Viscometer

Product Introduction PPT

- Provide excellent products and solutions for various industries

- www.apx1718.com

Company Introduction

www.apx1718.com

Company Overview Company Profile

The company was established in **2012** and is specialized in the development, design and production of intelligent automation sensor products. With a plant area of **3**,**000** square meters, the company has strong technical force, professional production equipment, complete testing instruments and supporting facilities. There is a scientific research team led by a group of scientific and technological personnel who have studied in domestic and foreign institutions. They have successively developed a series of products such as tuning fork level switches, tuning fork resonant density (concentration) meters, viscometers, microwave level switches, ultrasonic laminators, magnetostrictive level meters, radio frequency capacitance level meters, radar level meters, etc. The products are suitable for process measurement in automated production in industries such as petroleum, chemical, energy, metallurgy, environmental protection, medicine, food, and hydrology.

Company Overview Warehouse , Machining

Company Overview SMT patch, assembly and debugging

Company History and Vision

Our origin, goals and development direction

Origin and Heritage

Started in 2012, more than ten years of development

Vision and Direction

Create a domestic first-line brand and pursue excellence

Innovation drive

Continuous innovation, leading the industry's high quality standards

Development Strategy

Adhere to sustainable development and expand global market

Product Application Industry

01

Petrochemical

Crude oil, heavy oil, asphalt, grouting resin, lubricating oil, fuel oil, additives

02

New Chemical Materials

Silicone materials, polymer polyurethane, synthetic rubber, high-performance fiber composite materials

03

Adhesives, coatings, paints

High-performance coatings, new adhesives, nanomaterials

04

Electronic New Energy

Lithium battery paste, conductive silver paste, transparent conductive paste, solder paste semiconductor materials

05

Biochemical Engineering and Environmental Protection

Flocculants, biochemical engineering, bio-based nylon, environmentally friendly membrane materials

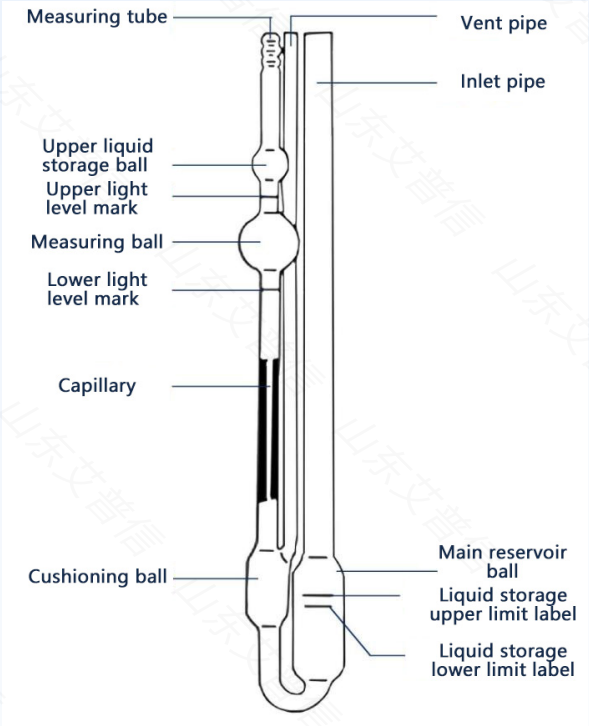
Viscometer Product Introduction

http://www.apx1718.com

Common types of viscometers

The rotational viscometer places the liquid in a specific container, then generates a velocity gradient by rotating the cylinder, measures the resistance of the rotating cylinder and converts it into ontrolling the rotation speed and measuring the resistance , an accurate viscosity value can be obtained.

Rotational Viscometer



At a certain temperature, when a liquid flows in a vertical capillary tube in a state of wetting the tube wall, its kinematic viscosity is proportional to the flow time. When measuring, use a liquid with known kinematic viscosity as a standard, measure the time it takes for it to flow out of a capillary viscometer, and then measure the time it takes for the sample to flow out of the same viscometer, and the viscosity of the sample can be calculated.

