Industrial oil
purification expert

Air separation industry varnish removal and oil pollution control

Kunshan WSD Environment Protection Equipment Co.,Ltd.

WSD - oil pollution control expert

China's carbon peak by 2030 & Carbon neutrality by 2060

The performance of industrial lubricating oil deteriorates after use. At this time, the overall oil change is a great waste and also a carbon emission of enterprises

Moreover, oil change may still fail to solve problems such as contamination in the lubricating oil system. If new oil is added, the system will deteriorate rapidly, and the equipment has the risk of safe operation due to the deterioration of oil performance, so the deterioration of oil must be solved

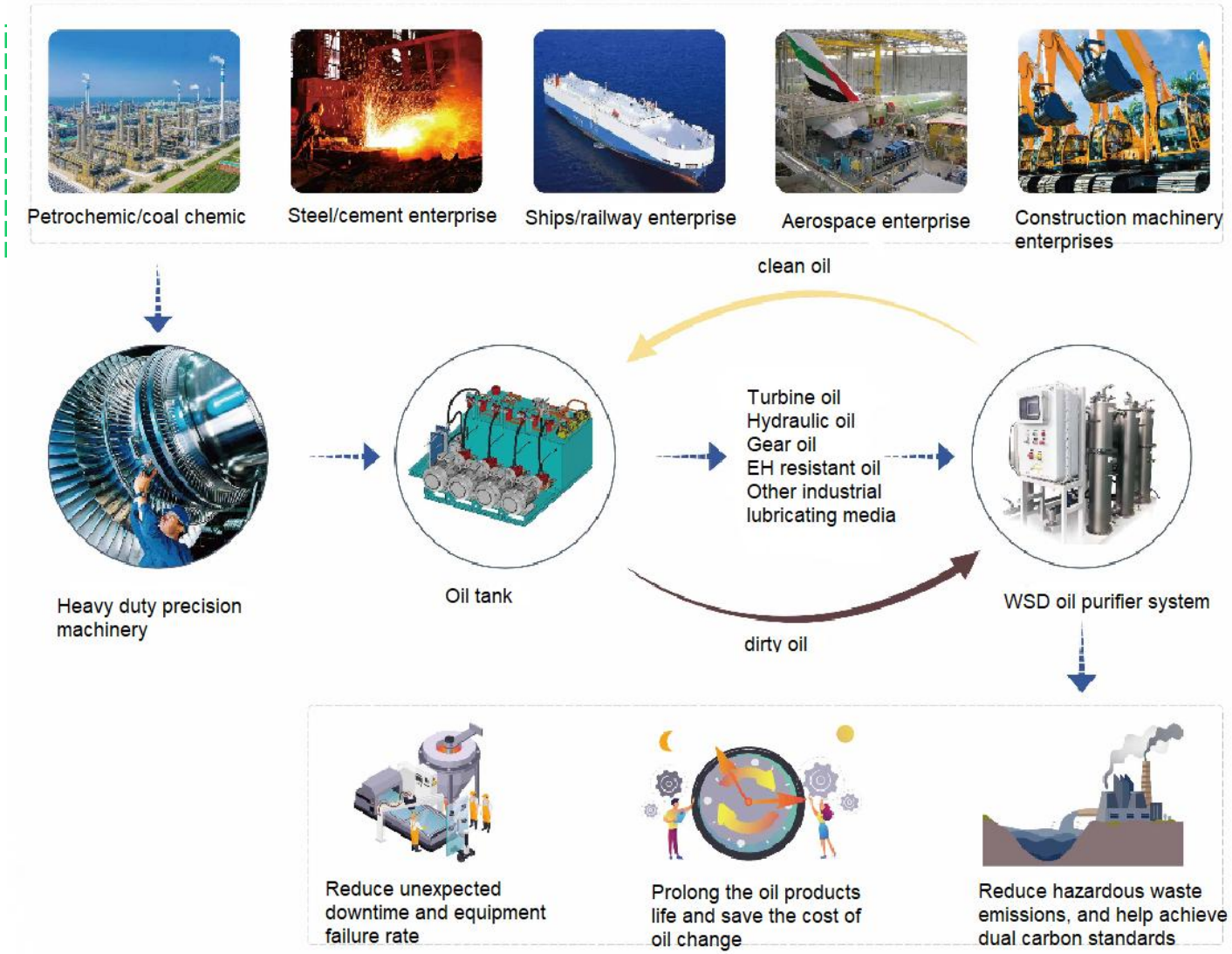
WSD specializes in industrial lubricating oil pollution control services can achieve for the enterprise:

1) Save the cost of purchasing new oil

2) No need to stop the oil change, reduce the loss of shutdown

3) Reduce equipment failure rate and improve production efficiency

4) Reduce the cost of hazardous waste disposal and environmental pollution



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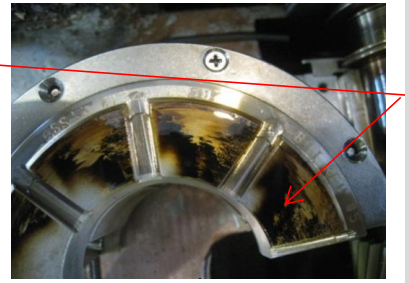
Formation and hazards of Varnish

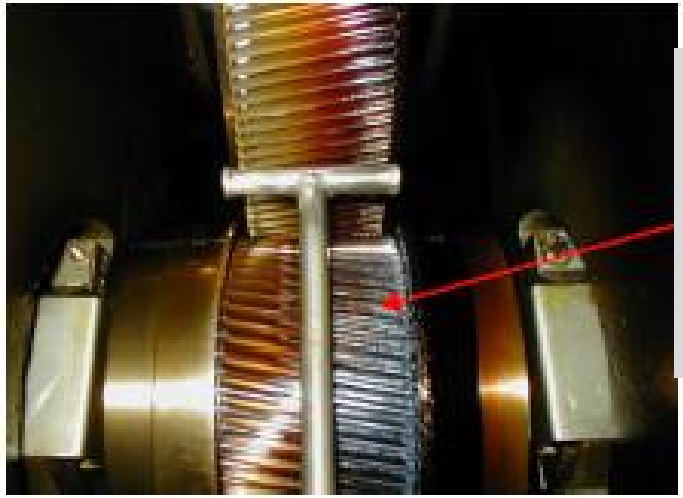
Varnish definition

Varnish

Varnish are many kinds of way colloids, varnish material, colloidal dirt, paint, etc., is a kind of elastic oxide, wax-like, gel, tar, carbon deposition, asphalt content, it is a kind of lubricating oil or hydraulic oil aging after composite oxide, in high temperature and high pressure, high speed rotating machinery are common in the lubrication and hydraulic system. The by-products formed by the oxidation decomposition of lubricating oil contain a large number of polar components, which are easily deposited on the metal surface to form a paint film. The deposition of paint film is an important reason for the reduction of the reliability of the compressor unit.



varnish on bearing bush



varnish on compressor gearbox

varnish on the tank wall

Initially, the surface is gold/tawny, but over time, the accessory is gradually covered with a darker rubbery coating, which eventually becomes a hard, paintlike substance

Why varnish is easily formed in compressors?

The operation environment is harsh and hot spot effect is formed on metal surface

ⅡⅢ Base oil alternative Ⅰ class base oil though thermal stability and oxidation stability improved solubility

Oil "micro-combustion" causes varnish formation

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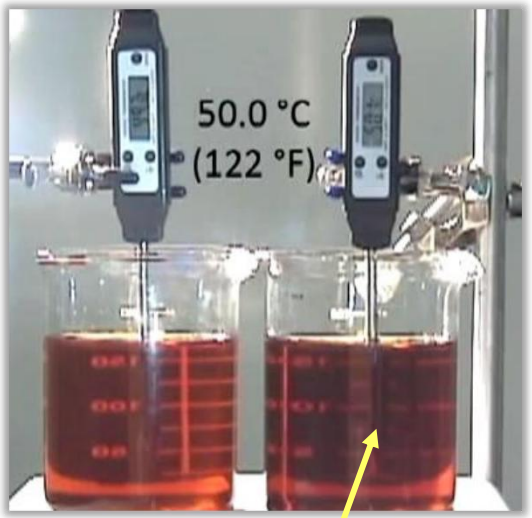
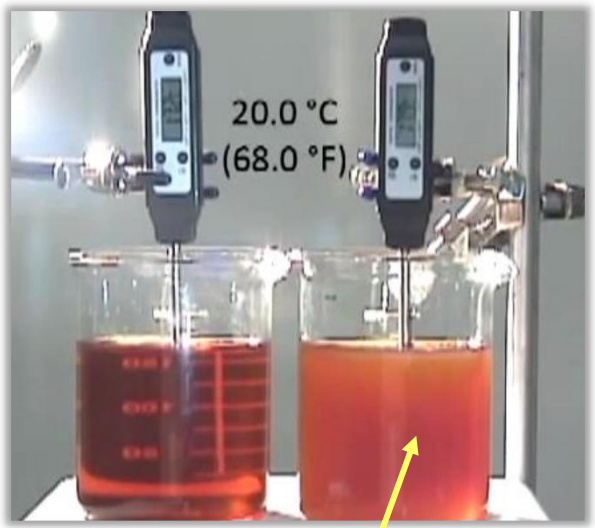
Reversibility of varnish

The solubility of varnish will **change with temperature**



dissolved state

When the temperature is high, the ability of the varnish to dissolve increases with the rise of the oil temperature, and the varnish exists in the oil in a dissolved state, so the oil is transparent



it becomes suspended after precipitation

When the temperature decreases, varnish dissolve ability becomes worse with the decrease of the oil temperature, and the varnish exists in the oil in the precipitation state, so the oil becomes turbid

