

Waste Management Technology

Off gases and waste treatment in general is an important part of the design and operation of the petrochemical, chemical or pharmaceutical production facilities. Raschka Engineering's innovative process know-how led to a number of successfully delivered capital projects. Especially for environmental technology, Raschka Engineering Ltd has entered into cooperation and licensing agreements with some leading companies.

Waste liquid incineration technology from **Combustion Solutions**, Austria

High technology ventilation solutions for explosive and toxic gases from **MEIDINGER**, Switzerland

Heat recovery solutions from **WEHRLE WERK**, Germany

Flame arrester technology from **PROTEGO**®, Germany

Catalytic off gas treatment from **CATALYST CENTRAL**, Huston USA

Raschka Engineering technology management including:

- System integration and overall project management
- Technology transfer
- Localized manufacturing with minimum import
- Compliance with Chinese regulation
- Design and implementation of control system
- Installation management and quality Control
- Commissioning and after sales service

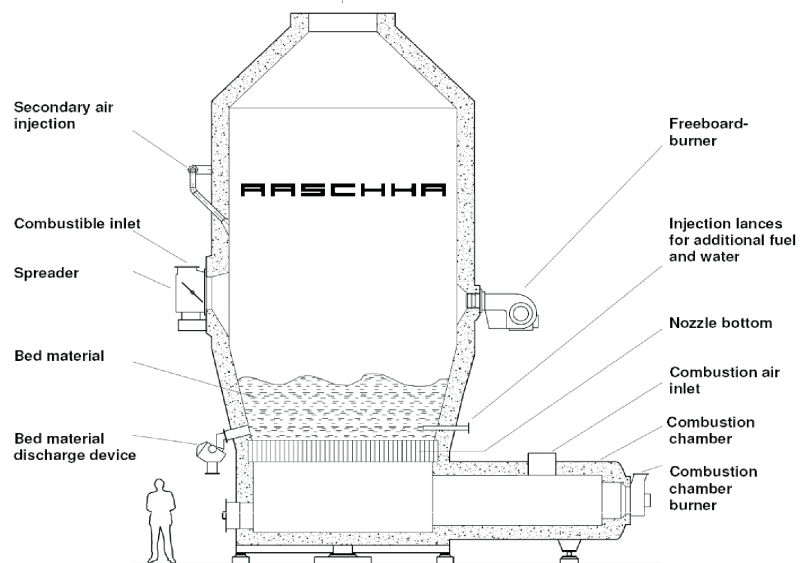


Raschka - Fluidized Bed Incineration Technology

RASCHKA

Application:

- Biomass, waste wood, bark, secondary fuel
- Ballast coal, low quality coal, pyrolysis coke, coal sludge
- Residuals from paper, cellulose and chemical industry
- Sewage sludge, waste sludge from industry and refineries
- Domestic waste, waste from slaughter houses, carcasses
- Pyritiferous ore



