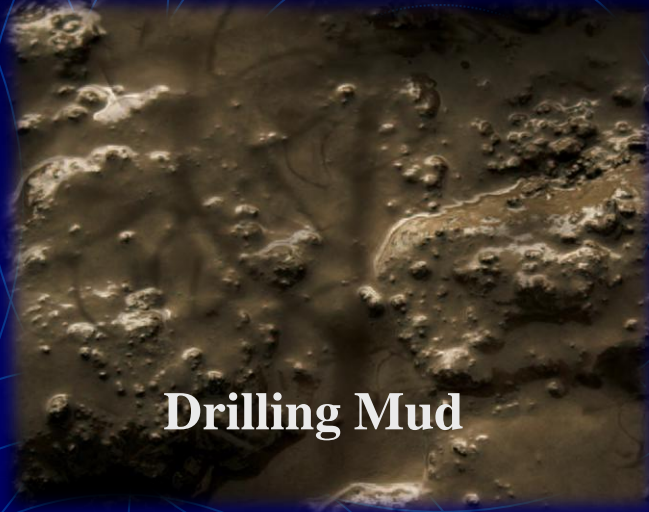


INDIRECT THERMAL DESORPTION SYSTEM



Tank Bottom Sludge



Drilling Mud



Soil Remediation



Hazardous Waste

Indirect Thermal Desorption Systems

KMT presents indirect heat thermal desorption system. This unique system can process various materials to the environmentally acceptable conditions. System will allow to recover hydrocarbons for future use.

Depending on application one or two stage system can be employed. Material to be processed also dictates type of the dryer to be used.

System can be mobile or stationary depending on volume and composition of the material to be processed.

Type of the materials system can process:

- Hydrocarbons contaminated soil (results of oil or fuel spillages, etc);
- Solid fraction after processing sludge from oil ponds or lagoons on centrifuge;
- Sediments from oil and bunker oil tanks;
- Spent catalysts used in oil refineries, etc.

Indirect Thermal Desorption Systems

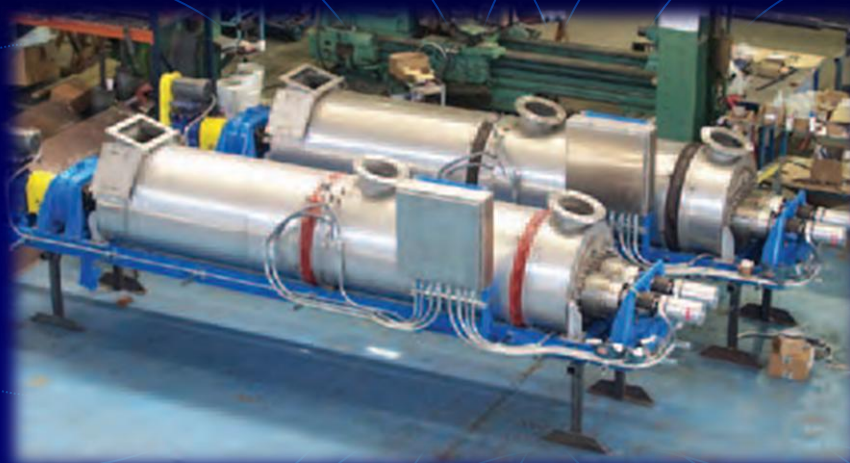
SCREW PROCESSOR: HIGH-EFFICIENCY, LOW PROFILE.

Standard dryer temperature configurations:

- Holo-Scru® dryer up to 700°F. Used for Drill Cuttings, water evaporation, light hydrocarbons contamination, etc;
- Electric-Scru dryer up to 1200°F. Used for tank bottom sludge, catalyst fines, contaminated soil, heavy hydrocarbons contamination, etc;
- Cooling Screw to cool material exiting the desorption chamber;

Tank Bottom Sludge and Soil Remediation

(CONDENSE AND RECOVER HYDROCARBONS IN ONE EASY STEP)



Electric-Scru® thermal desorption units is able to heat residual material up to 1,200-plus-degrees Fahrenheit, so that hydrocarbons and water vapor are condensed and recovered.

Discharged material is environmentally safe and may be discarded at any place. Two-stage systems make the process even simpler by removing water in first stage, while removing hydrocarbons in a second.