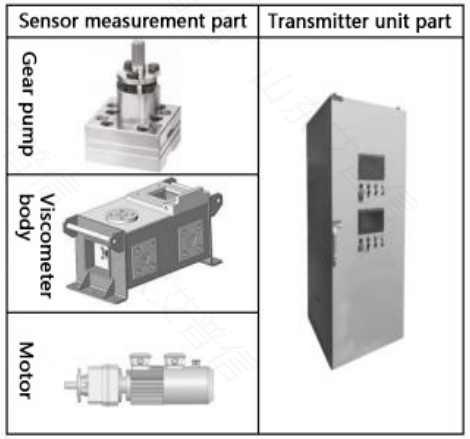
Capillary Viscometer

Common types of viscometers

The working principle of the Ford cup is to pour the test liquid into the cup, then quickly invert it and quickly lift it up to make the liquid flow out from the bottom of the cup. By measuring the time it takes for the liquid to flow out from the bottom of the cup (called the flow time), the viscosity of the liquid can be determined.

Ford Cup Viscometer

Capillary viscometer overall structure diagram



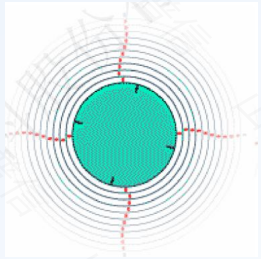
截图(Alt + A)

The metering pump passes the measured liquid through the capillary at a certain flow rate, and the differential pressure gauge measures the pressure difference at both ends of the capillary to indicate the viscosity value.

Online Cpillary Viscosity Measurement System

Vibrating online viscometer

Torsional motion produces shear waves



Different viscosities result in different shear wave energy losses

Working Principle of Vibration Viscometer

The working principle of the vibration viscometer is based on the sensor probe moving in a fluid with an amplitude of a certain frequency. This movement is affected by the viscous damping of the fluid, causing the amplitude of the probe to decay. In order to maintain the state of the probe's amplitude before interacting with the fluid, it is necessary to replenish the energy lost due to the viscous damping of the fluid. By measuring this part of the replenished energy , the viscosity of the liquid can be determined.

