Raschka Engineering

Fluidized Bed Technology

Raschka Engineering -History-

Dipl.-Ing. Georg Raschka Ingenieurbüro GmbH & Co.KG
Founded in 1946 by Dipl.-Ing. Georg Raschka, Heidelberg, Germany
Acquired by Lonza Engineering AG in February 2011

Lonza Engineering AG
Used to be part of the engineering organization of Lonza Group Ltd
Registration as independent company in 2008 in Basel, Switzerland

Renamed as

Raschka Engineering AG
On April 8th, 2013 in Basel, Switzerland
Change of registered address: Liestal, Switzerland

Raschka Technology

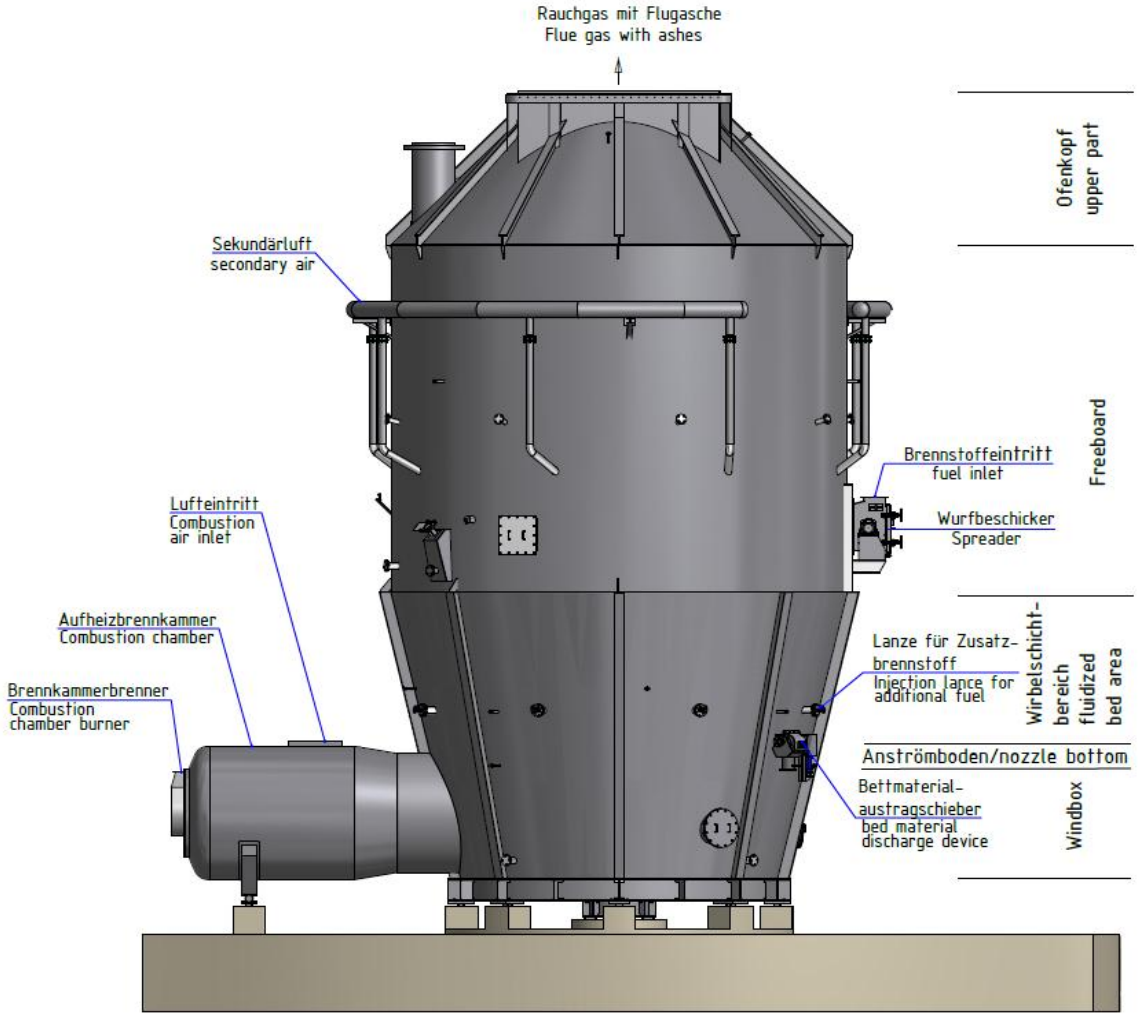
- More than 60 years of experience
- Planning and construction of fluidized bed incineration plants for
  - Environmentally friendly thermal waste disposal
  - Energy recovery and utilization
  - Energy generation
- Efficient disposal and utilization of liquid, pasty and solid materials
  - Municipal and industrial sewage sludge and waste
  - Waste from chemical, pulp and paper industry
  - Inferior and low grade coal
  - Industrial, refinery coal slurries and **contaminated soil**
  - Biomass, bark
  - Pyritiferous ore / pyrite roasting
- More than 100 references in Europe and Asia

