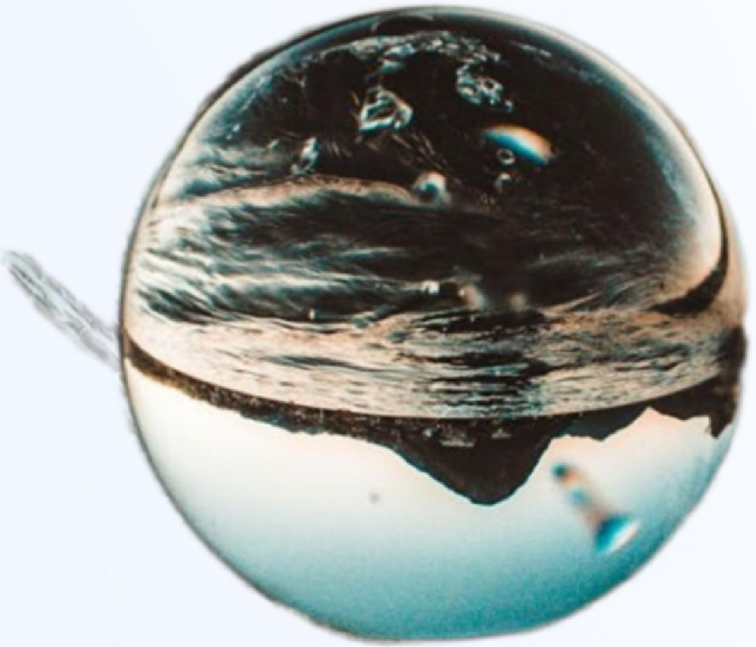
# 卓越水处理技术 &化学漂白技术

WATER TREATMENT TECHNOLOGIES &Chemical bleaching technology

## 及海外案例分享

PROJECT REFERENCES



广西博世科环保科技股份有限公司

Guangxi Bossco Environmental Protection Technology Co., Ltd.

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可靠的水处理供应商
Trustworthy supplier of water treatment technologies services for demanding customers


# New characteristics of kraft/corrugated wastewater

## 牛卡纸/瓦楞纸废水新特点

自成立以来，博世科坚持可持续发展道路，致力于为客户提供安全可靠的环保技术及设备。

Since establishment, BOSSCO is pursuing a vision of sustainability, and creating technologies and products that are safe, eco-friendly and reliable.

**Circle:From 30days to 7days**

Equipment

**ALL SCALING!!!**

piping

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**1.The quality of waste paper has decreased:** (1) The loss of cellulose is accelerating, and it is necessary to supplement European waste or wood pulp; (2) Filler: The use of lime and starch has increased.

**2. The result :**a significant increase in the concentration of calcium and magnesium ions in the wastewater, from 200-500ppm to **1200-2000ppm.**

**1.废纸品质下降：**（1）纤维素流失加快，需要补充欧废或者木浆；（2）填充物：石灰、淀粉使用量增多。

**2.结果是：**废水中钙镁离子浓度大增，从200-500ppm，增加到**1200-2000ppm。**

Hazards caused:

1. Equipment and pipeline scaling;
2. The aeration system is blocked;
3. **The granular sludge in the anaerobic system calcifies, causing the sewage station to collapse and become inoperable;**

造成的危害：

1.设备、管道结垢；

2.曝气系统堵塞；

3.厌氧系统颗粒污泥钙化，污水站崩溃，无法运行；

## Device Upgrade

***The water consumption is getting lower and lower***


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1. **Water consumption per ton of paper: decreased from 8-10 tons of water to 3-6 tons of water.**
2. **1.吨纸消耗水量：从原来8-10吨水，降低到3-6吨水。**

The wastewater treatment caused by the following phenomena:

1. CODcr increased from 4000-5000ppm to 8000-10000ppm;
2. 2. The concentration of harmful substances, such as calcium and magnesium ions, is further increased, increasing the difficulty of treatment;
3. 3. The design of sewage treatment system equipment may be too small and lack buffering capacity;

造成的废水处理存在以下现象：

**1.CODcr从4000-5000ppm，提高到8000-10000ppm；**

**2.有害物质浓度，如钙镁离子进一步提高浓度，增加处理难度；**

**3.污水处理系统设备设计会偏小，没有缓冲能力；**

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Due to the ban on the import of "foreign waste" - waste paper - in China, the use of wood chips and waste furniture for pulping has emerged. The wastewater contains adhesive substances, which have a deadly toxic effect on wastewater treatment.

中国由于“洋垃圾”——废纸禁止进口，导致出现利用木屑、废旧家具进行制浆，废水中含有粘胶物，对废水处理拥有致命的毒害作用。

***China say NO !!***

shortage of 18 million tons/year of chemical mechanical pulp/wood pulp


**Causing phenomenon:**

1. China's shortage of 18 million tons/year of chemical mechanical pulp/wood pulp; Provide Southeast Asian paper mills with opportunities to export to China;
2. Sewage treatment: Viscous substances poison granular sludge, increasing the difficulty of treatment;
3. Sewage treatment: The adhesive produces organic nitrogen, and the ammonia nitrogen/total nitrogen index of the effluent exceeds the standard;

