

Frequently Asked Questions - Dredging

About the Technology

1) What is the Genesis Rapid Dewatering System?

The Genesis Rapid Dewatering System separates solids of all sizes, particularly fine-grained solids, from water at very high speeds. This patented capability has a variety of benefits for industry and the environment. Contaminated waterways, such as lakes, reservoirs and harbors, can be quickly and inexpensively restored to their original depth and beauty.

2) What are the current dewatering methodologies used?

The methodologies employed to dewater dredged sediment from waterways primarily fall into three categories: (1) Upland disposal sites, (2) belt presses and thickener, and (3) geo-synthetic tubes. Typical dewatering times for fine-grained sediments are measured in months and years, depending on the methodology and size of project. These techniques have prohibitive costs, and being land-intensive, they are environmentally destructive and slow. Consequently, many communities and governments cannot afford to restore their waterways. In addition, populations everywhere are increasingly unwilling to accept any process that involves destruction of one ecosystem to save another.

3) Why is Genesis' technology unique?

Genesis is the only technology that can dewater a dredge flow instantaneously. The small size of the system's footprint, its mobility, and capability to scale up to virtually any flow mean that previously inaccessible urban waterways can be saved, and that major waterway cleanups are now affordable and non-destructive.

4) What are the environmental problems facing waterways that Genesis technology addresses?

Many waterways worldwide suffer from eutrication, or deterioration leading to the formation of wetlands. This typically results from agricultural run-off and other man-made causes. Some waterways are so polluted and stagnant that their animal and plant life die off, and in the case of rivers and streams, the current ceases to flow. Having continued access to healthy, clean lakes, rivers, marinas, shipping ports, and other waterways is vital to maintaining affordable water supplies, vibrant economies, and entire ecosystems. Additionally, paper mills and mining operations could greatly limit

their water use by recycling their “carriage” water in their industrial circuit, instead of discharging into natural waterways or disposal sites.

5) Why is dredging sometimes required to restore a waterway?

Cleaning a waterway often requires dredging. Dredging empties the water body of large quantities of built-up debris along the bottom, ranging from coarse material, such as clam shells, organic vegetation, and garbage, to sand and fine grained sediment, such as clays, silts, and organics.

6) How does the Genesis system overcome problems with disposal sites?

Unlike coarse material and sand, fine-grained sediment requires a long settling period to release even minimal water content. Currently, dredged sediment is typically dewatered in upland disposal sites (see Figure 1).



Figure 1: Typical upland disposal site

These sites are created by clearing vast areas of land and building dykes or levees around the site, resulting in a large sludge lagoon to hold the sediment discharged from a hydraulic dredge. Contained disposal facilities require purchasing land, if available, which is often expensive, and leveling it, so that it is completely flat. This construction process completely destroys all ecosystems in the area, including forests. The “process rate” for sun drying in containment areas is discouragingly slow, requiring an average drying time of seven or more years. Increasingly, communities and governments cannot afford to buy land for this purpose or are unwilling to destroy one ecosystem to save another. Similarly, in many coastal areas around the world, ocean dumping of sediment is now prohibited.

Genesis inverts the concept of settling sediment through a water column and instead drains water instantly away from the sediment through its revolutionary, patented system. This eliminates the need for vast amounts of time and/or land to dewater.

7) How is the Genesis system different from other dewatering methods?

Genesis is the only system that dewateres in real time. Operating in fresh or salt water environments, the Genesis Rapid Dewatering System (RDS) instantly recovers and stockpiles various types of solid material from the hydraulic dredge



Figure 2: Genesis Rapid Dewatering System (RDS)

flow down to ultra-fine clays, silts, and organics, while simultaneously returning clear water to the waterway (see Figures 2, 3, and 4). A single RDS unit can process a dredge flow of 2,000-5,000 gallons per minute (gpm), which is equivalent to 150-250 cubic



Figure 3: Hydraulic dredge flow



Figure 4: Return water off of Genesis RDS

yards of sediment per hour. No other technology in the world can begin to approach this capacity for high-speed dewatering of ultra-fine solids. The resulting, dewatered “cake” can be further dewatered in the Genesis process to retain less than 50% moisture content, which is equivalent to dry dirt. The dirt can be stacked for removal, trucking, or reuse options as topsoil or landfill.