Project Reference –extracts

81	FORMOSA PLASTIC CORPORATION TAIPEI (TW) (Start 2013, work in progress)	Basic- and detail engineering and supply of special parts for a fluidized bed incineration plant Throughput: 1.9 t/h of industrial sludge and fibres (25-30% DM)
80	CHIFENG DERUN DRAINAGE Co., Ltd. INNER MONGOLIA (CN) (Start 2013, work in progress)	Engineering and delivery of entire plant (EPC contract) for communal sludge dewatering, pre-drying, RASCHKA fluidized bed incinerator, heat recovery and flue gas treatment Throughput: 90 t/h with maximum DM concentration of 2%
79	STADT KARLSRUHE KARLSUHE (DE) (Start 2012, work in progress)	Engineering and delivery of RASCHKA special parts for the retrofit of the fluidized bed incineration plant #2
78	TONGLIAO MEIHUA BIO-TECH Co., Ltd TONGLIAO (CN) (2011)	Engineering, supply, erection and commissioning of a fluidized bed multi waste incineration plant for the incineration of sludge from waste water treatment plant, waste coal and waste liquid Waste incineration capacity: sludge 3'125 kg/h (25% DM) – 14'000 kg/h (32% DM), waste coal 2'700 kg/h – zero, waste liquid 8'330 kg/h - zero
77	CONSORCIO D. AGUAS BILBAO BIZKAIA BILBAO (ES) (2009)	Engineering/consulting: inspection of the waste heat steam boiler of the fluidized bed incineration plant (Plant #2, s.b.)
76	EMSCHERGENOSSENSCHAFT ESSEN (DE) (2009)	Engineering, delivery and mounting of the modifications of the pre-boilers of the fluidized bed incineration plants (Plants # 1 and 2, s.b.)
75	EMSCHERGENOSSENSCHAFT ESSEN (DE) (2009)	Engineering: Lay-out, design and schedule elaboration for the modifications of the pre-boilers of the fluidized bed incineration plants (Plants # 1 and 2, s.b.)
74	SMS CZ S.R.O. ROKYCANY (CZ) (2008)	Basic- and detail engineering and supply of special parts for a fluidized bed incinerator Throughput: 1.2 t/h of sewage sludge and screenings (23-30% DM)
49	INNOVATHERM GMBH LÜNEN (DE) (1997)	Approval planning, engineering, supply, erection and commissioning of the fluidized bed incinerators, two sludge hoppers and feeding system and ash cooling and transportation for a sewage sludge incineration plant, Throughput: 31 t/h of coal-conditioned sewage sludge corresponding to a TC of 37 MW
48	STADT BONN BONN (DE) (1994)	Engineering, supply, erection, commissioning of retrofit measures in order to minimize the emissions of the fluidized bed incineration plant (s.b.)
47	TREM GMBH BOTTROP (DE) (1994)	Engineering (determination of basic data and preliminary design for construction and reconditioning works with respect to the erection of a steam boiler and flue gas cleaning system in the drying plant (s.b.)
46	ISAR AMPERWERKE AG MÜNCHEN (DE) (1993)	Engineering: project study for a sewage sludge fluidized bed incineration plant Throughput: 2 t/h of sewage sludge (referring to DM)
45	LANDESHAUPTSTADT MÜNCHEN MÜNCHEN (DE) (1997)	Approval planning, engineering, supply, erection and commissioning of two fluidized bed incinerators for the sewage sludge incineration plant, Throughput: each 3 t/h of sewage sludge (referring to DM)
44	LANDESHAUPTSTADT STUTTGART STUTTGART (DE) (1992)	Engineering, supply, erection, commissioning of the fluidized bed incinerator, waste heat steam boiler and electrical and process measuring and control system for the fluidized bed incineration plant (Plant #2, s.b.) Throughput: 18.2 t/h of sewage sludge (22% DM) and 1.0 t/h of residues of WWTC (15% DM)
43	EMSCHERGENOSSENSCHAFT ESSEN (DE) (1991)	Engineering: planning of a two-line waste water treatment plant for separating heavy metals from the scrubbing waters from the scrubbing systems, required for the two fluidized bed incineration plants (Plants # 1 and 2, s.b.)
42	CELLULOSEFABRIK ATTISHOLZ RIEDHOLZ (CH) (1991)	Engineering, supply and erection of a pre-boiler for the fluidized bed incineration plant (s.b.) in order to increase the steam production from 8 t/h to 12 t/h

Combustion Solutions



CS Combustion Solutions is a team of senior specialists dedicated to dependability and innovation in the field of combustion technology.

CS is a member of the UNITHERM -CEMCON Group, which is successfully constructing burners, kilns and furnaces since its founding in 1946. CS can rely on UNITHERM's resources and experience in boiler and rotary kiln burner construction.

The CS Combustion solutions team has over 20 years of experience in engineering, supplying and commissioning of vertical and horizontal burners and combustors for:

- Sulphur, spent acid and acid gas
- Waste gas and waste air
- Waste water
- Hazardous and special waste liquids
- Pasty waste fluids



Products:

■ Burners

CS Combustion Solutions engineers and supplies burners for special applications with performance range between 1 and 90MW.

Field of application:

- Industrial boilers
- Rotary kilns
- Fluidized beds
- Combustors, Static incinerators
- Furnaces
- O₂-applications

■ Combustors

CS Combustion Solutions is your expert for the thermal oxidation of liquids, gases and powdered solids derived from byproducts in the refinery, petro-chemical, chemical & pharmaceutical industries.