Online Vibration Viscometer Performance Parameters

Voltage: DC24V 1W

Range: 0-100000000cp

Resolution: 0.1cp

Accuracy: 1%

Repeatability: 0.3%

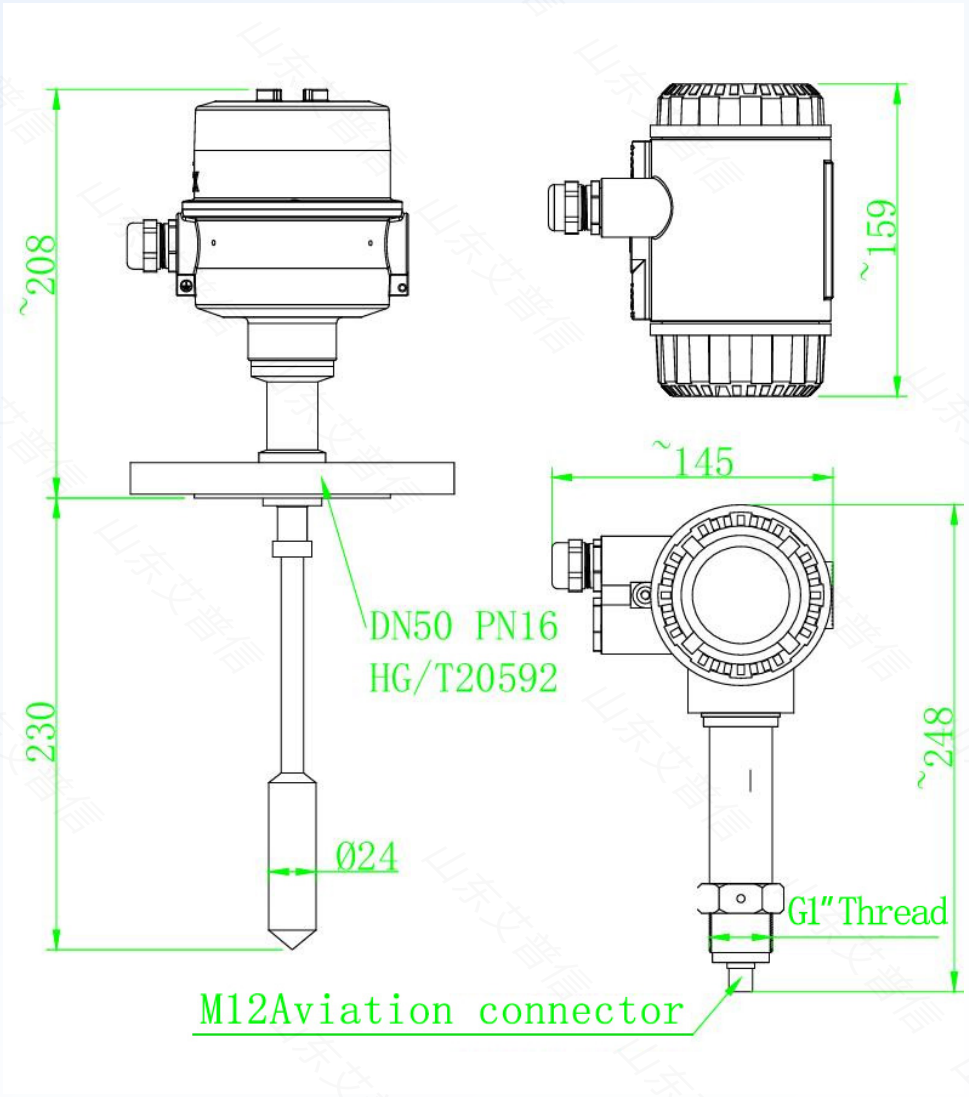
Temperature: 0-400℃

Pressure: -0.1-25MPa

Output: 4-20mA RS485 MODBUS

Material: 316L/Hastelloy/316+PTFE

Online Vibration Viscometer Dimensions



Viscosity measurement and analysis of Newtonian and non-Newtonian fluids

Difference Between Newtonian and Non-Newtonian Fluids

Viscosity of Newtonian fluid = shear force/shear rate = constant value
Viscosity of non-Newtonian fluid = shear force/shear rate ≠ constant value

The viscosity curves of non-Newtonian fluids can be roughly divided into two categories: shear thickening and shear thinning. Shear thinning means that the viscosity decreases with the increase of shear rate. The more the material is sheared, the thinner it becomes . Shear thickening is the opposite.

Most fluids are non-Newtonian fluids, and the material will change with the change of shear rate or time. Therefore, the viscosity value measured under certain conditions is different, and the measured viscosity value is a curve rather than a constant.

The magnitude of the shear rate is affected by many factors, including strain rate, temperature, chemical composition and crystal structure of the material, etc. The greater the strain rate, the greater the shear rate; the higher the temperature, the greater the shear rate; the chemical composition and crystal structure of the material will also affect the shear rate.

More than **80%** of the media we measure are non-Newtonian fluids

Different viscometers with different principles have different measurement results

The measurement results of viscometers based on different principles are different. This is because the measurement principle, structure, operating conditions and other factors of the viscometer will affect the final measurement results.

The following are the main reasons for the differences in measurement results between different viscometers:

Fluid properties: Fluids are divided into Newtonian fluids and non-Newtonian fluids. The viscosity of Newtonian fluids remains constant and is not affected by shear rate (rotation speed). The viscosity of non-Newtonian fluids changes with changes in shear rate or rotation speed. Their rheological properties are complex and are affected by factors such as shear rate (rotation speed), temperature, etc. Some fluid samples are also related to shear time.

Measuring principle of viscometer: Different viscometers use different measuring principles, such as rotational viscometer, plate viscometer, pressure drop viscometer and vibration viscometer, etc. These viscometers differ in measuring principles, conditions and units, resulting in different measuring results.

Operating conditions and parameters: The measurement results of the viscometer are also affected by operating conditions, including temperature, pressure, liquid composition, sample processing, instrument errors, environmental factors, etc. For example, changes in temperature will affect the movement speed of liquid molecules, thereby affecting viscosity; the composition and state of the liquid (such as whether it contains bubbles or impurities) will also affect the measurement results, making the online container measurement and laboratory sampling measurement purely different.

