

水泥窑协同处置废弃物

WASTE CO-PROCESSING IN CEMENT KILN



主要技术优势

Main technical advantages

- 燃烧温度高，物料在燃烧区停留时间长，有机物分解彻底；
- 回转窑热容量大，工作状态稳定，处理污泥的能力大；
- 水泥窑的碱性环境抑制酸性气体的排放；
- 水泥熟料对重金属固化效果好，重金属稳定化程度高，对污泥的适应性强；
- 无机矿化利用，有机质替代燃料，资源化利用程度高；
- 水泥窑系统有废热资源可供利用；
- 总体投资少、运行费用低、二次污染少，处理彻底。
- High combustion temperature, long retention time and complete decomposition of organics;
- Large heat volume, stable working condition, strong capacity of sludge treatment;
- Alkali environment prohibiting acid gas emission;
- Clinker good for solidation of heavy metal, high stability of heavy metal and wide adaptability to sludge;
- Utilization of inorganic mineral, substitute of organic fuel, high resource utilization;
- Heat recovery of cement kiln;
- Low total investment and operation cost, low secondary pollution.

1 研究、应用历程

HISTORY OF RESEARCH AND APPLICATION

中材国际工程股份公司天津分公司从上个世纪九十年代投入大量资金进行水泥窑协同处置废弃物技术及装备开发研究，目前有大量成熟技术投入工程应用，为使用企业创造了很好的经济效益与社会效益。

- 1) 检测全国多个地区污泥、生活垃圾、工业废弃物物理、化学特性，建立了废弃物物性数据库，为确立适宜的技术方案奠定了基础。
- 2) 开展了废弃物处置半工业试验、工业试验。
- 3) 承担了北京水泥厂年处理10万吨废弃物示范工程的研发设计，提供了适应废弃物处置烧成装备。对预处理中心、烧成系统进行了生产调试服务。
北京水泥厂处置500t/d污泥工程开发设计、进行了生产调试服务。
- 4) 承担了广州越堡水泥厂处置600t/d污泥处置工程开发设计,并进行生产调试及测试工作。
目前正在做上海、湖北、河南的污泥处理项目。
- 5) 为河北廊坊等地提供焚烧颗粒状工业废料回转窑及系统。
- 6) 武汉生活垃圾处理项目设计供货垃圾焚烧系统设备，运行状况良好。
生活垃圾筛上物的破碎、焚烧、资源化利用。
- 7) 提供污染土的焚烧，原位或异地解毒处理技术装备。

Since 1990s, Sinoma International Engineering (Tianjin) Co., Ltd has put a great deal of efforts and finance to develop technology and equipment of waste co-processing in cement kiln. Presently, it obtains a lot of mature technology for industrial application, and and creates good economic and social benefit.

- 1) Sinoma Tianjin inspects physical and chemical properties of sludge, living waste, and industrial waste of different regions of China, and sets up waste database, providing solid foundation for determination of proper waste disposal program.
- 2) Sinoma Tianjin conducts semi-industrial test and industrial test to waste.
- 3) Sinoma Tianjin undertakes the engineering design of Beijing Cement Co., Ltd Waste Disposal Showcase Project (100,000t/y), provides equipment of burning system, and completes commissioning of pretreatment and burning system. Besides, it undertakes engineering design and commissioning of Beijing Cement Co., Ltd Sludge Disposal Project (500t/d).
- 4) Sinoma Tianjin undertakes engineering design and commissioning of Guangzhou Heidelberg Cement Co., Ltd Sludge Treatment Project (600t/d). Presently, it undertakes sludge treatment projects in Shanghai, Hubei and He'nan.
- 5) Sinoma Tianjin provides rotary kiln system of particle waste combustion for Heibeilangfang
- 6) Sinoma Tianjin provides waste combustion equipments in Wuhan and it is in good operation condition. Crushing, combustion and resources utilization of oversized material of living waste.
- 7) Sinoma Tianjin provides technology and equipment of pollutant earth combustion and detoxication treatment.