Field of application:

- Sulfuric acid production
- SO₂-production
- Spent acid regeneration
- Thermal disposal of waste gases
- Thermal disposal of hazardous waste liquids
- Waste water disposal

■ Injection Systems

■ Sludge Lance





Largest zone 0 fan program developer and producer worldwide.

The company was founded in 1900 and since 1992 it has worked intensively with the conveyance of explosive gases and dusts and developed the first generation of zone 0 fans. In 1996 Meidinger AG won the Basel Innovation Prize for their zone 0 equipment. Henceforth, the third generation of exhaust fans has been placed in service. These ventilators are designed to comply with the most recent ATEX directives. Meidinger is one of only a few manufacturers which are licensed to build zone 0 fans.

Application:

- Pharmaceutical and chemical industries Drain of solvents generate often zone 0 gas mixtures. To avoid costly inertisation or continuous monitoring of concentration levels these fans are certified to run safe with permanent ignitable gases. Without inertisation gas the equipment also is more compact due to the smaller volume flow.
- Tank facilities
the conveyance of gasoline or kerosene vapours of zone 0 for recovering solvents (VRS), for combustion, or filtration through activated charcoal filters
- Energy technology
cooling fans for gas turbines, drain of hydrogen leakage gases
- Environmental technology
conveyance and pressurisation of natural gas
- Process technology
design according to PED (Pressure Equipment Directive)
- Food and nutrition industry



Products:

Different designs are available for different tasks

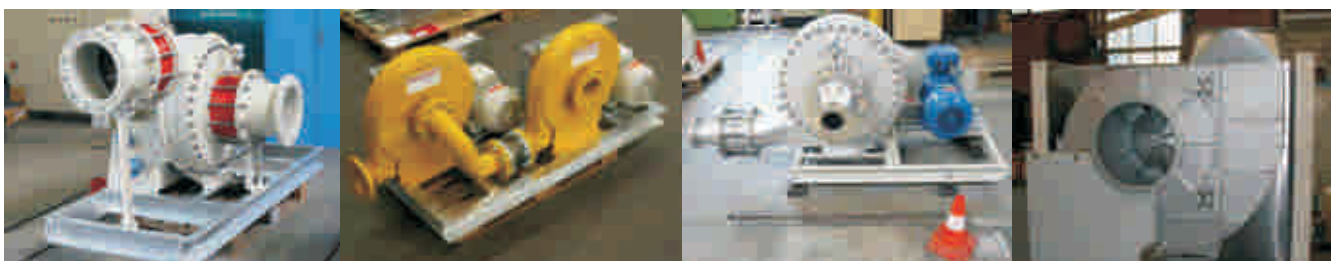
- centrifugal fans
- axial fans

Adapted to the special performance requirements, MEIDINGER supplies a wide range of different fan designs. Customer specific design possible, following national and international regulation. All essential performance data of the fans are stored in MEIDINGER's design program enabling accurate and fast response to customer inquiries.



Benefits of MEIDINGER fans:

- comprehensive drive variants
- the complete model range for optimal design
- wide selection of materials (casting, steel, stainless steel, nickel-alloy, titanium...) and coatings
- high efficiency due to optimized blade design
- high-quality, durable construction





Established in 1860.

Experience in plant construction and process equipment manufacturing in the field of energy and environmental technology.

- Combined Heat-and-power stations
- Thermal treatment of household waste and special waste
- Energy recovery from biomass
- Waste heat recovery (waste heat boiler)
- Plants for the treatment of waste water
- Plants for the mechanical-biological treatment of solid waste

The characteristics of plants:

- High efficiency
- Recognized combustion technologies
- Low emissions
- Long service life
- Flexible construction allowing the use of various raw materials and the production of variable electrical and thermal energy
- Speedy planning and construction using modular components
- Controlled combustion air-preheating
- Flue gas cleaning meeting national and international standards



References in Europe

(some examples out of more than 150):

MVA/KVA :