造成现象：

1.中国缺口1800万吨/年化机浆/木浆；给予东南亚国家纸厂出口中国机会；

2.污水处理：粘胶物毒害颗粒污泥，增加处理难度；

3.污水处理：粘胶物产生有机氮，出水氨氮/总氮指标超标；

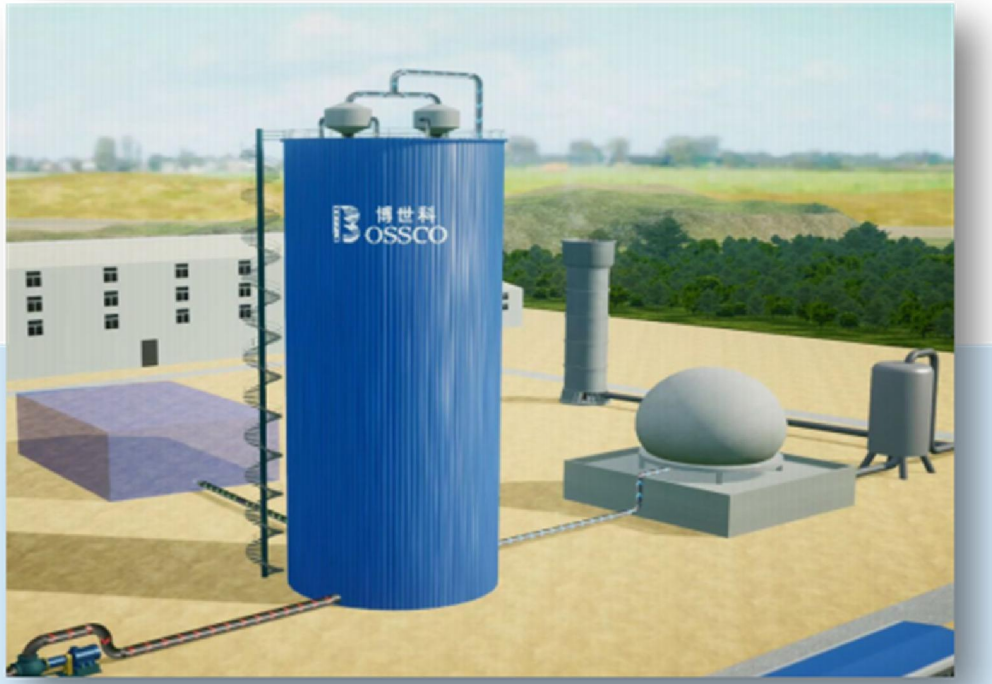
# Water treatment anti-calcification technology& chemical slurry chlorine dioxide & deep treatment new technology trends

水处理防钙化技术&二氧化氯&深度处理新技术趋势

# Up-flow Multistage Anaerobic Reactor (UMAR)

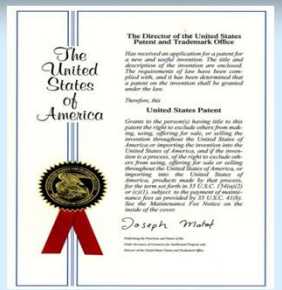
上流式多级厌氧反应器

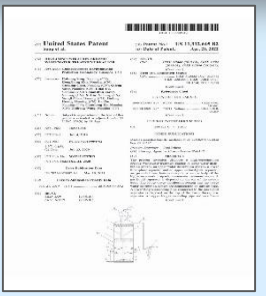
**New Anaerabic Reactor**




The **Up-flow Multistage Anaerobic Reactor (UMAR)** is an efficient and anti calcification agent of the stepwise treatment technology, fluidized bed technology and sludge Granulation technology, by which wastewater is efficiently treated, biomass is recycled, reclaimed water can be reused, while pollutant emission is ultra-low.

**上流式多级厌氧反应器(UMAR)**， 作为高效、抗钙化的厌氧反应器，其集分级处理技术、流化床技术和污泥颗粒化技术于一体，实现高效处理废水、回收生物质、中水回用，同时污染物超低排放。



**Up-flow Multistage Anaerobic Reactor (UMAR——International Patents)**

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# 核心技术
## KEY TECHNOLOGIES

IC reactor
IC原理厌氧反应器

VS

**UMAR benefits:**

- Flexible treatment capacity
- Much lower price
- No calcification problems
- Available granular sludge
- Optimal solution for CODcr removal

UMAR reactor
新型防钙化厌氧反应器

# 新型厌氧 IC 技术及防钙化措施
New anaerobic IC technology and anti calcification measures

**The calcification of sludge can only be slowed down but cannot be stopped. Achieving balance or reducing calcification is our goal。**

污泥的钙化只能减缓不能阻止，达到平衡或者减少钙化是我们追求的目标。

## Addition of auxiliary components of anaerobic scale inhibitor
厌氧阻垢剂辅组添加

**MaMain agent:**

**1、HEDP;2、ATMP;3、HPMA;**

**Function:**

**Without harming the granular sludge, it forms chelates with calcium and magnesium ions and is not absorbed by the sludge.**

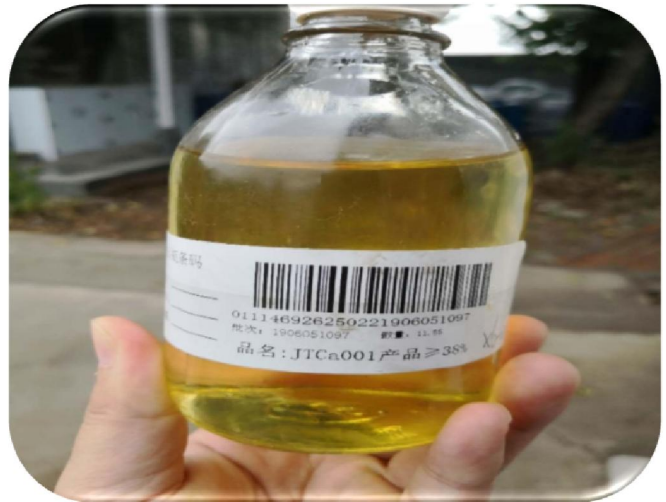
主要成分及作用:
主剂 1：羟基亚乙基二膦酸（简称 HEDP）；
主剂 2：氨基三甲叉膦酸（简称 ATMP;
副剂：水解聚马来酸酐（简称 HPMA;
作用：在不伤害颗粒污泥前提下，与钙镁离子生成螯合物，不被污泥吸收。

## Prevent air from entering the anaerobic system
防止空气进入厌氧系统

**Original design: The original design of the effluent reflux acidification tank,**

**Improvement measures: The effluent reflux enters the anaerobic main pipe, avoiding air contact.**

原设计：原设计出水回流酸化池，
改　进：出水回流进入厌氧母管，避免空气接触。



# 新型厌氧 IC 技术及防钙化措施

New anaerobic IC technology and anti calcification measures

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**污泥的钙化只能减缓不能阻止，达到平衡或者减少钙化是我们追求的目标。**


## Regularly discharge calcified sludge to facilitate water distribution

定期排放钙化泥，利于布水均匀

**(1) gravity of calcified sludge is between 1.8-2.56kg/cm3.**

**(2) when balance it is necessary to regularly discharge the bottom sludge, otherwise it will block the water distribution hole, resulting in anaerobic collapsing.**