Therefore, the most important requirement for viscosity measurement is repeatability, and the consistency of repeated measurements must be ensured.

Method for measuring non-Newtonian fluids using a rotational viscometer

When using a rotational viscometer, the viscosity of a non-Newtonian fluid depends on the shear rate. At low shear rates, the viscosity of a non-Newtonian fluid decreases as the shear rate increases, while at high shear rates, the viscosity increases as the shear rate increases. This rheological behavior makes the viscosity of non-Newtonian fluids difficult to measure.

The rotational viscometer can measure the viscosity of non-Newtonian fluids by simulating different shear rates by changing the rotation speed of the cylinder. Specifically, when the cylinder rotates at a low speed, the viscosity of the non-Newtonian fluid is high, and when the cylinder rotates at a high speed, the viscosity of the non-Newtonian fluid is low. This method measures the viscosity at different shear rates.

This method simulates the shear rate by changing the rotational speed to obtain the viscosity value. The operating conditions need to be changed during the measurement process, so the measured value cannot be used as a reference value for continuous measurement, but can only be used as a change value under the same operating measurement conditions for a certain period of time.

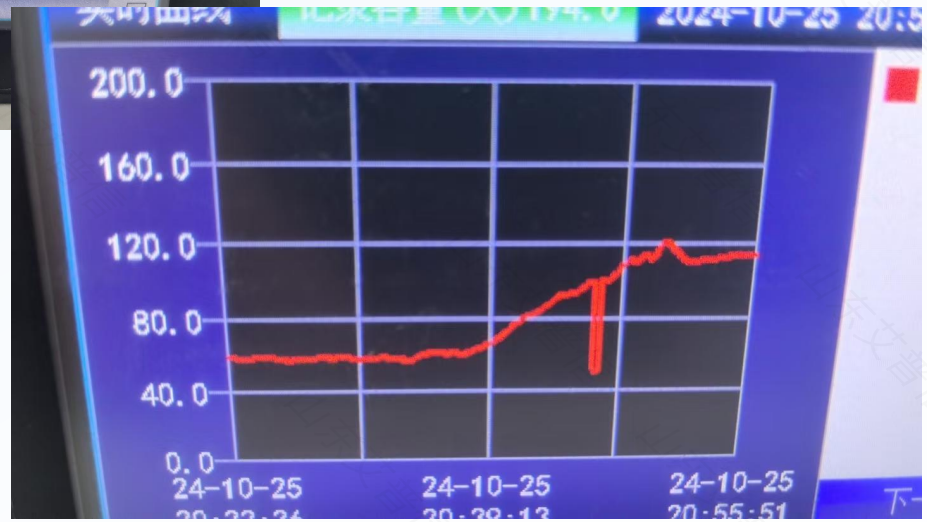
Why use an online vibration viscometer

Advantages of online viscometer (designed for real-time online measurement)

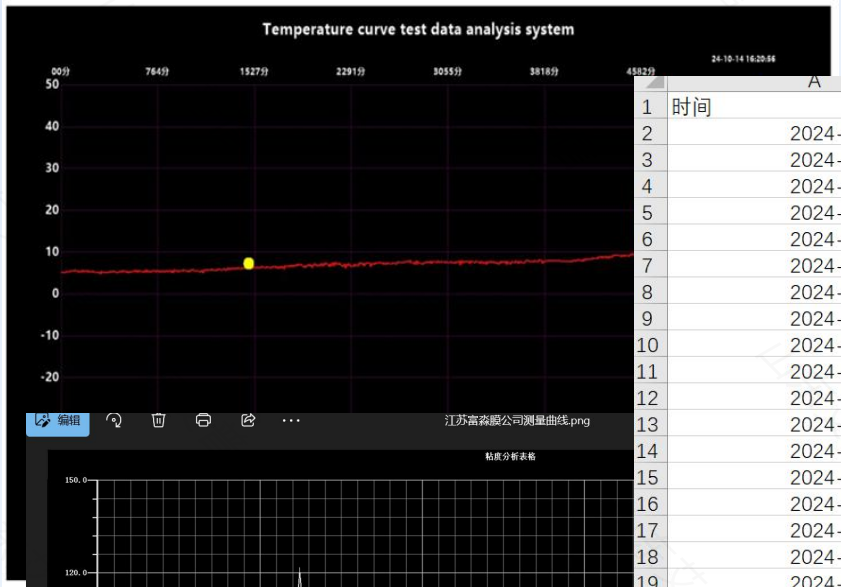
The online vibration viscometer probe is fully sealed and fixed in size. There is no need to replace the probe. The higher the viscosity, the greater the shear wave energy loss, and the smaller the viscosity, the smaller the shear wave energy loss. During the entire measurement process, continuous measurements are made from low viscosity to high viscosity under the same conditions. The sensor is always in the container, and the measurement environment changes synchronously with the process. The measurement results have a more accurate reference significance.