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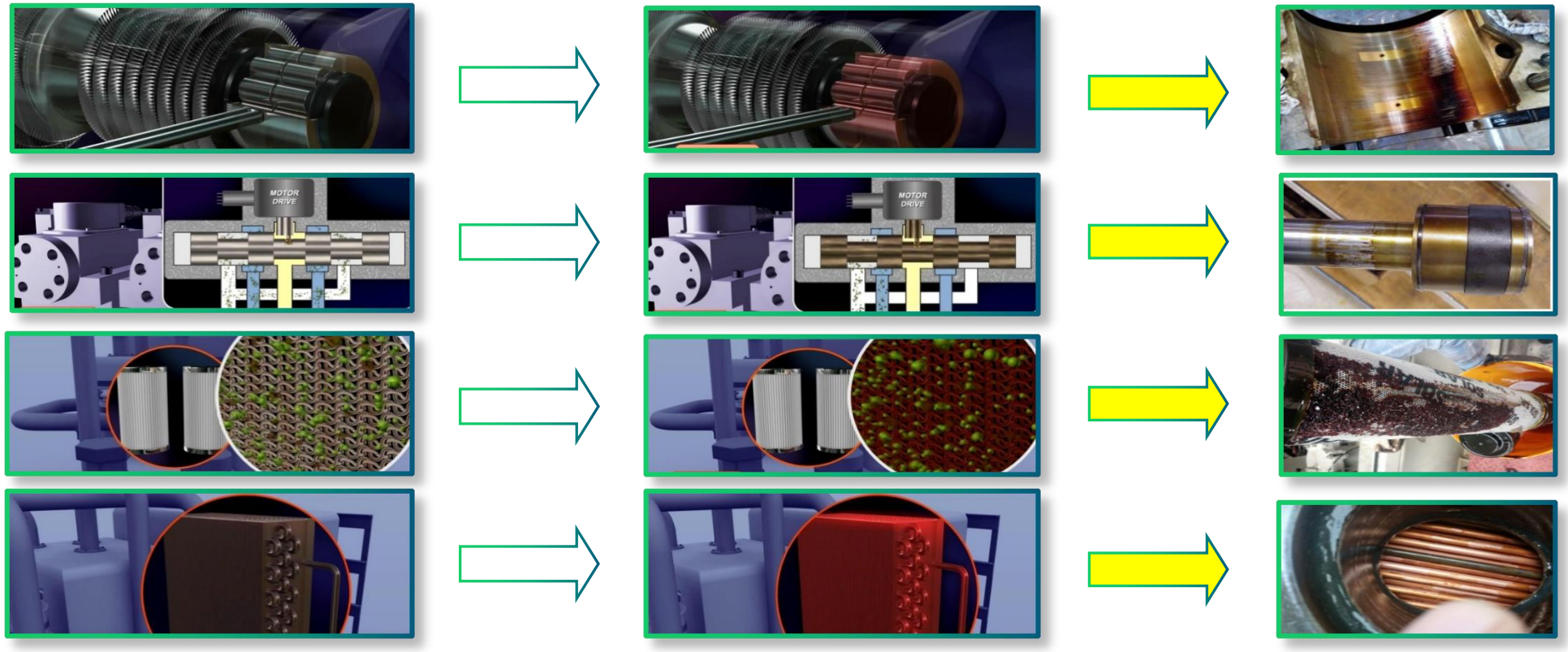
Reversibility of varnish

The varnish exist in the oil in two states：

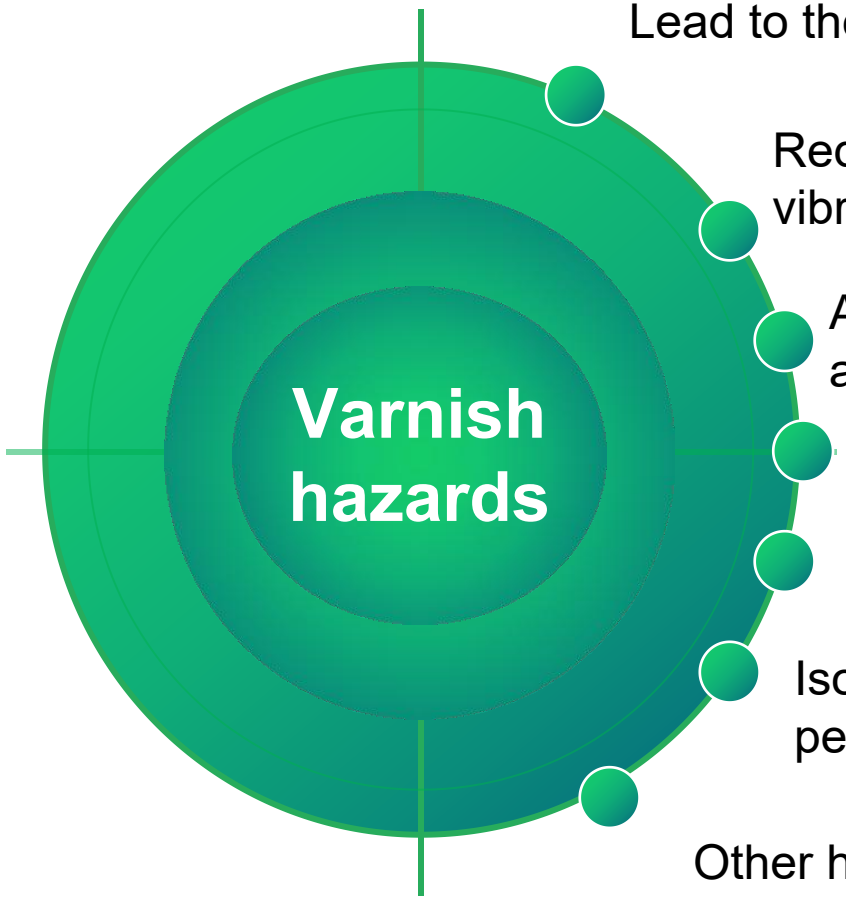
Dissolved varnish (varnish embryo) and precipitated varnish, the two states will change with the temperature, in the case of high oil temperature (50℃) or so, generally dissolved in oil, the higher the temperature the better solubility;

The oil temperature of the compressor unit in operation is about 50℃, and the varnish generally exists in dissolved varnish (varnish embryo). **The separate charge adsorption technology can not solve the dissolved varnish (varnish embryo) unit will always be in the uncontrollable risk**

Hazards of Varnish



Summary of varnish hazards



Lead to the blockage of the valve, affecting the valve work

Reduce clearance, increase friction, bearing bush temperature, vibration increase

Adhesion of contaminants and solid particles increases wear and tear

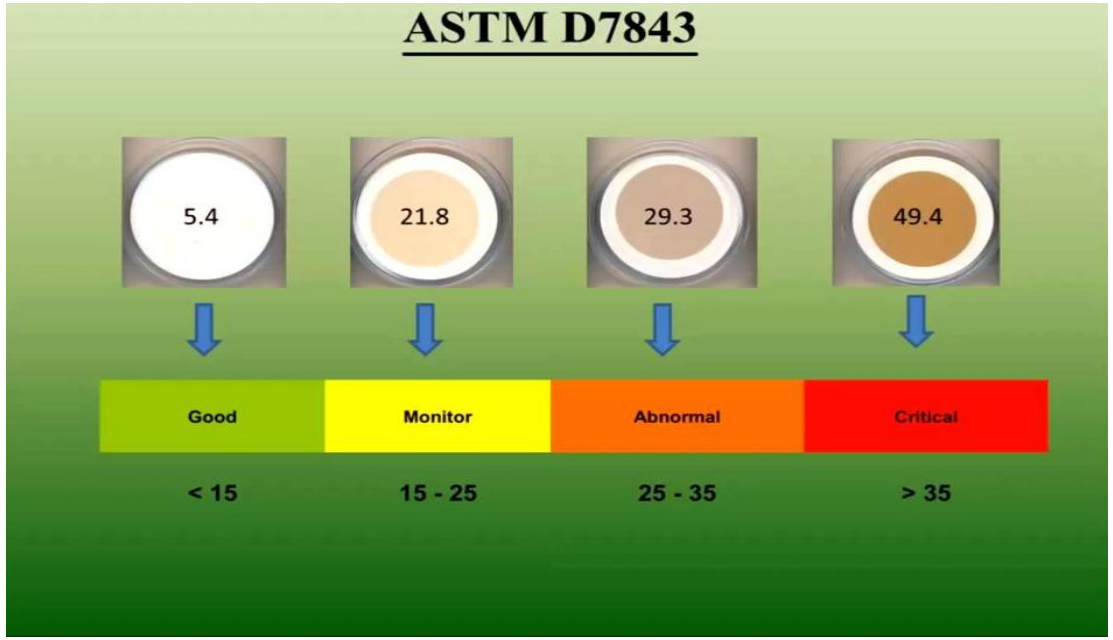
Accelerates the deterioration of oil products

Plug strainer or low flow line

Isolation of heaters and coolers, resulting in poor performance

Other hazards

Varnish Potential Testing （MPC)



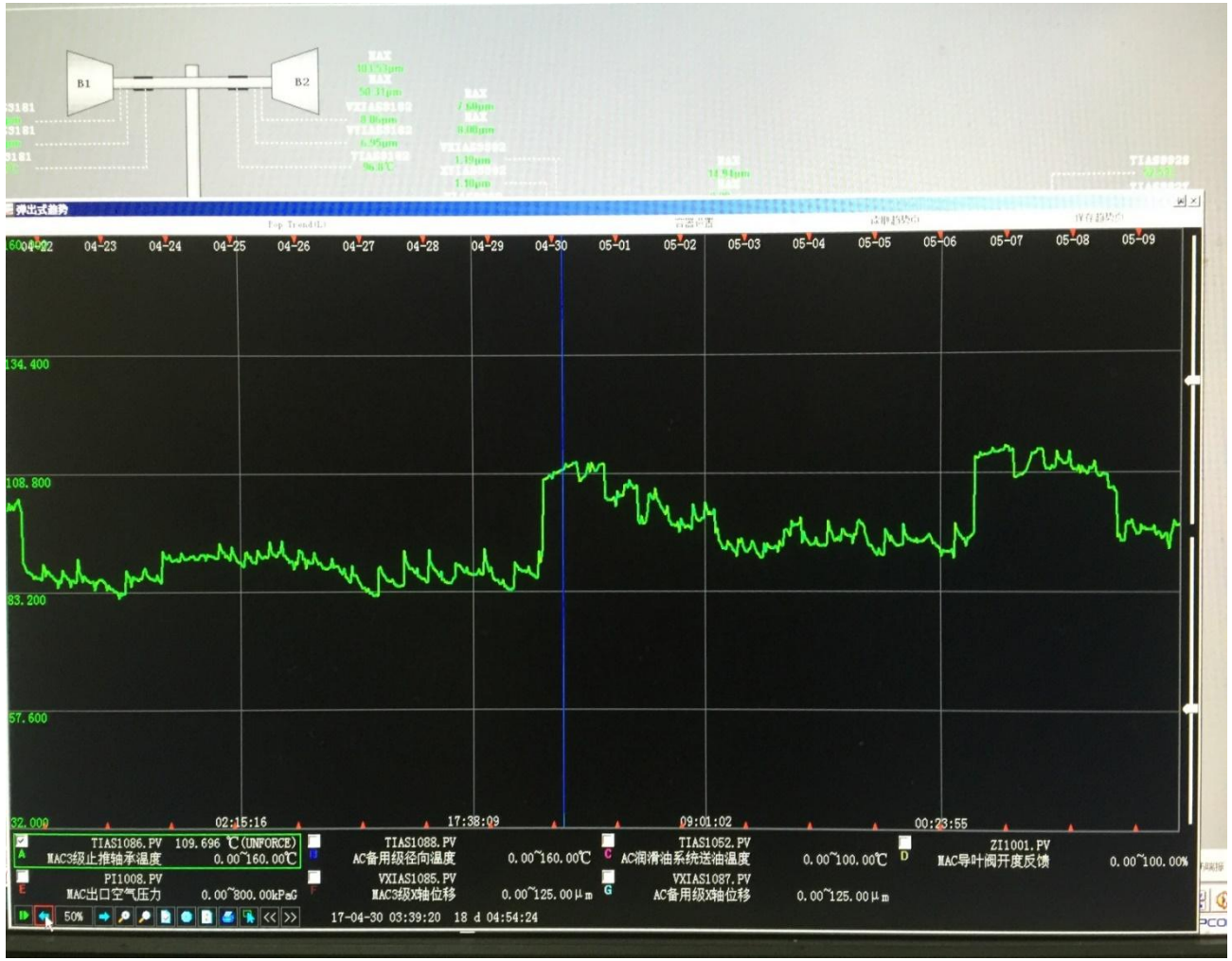
Heating:

1. Take 50ML sample and heat it to 60℃ for 24 hours
2. After the heating stage, place it at room temperature for 72 hours to avoid ultraviolet radiation

Filtering:

1. Add 50ML petroleum ether to the oil sample, stir for at least 30 seconds until uniform
2. Wash the 0.45um nitrocellulose filter with petroleum ether to remove excess oil samples
3. Spectrophotometer filter segment (colorimetric method)

Membrane Patch Colorimetry(MPC)



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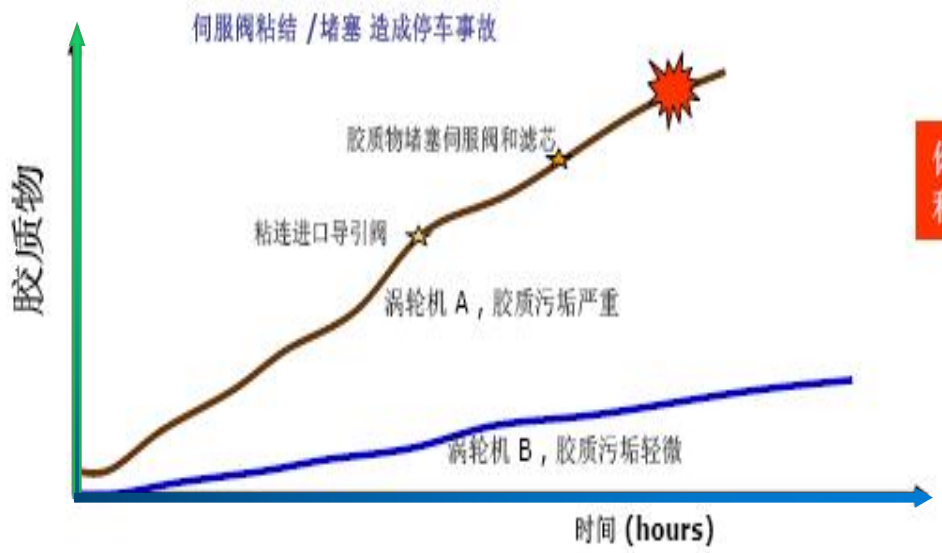
02

Varnish removal equipment

Start today Save tomorrow

How to prevent varnish?



你想等燃机的伺服阀出现故障再来检测和处理胶质物吗？

To monitor and detect lubricating oil varnish exists in the system

Monitor the severity of varnish deposition

If serious

Irreversible damage will be caused to the equipment

Fix the problem at a less serious stage

Electrostatic adsorption technology - remove suspended varnish

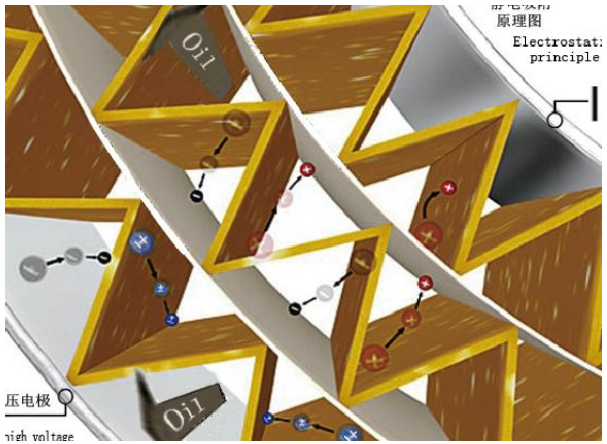
Electrostatic adsorption technology makes use of circular high-voltage electrostatic field to make pollutant particles in oil show positive and negative charges respectively

Under the action of electric field force, the positively and negatively charged particles swim toward the negative and positive electrodes respectively.

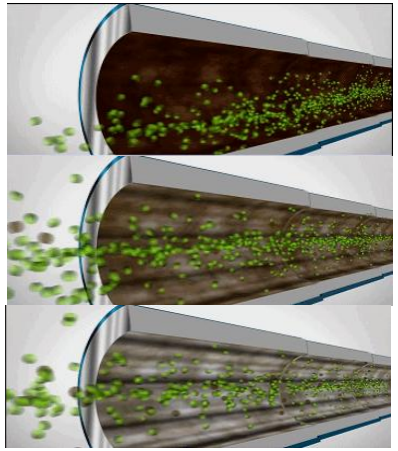
Neutral particles are moved by a stream of charged particles

Finally all particles are adsorbed on the collector

Complete removal of contaminants from oil



▲electric field effect

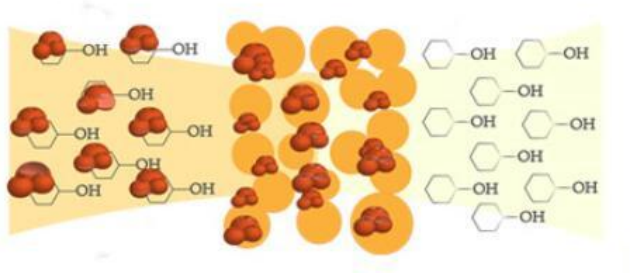


▲Peel off step by step

Ion Exchange Resins - Remove Dissolved varnish

Ion Exchange Resin - DICR™ is able to remove soluble contaminants from turbine oil, ensuring a decrease in MPC index, because most of them are soluble during turbine operation, and these products only form precipitation when they reach saturation, relying on static electricity Equipment cannot remove these dissolved by-products.

Using the abundant basic groups on the adsorption material, it can well adsorb all kinds of substances with acidic groups. The specially formulated resin gives the varnish embryo high affinity to the filter medium, so as to have a high removal rate of degraded products.



▲Electrolyte separation process

▲ Quickly remove soluble varnish and regenerate oil resin

▲ Resin filter

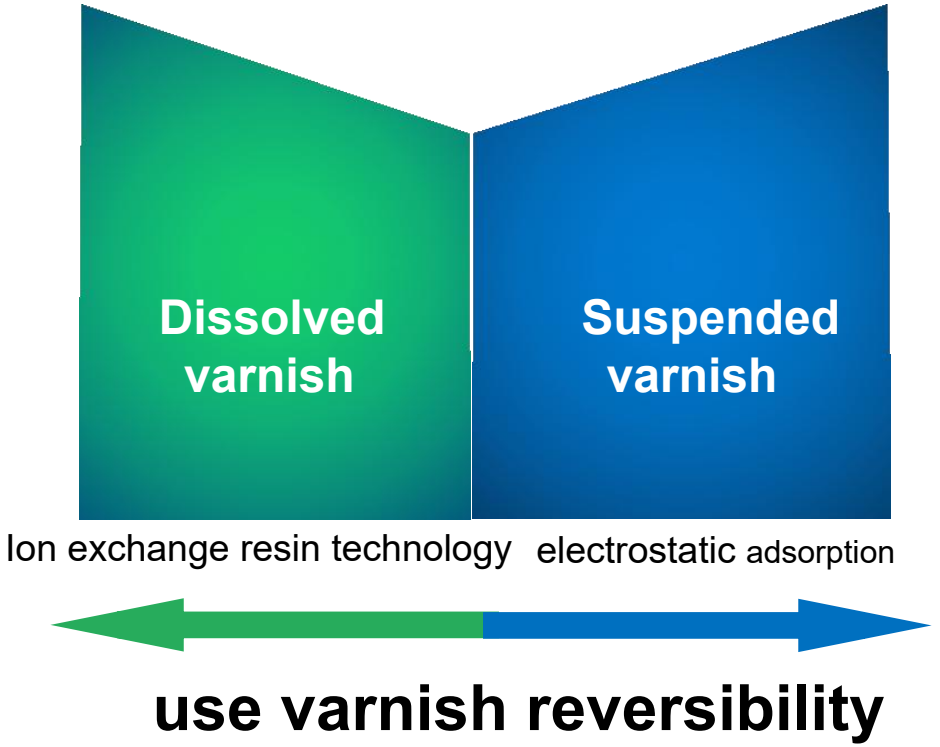
Varnish removal technology (electrostatic adsorption + ion exchange resin)

Electrostatic adsorption technology & ion exchange resin

Technology combines strength

Not only can it effectively remove suspended varnish

And can remove the dissolved varnish



Please note that there is a conversion relationship between these two forms:
When the accumulation of oxidation products increases, the dissolved state → the saturated state is precipitated, suspended and dispersed → deposited as a sludge varnish, and this process is reversed when the varnish is removed

Benefit to you

What can do when two main technology combines?