钙化污泥比重在1.8-2.56kg/cm3，当钙化泥与新增长污泥到达平衡后，需要将底部污泥定期排放，否则堵塞i布水孔，厌氧崩溃。

## Control pH value of anaerobic inlet： 5.2 — 6.0

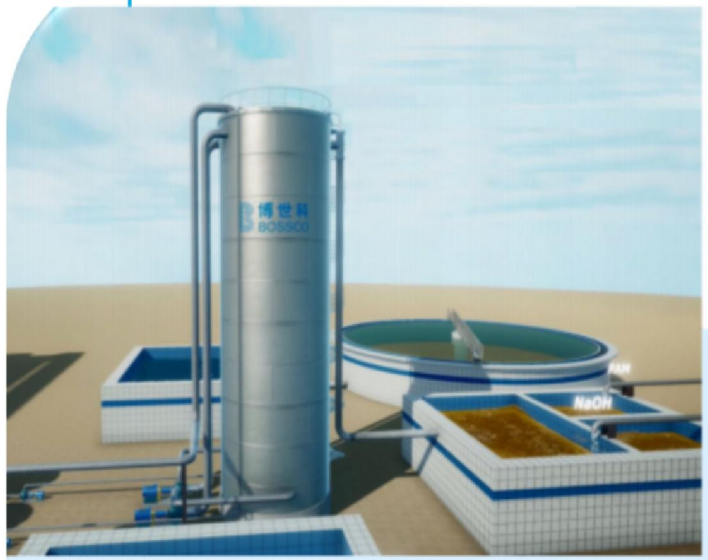
控制厌氧进塔pH值在：5.2-6.0

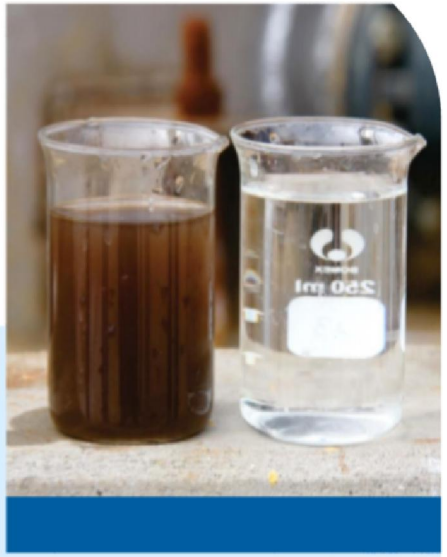
**Maintain a slightly acidic environment inside the low pH tower, thereby reducing the rate of calcification. The pH value is related to methane production activity, sludge yield, and CODr/Ca2+in and out of water.**

低pH保持塔内保持在偏酸性环境，从而降低钙化速率。pH数值与产甲烷活性、污泥产率、进出水CODr/Ca2+有关系。

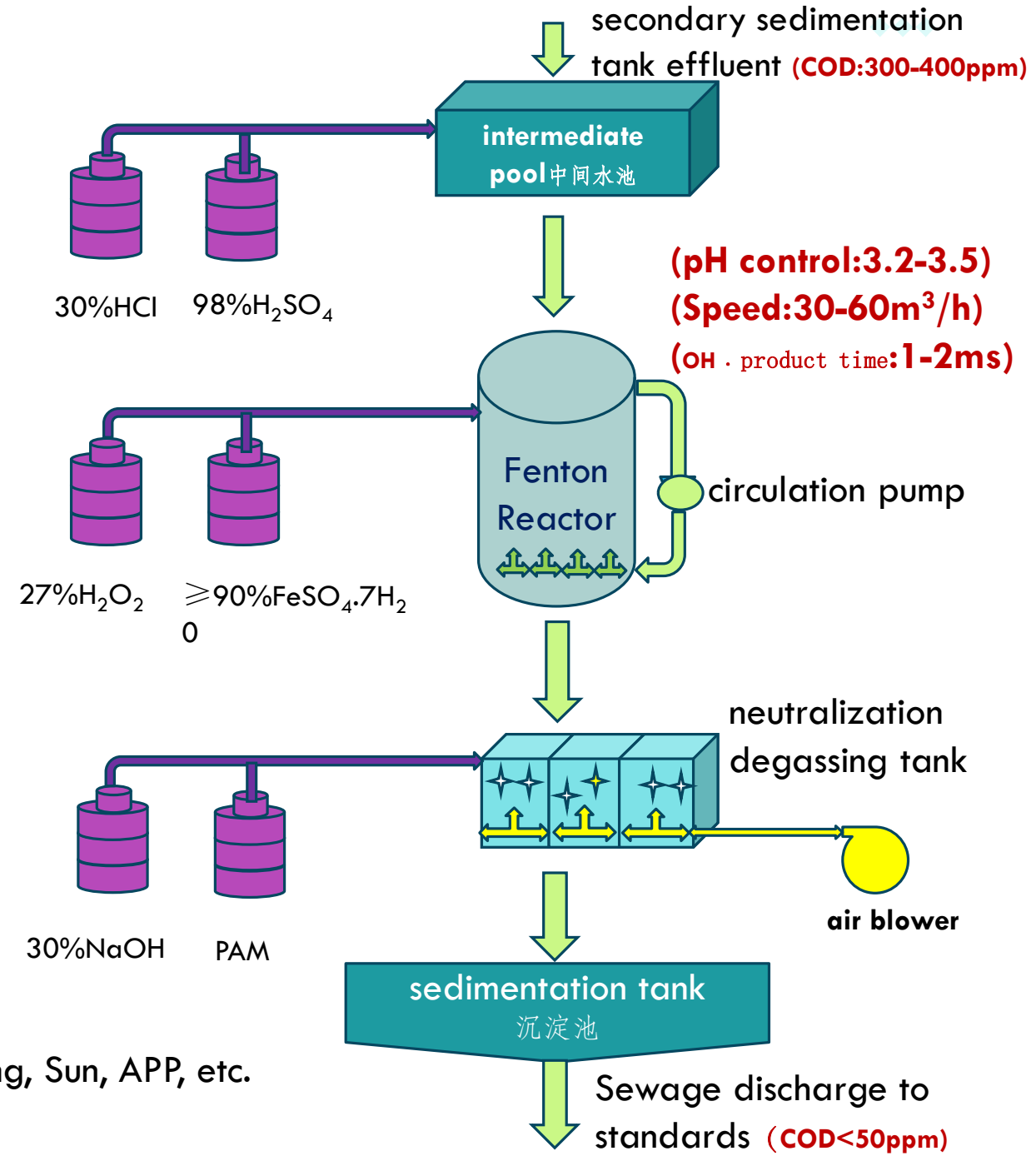
# FENTON REACTOR
## 芬顿氧化塔

**Inlet Water** 进水 **Outlet Water** 出水





**Fenton oxidation tower**
芬顿氧化塔




Application cases: Thuận an, Nine Dragons, Lee & Man, Chenming, Sun, APP, etc.
应用案例：顺安、玖龙、理文、晨鸣、太阳、APP等公司