The solution

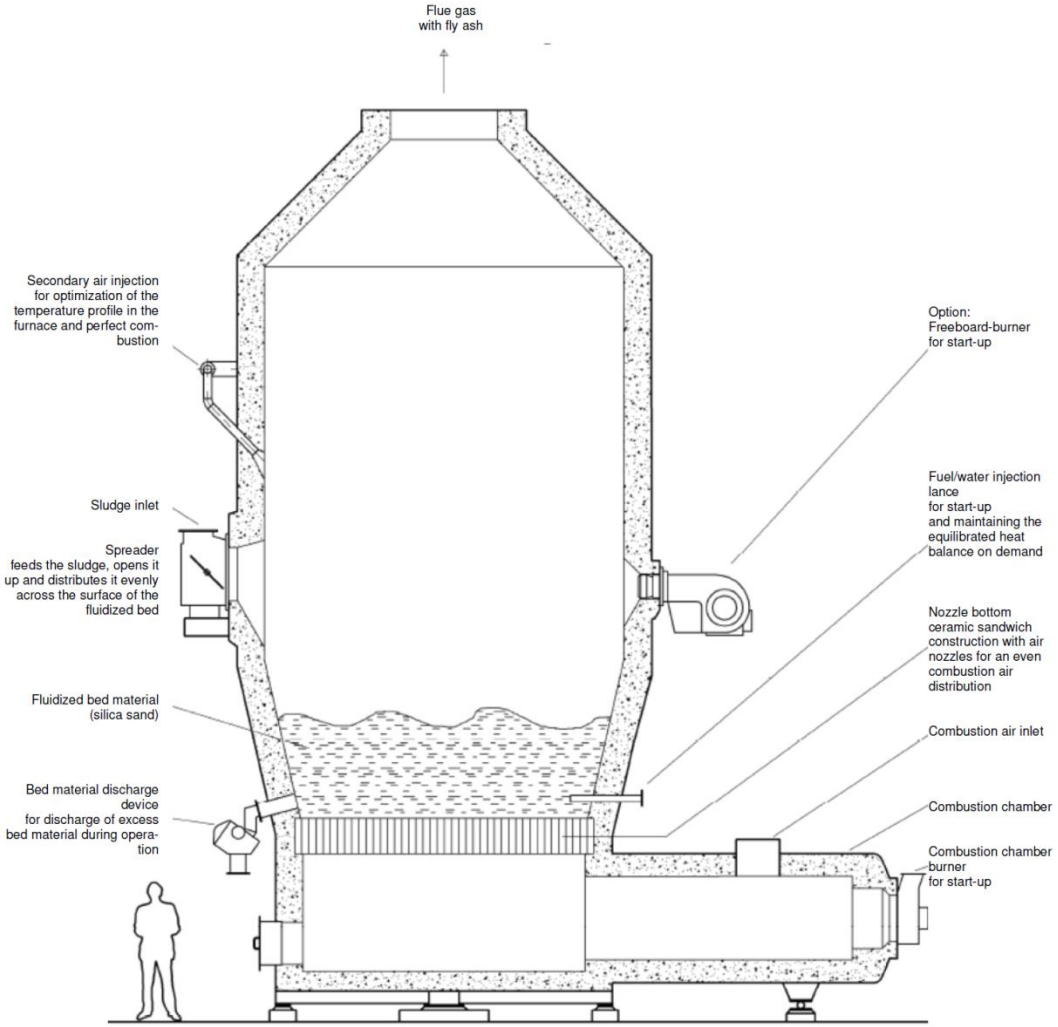
Thermal disposal and utilization of waste materials = Combustion in Raschka fluidized bed incineration plants

- evaporation and superheating of the moisture
- complete combustion of the organic substances/pollutants
- inorganic pollutants are glowed and discharged as concentrated residues of the flue gas cleaning
- environmentally friendly disposal
- energy recovery
- auto-thermal incineration process without additional fuel
- surplus energy utilization = power generation, heating …