- Reduce the ΔE value of QSA® or ASTM MPC and less than 15
- Peel and remove suspended and dissolved varnish
- Improve cleanliness and keep it below NAS Level 5 for a long time

WSD

WVD™ Series

▲explosion-proof

▲Non explosion-proof

Parameters

Pattern	WVD™ -II
Length	1005 mm
Width	771 mm
Height	1314mm
Weight	300 kg
Power	380 V, 50Hz, 3 phase
Flow rate	20L/min
CE certificate/explosion-proof certification	Yes
Seal ring	fluororubber
Tank size (depending on the type of oil, pollutants and application)	≤ 80,000 litre
	Fixed or moved
viscosity range	22-100cSt @ 40oC
Better liquid temperature	40 – 70℃

Product advantages

- WVD can quickly remove dissolved and suspended lubricant degradation products
- Fast reduction and prevention of servo valve adhesion
- Small footprint, simple and convenient operation
- Less maintenance, online operation

03

Case share

1 An industrial gas group

Customer pain point: an air compressor in Suzhou factory caused bearing temperature fluctuation due to varnish,the situation is serious, the unit was forced to stop for maintenance

Device name: Atlas compressor

Tank capacity: 6.5m³

Time of operation of WVD varnish removal unit: March 2017 till now

▲Device installation diagram

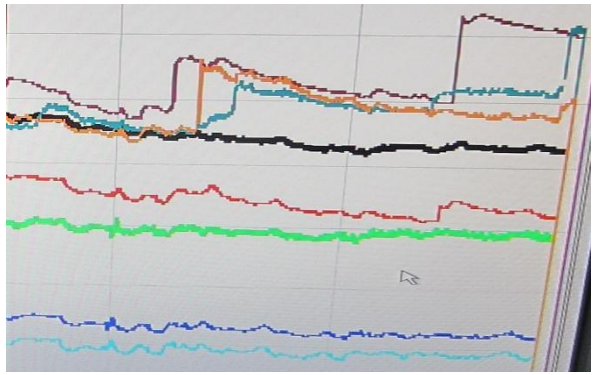
Temperature comparison before and after purification

After 48 days

Before purification

MPC:14

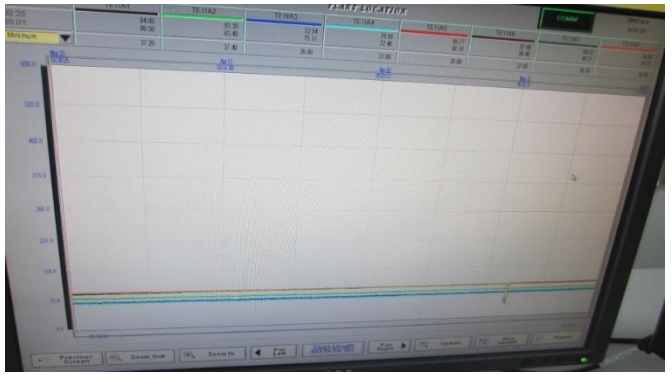
Cleanliness NAS1638：4 level



After purification

MPC：1.4

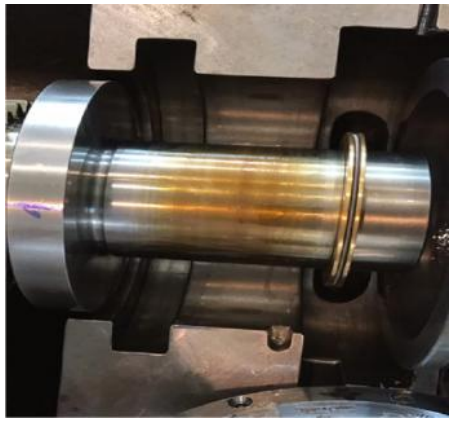
Cleanliness NAS1638：3 level



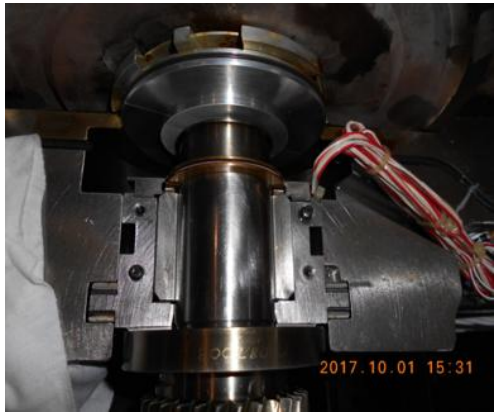
Comparison of bearing bush before and after purification

After 8 months use

Varnish accumulation on bearing bush before purification

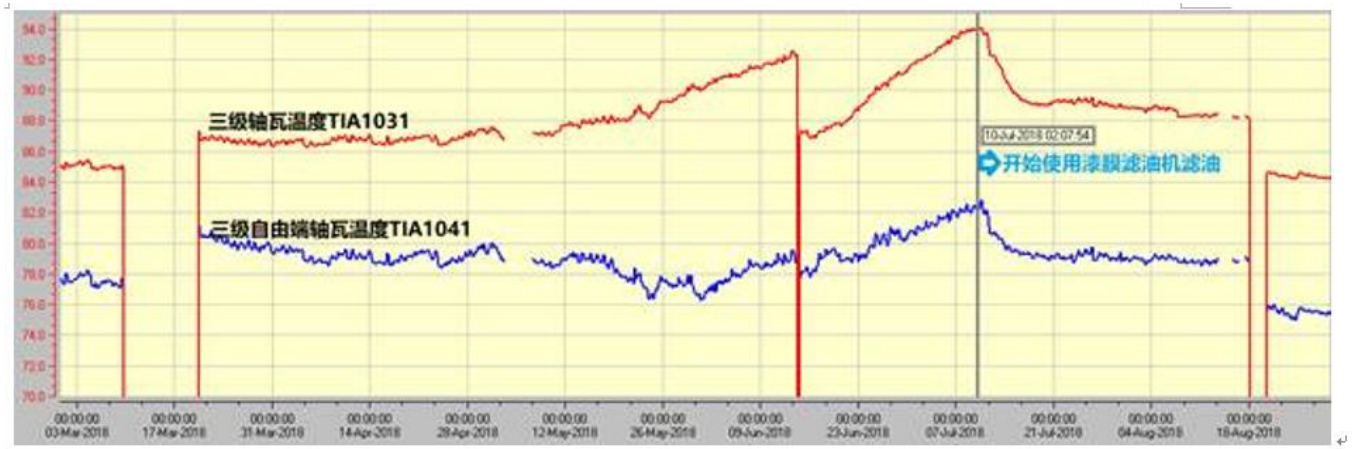


Varnish accumulation on bearing bush removed after purification



Application effect in other factories of the group

After using our WVD-II varnish removal unit in Suzhou factory, the abnormal phenomenon of bearing temperature trend rising slowly appeared in Ningbo factory. After 30 days of using our WVD-II varnish removal unit, the abnormal phenomenon of bearing temperature was significantly improved



bearing bush temperature trend

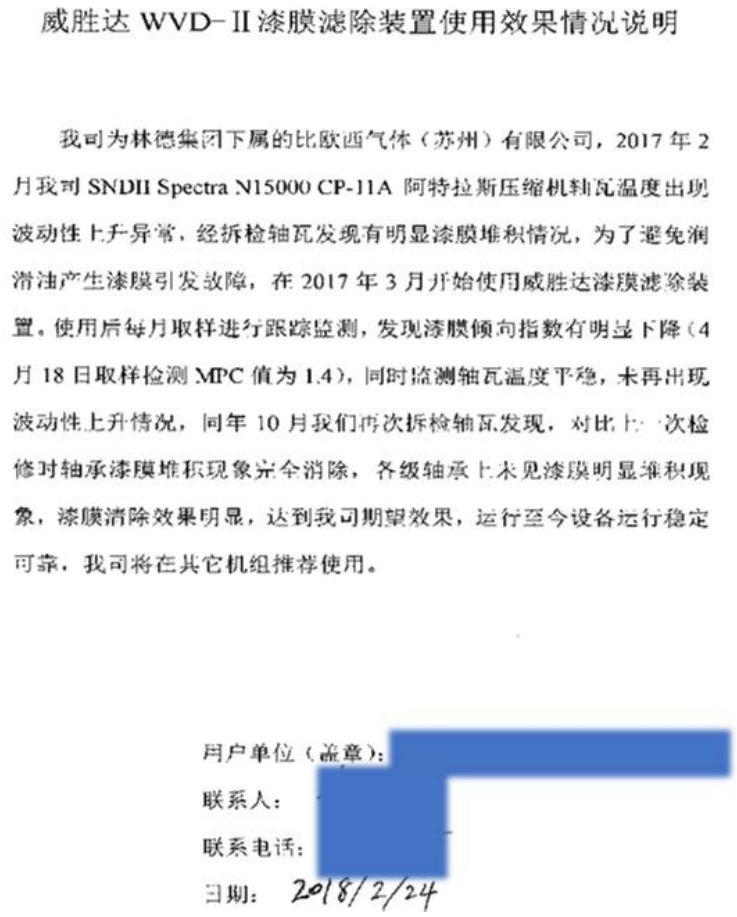
Comparison item	Before purification	After purification
Temperature of three grade bearing bush (℃)	94.1	84.2
Temperature of three-stage free end bearing bush (℃)	82.8	75.4
Varnish tendency index MPC	17.7	8.6

Parameters change before and after purification

Comprehensive evaluation

Since 2017, the group to use our WVD - II varnish removal unit, Ma'anshan, Shanghai, Fujian, Ningbo, Taiyuan and five partner companies also successively putting-in-service proactively our varnish removal unit, after using, MPC index decreased significantly, the indicators are lower than 15, cleanliness is a downward trend, moisture indicators are normal.

Since 2017, we have solved many problems of varnish for the gas company's 2 factories in Suzhou, Fujian, Ningbo, Taiyuan, Ma 'anshan, Shanghai and other key units, which have been recognized by customers



威胜达 WVD－II 漆膜滤除装置使用效果情况说明

我司为林德集团下属的比欧西气体（苏州）有限公司，2017 年 2 月我司 SNDII Spectra N15000 CP-11A 阿特拉斯压缩机轴瓦温度出现波动性上升异常，经拆检轴瓦发现有明显漆膜堆积情况，为了避免润滑油产生漆膜引发故障，在 2017 年 3 月开始使用威胜达漆膜滤除装置，使用后每月取样进行跟踪监测，发现漆膜倾向指数有明显下降（4 月 18 日取样检测 MPC 值为 1.4），同时监测轴瓦温度平稳，未再出现波动性上升情况，同年 10 月我们再次拆检轴瓦发现，对比上一次检修时轴承漆膜堆积现象完全消除，各级轴承上未见漆膜明显堆积现象，漆膜清除效果明显，达到我司期望效果，运行至今设备运行稳定可靠，我司将在其它机组推荐使用。

用户单位（盖章）：[redacted]

联系人：[redacted]

联系电话：[redacted]

日期：2018/2/24

2 A large gas company

Customer pain points: Customer 43000 large air separation, compressor using MAN turbine unit, thin oil station of about 48 cubic meters, using No. 46 turbine oil; MPC value was 21.2 when tested 36 months after startup, and rose to 24.8 when tested 44 months later, showing an upward trend, and there was varnish accumulation in bearing bush during previous maintenance