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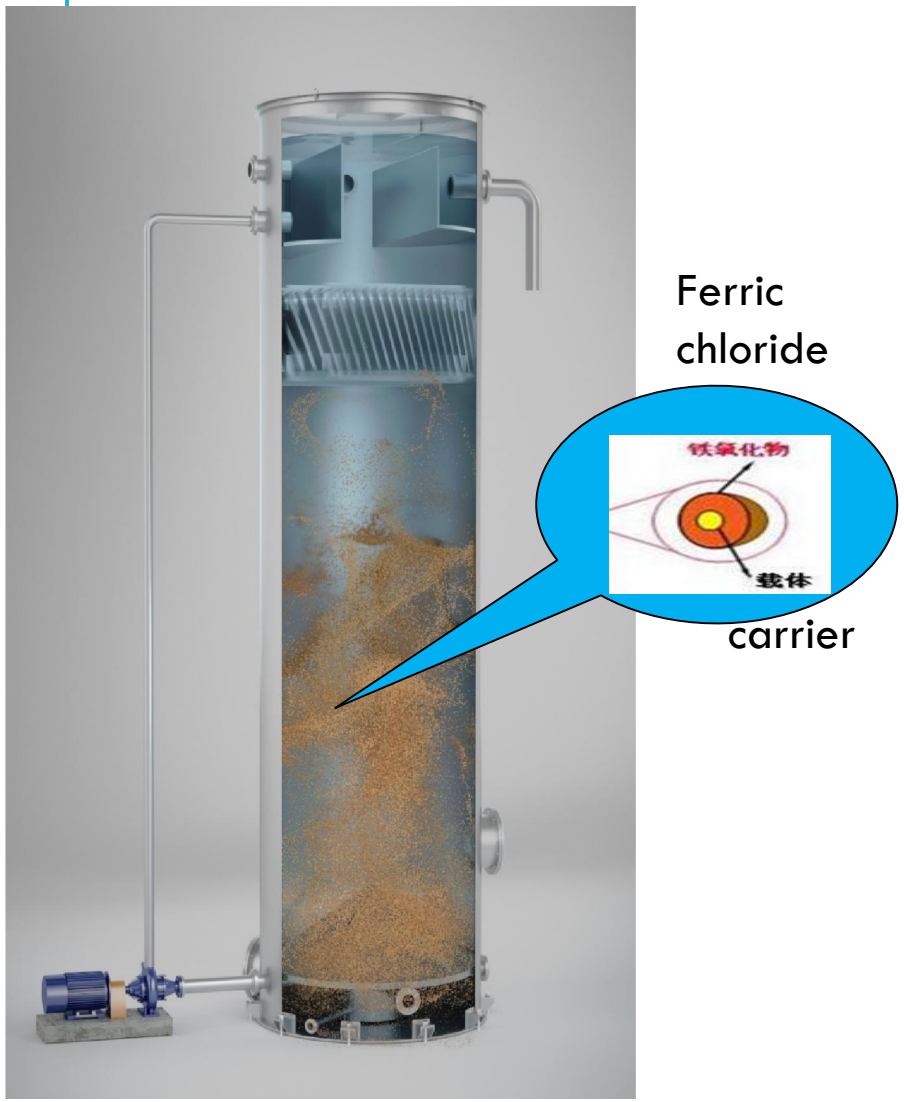
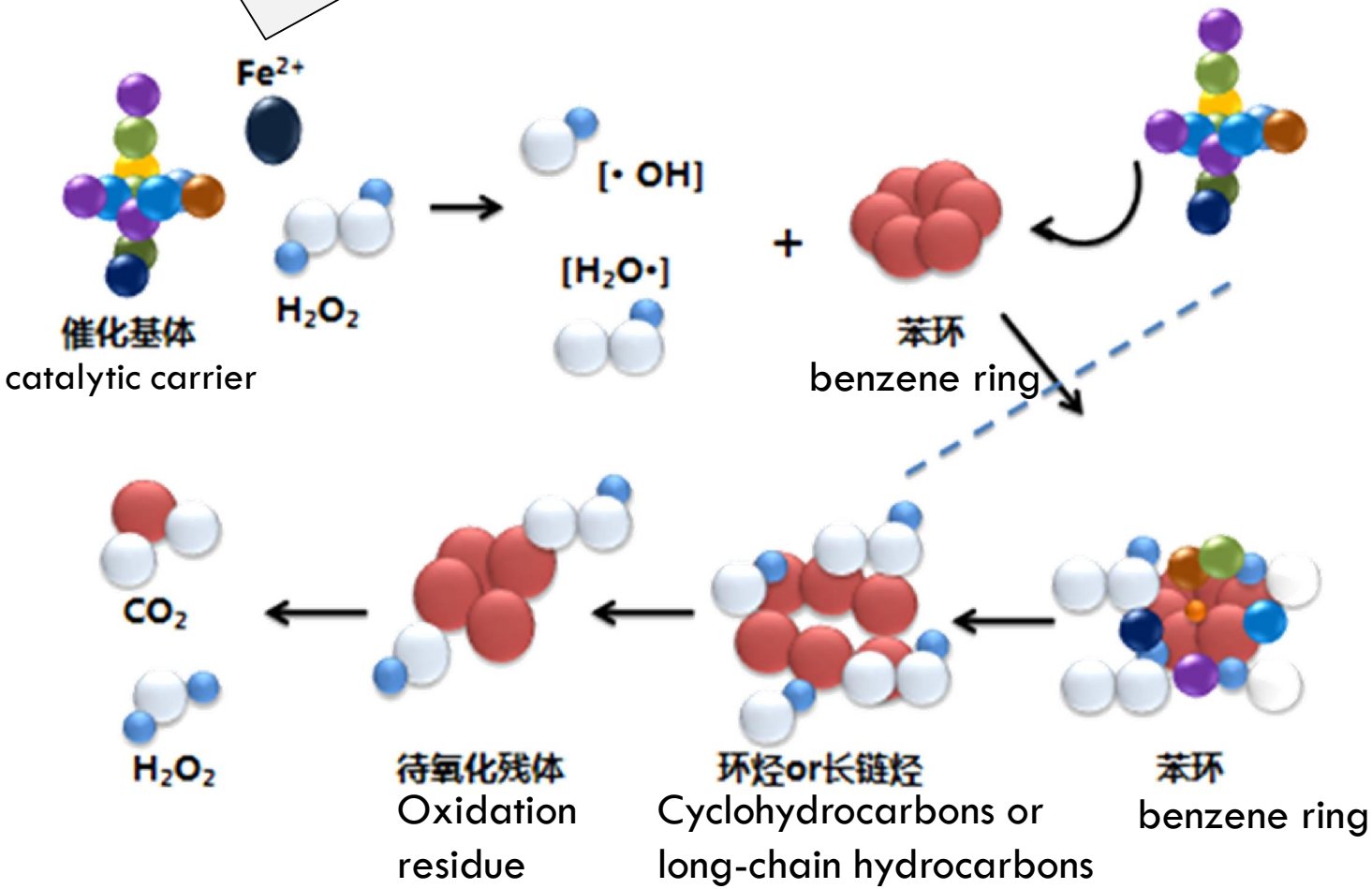
# FENTON REACTOR
## 芬顿氧化塔




