

山东亿达环保技术工程有限公司

污水处理工艺介绍

Introduction of Sewage Treatment Technologies
Shandong Yida Environmental Technology & Engineering Co., Ltd.

孙树林总经理

Sun Shulin - General Manager

公司概况

Corporate Profile

- 本公司于1994年创立，经过前十年（1994-2004）的不懈努力，我公司针对各种复杂的工业废水,采用目前世界上最先进废水处理技术并加以创新应用，以交钥匙方式完成了多家客户的废水治理工程。经多年工程运行验证，我公司全面拥有“微电解重金属脱除”、“曝气生物滤池深度脱氮及生物除臭”和“厌氧微动力消化污泥减量及资源化”等三项KNOWHOW（专有技术）。1999年8月获得国家环境保护总局颁发的环境工程设计证书
- Shandong Yida Environmental Technology and Engineering Co., Ltd. was founded in 1994. During the first decade, the company aimed at the market of various kinds of industrial wastewater that is hard to treat, adopted and applied the state-of-the-art technology creatively, and provided turn-key solutions to many customers in wastewater treatment industry. The outstanding achievement proved our mastery over three know-hows, which are as follows, heavy metal removal by micro-electrolysis, ammonia removal and bio-deodorization by biological aeration filter (BAF), and micro-power anaerobic sludge digestion and recycling. As early as in August 1999, Yida received the certificate for environmental engineering design issued by National Environmental Protection Agency.

公司概况

Corporate Profile

- 为更好地服务山东及全国环保市场，公司总部于2004年迁入山东邹城，更名为山东亿达环保技术工程有限公司
- To serve Shandong and the nationwide market better, the company moved its headquarter from Xiamen to the Economic Development Zone of Zoucheng City, Shandong Province. In August 1999, our company was awarded the Certificate of Environmental Engineering Design by the State Environmental Protection Administration.

公司概况

Corporate Profile

- 2005年后，本公司转入污水处理核心装备-潜浮式曝气机产品系列的创新研发，五年内共取得中国发明专利4项，美国发明专利4项；填补了“中层曝气”的国际空白。近十年来通过多项工程运行结果评估如下：
- In the year of 2005, our company shifted to the research and development of submersible floating aerator, which is an important innovation in wastewater treatment industry. In a period of five years, we have had been granted four China patents and four United States patents, and have had filled in both domestic and international gaps in this field by introducing the concept of middle-layer aeration. In the recent decade, the projects in which the submersible floating aerators are installed have four obvious advantages as follows.

公司概况

Corporate Profile

- (1) **中层曝气系统**能替代传统**底层曝气**和**表层曝气**系统，使污水（废水）处理厂进入**终身不停产并终身稳定达标**的新时代。
- (2) **精准供氧与精确混合**的能力使中层曝气系统比传统曝气系统节能30%-50%以上。
- (3) **深度脱氮**功能（出水 $\text{NH}_3\text{-N} < 0.5\text{mg/L}$ ）在现有传统工艺路线不改变、池型不改变、运行不停产的前提下，通过**中层曝气设备**替换原有系统全部达到优于一级A的标准。
- (4) **全面水上安装**的独特方式**终结了**污水处理厂必须停产进行检修与维护的历史。

公司概况

Corporate Profile

- Firstly, the conventional bottom and surface aeration systems are fully superseded by the middle-layer aeration system. The wastewater treatment plants entered a new era of no production suspension and lifelong stable performance and standard compliance.
- Secondly, the ability of accurate oxygen supply and mixing of our aerator enables the energy saving of the middle-layer aeration system to 30% ~ 50% compared to that of traditional aeration systems.
- Thirdly, the unique feature of advanced ammonia nitrogen removal makes the effluent meet and even far exceed the Grade A level standard by unchanging the existing treatment process and infrastructure.
- Last but not least, the installation process of middle-layer aeration device is always above the liquid level and has no contact with the basin's bottom. This advantage ends the requirement, which used to be a must in past decades, of production suspension for repair and maintenance.