- KVA Fribourg
Waste incinerating plant 47 t/h
Max .allowable overpressure :70 bar
Superheated steam temperature :405°C
- Renova , Göteborg
Waste incinerating plant 54.8 t/h
Max .allowable overpressure: 56 bar
Superheated steam temperature :400°C
- Satom , Monthey
Waste incinerating plant 44 t/h
Max .allowable overpressure:66 bar
Superheated steam temperature :410°C

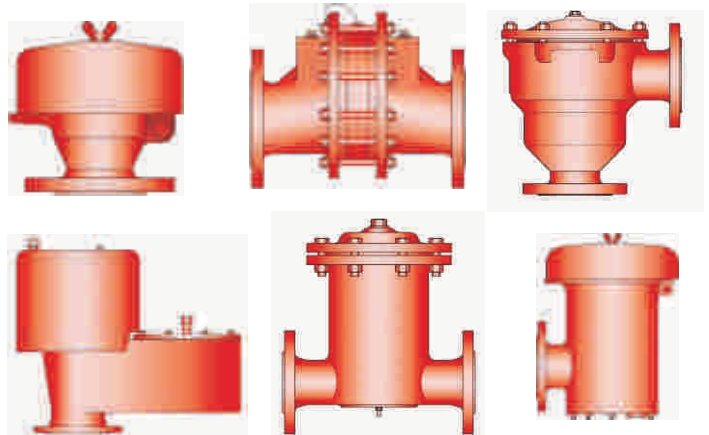
Biomass :

- Glunz AG , Hamm for plant Eiweiler Pre-boiler with grate and sprinkling stoker firing for coarse wood chips 17 MW
Max .allowable overpressure : 80 bar
- Helbra
Radiation boiler with grate and sprinkling stoker firing for wood 31.5t/h
Max allowable overpressure :52 bar
Superheated steam temperature :420°C
- Mannheim
Biomass heat-and-power station 78.8 t/h
Max .allowable overpressure :64 bar
Superheated steam temperature :450°C
- international standards



More than 50 years of experience;
Development and production of flame arresters, valves and tank accessories for industrial process engineering;
Its internationally registered trademarks PROTEGO®, FLAMEFILTER® and FLAMMENFILTER® have become a synonym for quality and functionality and process safety;
Product quality is assured according to international standards.

- DIN ISO 9001/2000
- DIN ISO 14001



The international testing and approval institutions have issued over 5000 product-approvals. The approvals are from:

- | | |
|---|---|
| <ul style="list-style-type: none"> ■ ATEX ■ DIN-ISO 14001 ■ DIN-ISO 9001-2000 ■ PED A1 ■ PED H H1 ■ WHG 19 I ■ AD2000-Merkblatt HP0 in connection with DIN EN 729-2 ■ GOST ■ RTN | <ol style="list-style-type: none"> ① In tank farms ② In processing plants for chemicals and pharmaceuticals ③ In vapour combustion units ④ In shipbuilding, offshore platforms and loading facilities ⑤ In vapor recovery systems ⑥ As components for blowers and machines ⑦ In biogas and landfill ⑧ In flare system |
|---|---|

Applications :



Catalyst Central



Catalyst Central serves both Academia and Industry well. Core Areas of Endeavor are:

- **Catalytic Consultants**

Whatever may be the issue of the day, knowing where to turn for responsive and reliable help is increasingly of value. Outsourcing of engineering expertise can help your company to be more productive. Providing expert assistance in catalyst selection, process development, process and reactor design, plant start-up, and troubleshooting: this is the domain of our Consulting division.