**IOP：Inorganic Oxidation Promoter**




Principles of Fenton catalytic oxidation technology

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# FENTON REACTOR
## 芬顿氧化塔

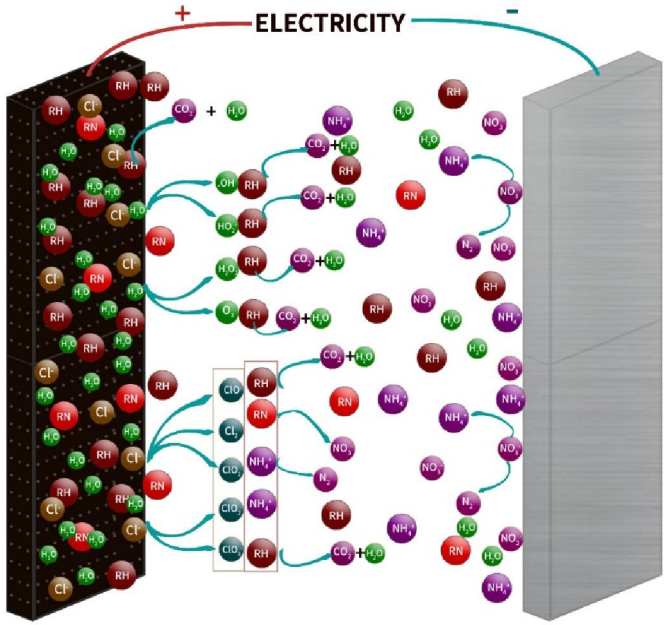
## Technical Principles and Characteristics
## 技术原理及特点

1) Strong catalytic oxidation ability, stable pollutant degradation ability;
2) Multi point water distribution, sufficient mass transfer, and improved oxidant utilization rate;
3) Carrier coating - heterogeneous oxidation, reducing catalyst dosage;
4) Strong impact load resistance: influent COD<300-400mg/l
5) Fast start, easy to operate, stable operation: effluent COD<30-100mg/l
6) The effluent quality is controllable and can meet different discharge standards
7) There are no operating components inside, with a long service life and simple maintenance
8) Equivalent conditions: When the influent TCOD is ≤ 400mg/L, the operating cost per ton of water can be reduced by about 30% compared to the traditional Fenton method（Civil + mixing）.

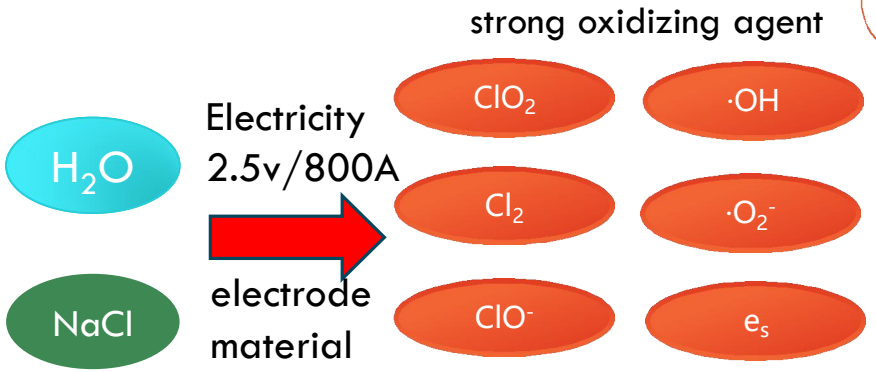
1）强催化氧化能力，污染物降解能力稳定；
2）多点布水、充分传质，提升氧化剂利用率；
3）载体覆膜-异相氧化，降低催化剂用量；
4）抗冲击负荷能力强：进水COD<300-600mg/l
5）启动快，易操控，运行稳：出水COD<30-100mg/l
6）出水水质可控，可满足不同排放标准
7）内部无运转部件，使用寿命长且维修维护简单
8）同等条件：在进水TCOD≤400mg/L，吨水运行成本较传统芬顿法(搅拌器+土建）可降低30%左右

| No 序号 | Model （m) 规格型号 | Volume($m^3$/d) 处理水量 | COD loading COD负荷 | Effluent CODcr 出水CODcr |
|---|---|---|---|---|
| 1 | ϕ3.8*13.5\ϕ3.8*15 | 10000\11000 | 2~2.2 T/d | ≤50ppm |
| 2 | ϕ3.6*13.5\ϕ3.6*15 | 9000\10000 | 1.8~2.0 T/d | ≤50ppm |
| 3 | ϕ3.2*13.5 | 7000 | 1.4 T/d | ≤50ppm |
| 4 | ϕ3.0*10 | 6000 | 1.2 T/d | ≤50ppm |
| 5 | ϕ2.8*10 | 5000 | 1.0 T/d | ≤50ppm |

# OCC New Technology for Paper Wastewater Treatment
## OCC造纸废水处理新技术




**Electrocatalytic oxidation—— the most promising deep treatment technology of the future!**
**未来最有潜力的深度处理技术—电催化氧化技术！**


**Advantages of electrocatalytic oxidation:**

1. **CODcr can realize 0ppm;.**
2. **No sludge generation;**
3. **The process does not need to add chemicals;**
4. **Low running cost.**