公司概况

Corporate Profile

- 自2013年至今近四年，我司运用上述专利装备进入制革废水治理改造领域，完成多项示范工程；彻底解决了本行业废水的疑难问题，找到了根治该行业4大难题的金钥匙。即：
 - （1）大量综合废水氨氮稳定达标，出水好于一级A标准。
 - （2）重金属、色度全部达到排放最高标准。
 - （3）厌氧微动力消化污泥减量和资源化。
 - （4）**曝气生物滤池**深度脱氮及生物除臭消除了皮革厂产生的异味。
- 新型绿色皮革产业集中区的核心优势在于，在上述现代综合环保系统的护航下，可把废水、废气、废渣和重金属“吃干、榨净、零排放”，创造真正可持续发展的道路。

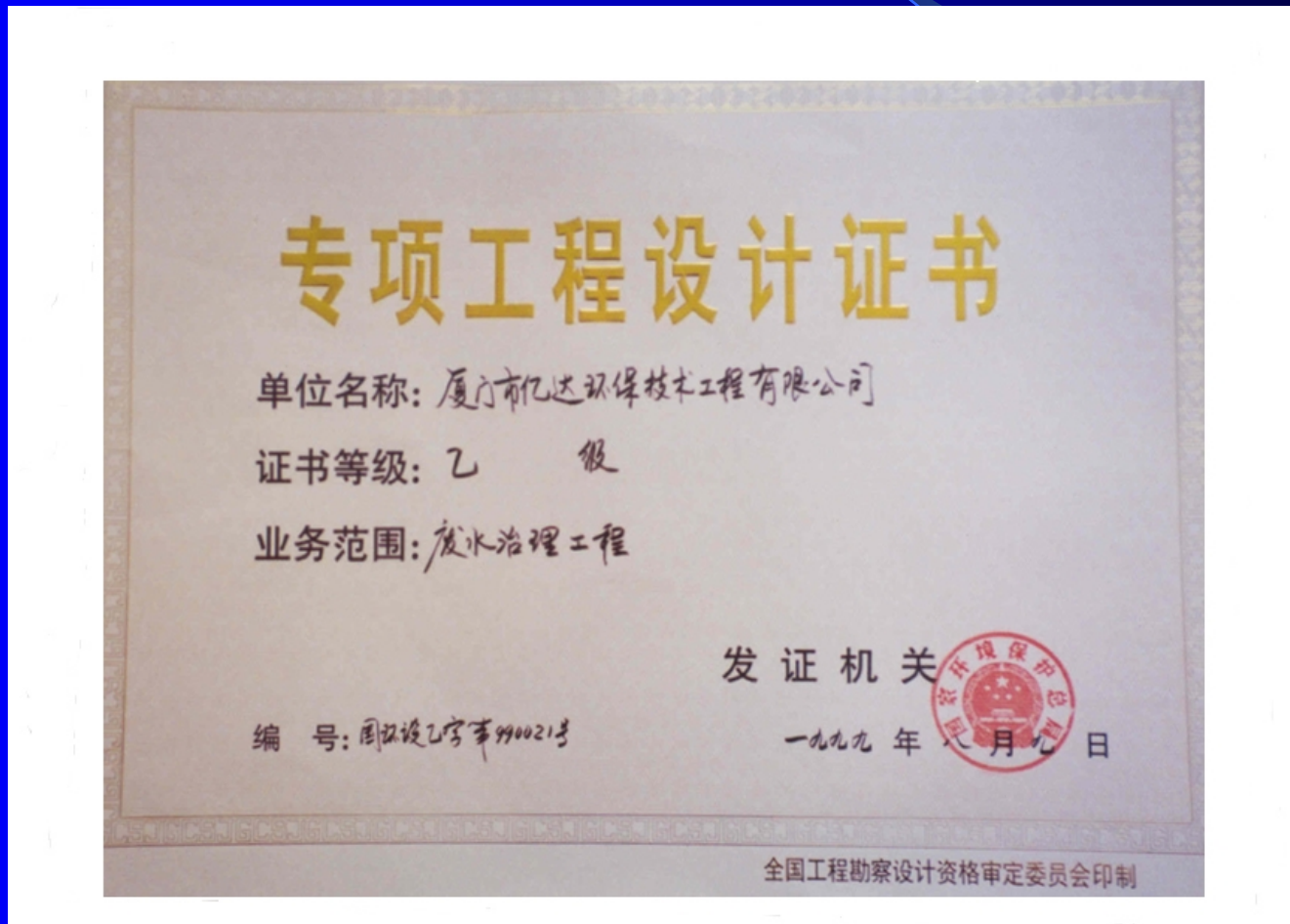
公司概況

Corporate Profile

- In recent five years, we have applied the patented aerators to the tannery industry and have solved many difficult problems in this industry. We have found the golden keys to these problems.
- Firstly, the ammonia nitrogen level of the effluent meets and far exceeds the stringent discharge standard and remains stable by installing the submersible floating aerators.
- Secondly, both the heavy metal removal and the chromaticity levels achieve the highest discharge standard.
- Thirdly, the micro-power anaerobic sludge digestion and recycling is realized.
- Fourthly, the ammonia nitrogen removal and bio-deodorization by BAF eliminate the odor in tannery factories. The core competitiveness of new green tannery industrial zone is that the objective to full treatment, digestion and zero discharge of wastewater, waste gas and waste solids can be achieved if it is conveyed by our modern environmental treatment systems.