There are Electric-Scru® installations that have been in operation for more than 20 years processing tank bottom sludge and other feed stocks such as soil and catalyst fines.

Drill Cuttings Dryers

(PROCESS 1.5 TO 500 TONS PER DAY WITH 99.5%
HYDROCARBON RECOVERY)



Holo-Scru® thermal desorption systems volatilize and recover 99.5% of hydrocarbons from drilling mud.

Holo-Scru® processes can accept feed stock with hydrocarbon percentages greater than 70%, effectively collecting and condensing water, diesel and other hydrocarbon vapors. In applications such as natural gas drilling where diesel and water constitute the liquid phase, diesel is typically filtered, then resold or reused as a lubricant for future drilling.

Units in operation in the U.S. process drill cuttings from shale drilling; This feed stock is generally 10% to 30% diesel, and 20% water. Recovery rates for diesel typically range from 97% to 99.5%.

Hazardous Waste Processing

(DELISTING RESOURCE CONSERVATION AND RECOVERY ACT ("RCRA") WASTE)

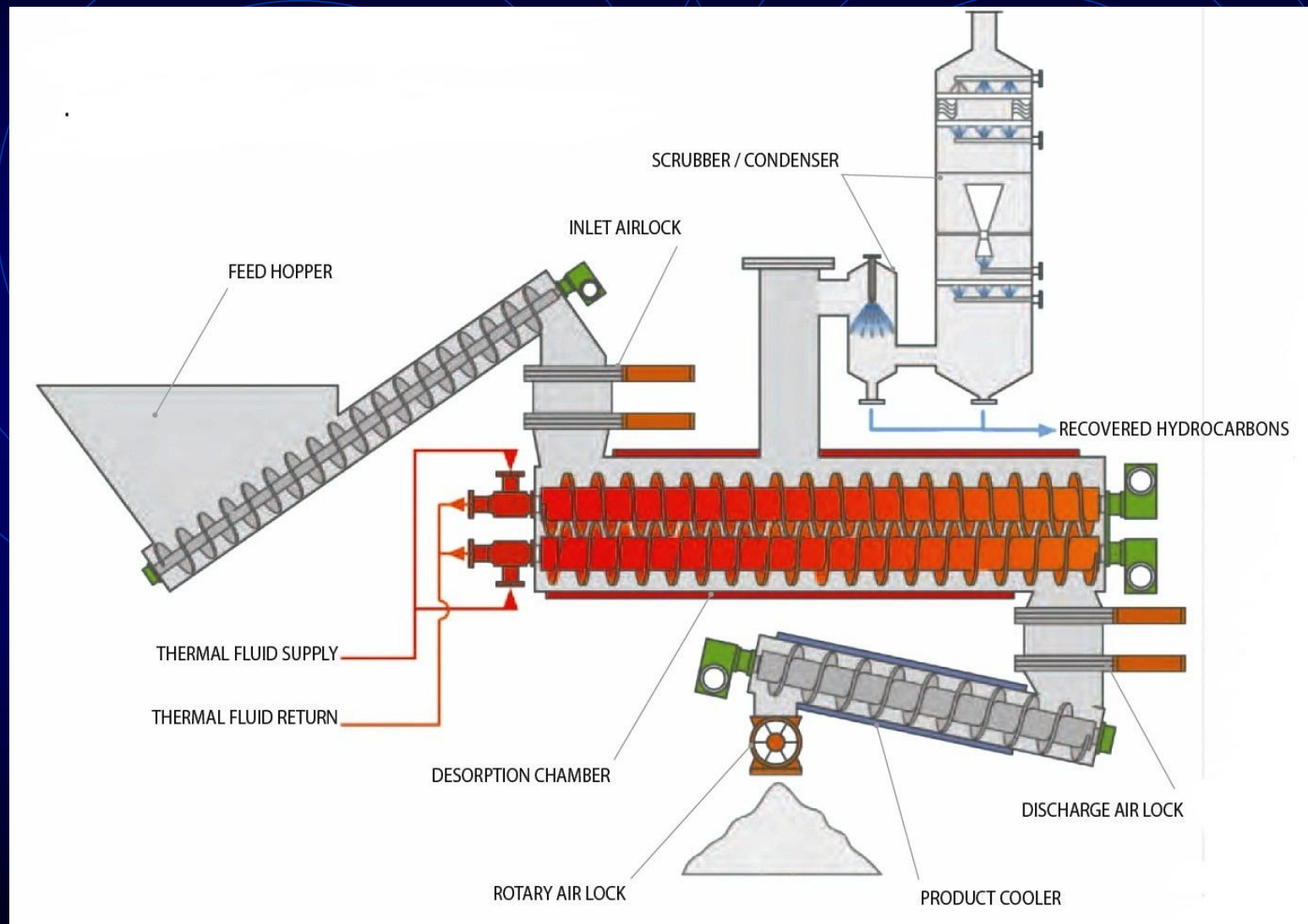


Holo-Scru® thermal dryer unit first stage and Electric-Scru thermal dryer unit second stage Such systems are excellent for delisting RCRA waste. Drums, cans, glass and plastic containers are just some of the items that carry hydrocarbon-laden materials such as paint, perfume, degreaser, oil, resins, and hair spray.

Such feed stock is typically shredded to 2-inch minus in order to add easily to the desorption unit. System handles the shredded metal and glass quickly and efficiently. Sticky materials are also handily-processed by virtue of the system's self-cleaning, rotor design. Process temperatures between 850 and 1,200-degrees Fahrenheit (depending on feed stock requirements) volatilize all hydrocarbons.