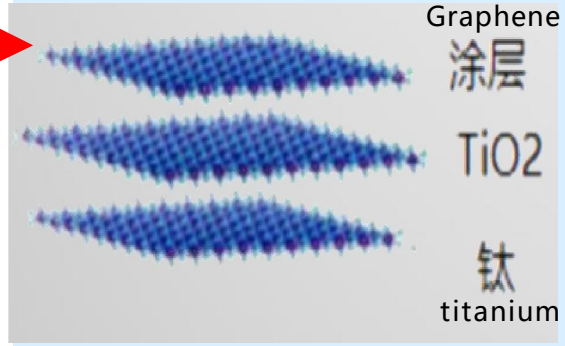
**电催化氧化优势：**

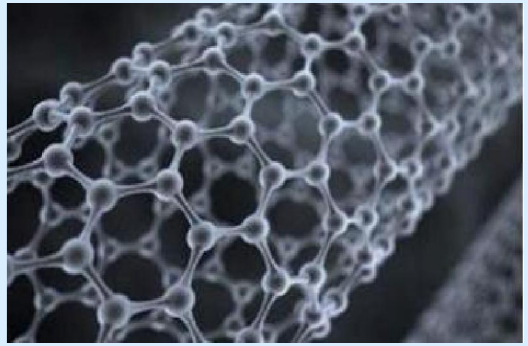
**1.CODcr可以实现0ppm;**
**2.无污泥产生；**
**3.过程不需要添加药剂；**
**4.运行成本低。**

# OCC New Technology for Paper Wastewater Treatment

## OCC造纸废水处理新技术

**The core is coated with graphene**



**secondary sedimentation tank effluent**
**二沉池出水**

Pretreatment system
预处理系统

① Remove SS impurities;
② Remove hardness
① 除SS杂质;
②除硬度;

Pre-Reactionsystem
预反应系统

① Pre-oxidation;
② Pre-reduction;
①预氧化;
②预还原;

Cleaning system
清洗系统

**Electrocatalytic systems**
**电催化系统**

$H_2/Cl_2$

Tail gas treatment system
尾气处理系统

$Ca^{2+}$、$Mg^{2+}$

**Efflunt CODcr<10-60ppm (as required)**

①Water washing/acid washing②Inverted pole
①水洗/酸洗
②倒极

**除垢措施**
**Descaling measures**

① Tail gas absorption;(Neutralization and reduction)
② Tail gas dilution;
①尾气吸收; （中和还原）
②尾气稀释;

Basic technical parameters of pole plate（极板基本技术参数）:

base material（基材）： Grade 1 pure titanium（一级纯钛 Tai)

Coating(涂层)： Graphene(石墨烯)

Substrate thickness(基材厚度)： 1mm-6mm

Coating volume(涂层量)： < 6g/m

Output Current Range(输出电流范围)： < 800-1000A/$m^2$

operating temperature(工作温度 )：10~90℃

surface resistance(表面电阻)： < 1.5Ω/ operating voltage（工作电压）： 2.5V

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# OCC New Technology for Paper Wastewater Treatment

## occ造纸废水处理新技术

**Paper wastewater**
造纸废水

Inlet cod: 402mg/l

Outlet cod: 32mg/l

power电耗:
7kWh/$m^3$

Volume水量: 1

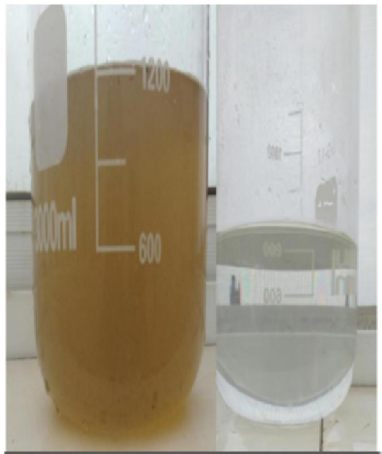
**RO concentrated water**RO浓水

Inlet cod: 189mg/l

Outlet cod: 80mg/l

power电耗:
6kWh/$m^3$

Volume水量: 1



**Petrochemical oily wastewater**
石化含油废水

Inlet color: 4800

Outlet color : 16

power电耗: 32kWh/$m^3$

Volume水量: 1L

**Chemical wastewater**
化工园区废水

Inlet cod: 170mg/l

Oytlet cod: 38mg/l

power电耗: 6.6kWh/$m^3$

Volume水量: 1L

**garbage leachate**
垃圾渗滤液

Inlet cod: 4262mg/l

Oytlet cod: 25.8mg/l

power电耗: 50kWh/$m^3$

Volume水量: 1L

**printing and dyeing wastewater**
印染废水

Inlet cod: 960mg/l

Oytlet cod: 75mg/l

power电耗: 45kWh/$m^3$

Volume水量: 1L

**At present, it has been successfully experimented in papermaking, RO thick water, garbage leachate, petrochemical, chemical park, printing and dyeing industry, and achieved ideal effluent COD, chromaticity (such as the above figure)**

目前已成功在造纸、RO浓水、垃圾渗滤液、石化、化工园区、印染行业实验，达到理想出水COD、色度（如上图）


# PROJECT REFERENCES

## 海外案例分享

依托强大的实力与完善的服务， 博世科已走向世界。服务210 余城市，受益人口3.6亿，涉足五大洲

BOSSCO has undertaken 400+ projects worldwide, with services covering 5 continents and benefiting 360+ million people in 210+ cities.