Device: compressor

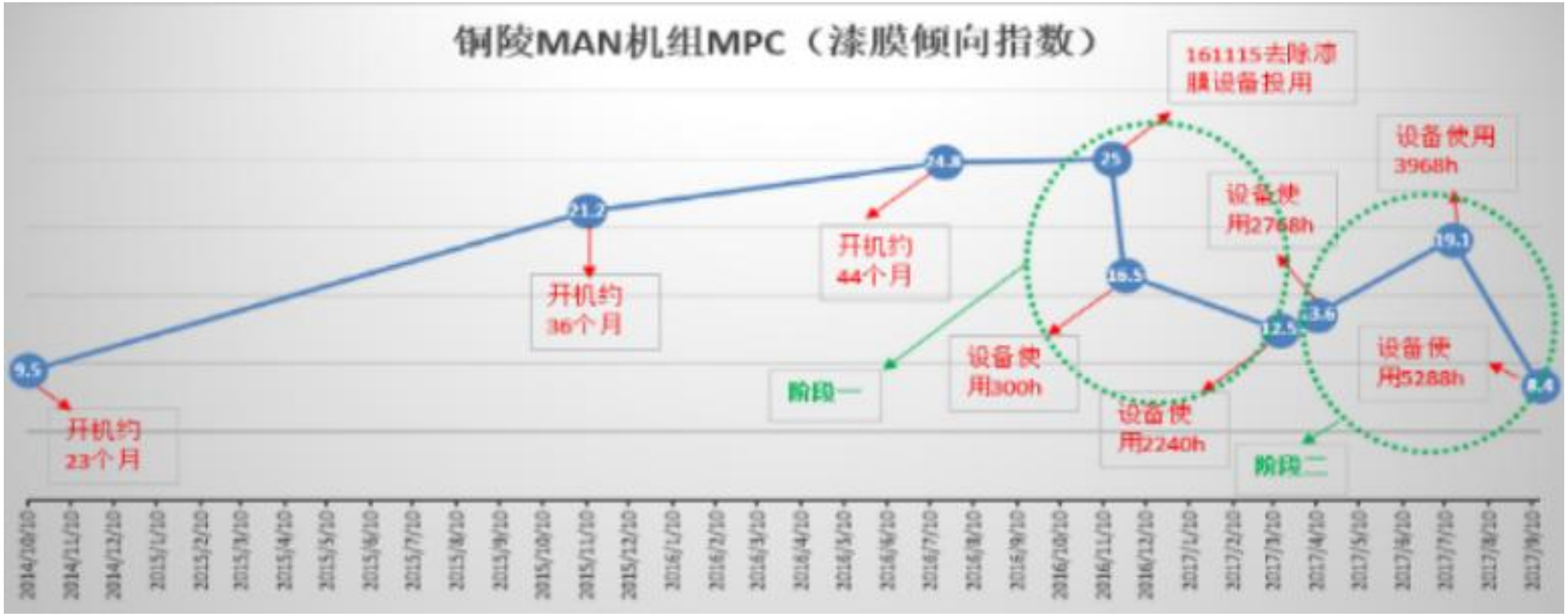
Tank capacity: 48m³

Time of operation of WVD varnish removal unit:

November 2016 till now

▲Device installation diagram

Comparison of MPC before and after purification



Comprehensive evaluation

产品运行使用报告

1	生产厂家	昆山威胜达环保设备有限公司
2	产品名称	润滑油漆膜清除专用设备
3	型号规格	WVD-II
4	产品运行数量	1 台
5	生产日期	2016 年 11 月
6	安装日期	2016 年 11 月
7	用户名称	铜陵盈德气体有限公司
8	运行起止时间	2016 年 11 月至今
9	运行使用情况	铜陵盈德气体为 43000 大型空分，压缩机组使用 MAN 透平机组，稀油站大约 48 立方，使用美孚 DTE846 透平油；开机 36 个月检验漆膜倾向指数 MPC 值 21.2，44 个月检验时 MPC 值升至 24.8，呈上升趋势，同时在检修时发现轴瓦有漆膜堆积现象存在；为清除和防至设备漆膜的生成，16 年 11 月 15 号安装威胜达 WVD-II 漆膜清除专用净油机，安装时 MPC 值为 25，设备运行 300 小时 MPC 值降为 16.5，使用 2240 小时 MPC 值降至 12.5。17 年 10 月 1 日设备停机检修，机组轴瓦上的漆膜已基本清除，达到盈德公司技术要求。设备运行至今漆膜及其它指标正常，我司已在安庆公司推广使用。
10	用户单位联系人及电话	

Since the installation of WVD-II varnish removal unit in November 2016 to October 2017, the equipment shut down for maintenance, the varnish on the bearing busings of the unit has been basically removed without any varnish accumulation, meeting the customer's technical requirements. Up to now, the varnish and other indicators are normal, and the customer has promoted the use in Anqing Company.

Since tongling factory put into use our company to clean the varnish effect is remarkable, Anqing, Zhuhai, Zhangjiagang, Baotou, Changzhou, Ningde, Zhangjiagang and other 27 subsidiaries are put into use on the compressor.

3 A large chemical company

Customer pain point: In September 2017, the bearing temperature of supercharger slowly rose to 92℃, causing the risk of jumping

Device name: 40,000 air separation supercharger

Tank capacity: 6m³

Time of operation of varnish removal unit: November 2017 till now

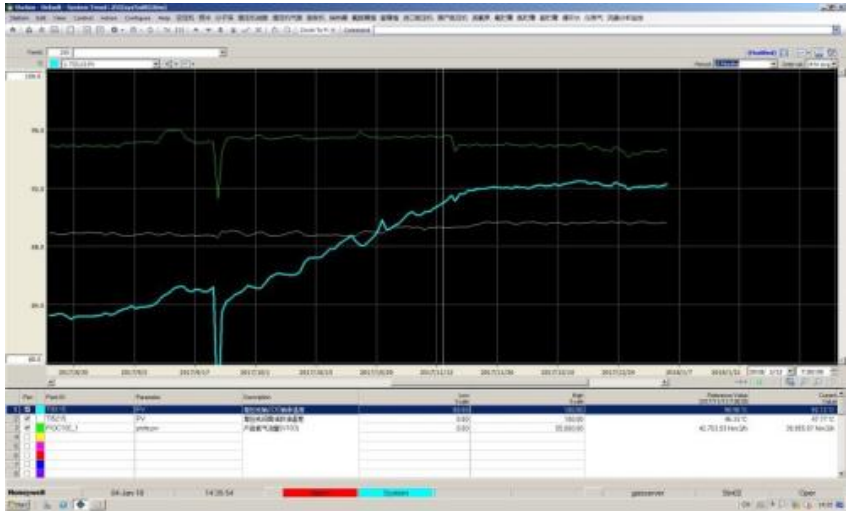
▲Device installation diagram

Temperature comparison before and after purification

Before purification

In September 2017, the bearing temperature of the supercharger rose slowly

In November 2017, the bearing temperature rose to 92℃



After purification

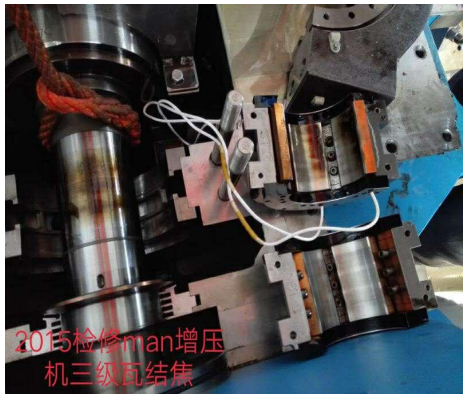
After 7 days of service, the bearing temperature is stable and does not rise

After 15 days of service, the bearing temperature began to decrease after one month，bearing temp reduce to **85**℃

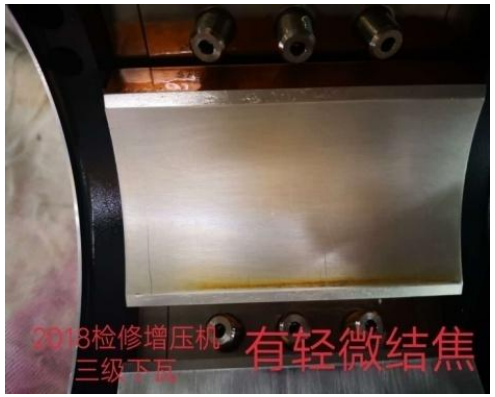
Bearing bush of supercharger and air compressor

supercharger

Maintenance in 2015, MAN supercharger three-level bearing bush coking



Repaired in 2018, the bearing bush of the supercharger had slight coking



air compressor

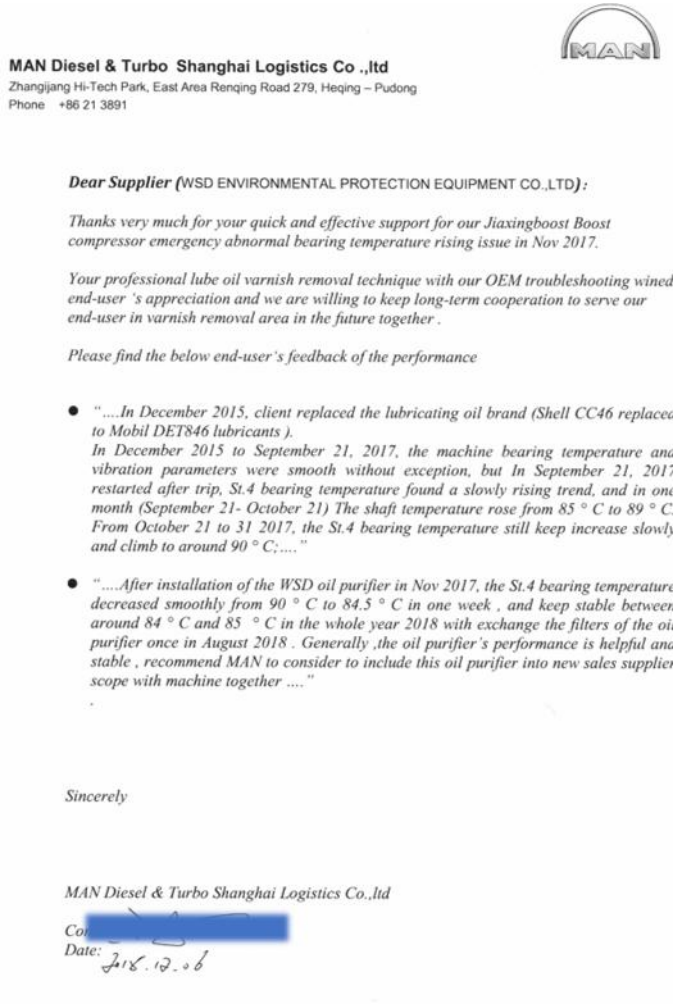
In 2018, the main bearing bush of the non-driving end of MAN air compressor was coking

In 2018, the main bearing bush of the non-driving end of the air compressor was coking

Comprehensive evaluation

In December 2018, the customer found that the supercharger bearing varnish had been obviously removed during maintenance;

Except the supercharger, other equipment doesn't use our machine, varnish is serious, in order to ensure air compressor safe operation; the air compressor station also purchase one set new our WVD - II varnish removal unit in February 2019.



MAN Diesel & Turbo Shanghai Logistics Co .,ltd
Zhangjiang Hi-Tech Park, East Area Renqing Road 279, Heqing – Pudong
Phone +86 21 3891

*Dear Supplier (*WSD ENVIRONMENTAL PROTECTION EQUIPMENT CO.,LTD*):*

Thanks very much for your quick and effective support for our Jiaxingboost Boost compressor emergency abnormal bearing temperature rising issue in Nov 2017.