专项工程设计证书

Certificate of Environmental Engineering Design



高新技术企业证书

Certificate of Hi-tech Enterprise of Shandong Province



污水处理技术工艺与业绩介绍

Introduction of Sewage Treatment Technologies and Related Projects

1. 曝气生物滤池工艺 (BAF)
Biological Aeration Filter (BAF)
2. 微电解电化学处理工艺 (CSFB)
Micro Electrolysis Treatment System (CSFB)
3. 超低耗生活污水处理组合 (A-TF)
Ultra-low Consumption Sewage Treatment (A-TF)
4. 上流式厌氧污泥床 (UASB)
Up-flow Anaerobic Sludge Bed (UASB)

曝气生物滤池 (BAF)

Biological Aeration Filter (BAF)

- 曝气生物滤池 (BAF) 技术是在生物接触氧化工艺的基础上，引入饮用水处理中过滤的思想，而产生的一种好氧废水处理工艺。

Biological Aeration Filter (BAF) is an aerobic sewage treatment technology that is developed on the basis of bio-contact oxidation technology and the idea about drinking water filtration.

- 在一级强化处理的基础上将生物氧化与过滤结合在一起，滤池后部不设沉淀池，通过反冲洗再生实现滤池的周期运行。

The technology combines biological oxidation and filtration on the basis of enhanced primary treatment. There is no requirement of sedimentation pond behind the filter and the periodical operation of the filter is realized through backwash.

曝气生物滤池的独特优点

Unique Features of BAF

- 占地面积小、投资少、用电负荷低、剩余污泥少。
Small land coverage, low investment, low power load and very little sludge residue.
- 出水质量高。在容积负荷为 $6\text{kg BOD}_5/\text{m}^3 \cdot \text{d}$ 时，出水 BOD_5 及SS均小于 20mg/l ，出水可达硝化和反硝化水平，可用于中水回用系统。
High quality effluent: When the volume load is $6\text{kgBOD}_5/\text{M}^3.\text{d}$, BOD_5 and SS will be both lower than 20mg/L . The removal rate is high. The effluent, which reaches the nitrification and de-nitrification level, can be used in the middle water reuse system.
- 省去二沉池及回流泵房，简化流程，建设、运转费用低，实现自动化控制。
BAF does not require secondary sedimentation pond and reflux pump house, thus saving the one-off investment. The whole process is simplified with low construction and operating costs, and automatic control can be easily achieved.