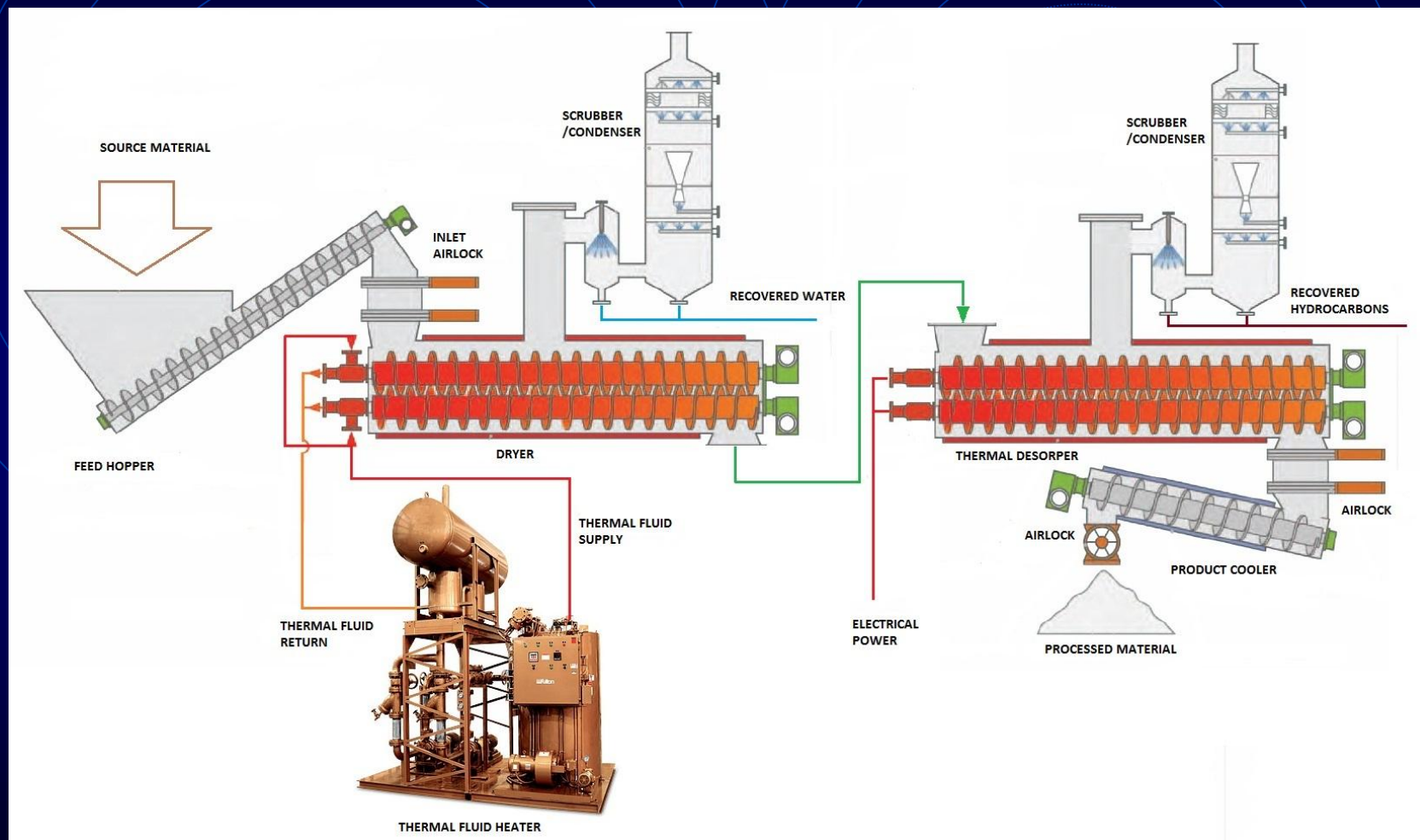
Indirect Thermal Desorption System

(Single-stage desorption unit diagram)



Indirect Thermal Desorption System

(Two-stage desorption unit diagram)



Thermal Desorption system specification

1. Feeding system

Feed system includes a feed containment bin (hopper) with internal twin intermeshed mixer arms which shall inhibit bridging and push the sludge onto a live bottom of the hopper. The live bottom shall provide feed to a feed screw conveyor for a metered feed.

2. Thermal Fluid Heater

The thermal oil heater uses PLC control for optimal heating efficiency.

The heating can be accomplished with a variety of energy sources including; waste heat, solar thermal, bio-gas, natural gas, propane, #2 fuel oil, diesel, coal, or electricity.



Thermal Desorption system specification

3. Holo-Scru Dryer

The dryer chamber includes twin, intermeshed HOLO-SCRU® rotors. In the drying chamber, material are heated under slight negative or positive pressure in a sealed, anaerobic environment. The dehydrating heat is indirect. Thermal fluid is circulated throughout the HOLO-SCRU® rotor, flitting and outer jacket of the drying chamber in a closed loop path.



4. Water Side Closed Loop Condenser/Scrubber

A high efficiency, direct contact, multi stage Venturi type condenser, constructed of corrosive resistant materials, followed by a packing section scrubber to remove particulate. The scrubber is very effective at condensing steam and removing particulate, odors and fumes. The design of the scrubber allows for collapsing of the steam and removal of particulate by impacting the gas stream with a high velocity spray of scrubbing/condensing liquid.

Thermal Desorption system specification

5. Electric-Scru Thermal Desorption Unit

The “Electric-Scru” Processor is an efficient way to thermally process materials. Unique to the “Electric-Scru” Processor is its patented use of electric heating element within the rotor and housing which generate process temperatures over 1000°F without the excessive volume of off-gases associated with direct-fired technologies.

