

VacuDry®

21 st Century Thermal Desorption



One technology for all types of oily wastes





Who we are

About us

- › Owner-managed family business
- › Over 20 years of experience in delivering hazardous waste recycling plants – worldwide
- › Turn-key, skid-mounted, mobile or stationary custom-made solutions
- › Contracts executed in over 30 countries
- › Equipment designed and produced in Germany
- › Headquarter in Munich, Germany

Our Philosophy

- › Zero industrial waste
- › Recover resources do not destroy them
- › Setting hazardous waste recycling standards of the 21st century
- › Enable hazardous waste business to grow green – making a profit and saving the environment
- › Provide the most flexible treatment technologies to cope with any current or future hazardous waste stream

Recent Experiences



Drill cuttings treatment in Azerbaijan

Feed material: Drill cuttings, contaminated soil
Throughput: 10 mt/h
80,000 mt/year
Oil recovery rate: > 99 %
Oil quality: Synthetic oil in product quality
In operation since: 2016



Heavy oily waste treatment in Australia

Oily waste, refinery waste, centrifuge cake
5 mt/h
38,000 mt/year
> 99 %
Secondary fuel
2014

Thermal desorption technology able to deal with all types of oily wastes

What Kuwait needs



Soil remediation

- › A budget of approx. US\$1.9 bil. is reserved for soil remediation projects (UNCC funded)
- › Approx. 26 mil. m³ of highly/visually oil-contaminated soil in an area of 114 km²
- › Objective to reduce the overall landfill capacity to less than 5 mil. m³
- › Combination of flexible technologies required to achieve the Total Remediation Solution (TRS)

Oil-based mud cuttings treatment

- › KPC expects to spend over US\$ 500 bil. to boost its crude oil production capacity to 4.75 mil. bpd
- › In line with this ambitious plan, KOC plans to publish tenders for treating OBM cuttings in the second half of 2019
- › Several contracts are expected to be awarded, each with a treatment capacity above 100 mt per day

VacuDry® – most flexible solution to meet Kuwait's goals



Wet drill cuttings



Oil lagoon sludge



Contaminated soil



Weathered drill cuttings



Refinery waste



Oily waste from industrial production

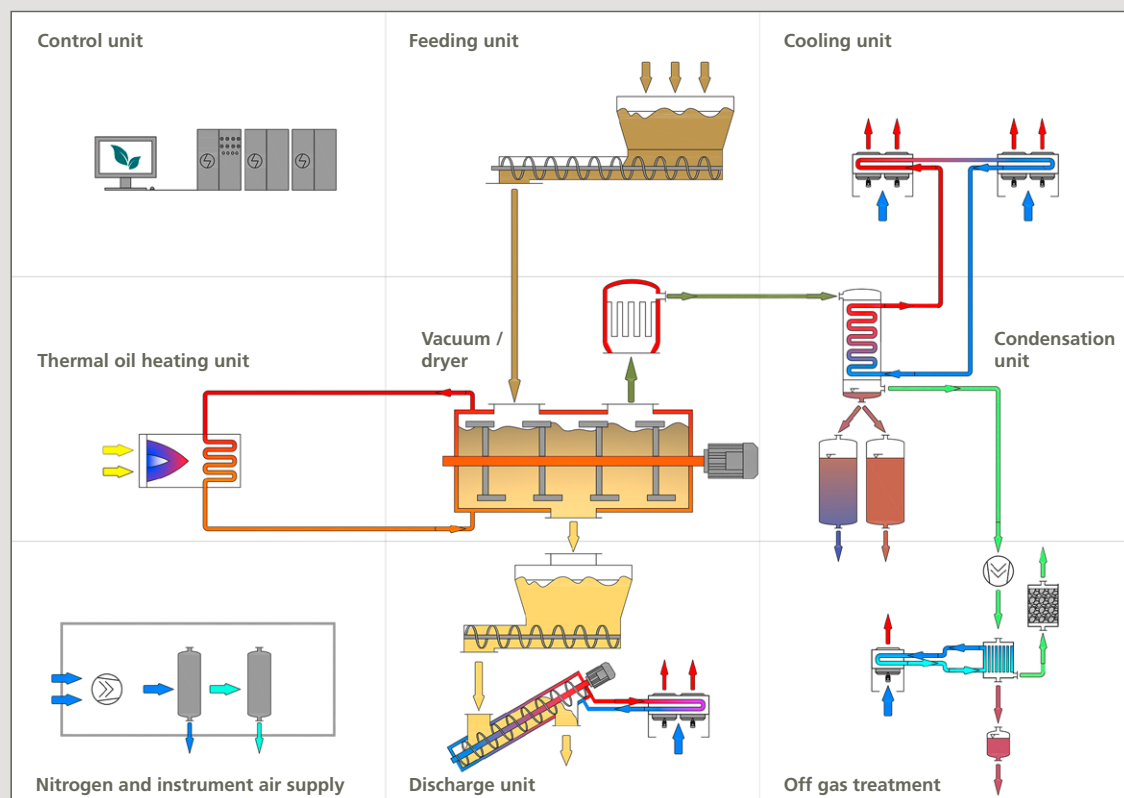
Kuwait needs VacuDry® to handle oily wastes for the next 20 years