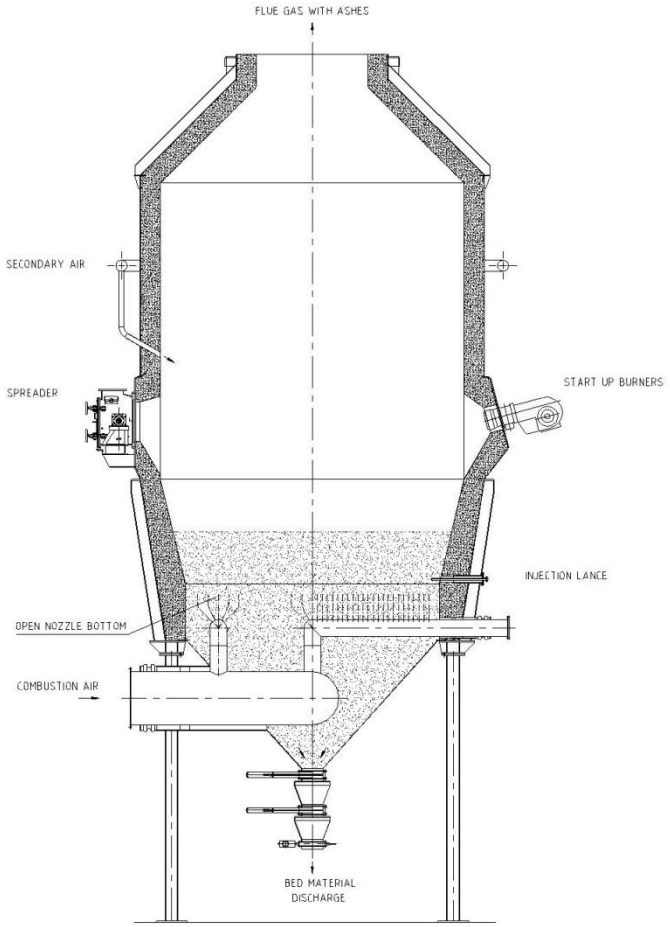
Core component: Raschka fluidized bed incinerator