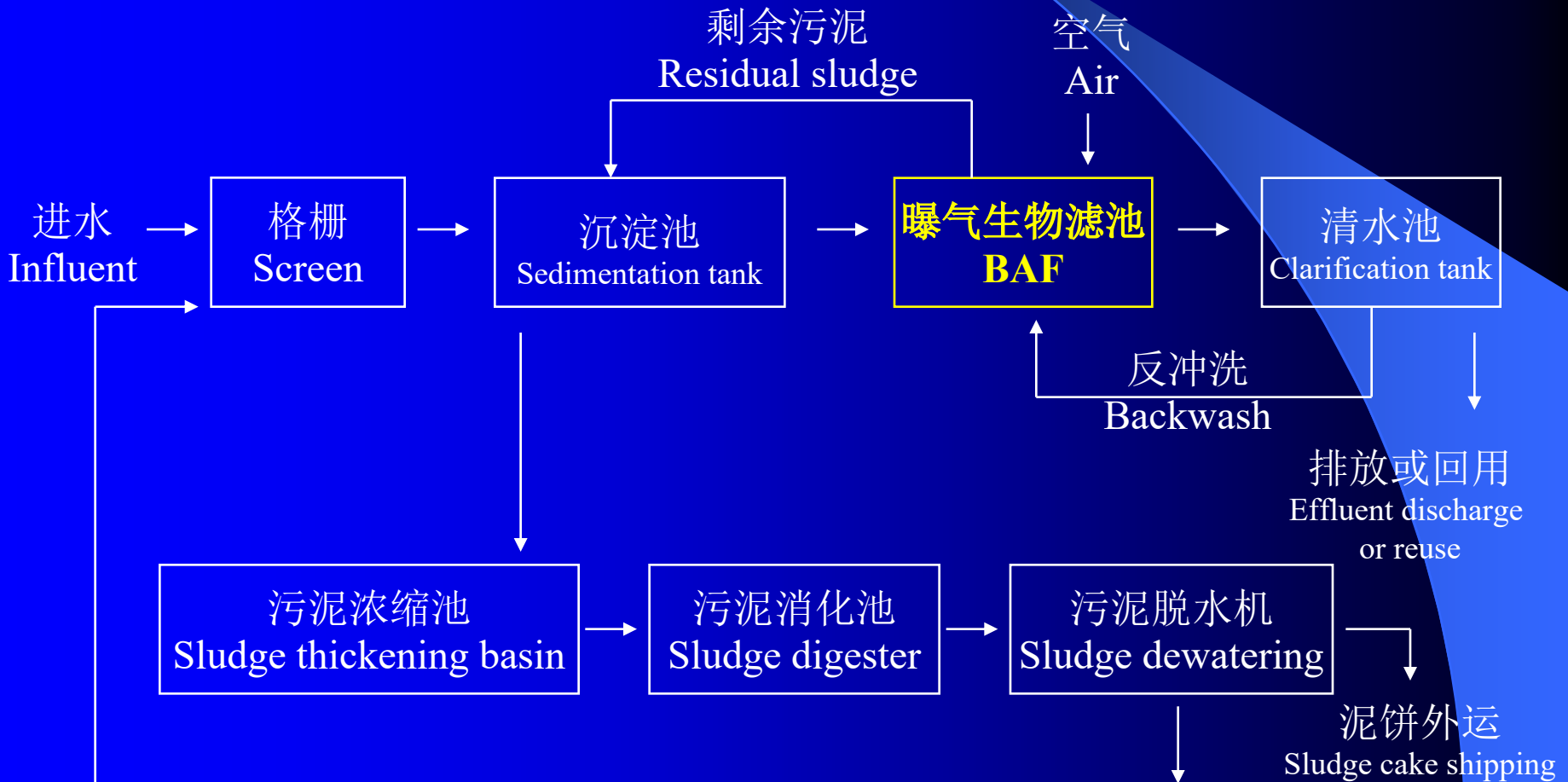
曝气生物滤池的独特优点

Unique Features of BAF

- 适用范围广： 适合城市污水、工业废水和生活污水。
Wide scope of application: YD-BAF is applicable to not only urban sewage but also industrial wastewater and domestic sewage.
- 抗冲击负荷强： 适应水量变化大、浓度变化大的波动，确保出水达标排放。
Strong resistance to impact load: high adaptability to changing sewage amount and fluctuation of concentration, assurance of high quality effluent.
- 采用一种新型滤料芯材，其各项性能均超过欧洲开发的陶粒滤料，而且价格低，具备在各国大规模推广实施的能力。
Our company has independently developed a new type of filter material. The material performs much better than the ceramic material developed in the EU. Since the price of this filter material is low, this technology can be applied worldwide.

BAF工艺流程示意图

BAF Flow Chart



BAF技术对各类污水的除污率 (%)

Removal Rate of BAF

污水类型 Type of Sewage	COD	BOD ₅	SS
城市污水 Urban Sewage	90	97	> 90
生活污水 Domestic Sewage	92.6	95.3	96.7
化工污水 Chemical Wastewater	85.5	95.6	92
印染废水 Printing and Dyeing	75	91.5	
啤酒废水 Brewery Wastewater	97	98.5	
食品加工废水 Food Processing	96.5	97.7	

北京燕山石化西区污水回用工程

Beijing Yanshan Petrochemical Co., Ltd.

Wastewater Reuse Project

- 中国最大的工业废水处理深度脱氮回用项目（12,000吨/天）

This project is the largest industrial sewage treatment and in-depth denitrification project in China(12,000 t/d).

- 我们自行设计、采用BAF工艺和新型滤料的污水处理工程

Our company carried out independent design and applied BAF and our own filter material for this project.

- 工程应用效果非常好，氨氮含量降解到1mg/l甚至零。

The project results in excellent effect. The ammonia and nitrogen in the effluent decrease to 1mg/l or even non-detect.