Your professional lube oil varnish removal technique with our OEM troubleshooting wined end-user 's appreciation and we are willing to keep long-term cooperation to serve our end-user in varnish removal area in the future together .

Please find the below end-user's feedback of the performance

- *"....In December 2015, client replaced the lubricating oil brand (Shell CC46 replaced to Mobil DET846 lubricants).*
  In December 2015 to September 21, 2017, the machine bearing temperature and vibration parameters were smooth without exception, but In September 21, 2017 restarted after trip, St.4 bearing temperature found a slowly rising trend, and in one month (September 21- October 21) The shaft temperature rose from 85 ° C to 89 ° C. From October 21 to 31 2017, the St.4 bearing temperature still keep increase slowly and climb to around 90 ° C;...."
- *"....After installation of the WSD oil purifier in Nov 2017, the St.4 bearing temperature decreased smoothly from 90 ° C to 84.5 ° C in one week , and keep stable between around 84 ° C and 85 ° C in the whole year 2018 with exchange the filters of the oil purifier once in August 2018 . Generally ,the oil purifier's performance is helpful and stable , recommend MAN to consider to include this oil purifier into new sales supplier scope with machine together ...."*

Sincerely

MAN Diesel & Turbo Shanghai Logistics Co.,ltd

Co [redacted]
Date: 2018.12.06

4 Cnooc northeast company

Customer's pain point: The customer's syngas centrifugal unit uses Shell 46# turbine oil. During the maintenance process, it was found that the bearing bush of the unit had varnish carbon accumulation, which often fluctuated abnormally in the normal operation process.

Plant name: syngas centrifuge

Tank capacity: 25m³

Time of operation of WVD varnish removal unit: June 2020 till now

▲Device installation diagram

Comparison of temperature curves before and after purification

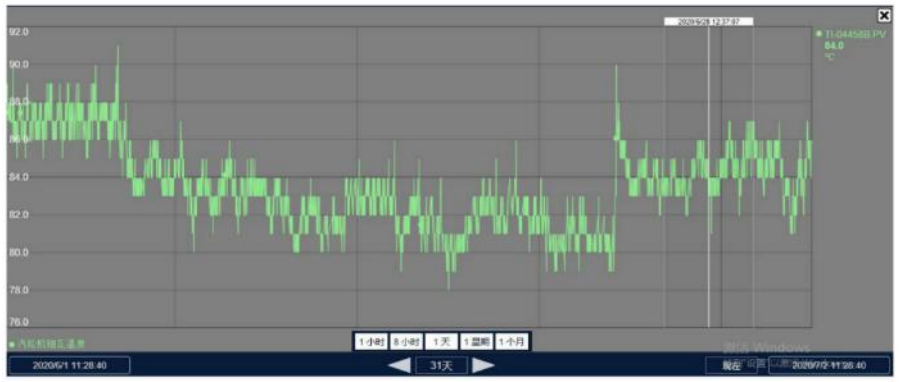
31 days after run

Temp from 91℃
to 78℃

After 4 months continuous run

Temperature stability in 70℃
botton to 67℃

净化前后 T1-04458B PV 温度变化图



6 月 1 日-7 月 2 日温度变化曲线图（最高温 91 度，最低温 78 度）

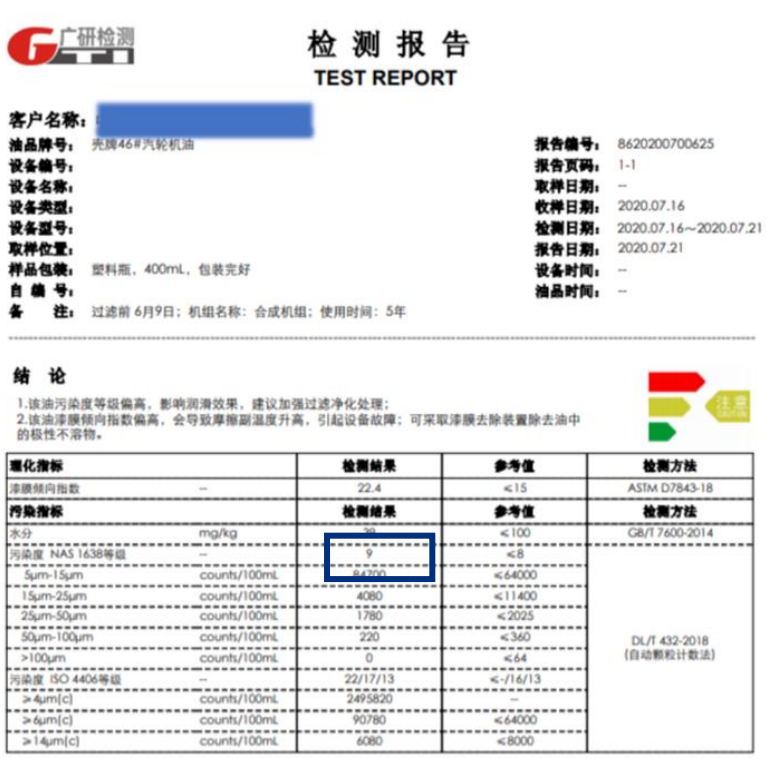
10 月 3 日-11 月 3 日温度变化曲线图（最高温 70 度，最低温 67 度）

Diagram of temperature change before and after purification

Comparison of MPC before and after purification

After 30 days run

before purification
MPC 22.4



广研检测

检 测 报 告
TEST REPORT

客户名称：[redacted]
油品牌号：壳牌46#汽轮机油
设备编号：
设备名称：
设备类型：
设备型号：
取样位置：
样品包装：塑料瓶，400mL，包装完好
自 编 号：
备　　注：过滤前 6月9日；机组名称：合成机组；使用时间：5年

报告编号：8620200700625
报告页码：1-1
取样日期：--
收样日期：2020.07.16
检测日期：2020.07.16~2020.07.21
报告日期：2020.07.21
设备时间：--
油品时间：--

结 论

1.该油污染度等级偏高，影响润滑效果，建议加强过滤净化处理；
2.该油漆膜倾向指数偏高，会导致摩擦副温度升高，引起设备故障；可采取漆膜去除装置除去油中的极性不溶物。

注意 CAUTION

理化指标		检测结果	参考值	检测方法
漆膜倾向指数	--	22.4	≤15	ASTM D7843-18
污染指标		**检测结果**	**参考值**	**检测方法**
水分	mg/kg	38	≤100	GB/T 7600-2014
污染度 NAS 1638等级	--	9	≤8	DL/T 432-2018 (自动颗粒计数法)
5μm-15μm	counts/100mL	84290	≤64000	
15μm-25μm	counts/100mL	4080	≤11400	
25μm-50μm	counts/100mL	1780	≤2025	
50μm-100μm	counts/100mL	220	≤360	
>100μm	counts/100mL	0	≤64	
污染度 ISO 4406等级	--	22/17/13	≤-/16/13	
>4μm(c)	counts/100mL	2495820	--	
>6μm(c)	counts/100mL	90780	≤64000	
>14μm(c)	counts/100mL	6080	≤8000	

After purification
MPC 2.5

广研检测

检 测 报 告
TEST REPORT

客户名称：[redacted]
油品牌号：壳牌46#汽轮机油
设备编号：
设备名称：
设备类型：
设备型号：
取样位置：
样品包装：塑料瓶，400mL，包装完好
自 编 号：
备　　注：过滤后 7月9日；机组名称：合成机组；使用时间：5年

报告编号：8620200700626
报告页码：1-1
取样日期：--
收样日期：2020.07.16
检测日期：2020.07.16~2020.07.21
报告日期：2020.07.21
设备时间：--
油品时间：--

结 论

该油所测各项指标正常。

正常 NORMAL

理化指标		检测结果	参考值	检测方法
漆膜倾向指数	--	2.5	≤15	ASTM D7843-18
污染指标		**检测结果**	**参考值**	**检测方法**
水分	mg/kg	38	≤100	GB/T 7600-2014
污染度 NAS 1638等级	--	7	≤8	DL/T 432-2018 (自动颗粒计数法)
5μm-15μm	counts/100mL	3200	≤64000	
15μm-25μm	counts/100mL	3380	≤11400	
25μm-50μm	counts/100mL	960	≤2025	
50μm-100μm	counts/100mL	60	≤360	
>100μm	counts/100mL	0	≤64	
污染度 ISO 4406等级	--	17/16/13	≤-/16/13	
>4μm(c)	counts/100mL	100280	--	
>6μm(c)	counts/100mL	36400	≤64000	
>14μm(c)	counts/100mL	4400	≤8000	

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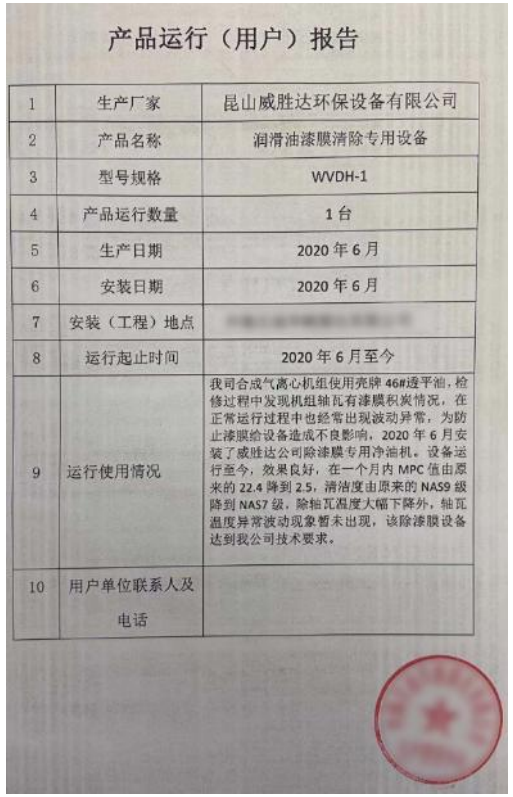
WSD

Comprehensive evaluation

▲Comparison of oil samples before and after purification



产品运行（用户）报告

1	生产厂家	昆山威胜达环保设备有限公司
2	产品名称	润滑油漆膜清除专用设备
3	型号规格	WVDH-1
4	产品运行数量	1台
5	生产日期	2020年6月
6	安装日期	2020年6月
7	安装（工程）地点	
8	运行起止时间	2020年6月至今
9	运行使用情况	我司合成气离心机组使用壳牌46#透平油，检修过程中发现机组轴瓦有漆膜积炭情况，在正常运行过程中也经常出现波动异常，为防止漆膜给设备造成不良影响，2020年6月安装了威胜达公司除漆膜专用净油机。设备运行至今，效果良好，在一个月内MPC值由原来的22.4降到2.5，清洁度由原来的NAS9级降到NAS7级，除轴瓦温度大幅下降外，轴瓦温度异常波动现象暂未出现，该除漆膜设备达到我公司技术要求。
10	用户单位联系人及电话	

▲Operation report

The customer purchased the varnish removal unit from our company in June 2020. The operation of the equipment has achieved good results so far. Within one month, the MPC value decreased from the original 22.4 to 2.5, and the cleanliness level decreased from the original NAS9 to NAS7.