- **Catalytic Labs**

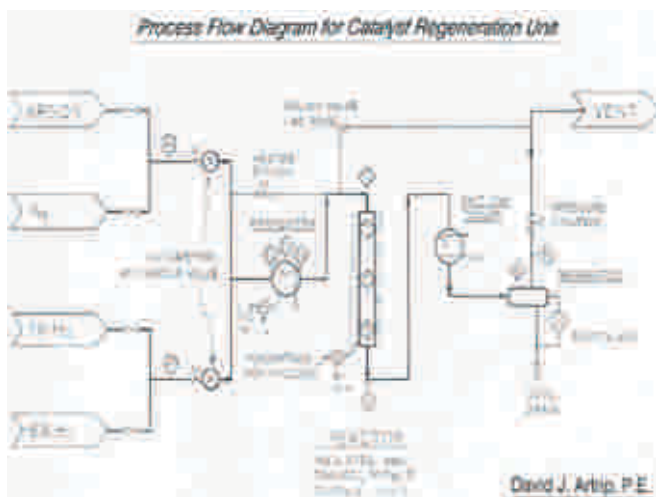
Whether challenged in process or catalyst development, catalyst selection, or a new project launch, there is often a need for laboratory work to help guide the project. Outsourcing such work to a capable and competitive lab can be a boon to one's budget! This is where Catalytic Labs comes in. We are well-equipped to handle fixed-bed testing for a wide range of catalysts and adsorbents, and would welcome an opportunity to work with you.

- **Reactor Systems**

For clients needing a new catalytic reactor, we can provide a complete turn-key package. Our scope can include not only the catalyst supply and reactor design but also the fabrication of the reactor vessel, the control scheme, and instrumentation. A smart system to mastermind your operation brings about the maximum return on investment!

- **Research Catalysts**

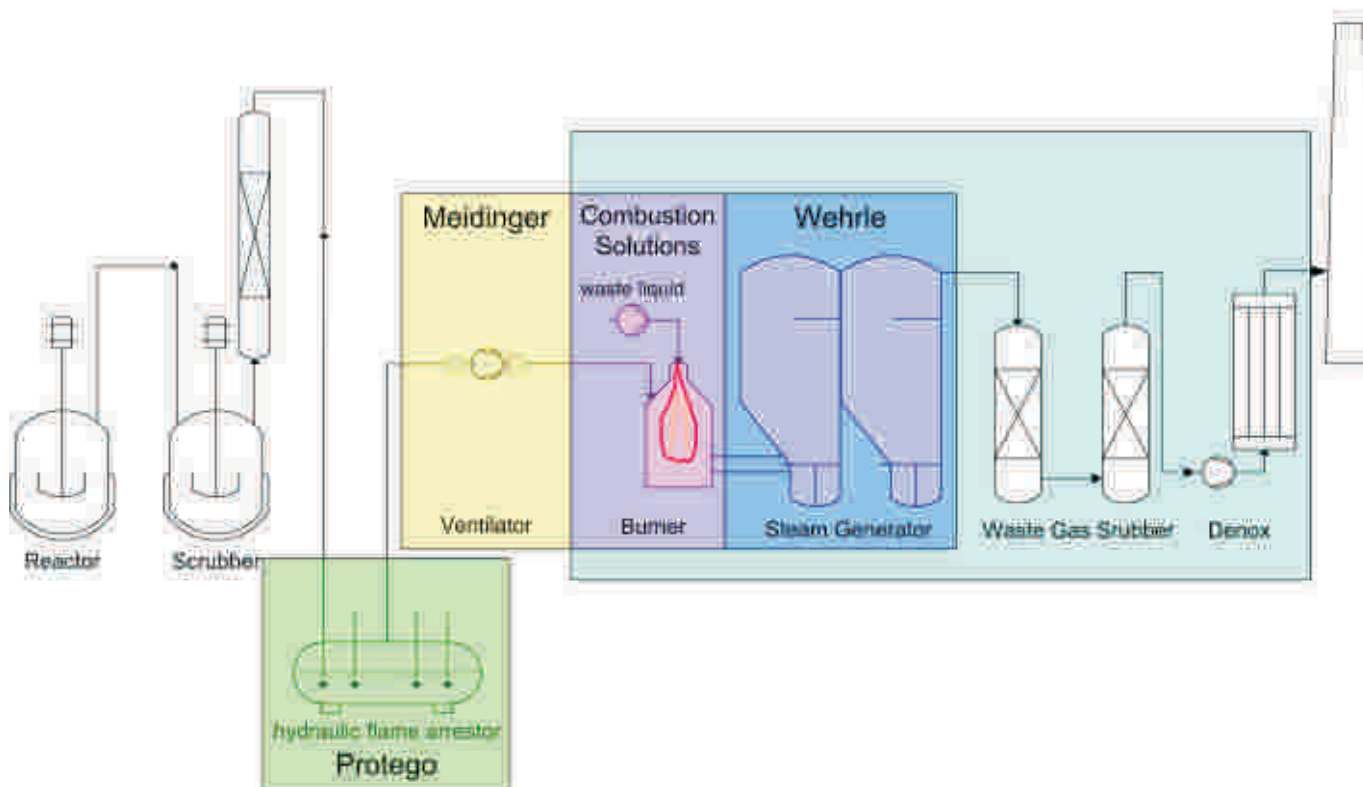
Research Catalysts, Inc. (RCI) specializes in quick delivery of catalysts and adsorbents for purification, in the precise quantities needed, and at reasonable prices. From our warehouses in Houston and Conroe, Texas we can deliver to anywhere in the world. The right quantity of the right product, at the right time and price!