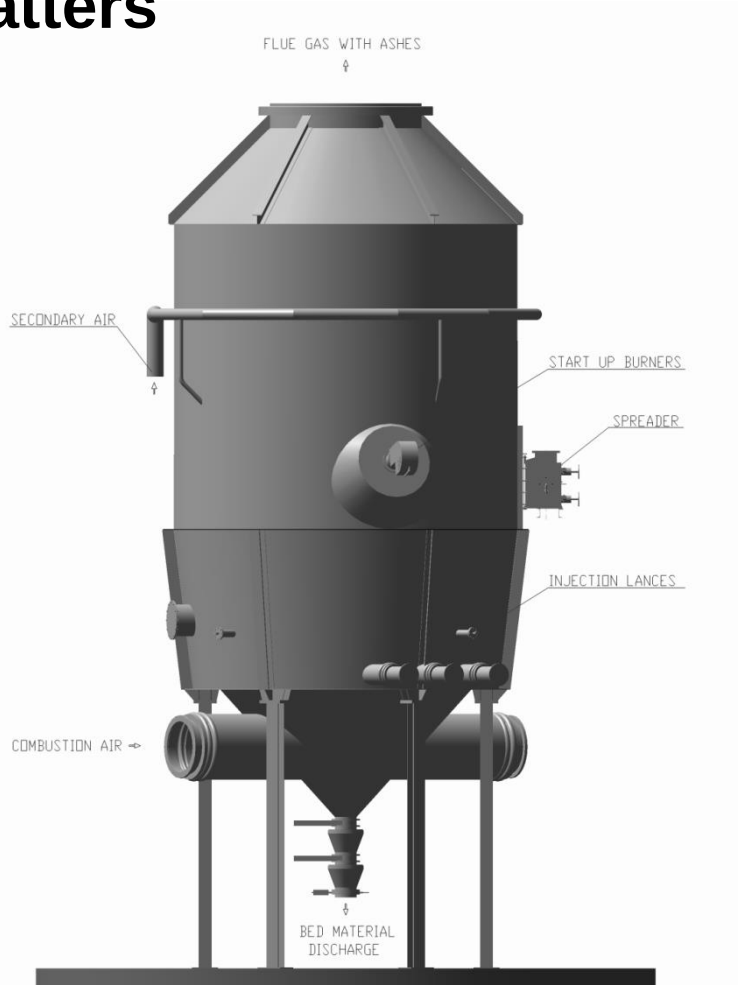


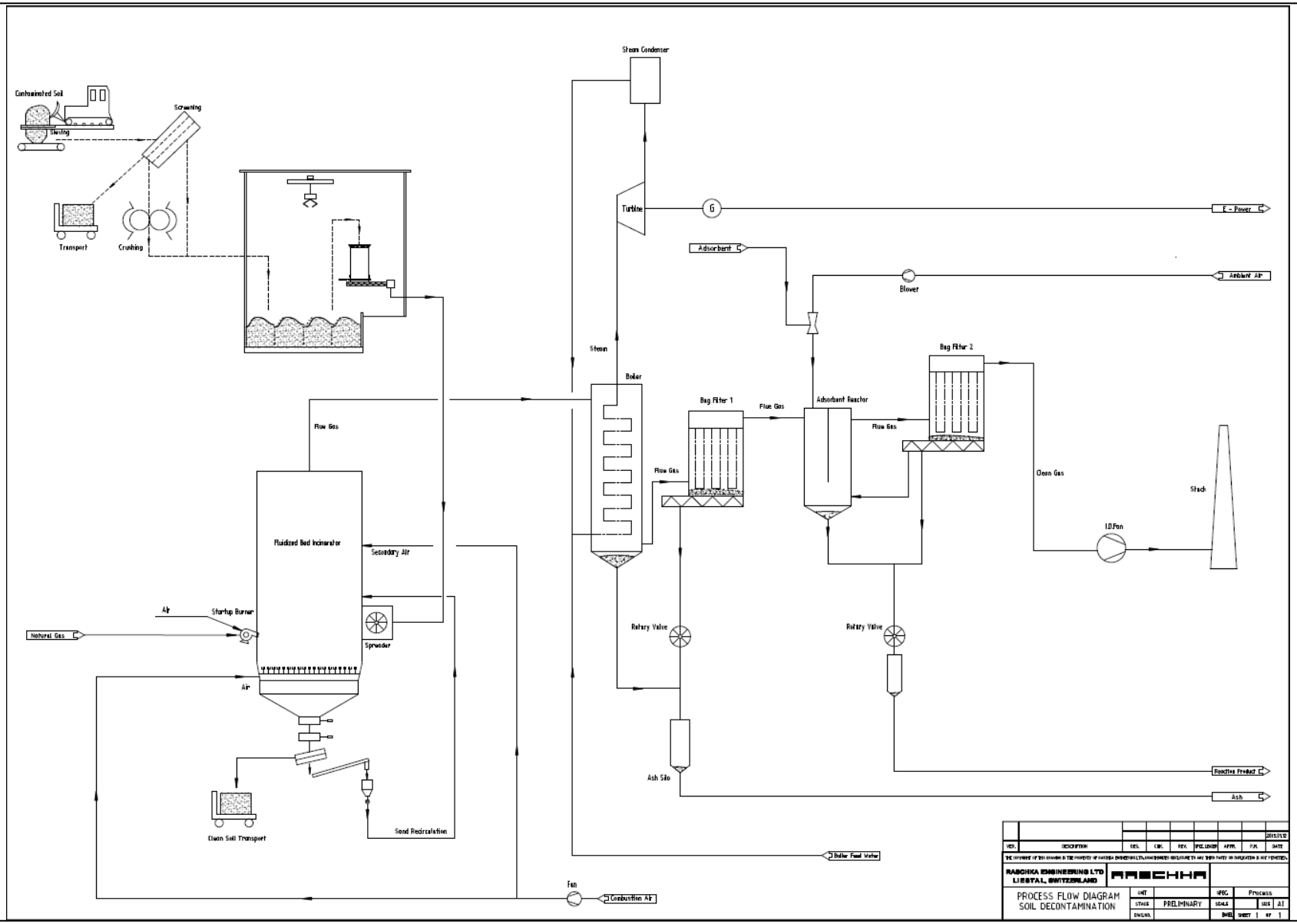
Core component: Raschka fluidized bed incinerator



Core component: Raschka fluidized bed incinerator for material containing foreign matters






Steam Condenser
Contaminated Soil
Screening
Sieving
Transport
Crushing
Turbine
G
E - Power
Adsorbent
Blower
Ambient Air
Steam
Boiler
Bag Filter 1
Flue Gas
Adsorbent Reactor
Bag Filter 2
Flue Gas
Flue Gas
Flue Gas
Clean Gas
Stack
I.D.Fan
Fluidized Bed Incinerator
Secondary Air
Air
Startup Burner
Natural Gas
Sprayder
Air
Rotary Valve
Rotary Valve
Ash Silo
Reactive Product
Ash
Clean Soil Transport
Sand Recirculation
Boiler Feed Water
Fan
Combustion Air
RASCHKA ENGINEERING LTD
LIESTAL, SWITZERLAND
RASCHKA
PROCESS FLOW DIAGRAM
SOIL DECONTAMINATION
PRELIMINARY
Process

