Genoil
Sand Decontamination Technology

The Genoil Sand Decontamination Technology (GSDT) is an innovative process designed to cleanse sand to environmental standards with minimal water and energy consumption.

The process and a key component, the reactor, have been recently granted two US patents which evolved from extensive experience acquired with a former Genoil sand washing plant.

The technology is the latest stage of development of this process featuring significant improvements such as: energy efficient steam cleaners, novel reactors, multiple dewatering stages, an elutriation water purifying system etc.

The system can be shipped in containers and installed on beaches for decontaminating the sand on site.

Process Description:

With reference to Fig. 1 showing the Process Flow Diagram, sand is metered and fed to reactor No.1 where the decontamination process occurs in several steps.

- Initially powerful steam jets extract and separate the bulk of hydrocarbons from the sand. A device guides the sand on a helical path exposing it to steam cleansing and also facilitating hydrocarbon removal.

- Sand then falls through a rinsing section where water jets detach residual oil particles by way of vigorous agitation. Oil rises to the water surface and joins the froth that resulted from steam cleansing.

- A funnel-shaped weir confines the froth around an oil skimmer and also isolates inadvertently entrained sand particles. The skimmer conveys the froth to a decanter where oil is reclaimed for reuse.

- Furthermore, the water jets disperse other contaminants contained by sand, particularly dissolved solids, and forms a relatively diluted solution.

- Water emerging from the rinsing device flows upwardly through the reactor and then cascades into an adjacent gravity separator.

- Meanwhile, sand descends into a solids-water separation zone and forms a blanket of controlled thickness. The sand layer acts as a barrier, blocking the migration of contaminants to the reactors disposed downstream.

- A specially designed conveyor dewaters and meters the sand in the lower portion of reactor No. 1.

- Relatively dry sand is then transferred to the steam-cleansing section of reactor No. 2, where the decontamination process is resumed. Due to removal of water from sand, the amount of dissolved contaminants reaching reactor No. 2 is significantly reduced.

- From reactor No.2, sand is conveyed downstream and similarly processed through reactors Nos. 3, 4 and 5. Sand is thus rendered progressively cleaner until it meets stringent environmental standards. Clean sand is finally transferred to a dewatering device where it is suitably dried and rendered transportable to disposal sites.

- Vital to the decontamination process is a counter current flow of elutriation water through the reactors. Elutriation water is supplied from duly selected sources such as rivers or lakes and stored in a tank.

- Sea water will be utilized which eliminates the water recycling system. When sand is being reclaimed for certain applications such as cement factories, elutriation water needs to contain minute amounts of dissolved solids.

- In such situations distilled water is the only alternative and is to be produced by way of reverse osmosis units. A limited amount of elutriation water is also supplied to the steam cleaners in order to form steam jets.

- After rinsing and diluting the contaminants in the reactor, elutriation water is diverted to a corresponding gravity separator.

- Oil particles are duly removed from the stream whereas dissolved solids and clay pass through the separator. Consequently dissolved solids, which are initially diluted in reactor No. 5, become increasingly concentrated as elutriation water moves upstream through the reactors.

- The sand washing plant is designed to balance the amount of dissolved contaminants entering the reactors with the contaminants leaving them.

- A computer monitor maintains the concentration of contaminants in each reactor at preset levels for ensuring stable product quality. To this end the program calculates the amount of elutriation water needed in various situations and accordingly regulates the flow rate.

- Upon completing the rinsing process in reactor No.1, elutriation water contains concentrated contaminants and is diverted to a purification system for recycling.

- At first three clarification tanks disposed in parallel extract the fines. The clarifiers operate in conjunction with a floating arrangement that minimizes agitation in order to enhance the clarification process.

- Relatively clear water emerging from the clarifiers is further processed in a polishing oily-water separator designed to remove minute particles of oil that could not be separated by gravity.

- Elutriation water is then filtered and treated to meet the exacting requirements of the reverse osmosis unit.