山东钢山酒业废水处理工程 (200吨/天, BAF)

Shandong Gangshan Liquor Co., Ltd.
Wastewater Treatment Project (200t/d, BAF)





微电解处理工艺 (CSFB)

Micro Electrolysis Treatment System(CSFB)

- CSFB利用微电池原理所引起的电化学和物理化学反应（催化、氧化还原、置换、电附集、絮凝、吸附、共沉）等多种综合效果，去除废水中的污染物。

This technology utilizes the electrochemical and physiochemical reactions caused by micro electrolysis, such as catalysis, oxidation, deoxidization, replacement, electro deposition, condensation, absorption and co-precipitation to eliminate the pollutants in the wastewater.

- 主要用于脱色和重金属去除，适于印染染料和电镀废水处理。

CSFB is used for the decolorization and heavy metal removal of dyeing and plating industry sewage.

- 使用该系统废水脱色率可达95%-98%，重金属去除率达99%，COD去除率达50%-70%，透视度均达30公分以上。

This system can achieve the wastewater decolorization rate of up to 95%-98%, heavy metal elimination rate of up to 99%, COD elimination rate of up to 50%-70%, and transparency clarity of at least 30.

微电解技术的优势

Technical Advantages of CSFB

- **操作成本低:** 处理过程中只须添加少量酸碱调整剂, 故污泥产生量低, 减少了二次处理费用; 驱动装置的耗电量很少, 节约能源。
Low operating cost: Just a small amount of pH additive is necessary during the treatment, so sludge output is little and the secondary treatment cost is reduced. The power consumption of the driving unit is very low, thus saving a lot of energy.
- **占地空间小:** 处理设备仅须一综合池以调匀预沉进流废水, 另须一沉淀池进行固液分离即可。
Small land coverage: The treatment equipment only needs a pond for mixing the pre-deposition incoming wastewater, and a sedimentation pond for solid-liquid separation.
- **回收再利用:** 此系统仅须添加过滤装置, 即可满足水的回用的目标。
Reuse of effluent: With additional filtration facility, this system can achieve the objective of wastewater reuse.

微电解技术的优势

Technical Advantages of CSFB

- 适应能力强：YD-CSFB不受地理，季节的限制。在一定条件范围操作下，几乎不受水质变化的影响，且又可与各种不同废水处理设备串联，具有广泛的适应能力。

Strong adaptability: CSFB is not limited by geography or climate. In certain conditions, it is almost free from the impact of water quality, and it can be connected with various wastewater treatment facilities. The system maintains strong adaptability.

- 自动化：大多数废水处理程序，虽号称“自动化”，事实上仍须时时留意操作过程，而YD-CSFB可以真正达到自动化目的。

Automation: Most wastewater treatment processes, though claimed to be “automatic”, actually needs to be taken care of during the operation. CSFB achieves full automation without any manpower requirement.

微电解技术的适用范围

Scope of Application of CSFB

- 印染厂、染料厂废水 Printing and dyeing wastewater
- 造纸厂、浆粕厂黑液 Black liquor from paper and pulp industry
- 生活污水 Domestic sewage
- 垃圾渗滤液 Garbage leachate
- 焦化厂废水 Coke-oven plant wastewater
- 涂装生产线废水 Wastewater from painting industry
- 化工厂废水 Wastewater from chemical plants
- 电镀厂综合废水 Plating industry sewage
- 制革染色加工废水 Leather industry sewage
- 印刷、制板废水 Printing industry sewage
- 钢铁、铝业废水
Wastewater from the iron & steel and aluminum industries
- 清洁剂制造废水 Cleaner industry sewage

厦门染整厂1200吨/天废水处理工程 Xiamen Dyeing & Finishing Factory (1200t/d)



温州华南染料公司200吨/天染料废水工程 Wenzhou Huanan Chemical Co., Ltd.(200t/d)



广东粤东地区2400吨/天综合电镀废水工程 Jieyang Plating Effluent Treatment Project(2400t/d)



浙江艳棱有限公司500吨/天染料废水工程 Dye-manufacturing Sewage Treatment (500t/d)



超低耗污水处理工艺 (A-TF)

Ultra-low Consumption Sewage Treatment Technology (A-TF)

- YD-A. TF组合工艺是本公司开发的超低耗污水处理技术, 已经用于工业废水和城市污水处理工程。本工艺属于生物技术, A段是厌氧段, TF段是好氧段。

YD-A.TF combined technology is an ultra-low consumption sewage treatment technology developed by our company. It has been applied in some industrial wastewater and urban sewage treatment projects. It is a kind of biotechnology in which section A is anaerobic while section TF is aerobic.