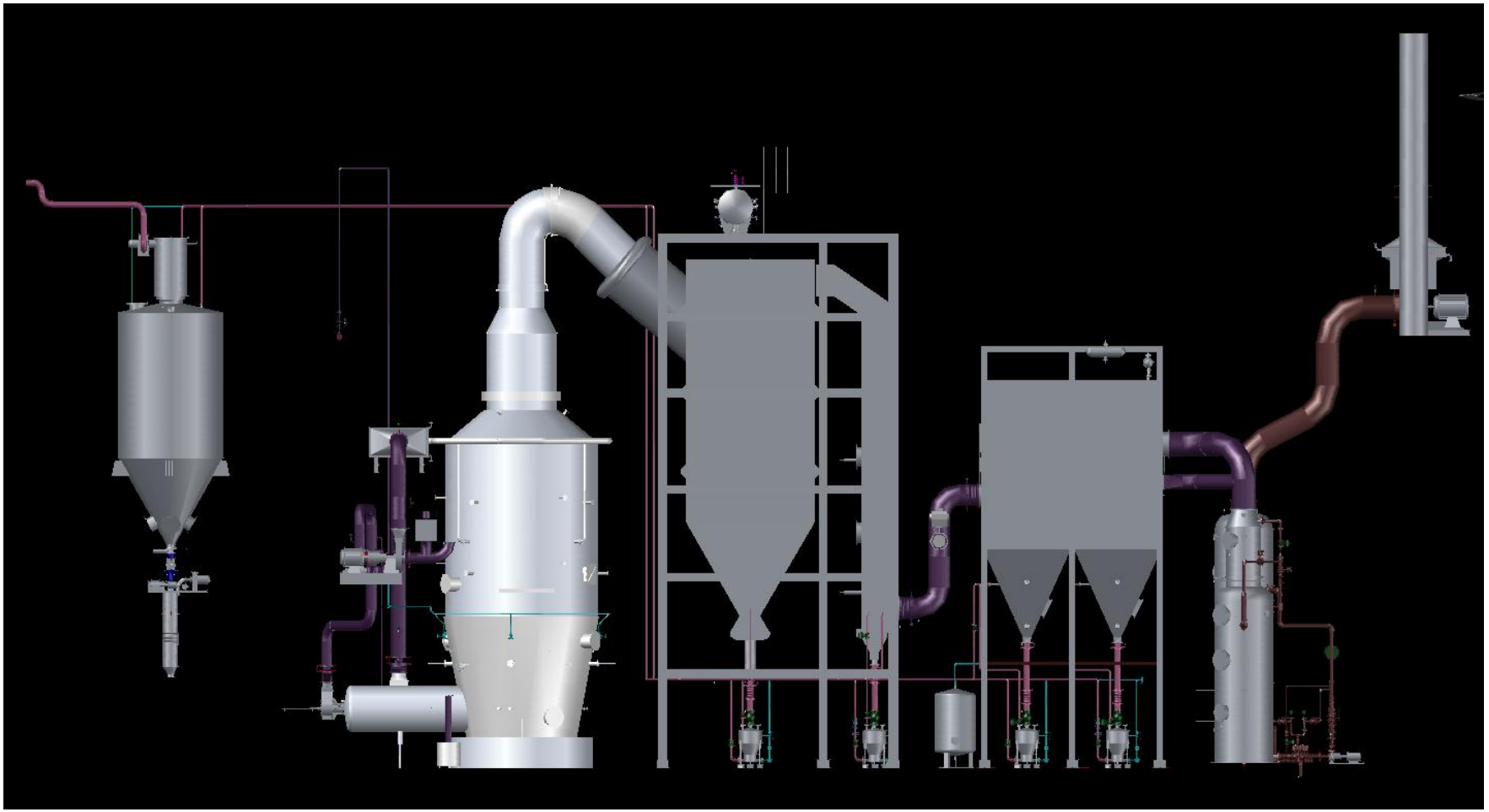
Treatment of contaminated soil typically includes the following steps:

- Soil excavation and transport to treatment plant
- Sieving, screening
- Crushing
- Buffering
- Feeding to incinerator
- Return of cleaned material
- Heat recovery and power generation
- Flue gas treatment