2 水泥窑协同处置技术优势

ADVANTAGES OF WASTE CO-PROCESSING IN CEMENT KILN

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3 可处置的废弃物

DISPOSAL WASTE

水泥窑热容量大、包容性强的特点，可以处理多种工业废弃物、生活垃圾衍生燃料、农业废弃物以及危险废弃物。

Cement kiln is of high heat volume and wide adaptability, and able to dispose different types of industrial waste, living waste derived fuel, agriculture waste and hazardous waste.



电镀污泥 Electroplating sludge

废油漆 waste paint

废液 waste liquid

废树脂 waste resin



印染污泥 Paint sludge

RDF

秸秆 straw waste

废轮胎 tyre

4 不同类型废弃物的处置方式

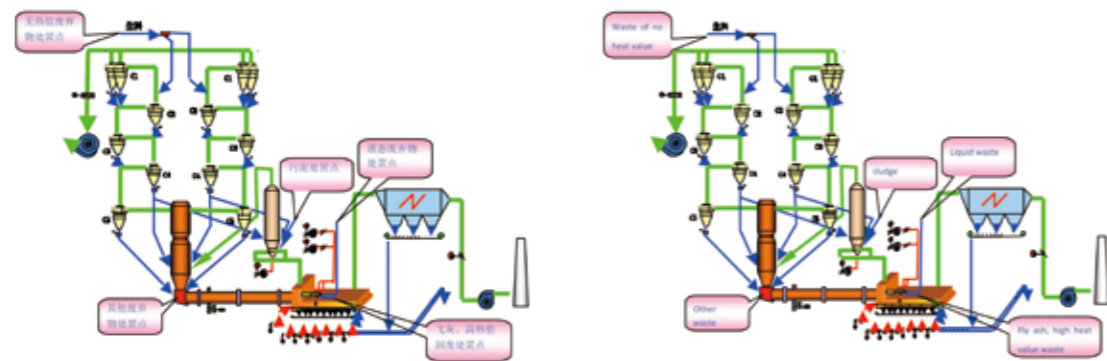
WAYS OF DISPOSAL FOR DIFFERENT TYPES OF WASTE

对于不同种类、性质的废弃物(形态: 固体、液体、半固体, 成份: 不同有害物含量, 有无热值等), 采取不同的预处理方式和入窑位置, 然后以替代燃料和或替代原料的方式在水泥窑中协同处置。

For different type and property of waste (solid, liquid, semi-solid; containing different hazardous matter, with or without heat value), it will take different pretreatment means and feed in different position of kiln, and will be regarded as alternative fuel or raw material to be disposed in cement kiln.

废物类型	垃圾飞灰(固态)	炉渣(固态)	工业污泥(半固态)	废白土(固态)	液态废弃物(液态)	破碎的固体废弃物(固态)
特殊性	高R ₂ O、高Cl ⁻ 、重金属	高Cl ⁻ , 较高SiO ₂	水分和粘性	10%左右的油分, 苯系物, 较高SiO ₂	HCl、HF以及碱的影响	种类较广
处理方式	从窑头喷入	原料调配仓进入	调配进流态化装置或窑尾	窑尾或流态化装置喷入	从窑头燃烧器喷入	高热值进窑头, 高、中热值入流态化装置
利用方式	替代原料	替代原料	替代原料	替代原料	高热值的作为替代燃料	较高热值的作为替代燃料

Type	Waste Combustion Ash(soild)	Finance Slag (soild)	Industrial sludge (semi- soild)	Spent Bleaching Earth (soild)	Liquid Waste (liquid)	Crushed Solid Waste (soild)
Characteristics	High R ₂ O, high Cl ⁻ , heavy metal	High Cl ⁻ , Higher SiO ₂	Moisture and stickness	10% oil, Benzene series, Higher SiO ₂	HCl, HF and alkali impact	various
Means of Disposal	From cooler	From raw mix bin	From fluidized bed or preheater	From fluidized bed or preheater	From kiln burner	High heat value from cooler, high&medium heat value from fluidized bed
Used as	Alternative raw material	Alternative raw material	Alternative raw material	Alternative raw material	High heat value as alternative fuel	High heat value as alternative fuel