- 本工艺与活性污泥技术相比, 产污泥量低, 产泥率只有0.1 kg干泥/kg COD 以下, 并且污泥含水率低 (在90%左右), 容易处理。

Compared with the activated sludge process, the sludge output of ATF is only 0.1kg (dry sludge)/kg COD or below, and the water content of the sludge is low (about 90%) and easy to treat.

超低耗污水处理工艺 (A-TF)

Ultra-low Consumption Sewage Treatment Technology (A-TF)

- 本工艺的一次性投资费用最低，运行费用低于0.2元/立方米。

This technology features both the lowest investment and the lowest operating cost as well. Operating cost is lower than RMB 0.2/m³;

- 不需鼓风曝气，也不需投加化学药品，可达到国家一级排放标准。

A-TF conforms to the first class emission standard of our country can be achieved without aeration or any chemical additives.

A-TF组合工艺和其他工艺对投资和运行费用的比较

Comparison of investment and operating costs between A-TF and other technologies

指标 Indicators		SBR	氧化沟技术 Oxidation Ditch	活性污泥法 Activated Sludge	A-TF
投资指标 Investment	软投资 Soft investment	最多 Highest	少 Low	多 High	最少 Lowest
	土建投资 Construction costs	较少 Less	多 High	最多 Highest	最少 Lowest
	设备投资 Equipment	多 High	最多 Highest	少 Low	最少 Lowest
	材料投资 Materials	少 Low	少 Low	少 Low	多 High
运行费用 Operating costs	直接运行费用 Direct costs	较少 Less	最多 Highest	多 High	最少 Lowest
	间接运行费用 Indirect costs	较少 Less	多 High	多 High	最少 Lowest

济宁维维乳业有限公司废水处理工程

Shandong Jining VV Dairy Co., Ltd
Wastewater Treatment Project



上流式厌氧污泥床 (UASB)

Up-flow Anaerobic Sludge Bed (UASB)

- UASB是一种厌氧处理技术。

UASB is anaerobic treatment technology.

- 其最大特点是能在反应器内实现污泥的颗粒化。颗粒具有良好的沉降性能和很高的产甲烷活性；污泥颗粒化后的反应器内污泥的平均浓度高达50-120g。

Its main characteristic is that sludge granulation can be realized inside the reactor. The granules maintain excellent performance of sedimentation and very high methane productivity. After the sludge granulation, the average concentration of the sludge in the reactor is up to 50-120g.

- 反应器的水力停留时间较短，具有很高的容积负荷。

UASB reactor has short hydraulic retention time and high volume load.

UASB的技术优势

Technical Advantages of UASB

- 容积负荷大（8-20kg/dm³），而且不需建造体积庞大的二沉池；与好氧方法相比，节约大量的基建投资和占地面积。
Big volume load (8-20kg/dm³); a huge secondary sedimentation pond is not required. Compared with aerobic methods, it saves construction costs and land area.
- 不必进行曝气，节约大量动力。对废水营养要求不高，不需投加化学药品。
Aeration is not required, which saves a lot of energy. It does not have high requirements on wastewater nutrition and does not need any chemical additives.
- 主要设备呈密闭或半密闭状态，带气味的气体散逸量小，适宜在食品工业中使用。
The major equipments are sealed or half sealed, thus the odor seldom disperses. Therefore, it is suitable for food-processing industry.
- 污泥产量低，且污泥很容易利用或处理，操作很简单。
Low sludge output; the sludge can be easily used or disposed.

UASB的技术优势

Technical Advantages of UASB

- 可处理有机物浓度很高的废水，厌氧菌喜爱在有机物浓度很高的环境中生长，不必用新鲜水稀释。适用的COD浓度范围1000-5000mg/l。
Wastewater with very high organic concentration can be treated. Anaerobic bacteria like to live in an environment with high organic concentration, and it is not necessary to dilute the wastewater with fresh water. Applicable COD concentration ranges from 1000mg/l to 5000mg/l.
- 可产生大量沼气，一般去除1kg COD_{Cr}可产沼气0.5-0.6立方米（沼气热值与城市煤气热值相当）。其不需加压就可直接利用，如锅炉、民用燃气、发电均可。
A lot of methane can be produced. Generally, elimination of 1kg COD_{Cr} can result in methane output of 0.5-0.6m³ (the heating value of methane is equal to that of coal gas). The methane can be used directly, in boiler, civil fuel gas and power generation without pressurization.