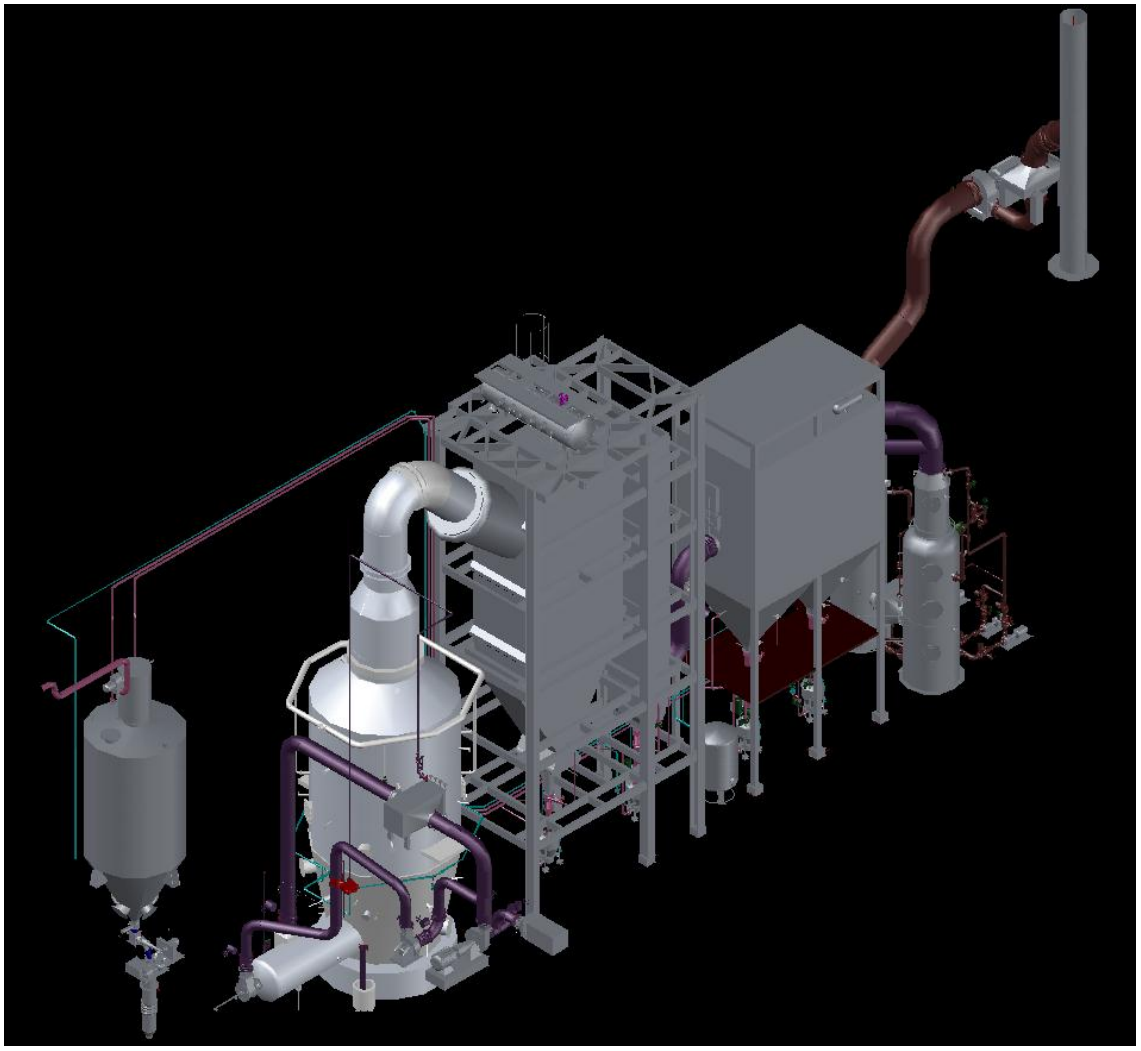
Plant design

The plant design very much depends on the type and concentration of contamination and overall soil throughput