Raschka Engineering

Raschka Engineering Ltd. has analyzed the typical waste gas amount and composition from a standard 10 to 16m³ API batch reactor system, with a product portfolio operated in other Lonza plants around the globe. With such data at hand a URS (user requirement specification) was written outlining the basic design values for the Lonza Nansha incineration plant.

- Proven design with know-how and competence supported by licensing partners
- More than 90% of the value is purchased locally
- Full compliance with Chinese regulations



Hydraulic flame arrestor with Raschka Engineering holding an exclusive manufacturing license for China market



Safety and control valve rig to feed various incineration nozzles/lances



Incineration chamber with access platform, including steam generator with integrated steam blower to clean heat transfer area during operation



Flue gas treatment with DeNOx unit and economizer

Lonza Nansha Plant, Guangzhou, China

An important part when designing and operating an active pharmaceutical ingredient batch plant is the treatment of all the off gas and waste solvent generated from it. Small and larger cGMP production campaigns for different products/processes are usually produced over time in an API production train. As a result there is a constant change of waste solvent which does not allow for an economically viable solvent recovery system not to mention the concern of potential cross contamination. Preferred solutions to handle fluctuating off gas and waste streams from such systems are incineration plants with integrated heat recovery and flue gas treatment.

Raschka Engineering has analyzed the typical off gas amount and composition from a standard 10 and 16m³ API batch reactor system, with a product portfolio operated in other Lonza plants around the globe. With such information at hand a URS (user requirement specification) was written containing the basic design values for Lonza Nansha plant:

- Waste water content in liquid incineration feed maximum 2'000 kg/h
- Nominal calorific value of residue 18'000 KJ/kg
- Maximum calorific value of residue 43'000 KJ/kg
- Nominal thermal capacity of the plant 7'200 KW



Lonza Switzerland Plant

Item	Capacity
Liquid	48'000 Ton/Year
Solid	2'000 Ton/Year
Waste Gas	10'100 Nm ³ /H
Waste Water	60 Ton/Day

In this context, Raschka Engineering's service could include:

- Conceptual design, URS, Basic design
- Environmental assessment report
- Cost estimation
- Detail design (equipment, piping, instrumentation, electrical, civil)
- Risk analysis
- Procurement, quality supervision
- Schedule and cost control
- Qualification, Documentation and maintenance manuals
- Operator training
- Maintenance and on call service

Pls. contact us for a quotation. An extensive service list is available on our website: <http://www.raschka-engineering.com>



Steam boiler after waste incinerator

Raschka Engineering Ltd

Raschka Engineering Ltd. Liestal, Switzerland (previously known as Lonza Engineering) now reflects the superior and well known Raschka FBI technology in its name together with its wholly owned subsidiary Raschka Engineering & Consulting Co., Ltd, China provides customer oriented services with a professional, experienced and highly motivated engineering team. We have 20 years of successful project management experience in China which makes us a perfect partner for the chemical, pharmaceutical and biopharmaceutical industry. A board range of services with a project reference list underlining our capabilities is available upon request.

Raschka Engineering has successfully managed multiple complex projects such as continuous operating plants for the production of food and feed additives as well as active pharmaceutical ingredient plants including waste gas and liquid waste treatment facilities

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