Analysis report on varnish treatment of turbine oil in nuclear power plant

1. 项目背景

1.1 现场描述

[redacted]号机组已运行近4年、2号机组已运行3年、3号机组运行2年多、4 号机组运行1年多，使用油品均为国产某品牌KTL46#核电专用汽轮机油。1/2机组大检修时，机组电机部分轴瓦不同程度出现下图1.1所示的“漆膜”现象，3/4机组大检修时，也出现类似情况。

图 1.1 轴瓦漆膜现象

“漆膜”是一种高分子烃类聚合物，是油品中添加剂消耗后生成的产物，与基础油降解生成的物质发生反应并最终在金属表面产生聚结。在汽轮机系统中随着投运时间增长，在系统中生成会越多，但汽轮机正常工作温度下均呈溶解状态。但当漆膜达到饱和或系统温度变化，就好沉积在系统各部件上，当系统再运行，会存在阀件卡涩、轴瓦温升、过滤器压差报警等风险。

与此同时，7 月份，3#机组的 3GHE001CW 中在用汽轮机出现泡沫较多现象，导致就地磁翻板液位计显示液位显示虚高问题。当 3GHE302LN 到达 1010mm 时，会联锁停运 3GHE401PO。3GHE001CW 内泡沫过多后进入抽真空管道，3GHE401PO 抽真空效果变差，需运行人员就地多次对 3GHE005CW 排油。现场泡沫视窗如下图 1.2 所示。

广研检测 在用汽轮机油漆膜处理试验分析

序号	检测项目		项目意义
1	40℃运动黏度，mm²/s		油品牌号划分的主要依据；油品劣化的重要报警指标
2	100℃运动黏度，mm²/s		
3	黏度指数		油品的黏温特性评价
4	酸值， mgKOH/kg		反映基础油的精制程度；油品氧化变质的程度
5	泡沫特性	程序 I 24℃	油品生成泡沫的倾向及泡沫稳定性评价指标
		程序 II 93.5℃	
		程序III 24℃	
6	抗氧化剂含量 RULER		油品胺类和酚类抗氧化剂含量及消耗测试指标
7	漆膜倾向指数 MPC		油品生成漆膜倾向性测试
8	水分， mg/kg		油品含水量评价指标；油中水污染情况评价
9	污染度		油中污染物颗粒数量、尺寸分布

WSD

Result comparison

表 4.1　40℃运动黏度检测结果

设备编号		1GGR010BA	2GGR010BA	3GGR010BA	8SKH502BA	新油
40℃运动黏度，mm²/s	未处理样品	44.44	44.51	44.69	44.04	44.93
	处理样品	44.24	44.43	44.64	44.18	--
100℃运动黏度，mm²/s	未处理样品	7.344	7.358	7.349	7.334	7.417
	处理样品	7.345	7.359	7.378	7.326	--
黏度指数	未处理样品	129	129	128	130	129
	处理样品	130	129	129	129	--

表 4.3　泡沫特性检测结果，单位：mL/mL

设备编号		1GGR010BA	2GGR010BA	3GGR010BA	8SKH502BA	新油
未处理样品	程序 I　24℃	260/0	180/0	130/0	130/0	5/0
	程序 II　93.5℃	30/0	30/0	30/0	30/0	0/0
	程序III　24℃	260/0	120/0	90/0	100/0	5/0
处理样品	程序 I　24℃	10/0	30/0	80/0	20/0	--
	程序 II　93.5℃	5/0	10/0	20/0	20/0	
	程序III　24℃	20/0	50/0	80/0	30/0	

表 4.2 酸值检测结果，单位：mgKOH/kg

设备编号	1GGR010BA	2GGR010BA	3GGR010BA	8SKH502BA	新油
未处理样品	0.09	0.09	0.10	0.11	0.10
处理样品	0.05	0.06	0.07	0.06	--

表 4.4 抗氧化剂含量检测结果，单位：%

设备编号		1GGR010BA	2GGR010BA	3GGR010BA	8SKH502BA	新油
酚类	未处理样品	38	37.9	50.7	52.7	100
	处理样品	38.1	37.9	51	52.5	--
胺类	未处理样品	86.1	84.9	118	118	100
	处理样品	86.4	85.7	117	110	--

表 4.5　漆膜倾向指数检测结果

设备编号	1GGR010BA	2GGR010BA	3GGR010BA	8SKH502BA	新油
未处理样品	10.3	9.4	12.4	9.1	1.9
处理样品	2.1	2.4	2.2	2.4	--

Site installation picture

Yancheng Yinde

Ningbo Linde

APJincheng air chemical industry

Wuhan iron and steel petrochemical industry gas

Xuzhou Shaanxi drum industrial gas

Guangxi Jinchuan Xinrui Gas

Sinopec Shanghai Petrochemical Company Limited

Hubei Sanning Chemical

Yankuang Lunan Chemical Co.,Ltd

Partial customer reference

Air separation

- Shenmei 100,000 class air separation plant
- Subsidiaries of the Linde Group
- Subsidiaries of Air Products
- Yingde Gas Subsidiaries
- Baosteel Gas Subsidiaries
- MAN Turbo
- CITIC Special Steel Air Separation Workshop
- Air branches of Yankuang Group
- WISCO Petrochemical Industrial Gas
- Subsidiaries of Huayi Group
- Chinese Salt Red Quartet
- Guangxi Jinchuan cutting-edge gas
- Sanjiang Chemical

Coal chemical industry

- Datang Inner Mongolia Duolun Coal Chemical Industry
- Yanchang China Coal Yulin Energy Chemical
- Yankuang Xinjiang Energy Chemical Co., Ltd.
- Yankuang Lunan Chemical
- Lianhong New Materials
- Inner Mongolia Boda Field Chemistry
- CNOOC Huahe Coal Chemical
- Hubei Sanning Chemical Co., Ltd.
- Sinopec Great Wall Energy Chemical
- Henan Xinlei Energy
- Tongling Taifu Coking Plant

Petrochemic

- Shanghai Petrochemical
- SECCO Petrochemical
- Qilu Petrochemical
- Maoming Petrochemical
- Jinan Refinery
- Jinling Petrochemical
- Unipec
- Tianjin Petrochemical
- Yizheng Chemical Fiber
- Yangzi Petrochemical
- Qingdao Petrochemical
- Zhongke Refinery
- Zhongyuan Petrochemical