UASB的技术优势

Technical Advantages of UASB

- 在工厂产量较低或因故停产期间，厌氧菌可以长时间处于休眠状态，而不需要专门维护，再开工十分方便。

When a plant suffers from low output or stops production, the anaerobic bacteria may hibernate for quite a long time. It is not necessary for special maintenance, and re-start of operation is very easy.

- 耐冲击负荷能力强，不需设大容积的调节池。

Strong resistance to impact load; it is not necessary to build up a big-capacity control pond.

- 无泡沫、污泥膨胀问题，维修费用可以忽略。

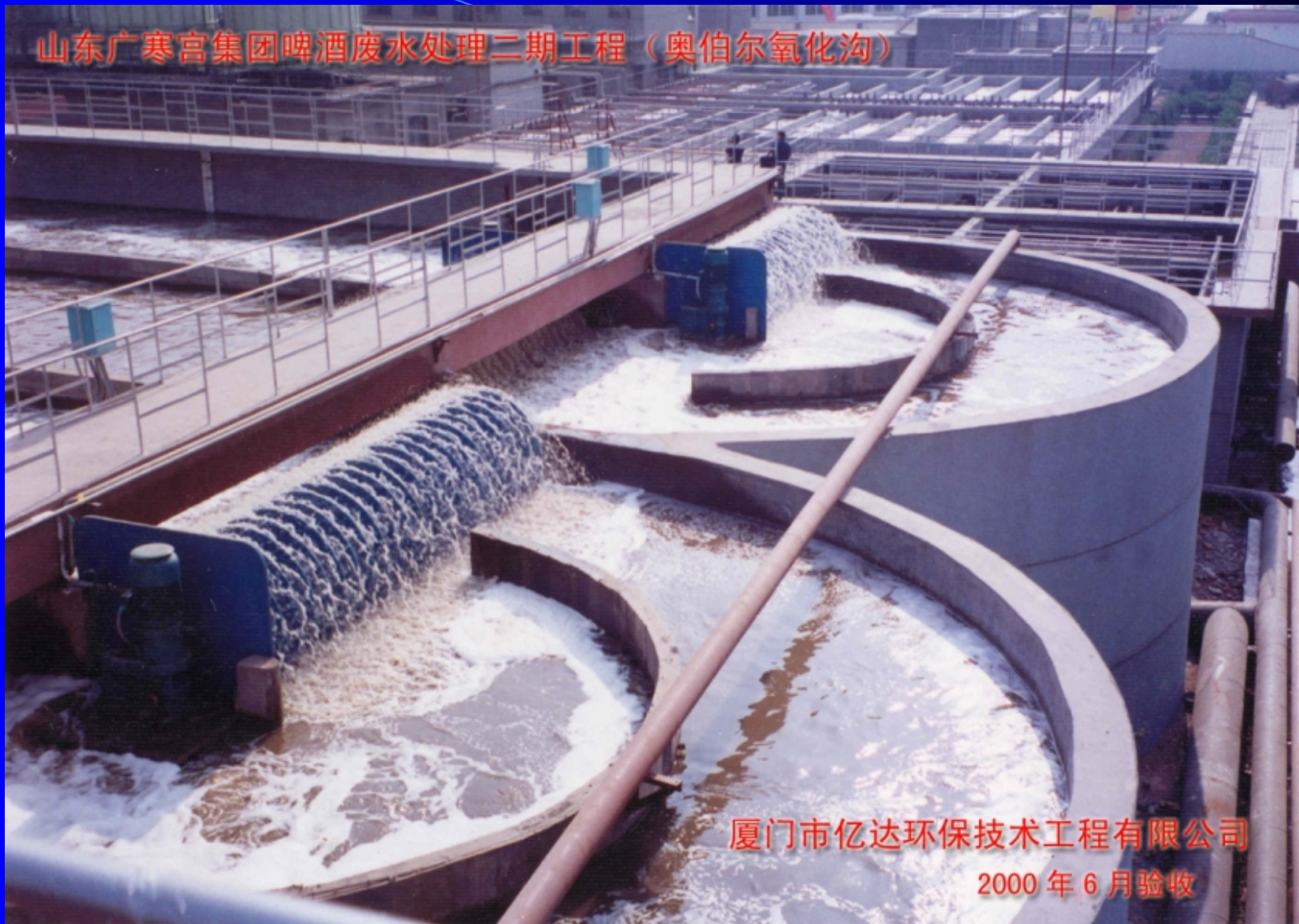
Free from such problems as foam and sludge expansion; maintenance cost can be ignored.