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# 海外案例

**PROJECT REFERENCES**

**20,000 $m^3$/d （NINE TROGAN）污水处理厂**

**20,000 $m^3$/d waste water treatment plant**

**项目地 (Project site):**

越南(Vietnam)

## Inlet and outlet water indicators

进出水指标

| Index | SCODcr | $Ca^{2+}$ | SS | PH |
|---|---|---|---|---|
| 进水 Raw effluent | ≤4,000 | ≤800 | ≤500 | 6-9 |
| 出水 Treated effluent | ≤50 | -- | <30 | 6-9 |

Note: Nine Dragons SCODcr corresponds to raw water total CODcr of about 8000mg/L

备注：玖龙SCODcr对应原水总CODcr约8000mg/L

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# 海外案例
## PROJECT REFERENCES

**12,000m³/d （Tuần An Paper）污水处理厂(正在建设)**

**12,000m³/d waste water treatment plant（Under construction)**

**项目地 (Project site):**

越南胡志明 (Ho Chi Minh, Vietnam)

## Inlet and outlet water indicators
进出水指标

| Index | CODcr | 色度 | SS | PH |
|---|---|---|---|---|
| 进水 Raw effluent | ≤10,000 | ≤ 2,000 | ≤1,000 | 5.5-7 |
| 出水 Treated effluent | ≤ 60 | <50 | <30 | 6-9 |

**Under construction, future renderings**

**正在建设，未来效果图**

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# 海外案例
## PROJECT REFERENCES

**4,500m³/d （Sun Paper Industry）污水处理厂**

**4,500m³/d waste water treatment plant**

**项目地 (Project site):**

缅甸内比都 (Naypyidaw, Myanmar)

## Inlet and outlet water indicators
进出水指标

| Index | CODcr | $BOD_5$ | SS | PH |
|---|---|---|---|---|
| 进水 Raw effluent | ≤5,000 | ≤2,500 | ≤3,500 | 6-9 |
| 出水 Treated effluent | ≤100 | <30 | <80 | 6-9 |

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# 海外案例
**PROJECT REFERENCES**

(LEE MAN)**污水处理项目**
**Effluent treatment plant**

**项目地 (Project site):**
马来西亚彭亨州 (Pahang, Malaysia)

## Inlet and outlet water indicators
进出水指标

| Index | CODcr | 色度 | SS | PH |
|---|---|---|---|---|
| 进水 Raw effluent | ≤10,000 | ≤ 2,000 | ≤1,000 | 5.5-7 |
| 出水 Treated effluent | ≤ 40 | <30 | <30 | 6-9 |

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# 海外案例

**PROJECT REFERENCES**

**3,000 $m^3$/d** (Double A)**污水处理厂**

**3,000 $m^3$/d waste water treatment plant**

**项目地 (Project site):**

泰国巴真府(Bajin Province, Thailand)

## Inlet and outlet water indicators

进出水指标

| Index | CODcr | $BOD_5$ | SS | PH |
|---|---|---|---|---|
| 进水 Raw effluent | ≤10,500 | ≤ 5,000 | ≤240 | 5.5-7 |
| 出水 Treated effluent | ≤ 200 | <50 | <60 | 6-8 |

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# 海外案例

**PROJECT REFERENCES**

**5,800 $m^3$/d ()污水处理厂**

**5,800 $m^3$/d waste water treatment plant**

**项目地 (Project site):**

菲律宾( Philippe)

## Inlet and outlet water indicators

进出水指标

| Index | CODcr | 色度 | SS | PH |
|---|---|---|---|---|
| 进水 Raw effluent | ≤10,000 | ≤2,000 | ≤1,000 | 5.5-7 |
| 出水 Treated effluent | ≤60 | <50 | <30 | 6-9 |

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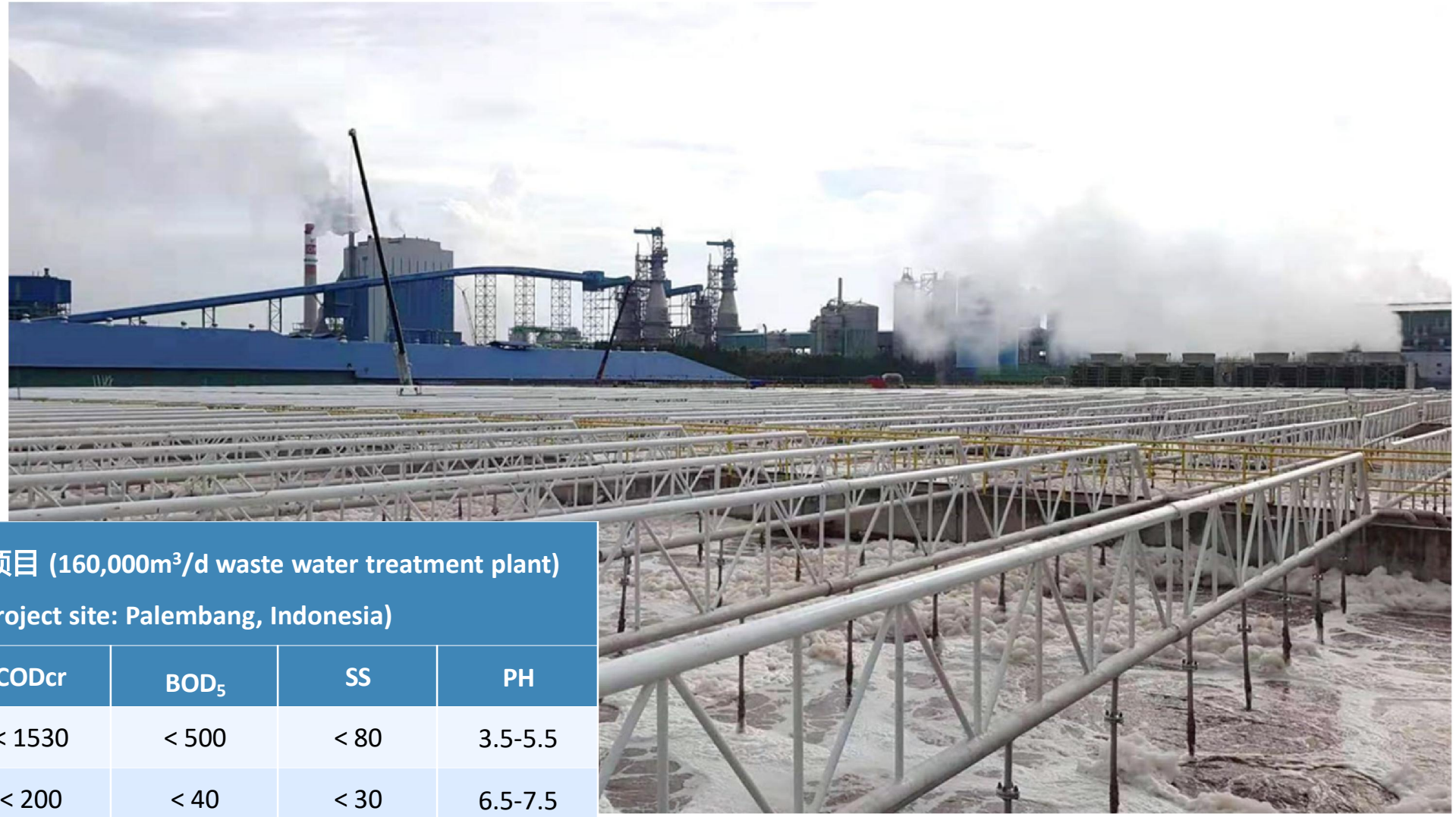
# 海外案例