不同类型废弃物入窑处置点示意
Diagram of Waste Input Position

5 废弃物预处理技术

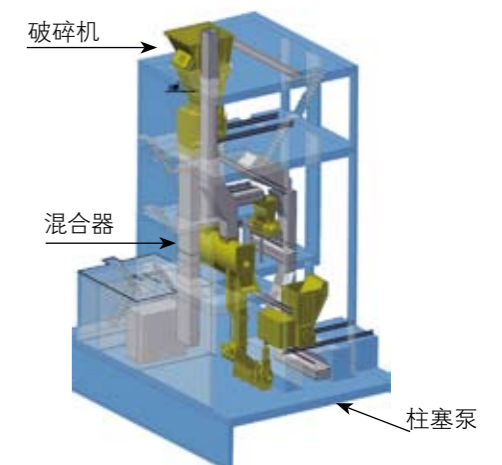
PRETREATMENT OF WASTE

1、半固体系统

适用于高水分、高粘度、高含固率等有毒有害废弃物或少量污泥类废弃物的快速处置。现有的工艺成套技术装备可满足0.3~3万吨/年的处置要求。

a) SEMI-SOLID TREATMENT

Appropriate for rapid treatment of high moisture, high stickness, high solid content hazardous waste or a small amount of sludge; existing process and equipment reaching disposal capacity of 3,000~30,000t/y

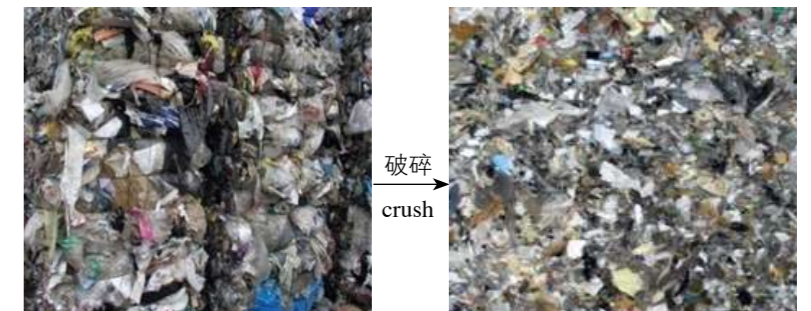


2、替代燃料制备系统

可将可燃工业废弃物和生活垃圾筛上物等含热值且水分较低的废弃物作为替代燃料利用。现有成套工艺技术装备可满足0.5~5万吨/年的处置要求。

b) ALTERNATIVE FUEL TREATMENT

Appropriate for using RDF from low moisture combustible industrial waste and oversized living waste as alternative fuel; existing process and equipment reaching disposal capacity of 5,000~50,000t/y

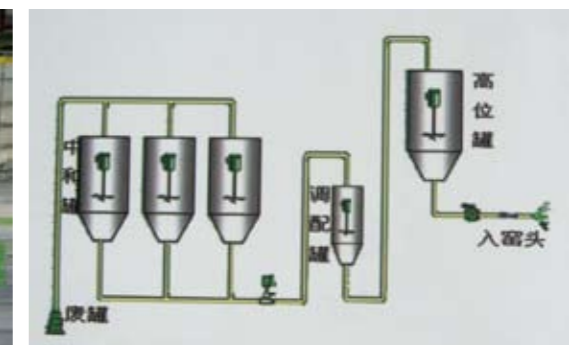


3、废液处理系统

可将废酸液、废碱液、有机溶剂、矿物油等预处理后, 在水泥窑高温富氧区处置。现有的成套工艺技术装备的处置能力可达2万吨/年。

c) WASTE LIQUID TREATMENT

Appropriate for pretreatment of waste acid, waste alkali, waste organic solution and waste mineral oil and disposed in high oxygen contained high temperature zone of cement kiln; existing process and equipment reaching disposal capacity of 20,000t/y



