. When the steel ball friction pair works, a small signal corresponding to the magnitude of the force is generated through a force sensor, and the friction torque measurement system displays the value of the friction torque. The friction torque data can be preset according to the magnitude of the friction torque in the experiment, achieving automatic parking function when the friction torque exceeds the preset value.

A 250W annular heater is installed outside the high-temperature oil box, and the temperature transfer element is a Pt100 platinum resistor. The test temperature is digitally controlled and alarmed from room temperature to 250 ℃ through a temperature control meter, and the signal is input into the microcomputer control system. The temperature control accuracy can be controlled within ± 2 ℃.

4.3 Micro control servo loading system

The Hengxu brand SGW-1OA four ball friction testing machine is the latest lubricating oil four ball specialized friction testing machine that adopts guidance control technology. The control system adopts a new HTMS control system, and the long-term measurement of lubricating oil and extreme pressure anti-wear measurement are divided into different control methods. The load maintenance adopts advanced tracking ratio adjustment structure, multi-stage guidance adjustment, and adopts advanced control concepts to distinguish and control different test forms, overcoming many problems such as high hydraulic loading noise, poor stability, and cumbersome later maintenance, effectively improving equipment reliability and stability.

4.4 Test System Operation Main Interface

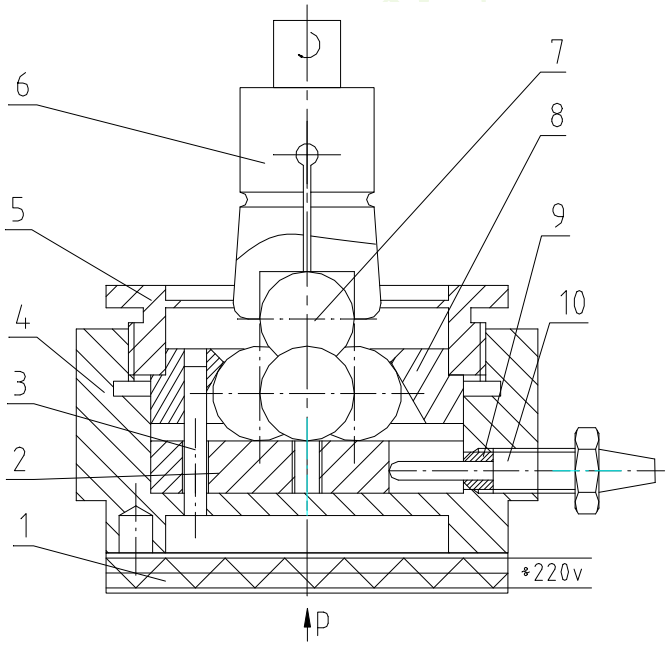
4.5 Measurement of wear spots

The measurement of steel ball wear spots is carried out using a measuring microscope with a measurement accuracy of 0.01mm. By designing the base structure of the measuring microscope, it is possible to measure the wear spots of three steel balls in the oil box without removing the steel balls. When measuring, first place the oil box on the head seat of the oil box installed together with the microscope, align the steel ball with the objective lens of the microscope, and then rotate the focusing handwheel to obtain clear wear spots. Then use specialized software to measure the

diameter of the abrasions. Rotate the oil box and use the same method to measure the average wear spot diameter of the other two steel balls in sequence. The arithmetic mean of the average wear spot diameter of the three steel balls is the average wear spot diameter of this experiment.

The microcomputer electronic template measurement system can present the grinding spot image on the computer, and use specialized processing software to measure, edit, and save the image. This grinding spot measurement system is easy to operate and improves measurement accuracy. At the same time, according to customer needs, the metallographic measurement system can also be used to measure and draw other frictional spots.

Five、 Introduction to Friction Pair of Testing Machine



Four ball friction pair

1- heater 2- pad 3- cylindrical pin 4. oil box 5- locking screw ring 6- spring clamp 7- standard test steel ball (GB308-84) 8- pressure ring 9- soft aluminum pad 10- platinum thermistor sensor

Tel:+86-0531-85860713，+8615508660930

WeChat/WhatsApp：+8615508660930

QQ：1538151698

The contact：Janna Tang

Email:cnjntest@163.com

Add:No. 102-1, building 68, Xinmao Qilu science and technology city, No. 299, Zidong avenue, Tianqiao district, Jinan city, Shandong province China

Jinan Hengxu Testing Machine Technology Co.,Ltd