- After desalting, the bulk of elutriation water is recycled to the storage tank whereas brine is pumped to a disposal well. As a result, the water consumption can be reduced by at least 50%. In certain situations it is economical to utilize reverse osmosis units disposed in series, an arrangement that maximizes the amount of water that can be recycled.

- In northern regions reducing the amount of cold water supplied from rivers also brings about important heat energy savings.
When sea water is used for cleansing oil contaminated beaches the water is merely decontaminated and discharged into the sea.

- Fines originating from the clarifiers are further de-watered by means of a decanter centrifuge. Clean water overflowing from the centrifuge is redirected to the purification system and recycled. Cake accumulated in the centrifuge is processed with minimal emissions and energy consumption through a gasification device that eliminates traces of oil in order to render the fines suitable for disposal.

GENOIL SAND DECANTAMINATION TECHNOLOGY (GSDT)
PROCESS FLOW DIAGRAM

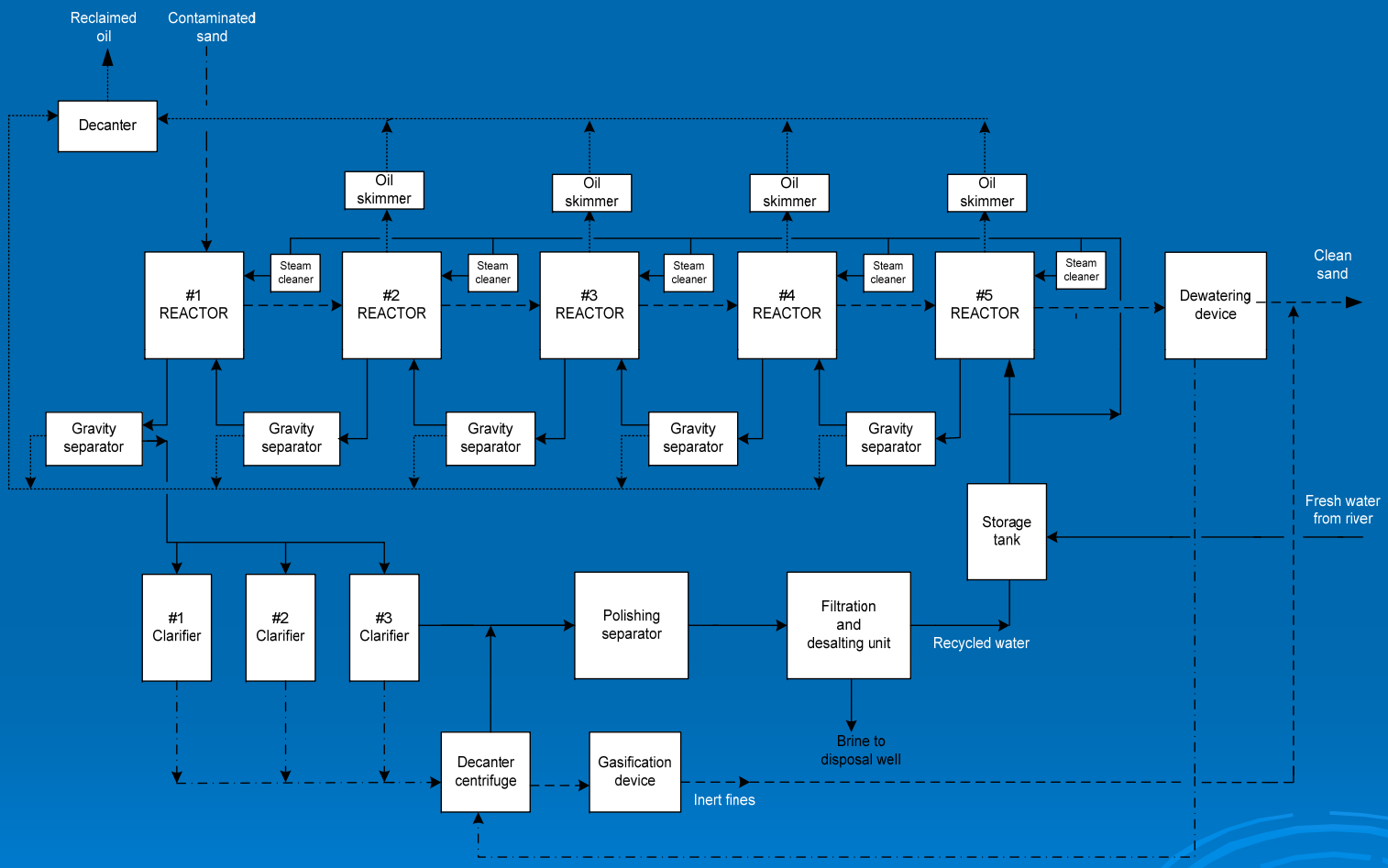
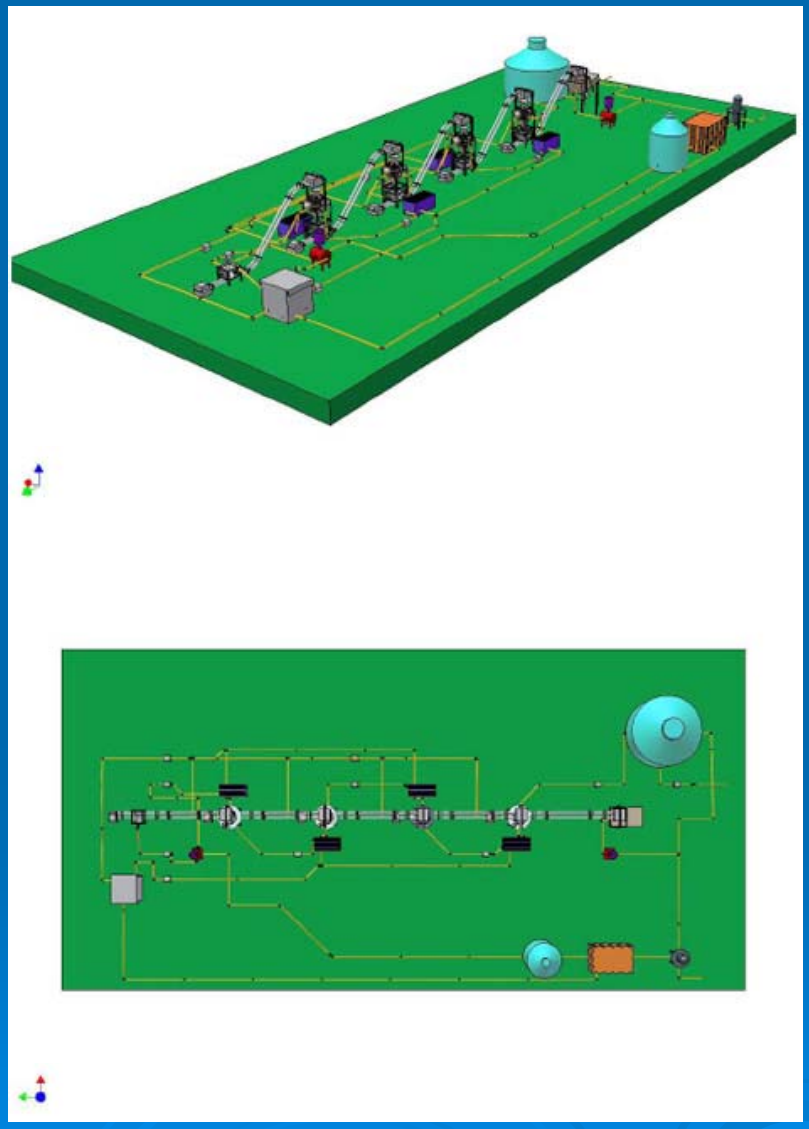


Figure 1



Genoil – Engineering Technologies for the Future

Thank You

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