Electrical heating elements contained within the hollow core of the screws are operated to heat the screws evenly at a controlled rate. Thermocouples are installed along the length of the processor to measure the material temperatures at the specified locations. The equipment is designed airtight with nozzles for possible injection of an inert gas such as nitrogen to limit the oxygen content. The housing is totally insulated for minimal heat loss. An adequate number of vapor ports are installed in order to collect the off-gas emissions generated during system operation.



Thermal Desorption system specification

6. Oil Side Closed Loop Condenser/Scrubber

A high efficiency, direct contact, multi stage Venturi type condenser, constructed of corrosive resistant materials, followed by a packing section scrubber to remove particulate. The scrubber is very effective at condensing hydrocarbon vapors and removing particulate. The design of the scrubber allows for collapsing of the vapors and removal of particulate by impacting the gas stream with a high velocity spray of scrubbing/condensing liquid.

7. Cooling screw

Combination of the water-cooled screw rotor and jacketed housing cool the treated material after Thermal Desorption Unit for safe handling.

7. PLC

Allen Bradley Compact Logic programmable controller with touch panel HMI display is provided complete with internal timers to control the time/temperature regimes and machine functions.

Advantages of proposed system

- High energy efficiency;
- Low cost of operation;
- Meet EPA requirements;
- No after burning, No catalytic combustion;
- Can process materials with high level of hydrocarbons;
- Small footprint;
- Heating capabilities run from 80 to 1200 degrees Fahrenheit;
- Can be built to be operated under a vacuum or under pressure.
- High safety
- Self cleaning operation



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