**PROJECT REFERENCES**



**160,000m³/d(APP)污水处理项目 (160,000m³/d waste water treatment plant)**

**项目地：印度尼西亚巨港 (Project site: Palembang, Indonesia)**

| Index | CODcr | $BOD_5$ | SS | PH |
|---|---|---|---|---|
| 进水 Raw effluent | < 1530 | < 500 | < 80 | 3.5-5.5 |
| 出水 Treated effluent | < 200 | < 40 | < 30 | 6.5-7.5 |

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# 海外案例

**PROJECT REFERENCES**

**(APP)污水处理厌氧项目(建设中)**

**Anaerobic Reactor Project ( under construction)**

**项目地 (Project site):**

印度尼西亚西冷(Serang, Indonesia)

## Inlet and outlet water indicators

进出水指标

| Index | CODcr | 色度 | SS | PH |
|---|---|---|---|---|
| 进水 Raw effluent | ≤10,000 | ≤ 2,000 | ≤1,000 | 5.5-7 |
| 出水 Treated effluent | ≤ 60 | <50 | <30 | 6-9 |

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# 海外案例

**PROJECT REFERENCES**

**17,808m³/d(trop)污水技改项目**

**17,808m³/d ETP upgradation project**

**项目地 (Project site):**

印度喜马偕尔邦 (Himachal Pradesh, India)

## Inlet and outlet water indicators

进出水指标

| Index | CODcr | $BOD_5$ | SS | PH |
|---|---|---|---|---|
| 进水 Raw effluent | ≤4,050 | ≤ 1,430 | ≤ 1,600 | 4.5-5.5 |
| 出水 Treated effluent | ≤ 100 | <10 | <30 | 6.5-8.5 |

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# 海外案例
**PROJECT REFERENCES**

**(red flag)污水处理厂**
**Waste water treatment plant**

**项目地 (Project site):**
白俄罗斯 (Belarus)

## Inlet and outlet water indicators
进出水指标

| Index | CODcr | $BOD_5$ | SS | PH |
|---|---|---|---|---|
| 进水 Raw effluent | ≤4,050 | ≤ 1,430 | ≤ 1,600 | 4.5-5.5 |
| 出水 Treated effluent | ≤ 100 | <10 | <30 | 6.5-8.5 |

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# 海外案例
## PROJECT REFERENCES

(LEE MAN)**供水处理厂**
**Water treatment plant**

**处理量（Capacity）:**
16,000$m^3$/d

**项目地 (Project site):**
缅甸内比都 (Naypyidaw, Myanmar)

## Inlet and outlet water indicators
进出水指标

| Index | Turbidity 浊度 (NTU) | main iron Fe(mg/L) | Main Fierce Mn(mg/L) |
|---|---|---|---|
| 进水 Raw effluent | 50~100 | ≤8 | ≤0.6 |
| 出水 Treated effluent | ≤5 | <0.1 | <0.05 |

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# 海外案例

**PROJECT REFERENCES**

**4,200m³/d(San Buenaventura) 糖厂污水处理项目**

**4,200m³/d sugar waste water treatment plant**

**项目地 (Project site):**

玻利维亚玻利维亚圣布埃纳文图拉 (San Buenaventura, La Paz, Bolivia)

## Inlet and outlet water indicators

进出水指标

| Index | CODcr | $BOD_5$ | SS | PH | TEMP. |
|---|---|---|---|---|---|
| 进水 Raw effluent | ≤1586 | ≤583 | ≤200 | 5-8 | ≤60°C |
| 出水 Treated effluent | ≤250 | ≤60 | ≤60 | 6-9 | ≤38°C |

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# 海外案例

**PROJECT REFERENCES**

**20,000m³/d(mordon PM6 paper) 土耳其现代纸业PM6纸板厂项目**

**20,000m³/d occ waste water treatment plant**

**项目地 (Project site):**

土耳其宗古尔达克地区 (Zongguldak region of Türkiye)

## Inlet and outlet water indicators

进出水指标

| Index | CODcr | $BOD_5$ | SS | PH | TEMP. |
|---|---|---|---|---|---|
| 进水 Raw effluent | ≤6500 | ≤6251 | ≤200 | 6.5-8 | ≤40-50°C |
| 出水 Treated effluent | ≤100 | ≤30 | ≤80 | 6-9 | ≤38°C |

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# 海外案例

**PROJECT REFERENCES**

（LEE MAN）**供水处理厂**

**Water treatment plant**

**处理量 (Capacity):**

40,000$m^3$/d

**项目地 (Project site):**

越南(Vietnam)

## Inlet and outlet water indicators

进出水指标

| Index | Turbidity 浊度 (NTU) | main iron Fe(mg/L) | Main Fierce Mn(mg/L) |
|---|---|---|---|
| 进水 Raw effluent | 20~100 | ≤5 | ≤0.1 |
| 出水 Treated effluent | ≤5 | <0.1 | <0.05 |

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# 海外案例
## PROJECT REFERENCES

(LEE MAN )**供水处理厂**
**Water treatment plant**

**处理量（Capacity):**
25,000$m^3$/d

**项目地 (Project site):**
马来西亚彭亨州 (Pahang, Malaysia)

## Inlet and outlet water indicators
进出水指标

| Index | Turbidity 浊度 (NTU) | main iron Fe(mg/L) | Main Fierce Mn(mg/L) |
|---|---|---|---|
| 进水 Raw effluent | 50~500 | ≤8 | ≤0.5 |
| 出水 Treated effluent | ≤5 | <0.1 | <0.05 |

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# 部分合作客户
PARTNERSHIP

## Distribution of cooperative pulp and paper customers in countries（14）：
## China, United States, Turkey, Vietnam, Laos, Myanmar, Malaysia, Thailand, Philippines, Indonesia, Belarus, Bolivia, India, Cambodia.

已合作制浆造纸客户分布国家（14）：中国、美国、土耳其、越南、老挝、缅甸、马来西亚、泰国、菲律宾、印尼、白俄罗斯、玻利维亚、印度、柬埔寨。

# 感谢聆听

# THANK YOU


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