1. Easy to install, can be displayed next to the tank and remotely transmitted to DCS; can be installed in kettles, pipelines, and pools.
2. Good repeatability, stable measurement, not affected by stirring, bubbles, and flow rate.
3. Simple interface operation, data can be modified and saved.

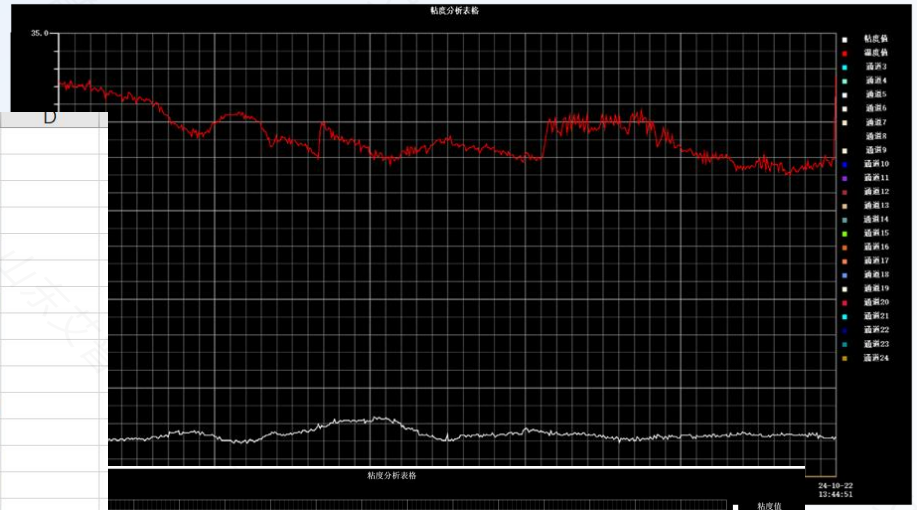
Online vibration viscometer with recorder