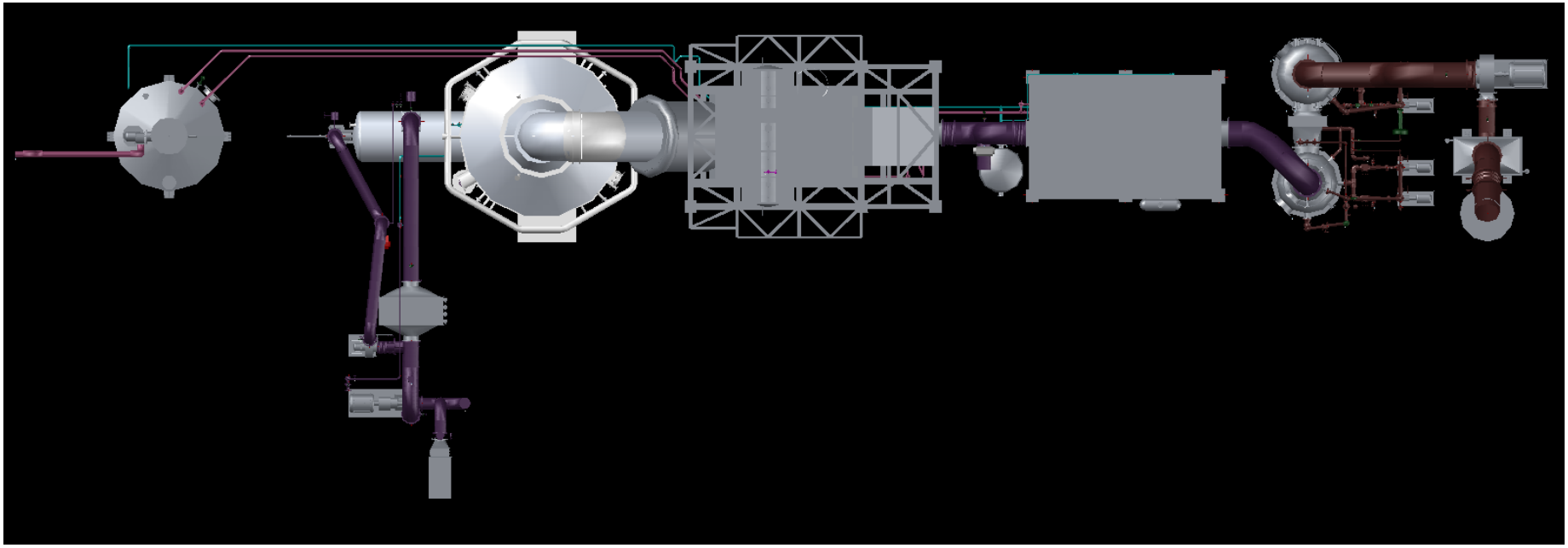
Plant design example



Plant design example



Plant design example



Dimensions incineration plant: length 35 m, width 7 m
Overall dimensions building: length 49 m, width 22 m, height 22 m

Advantages of the Raschka Fluidized Bed Technology

- ✓ **Efficient, proven, reliable**
- ✓ **Individual, tailor-made solutions**
- ✓ **Environmentally friendly**
- ✓ **Auto-thermal process without additional fuel**
- ✓ **Energy recovery and energy utilization for the process, power generation, heating**
- ✓ **The emission limits (17.BImSchV / Directive 2000/76/EC) / local regulations are kept reliably**
- ✓ **Experience: NO_2 - limits are kept without any NO_x reducing measures (e.g. SNCR)**

Case studies

Plant	Innovatherm GmbH Fluidized bed incineration plant Lünen
Customer	Innovatherm GmbH Lünen, Germany
Start up	1997
Fuel	Coal conditioned sewage sludge from municipal waste water treatment plants, other waste materials
Fuel capacity	31 t/h
Incineration conditions	Acc. to German 17. BImSchV / European regulations
Steam parameters	40 bar 400 °C superheated
Steam generation	41 t/h
Flue gas cleaning	Electrostatic precipitator, flue gas scrubbing system (effluent free)
Flue gas volume	93'000 m_n^3/h

Plant	WWTP Jihlava Fluidized bed incineration plant
Customer	SMS CZ s.r.o. Rokycany, Czech Republic
Start up	2008
Fuel	Sewage and industrial sludge and residues from municipal waste water treatment plant
Fuel capacity	1.2 t/h of sewage sludge and screenings (23-30 % DM)
Incineration conditions	Acc. to German 17. BImSchV / European regulations
Heat recuperation	Combustion air pre-heating 600-650 °C, hot water boiler for heating purposes
Flue gas cleaning	Dry flue gas scrubbing system
Flue gas volume	4'500 m_n^3/h

Case studies

Plant	Zweckverband ARA Visp (Lonza Visp) Fluidized bed incineration plant
Customer	City of Visp operated by Lonza Group AG Visp, Switzerland
Start up	1976
Fuel	Sewage and industrial sludge and residues from municipal waste water treatment plant
Fuel capacity	5 t/h of sewage sludge (15 % DM)
Incineration conditions	Acc. to Swiss emission standard
Steam parameters	10 bar saturated
Flue gas cleaning	Electrostatic precipitator, flue gas scrubbing system
Flue gas volume	10'000 m_n^3/h

Plant	WWTP Chifeng Fluidized bed incineration plant
Customer	Chifeng Derun Drainage Co., Ltd. Chifeng, Inner Mongolia, China
Start up	Q1 2015
Fuel	Sewage sludge
Fuel capacity	90 t/h of sewage sludge (max. 2 % DM)
Incineration conditions	Acc. to German 17. BImSchV / European regulations
Steam parameters	12 barg saturated
Steam production	6 t/h
Flue gas cleaning	Bag filter, flue gas scrubbing system
Flue gas volume	18'000 m_n^3/h

Case studies

Plant	Bottrop ZSB (Central sludge treatment plant) Fluidized bed incineration plants # 1 + 2
Customer	Emschergenossenschaft Essen, Germany
Start up	Plant 1: 1979, plant 2: 1991
Fuel	Sewage sludge and residues from municipal waste water treatment plant
Fuel capacity	3 t/h dry solids each
Incineration conditions	Acc. to German 17. BImSchV / European regulations
Steam parameters	35 bar 400 °C superheated
Steam production	7 t/h each
Flue gas cleaning	Electrostatic precipitator, flue gas scrubbing system
Flue gas volume	21'000 m_n^3/h each