Other

Sany Group

Liugong Group

Hang Cha

Doosan

Bosch Rexroth

Shanghai Danfoss Hydraulics

SKF

Liaoning Hongyanhe Nuclear Power Plant

Hegang

Handan Iron and Steel

Ansteel

Mountain Steel

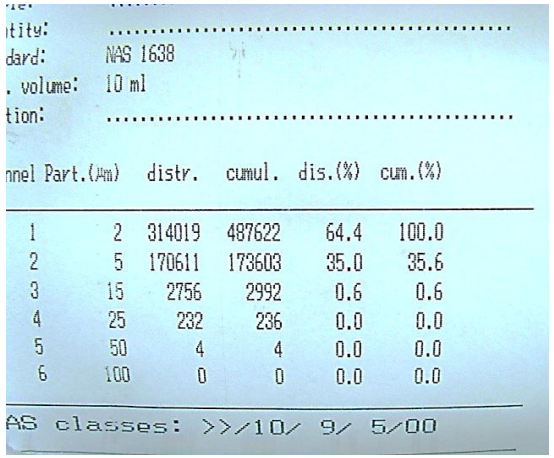
Shougang

04

Cleanness Water abnormal solution

Filter element conventional filtration equipment

The **aperture of filter** element determines the **filtration accuracy**

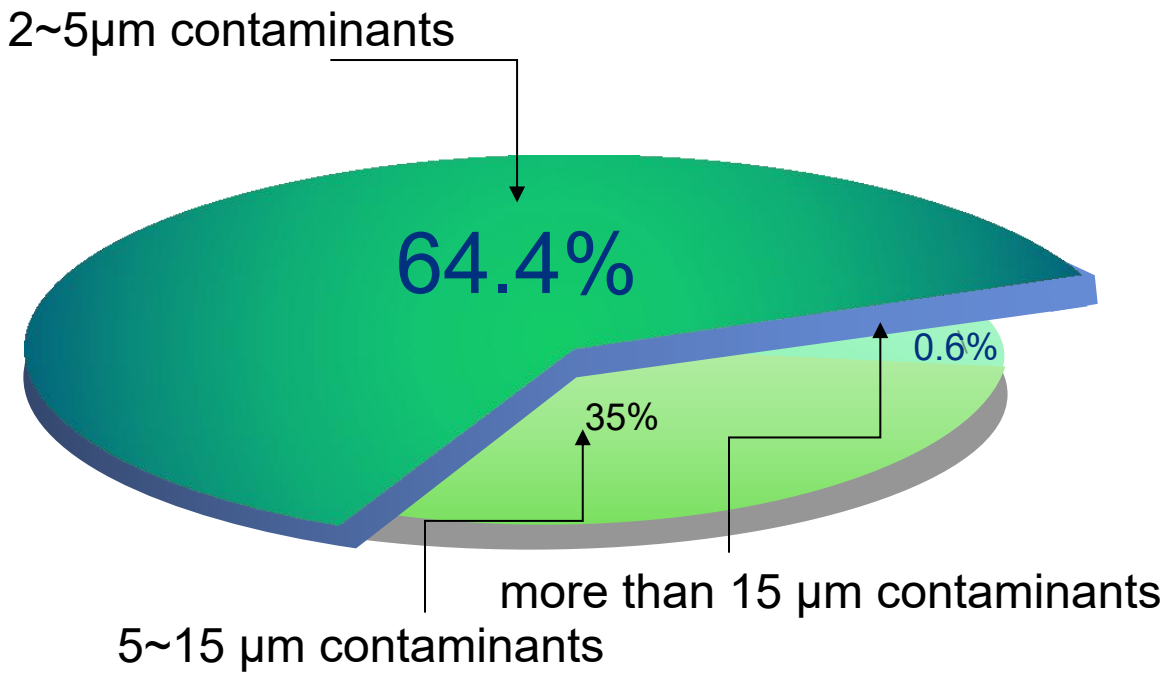


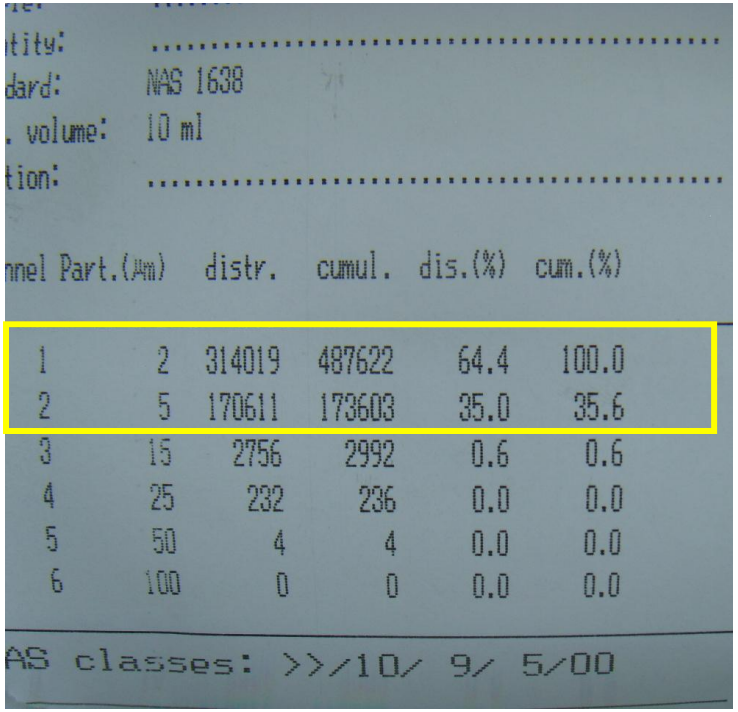
nnel	Part.(µm)	distr.	cumul.	dis.(%)	cum.(%)
1	2	314019	487622	64.4	100.0
2	5	170611	173603	35.0	35.6
3	15	2756	2992	0.6	0.6
4	25	232	236	0.0	0.0
5	50	4	4	0.0	0.0
6	100	0	0	0.0	0.0

AS classes: >>/10/ 9/ 5/00

WSD

More than 60% of contaminants are less than 5μm in old systems





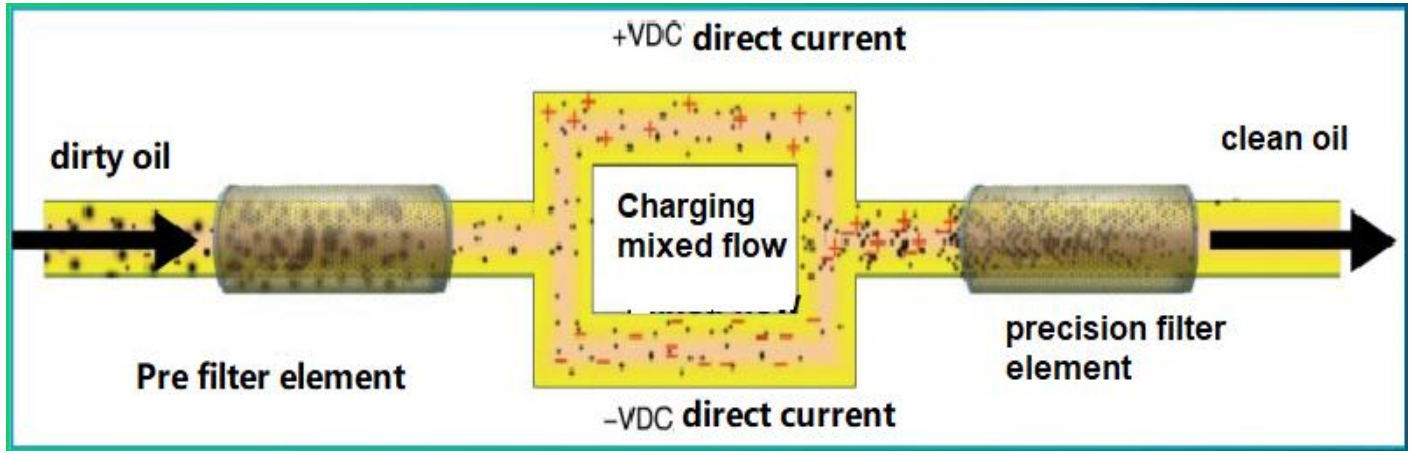
tity: .....
dard: NAS 1638
. volume: 10 ml
tion: .....

nnel	Part.(Am)	distr.	cumul.	dis.(%)	cum.(%)
1	2	314019	487622	64.4	100.0
2	5	170611	173603	35.0	35.6
3	15	2756	2992	0.6	0.6
4	25	232	236	0.0	0.0
5	50	4	4	0.0	0.0
6	100	0	0	0.0	0.0

AS classes: >>/10/ 9/ 5/00

The release of pollutants monitored by particle counters found that the particles of 2~5 microns and 5~15 microns were the most, accounting for 64.4% and 35% respectively.

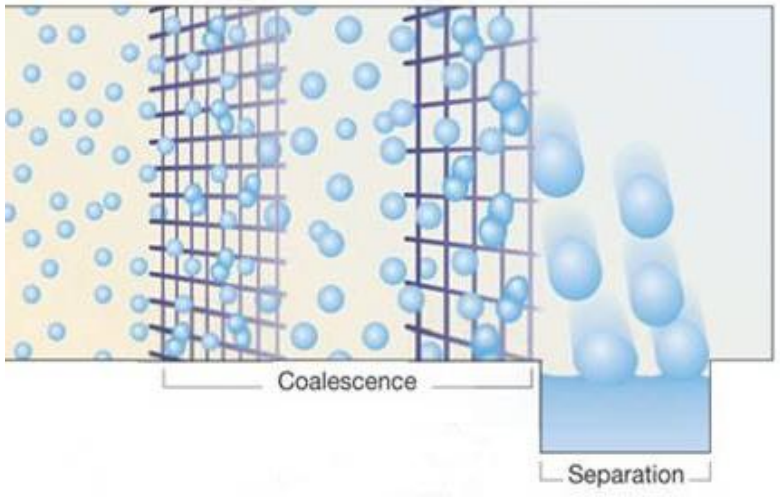
Balanced Charge Purification



The positive and negative electrodes are placed in two paths in the non-conductive fluid to charge and charge the particulate pollutants in the fluid, one is loaded with positive (+) charges, the other is loaded with negative (-) charges, and then the oppositely charged electrodes are charged. The particles are remixed, attract each other and accumulate into agglomerates, and the size becomes larger, so that the small particles that are not easy to filter are easier to be removed by filtration.

Working principle of coalescence and separation

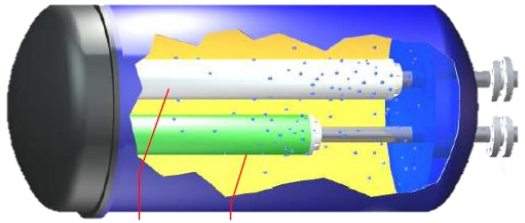
①Coalescence: the free water in the oil is coalesced into larger droplets after passing through the coalescing filter element



②Separation: larger water droplets are blocked on the outer surface of the filter element and settle to the water storage tank by gravity

Imported coalescing filter elements:
100% synthetic materials
(No cellulose, reducing the risk of filter compatibility)

Fully imported double stage separation precision filter element characteristics
Water blocking and high efficiency fiberglass post-filtration



Coalescing filter

Separation filter

Balanced Charge + coalescence separation invention Patent Certificate

高新技术产品认定证书

产品名称：RO 逆渗透电荷式真空滤油机

产品编号：140583G1538N

承担单位：昆山威胜达环保设备有限公司

江苏省科学技术厅

有效期伍年

二〇一四年十一月

发明专利证书

A coal carbonization company

Customer pain point: Customer's new unit needs to be equipped with oil purifier to purify oil products

Device name: Shaanxi drum compressor

Tank capacity: 8-9m³

Wjj-50 oil purifier use time: From June 2021 to now,Cleanliness before purification NAS1638:11 (45 days) ,Cleanliness after purification NAS1638:6

▲Device installation diagram

Other oil purifier series

static electricity oil purifier

Balanced charge oil purifier

Coalescing and separating oil purifier

Vacuum water and oil purifier

Refueling & filter trolley

Applicable to: air separation, coal chemical, petrochemical, electric power, steel, aerospace, construction machinery, hydraulic, shipbuilding and other industries

05

Brand introduction

About WSD

Focus on development of

industrial oil purification equipment

History of development

2010-2011

Electrostatic oil purifier applied in aviation system of China; Heavy traffic electrostatic purifier used large lubrication station in Germany MAN changzhou factory

2012-2013

Electrostatic purifier batch used in saic, jiang huai group; Balance charge filter oil machine batch application in the Chinese group, high-power diesel engine lubrication system

2014

In addition to the varnish removal unit successfully in petrochemical field, air separation, coal chemical industry, offshore platform

2015

Balance charge oil purifier machine application in the electric power industry 1 million units for the first time

2016

WSD's electrostatic oil purifier application
LTK hydropower station in Thailand;
Successful application of paint film filter
In the GE9E gas unit

2017

WSD oil purifier at home and abroad hydraulic
Component companies (Rexroth, Eaton,
Danfoss, Youyan, Doosan, Hengli, Liyuan, Yuci, etc.) has been applied in batches;
Successful application of paint film filter
At the core of the petrochemical ethylene plant are three engines

2018

WSD's oil purifier realizes full coverage of "three barrels of oil"
Reached framework purchase agreements with a number of global air separation giants

2019

WSD oil purifier in the construction machinery industry (Sany, XCMG, Liugong, shanhe intelligent, Doushan, hzforklift, etc.) has been applied in batches; Moreover, we have reached long-term cooperation with Shell to provide intelligent lubrication services for customers

2020

oil purifier is successfully used in the nuclear power industry

Core competitiveness

2000+

Global customers

50+

One in every five top 10 global company select WSD

5

Core patents to break the foreign technical barriers and market monopoly

6000+

Long-term stable operation continue to create value for customers

8000+㎡

factory

10%

R&D investment intensity

Brand achievement

Certificate of honor

About us

OIL PURIFIER

净油机

- Save the cost of oil change, prolong the service life of oil products;
- Prolong the service life of equipment, reduce maintenance and repair costs;
- Reduce unexpected downtime;
- Save energy and protect the environment

WSD

Application fields

Petrochemical

Coal chemical industry

Air separation

Steel

Ships

Engineering machinery

Electric power

Aerospace

About us

What WSD sell?---clean fluids

- Provider of reliable technology
- Customer's technical partner
- pollution control consultant

WSD Pollution control in three steps

- Set oil pollution control targets
- Choose the appropriate filter tool
- Monitor oil indicators online or regularly

Our partner

Fortune Global 500

Well-known domestic enterprises

Well-known foreign enterprises

WSD

Contact us

WSD

All the achievements we made today
start from every uncompromising stance

Jessica Zhao

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