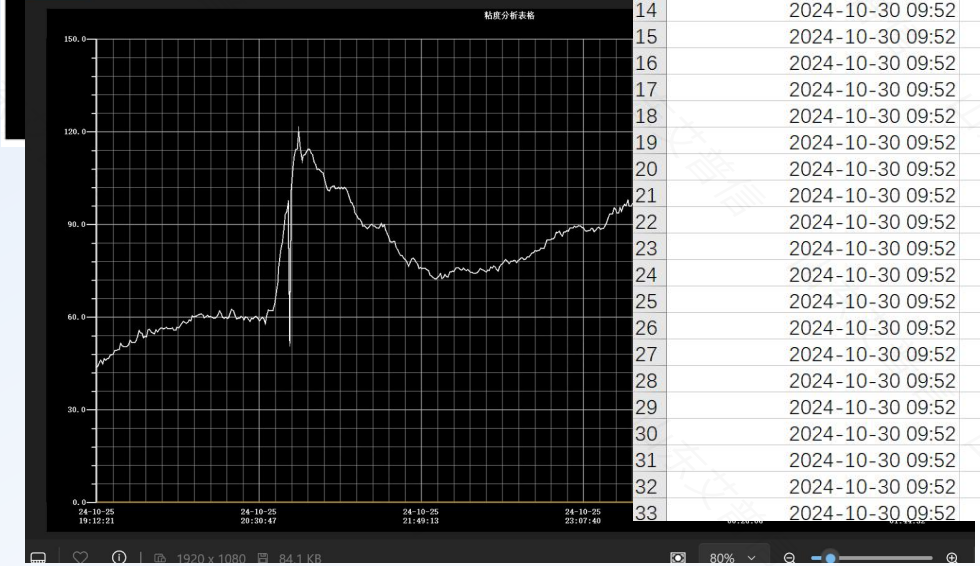


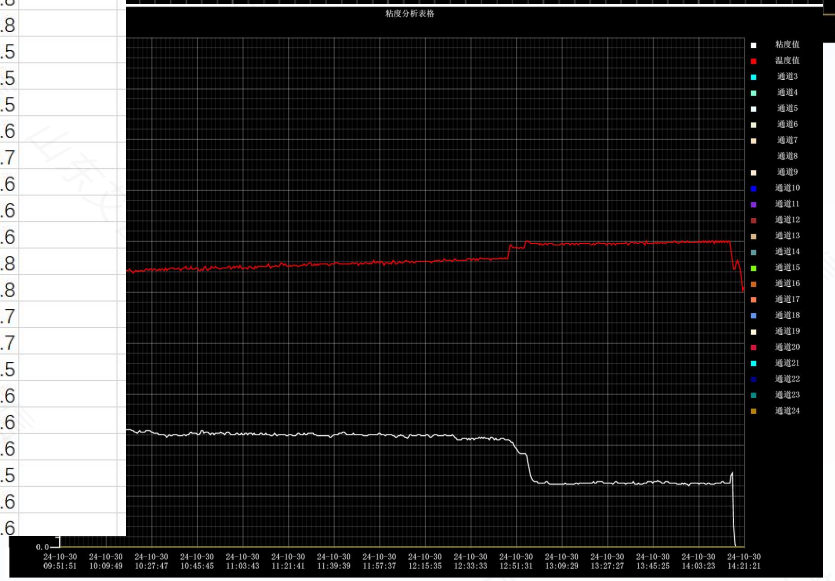
Online Vibration Viscometer Output Table and Trend Chart



	A	B	C	D
1	时间	粘度值CP	温度值℃	
2	2024-10-30 09:51	9.1	21.6	
3	2024-10-30 09:51	9.1	21.5	
4	2024-10-30 09:51	9.1	21.6	
5	2024-10-30 09:51	9.1	21.6	
6	2024-10-30 09:51	9.1	21.6	
7	2024-10-30 09:51	9.1	21.6	
8	2024-10-30 09:51	9.1	21.6	
9	2024-10-30 09:51	9.1	21.5	
10	2024-10-30 09:51	9.1	21.6	
11	2024-10-30 09:52	9.1	21.7	
12	2024-10-30 09:52	9.1	21.5	
13	2024-10-30 09:52	9.1	21.8	
14	2024-10-30 09:52	9.1	21.8	
15	2024-10-30 09:52	9.1	21.5	
16	2024-10-30 09:52	9.1	21.5	
17	2024-10-30 09:52	9.1	21.5	
18	2024-10-30 09:52	9.1	21.6	
19	2024-10-30 09:52	9.1	21.7	
20	2024-10-30 09:52	9.1	21.6	
21	2024-10-30 09:52	9.1	21.6	
22	2024-10-30 09:52	9.1	21.6	
23	2024-10-30 09:52	9.1	21.8	
24	2024-10-30 09:52	9.1	21.8	
25	2024-10-30 09:52	9.1	21.7	
26	2024-10-30 09:52	9.1	21.7	
27	2024-10-30 09:52	9.1	21.5	
28	2024-10-30 09:52	9.1	21.6	
29	2024-10-30 09:52	9.1	21.6	
30	2024-10-30 09:52	9.1	21.6	
31	2024-10-30 09:52	9.1	21.5	
32	2024-10-30 09:52	9.1	21.6	
33	2024-10-30 09:52	9.1	21.6	