Plant	Stuttgart Hauptklärwerk Mühlhausen Fluidized bed incineration plant # 2
Customer	City of Stuttgart Stuttgart, Germany
Start up	1992
Fuel	Sewage sludge and residues from municipal waste water treatment plant
Fuel capacity	4 t/h dry solids
Incineration conditions	Acc. to German 17. BImSchV / European regulations
Steam parameters	12 bar saturated
Flue gas cleaning	Electrostatic precipitator, flue gas scrubbing system
Flue gas volume	25'000 m_n^3/h

Case studies

Plant	München Klärwerk Gut Grosslappen Fluidized bed incineration plants # 1 + 2
Customer	City of Munich Munich, Germany
Start up	1997
Fuel	Sewage sludge from municipal waste water treatment plant
Fuel capacity	3 t/h dry solids each
Incineration conditions	Acc. to German 17. BImSchV / European regulations
Steam parameters	40 bar 400 °C superheated
Steam generation	8 t/h
Flue gas cleaning	Electrostatic precipitator, flue gas scrubbing system
Flue gas volume	18'000 m_n^3/h

Plant	Karlsruhe Klärwerk Neureut Fluidized bed incineration plant # 2
Customer	City of Karlsruhe Karlsruhe, Germany
Start up	1991
Fuel	Sewage sludge and residues from municipal waste water treatment plants
Fuel capacity	2 t/h dry solids
Incineration conditions	Acc. to German 17. BImSchV / European regulations
Steam parameters	40 bar 400 °C superheated
Steam generation	7 t/h
Flue gas cleaning	Electrostatic precipitator, flue gas scrubbing system
Flue gas volume	18'000 m_n^3/h

Case studies

Plant	Norske Skog Cheongwon Mill (formerly Onyang Pulp Co.) Cheongwon, Korea Fluidized bed incineration plant
Customer	Samsung Engineering (general contractor) Seoul, Korea
Start up	1996
Fuel	Paper sludge, rejects and refuse from paper factory
Fuel capacity	5.6 t/h dry solids
Incineration conditions	Acc. to German 17. BImSchV / European regulations
Steam parameters	10 bar saturated
Steam generation	20 t/h
Flue gas cleaning	Electrostatic precipitator, flue gas scrubbing system
Flue gas volume	45'000 m_n^3/h

Plant	Tongliao Meihua Fluidized bed multi waste incineration plant
Customer	Tongliao Meihua Bio-Tech Co., Ltd. Tongliao, Inner Mongolia, China
Start up	2011
Waste source	Sludge from waste water treatment plant, waste coal, waste liquid
Waste incineration capacity	Sludge: 3'125 kg/h (25% DM) - 14'000 kg/h (32% DM) Waste coal: up to 2'700 kg/h Waste liquid: up to 8'330 kg/h
Incineration conditions	Acc. to German 17. BImSchV / European regulations
Steam parameters	12 bar saturated
Steam generation	20 t/h
Flue gas cleaning	Quench, bag filter, flue gas scrubbing system
Flue gas volume	47'000 m_n^3/h

Case studies

Plant	Xinjiang Wujiaqu Plant Fluidized bed incineration plant with 2nd combustion chamber
Customer	Meihua Holding Group Co., Ltd, China
Start up	Nov 2014
Waste source	Sludge and waste liquid from production plant
Waste incineration capacity	Sludge: 4'400 kg/h (15~20% DM) Coal: up to 2'500 kg/h Waste liquid: up to 15'000 kg/h (fed into 2nd combustion chamber)
Incineration conditions	Acc. to German 17. BImSchV / European regulations
Steam parameters	52 bar 485 °C superheated
Steam generation	40 t/h
Flue gas cleaning	Hot gas cyclone for first stage dust removal between FBI and 2nd combustion chamber, quench, bag filter, flue gas scrubbing system
Flue gas volume	100'000 m_n^3/h

Plant	WWTP Bonn Salierweg Fluidized bed incineration plant (two lines)
Customer	City of Bonn, Germany
Start up	1981
Fuel	Sewage sludge
Fuel capacity	4.7 t/h of sewage sludge (30 % DM)
Incineration conditions	Acc. to German 17. BImSchV / European regulations
Steam parameters	7 barg saturated
Steam production	2.8 t/h
Heat recovery, flue gas cleaning	Recuperator for combustion air pre-heating (620 °C), waste heat steam boiler, flue gas dedusting, flue gas cleaning system
Flue gas volume	11'500 m_n^3/h

Thank you for your kind attention !







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