山东广寒宫集团有限公司啤酒废水处理工程

Shandong Guanghangong Group Brewery Process Wastewater Treatment

- 我司设计建造的国内最大的单体UASB (10,000m³)
This project is the biggest single-unit UASB designed by our company(10,000m³)
- 已连续稳定运行四年。
The system has been running stably for more than three years.

山东广寒宫集团啤酒废水处理二期工程（奥伯尔氧化沟）



厦门市亿达环保技术工程有限公司

2000年6月验收

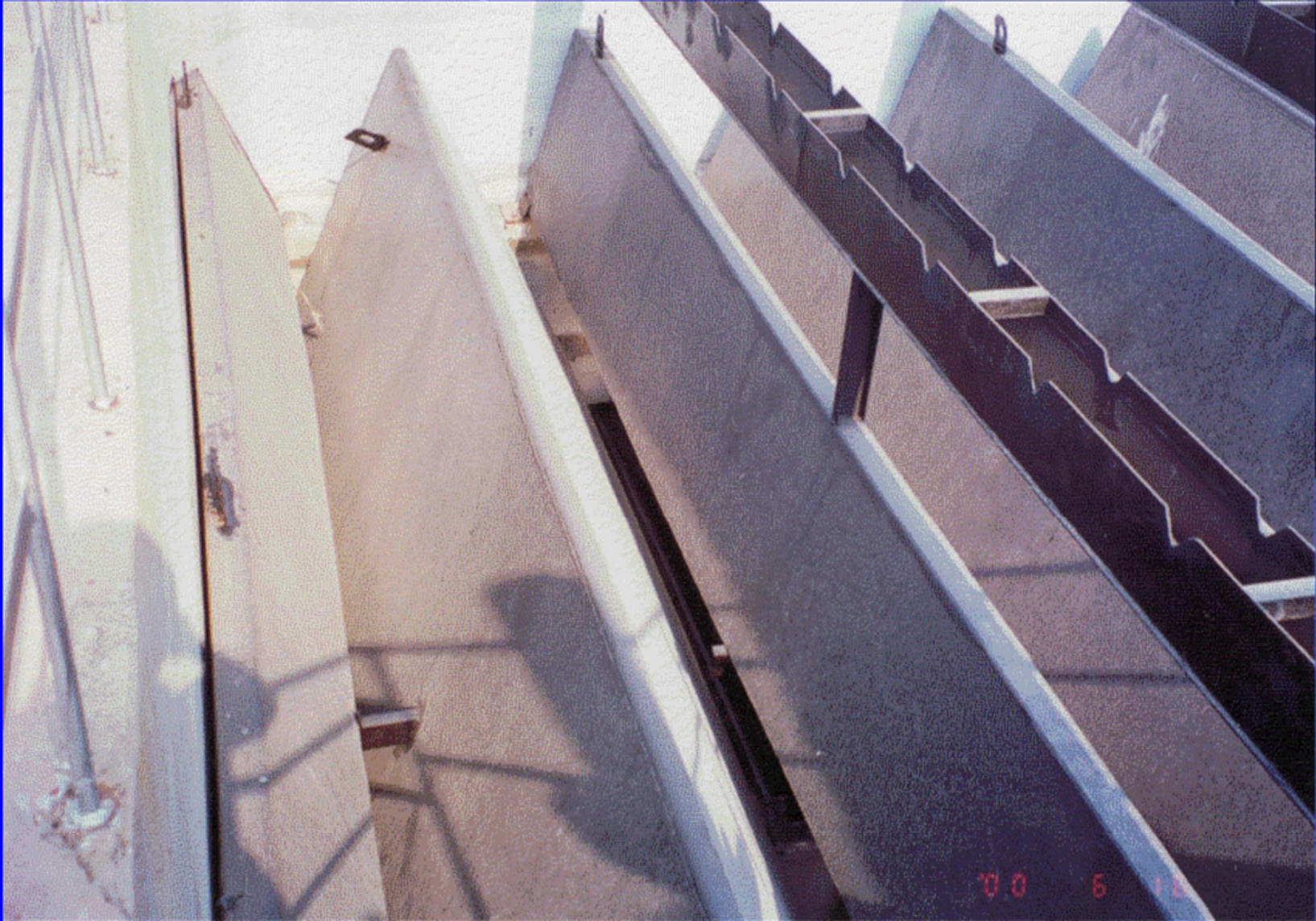
山东广寒宫集团啤酒废水处理一期工程 (A/O)



厦门市亿达环保技术工程有限公司

1998年6月验收





结论

Conclusion

- 我们拥有各类工业废水和城市生活污水处理经验。