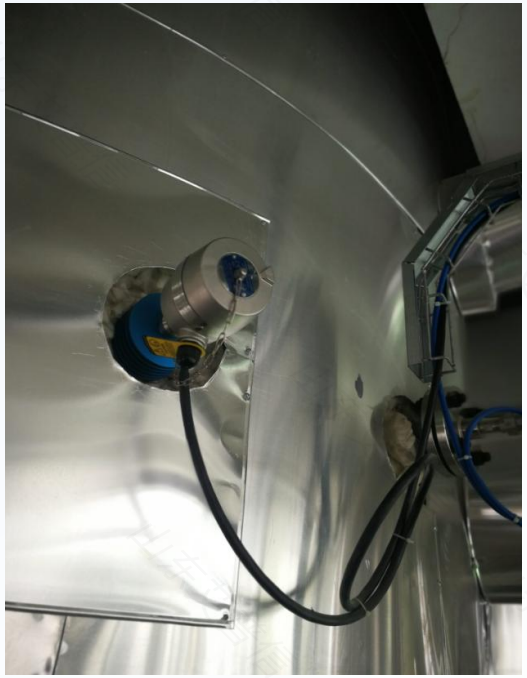


With these data, we can analyze, adjust, and trace the production process, realize automated production, ensure product consistency, and improve quality stability.

On-site installation

Resin

Wet Strength Agent



Adhesives

On-site installation

Silicone

Metal quenching liquid

On-site installation

Offshore platform oil well

Resin Industry

On-site installation

Environmentally friendly flocculant

Dry strength agent

Bio-based nylon

On-site installation

End User


山东得顺源石油科技有限公司
Shandong Deshunyuan Petro Sci& Tech Co.LTD


Runhe 润禾


苏州意森科技有限公司


济宁亚科新材料科技有限公司
Yacoo (Jining) Advanced Materials Technology Co.,Ltd.


NITTA
NITTA CORPORATION OF CHANG ZHOU


安徽金奥博新材料科技有限公司
Anhui King Explorer New Material Technology Co., Ltd


山东立中新能源材料有限公司
SHANDONG LIZHONG NEW ENERGY MATERIAL CO., LTD


江苏富淼科技股份有限公司
JIANGSU FEYMER TECHNOLOGY CO.,LTD.


Technologies Co., Ltd.


CATHAY
凯赛生物材料应用展厅
BIOMATERIALS APPLICATION SHOW ROOM

Some cooperative customers

Zhejiang Runhe Silicone New Materials Co., Ltd.

Shin-Etsu Silicone (Nantong) Co., Ltd. (Japanese company)

Nida Precision Transmission (Changzhou) Co., Ltd. (Japanese company) Microvast Power System (Huzhou) Co., Ltd.

Suzhou Tianhua New Energy Technology Co., Ltd.

Zhangjiagang Jiangsu Fumiao Technology

Kenna Metals Xuzhou Co., Ltd.

Hydrogen Power New Materials (Shandong) Co., Ltd.

Guobang Tianrun Pharmaceutical Factory

Shandong Deshunyuan Petroleum Technology Co., Ltd.

Shandong Aosai New Materials Co., Ltd.

(Brazil) Glauber Cabral de Souza Pietro (Zhoushan) Ship Technology Co., Ltd. Xinxiang Tongmeng Chemical Technology Co., Ltd. Hebei Lansheng Polymer Materials Co., Ltd. Jerry Environmental Technology Co., Ltd. Liaoning Petrochemical Vocational and Technical College Training Base

Weifang Xinbaishun Industry and Trade Co., Ltd.

Cathay Bio Shanghai Co., Ltd. Sinopec Fourth Machine Plant Henan Ruichang Environmental Engineering Co., Ltd. Yibin Tietuo Laser Technology Co., Ltd. Wuhan Kewen Electromechanical Integrated System Co., Ltd.

China University of Mining and Technology (Beijing)

Quality Control System

Certification and compliance with international quality management systems

01 Comply with international quality standards

Comply with ISO standards to improve product quality

02 Quality Management System Certification

Analysis of the certification process and its importance

03 Continuous improvement and quality control

Optimization strategy after system certification

Thank you

Presenter name 王梅13863706553

www.apx1718.com