Technical Advantages

Capabilities

- › **Flexibility:** Suitable for all types of oily wastes, such as tank cleaning sludge, refinery sludge, drill cuttings and contaminated soils.
- › **Adaptability:** Different wastes can be processed in the same plant without modification – batch process
- › **Consistency feed material:** No limitation for oil, water and solid content
- › **Oil recovery rate:** > 99 % (TPH C10-C36)
- › **Final oil content of treated solids:** < 0.5 % (TPH C10-C36)

VacuDry® process



Health and Safety

- › ATEX (explosion protection) certificate, approved by German TÜV
- › External HAZOP conducted for each plant as part of the engineering
- › Safety Integrity Level (SIL) for safety relevant loops
- › Control philosophy with safety focus, implemented by control logic, automated safety routines, interlocks, and set points for alarm and warning triggers
- › Plant automatically reaches safe mode if required, independent of operator action

Zero accidents in our plants in over 15 years of operation

Commercial Advantages

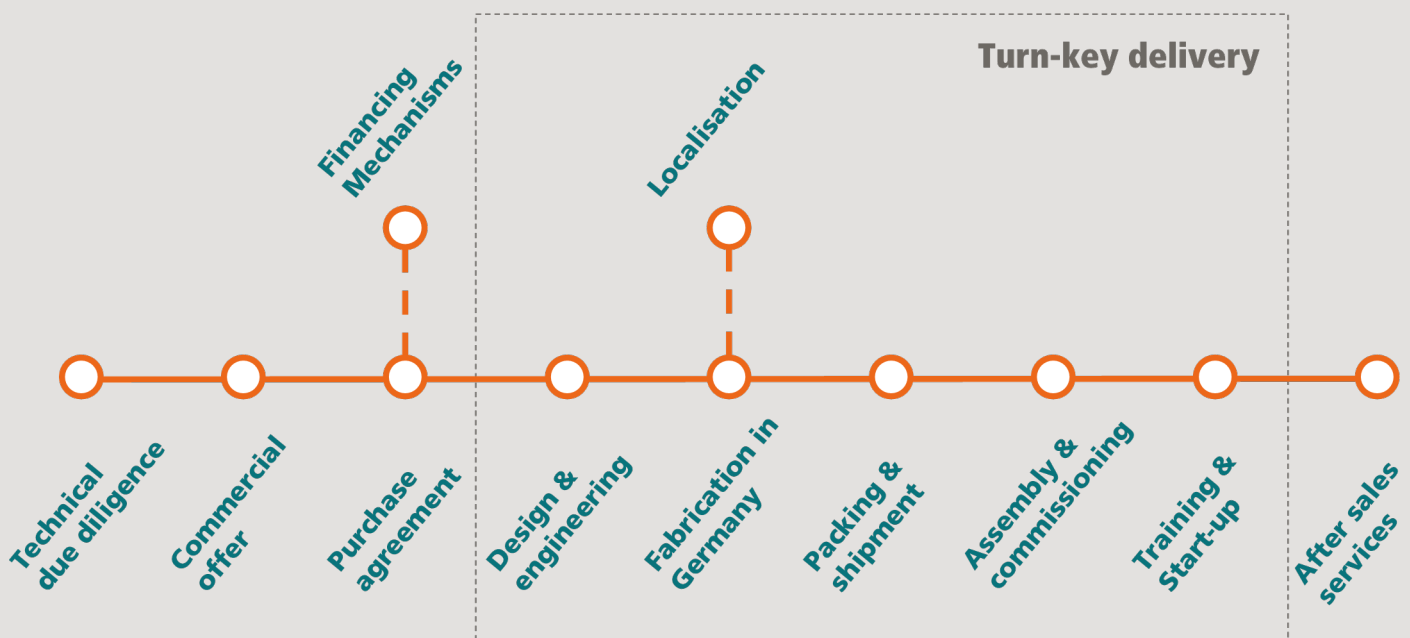
Financial Mechanisms

- › Extensive network with German and EU based first-class banks
- › Access to international financial institutions and development funds
- › Pay-as-you-earn credits available
- › Lower interest rates and long term financing for our clients in comparison to local banks
- › Evaluation of financing models together with our team of highly skilled business engineers

Low Operational Expenditures

- › Easy operation due to self-adapting batch process
- › No expert knowledge required for pre-blending or mixing of wastes required
- › Staff required for operation: 2-3 per shift
- › Typical energy consumption: 300-400 kWh/mt
- › Typical operating hours per year: > 7,500
- › Permanent plant supervision and joint operation by econ industries possible

Full service approach



Your profit

- › Reduced CAPEX due to depreciation times of 15 or 20 years – possible due to long-life and flexibility of equipment
- › Feasible to combine with other treatment processes
- › Recovery of valuable resources rather than incineration
- › Min. 4x higher energy efficiency compared to other desorber types (e.g. rotary kilns)