4、焚烧残渣处理系统

可将生活垃圾焚烧残渣替代水泥生产的硅质、铝质原料进行使用。现有的成套工艺技术装备的处置能力可达4万吨/年。

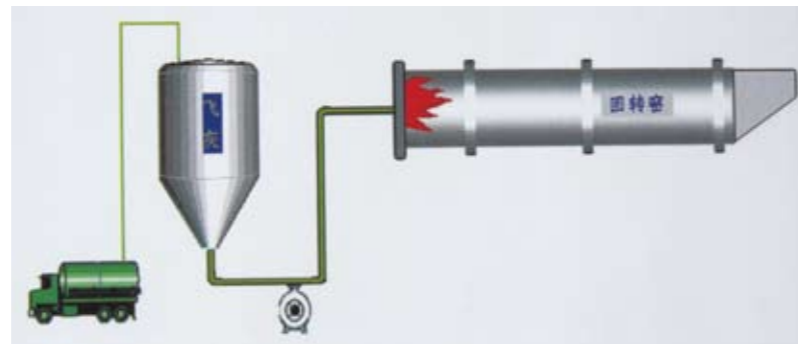


d) COMBUSTION RESIDUE TREATMENT

Appropriate for using combustion residue as alternative silica and alumina raw material; existing process and equipment reaching disposal capacity of 40,000t/y

5、飞灰处理系统

把危害性极强的飞灰通过窑头多通道燃烧器喷入窑内焚烧，彻底消除其危害，实现飞灰在水泥窑规模化、终端处置。



e) COMBUSTION FLY ASH TREATMENT

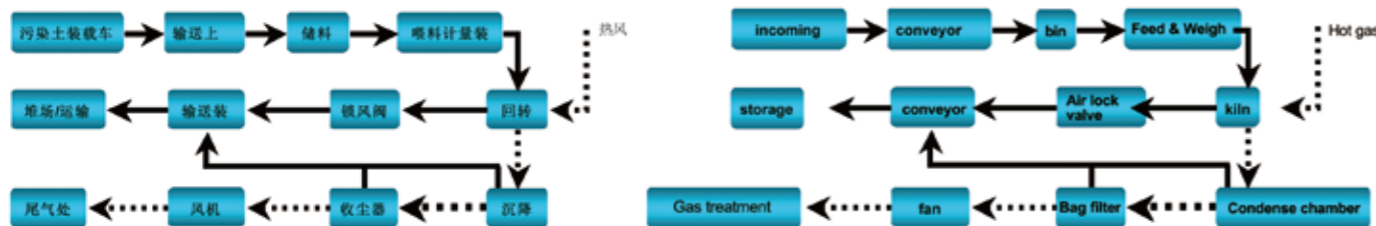
Appropriate for injecting hazardous combustion fly ash to kiln burner to completely eliminate its danger and realizing final disposal in cement kiln

6、污染土解毒修复

采用热解吸的方式处理污染土，将被挥发性有机物污染的土壤加热到 150°C~320°C(低温热解吸) 或者 320°C~540°C(高温热解吸)，通过控制停留时间选择性的将污染物挥发出来。通过载气或者真空系统将挥发出来水和有机物带到蒸汽处理系统。

f) DETOXIFICATION OF POLLUTANT EARTH

Appropriate for detoxification of pollutant earth by means of thermal desorption, that it to heat up volatile organic pollutant earth to 150°C~320°C(low temperature thermal desorption) or 320°C~540°C(high temperature thermal desorption), in order to volatilize of pollutant matters by controlling retention time, and finally by means of carrier gas or vacuum to bring water and organics to steam treatment system.



6 工程实例

REFERENCE

1、北京金隅集团城市工业废弃物综合处置示范线
处置能力10万吨/年；2002年10月投入运行

Beijing Jinyu Group City & Industrial Waste Treatment Project
Capacity: 100,000/y. Operated in Oct. 2002



抓斗 v-grab

破碎机 crusher

混合器 mixer



柱塞泵 Piston pump

浆渣入窑处置点
Sludge input

废液均质混合
Waste liquid mixing

高热值废物窑头喷入
High heat value from cooler

2、贵州三岔拉基替代衍生燃料（RDF）处置项目
处置能力220吨/天

Lafarge Sancha
Alternative Fuel
(RDF) Disposal
Project
Capacity: 220t/d



收储破碎系统 Storage & Crushing

入窑处置系统 Piston pump

输送转运 transportation

喂料系统 Feeding



NEW DRY PROCESS
ON 8000t/d NEW D
T PRODCUTION 80
GY OF CEMENT PRO

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