- › Lowest process emissions below 100 m³/h due to vacuum operation
- › Localisation possible

Profitable from the first day – Lucrative for the next 20 years

Soil remediation – Category (58)

Key Facts

Input material:	All types of contaminated soils, oily wastes, and sludges
Output material:	Oil (secondary fuel), water, solids (TPH C10-C36 below 1%, < 0.1% possible)
Plant design:	Fixed or mobile execution 0.5 ... > 10 mt/h throughput capacity
Heating system fired by:	Fuel oil, diesel, natural gas, electricity, biofuels, recovered mineral oil fraction



Benefits of VacuDry® oily waste plants

- › Highest flexibility regarding different feed material; no restriction on composition and consistency
- › Possible to combine with other pre-treatment technologies e.g. centrifugation or soil washing
- › Defined separation of reusable hydrocarbons through gradual heating
- › Emission and dust-free system by encapsulated treatment of exhaust vapours and solids
- › Reuse of the condensed, clean water for re-moistening of treated mineral solid output
- › High operational availability due to self-cleaning dryer



Any feed material
Any solid, water and oil content

Oil-based mud cuttings treatment – Category (59)

Key Facts

Input material:	OBM / SBM cuttings (no limitation on oil, water, solid content)
Output material:	Highest quality of recovered high price drilling oil
Plant design:	Fixed or mobile execution 0.5 ... > 10 mt/h throughput capacity
Heating system fired by:	Fuel oil, diesel, natural gas, electricity, biofuels, recovered mineral oil fraction



Benefits of VacuDry® cuttings plants

- › Product-quality of recovered drilling oil – ready to sell
- › No limitation on oil, water and solid content
- › High oil recovery rate: > 99 %
- › Precise control of the recycling process
- › Low thermal energy consumption
- › Low wear and tear



**Only indirect heated thermal desorption unit recovering
> 99 % of oil in product quality**

Zero industrial waste ... !



Move towards sustainable hazardous waste recycling in Kuwait
and establish yourself as long-term provider of environmental services

Cash in on this one-time opportunity!



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