8) How does the Genesis system produce cost savings?

Operational costs of the Genesis system typically run 30% to 50% less than traditional dewatering techniques. Because the Genesis RDS is able to sustain a 1:1 (dredge time to dewatering time) operating ratio with a dredging operation, projects can be completed in 1/3 of the time required by other dewatering processes. The mobility of the Genesis RDS further reduces costs by allowing quick set-up and restoration of the operating site (generally 48 hours). In addition, the small operational footprint required by the system (usually 150' x 150') allows on-site processing in congested or urban locations that would prohibit the use of other dewatering technologies (see Figure 5).

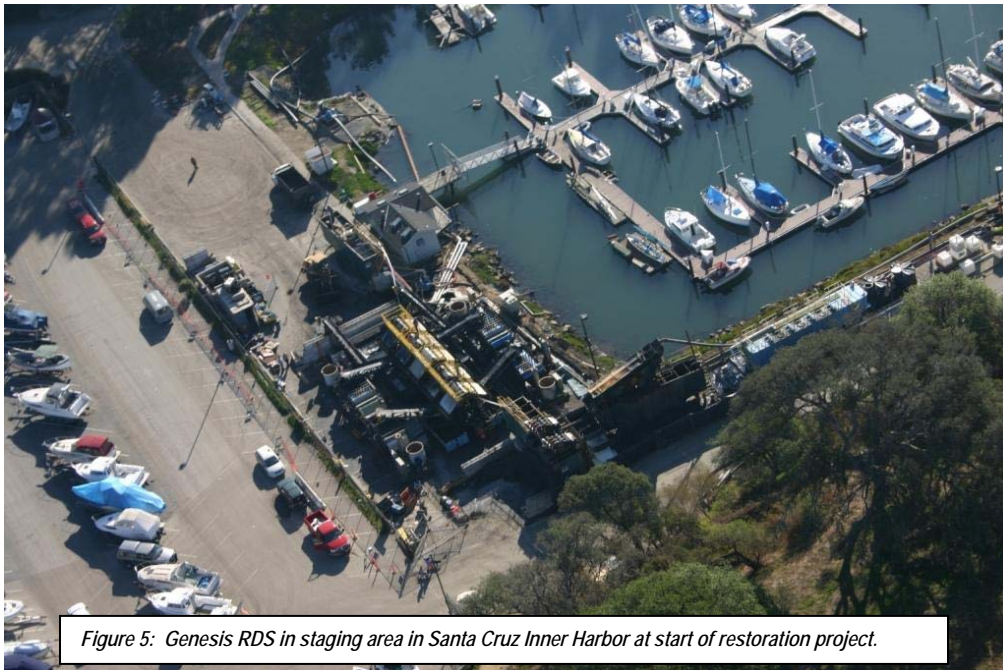


Figure 5: Genesis RDS in staging area in Santa Cruz Inner Harbor at start of restoration project.

9) How flexible and scalable is the Genesis system?

Successful operation of the Genesis RDS assumes a dredge flow rate of 2,000-5,000 gpm at any density the dredge can pump. With little or no increase in the footprint, additional pods or RDS units can be deployed to scale up to any sized project and can be land or barge mounted. The Genesis dewatering process can accommodate a dredged solids spectrum profile from as large as 5" (heavy debris) to as small as 7-14 angstroms (fine clays).

10) How are sand and coarse debris removed?

The process encompasses several stages of sediment/asset recovery prior to reaching the Genesis RDS unit:

- Stage one utilizes an innovative coarse screening system to facilitate removal of coarse debris that may include a variety of obstructive materials such as shells, beverage cans, tree stumps, shoes, lumber, fiberglass, or fibrous plant life.
- Stage two is a screening unit designed to remove, classify, and stockpile gravel. The unit we recommend is capable of classifying retrieved gravel according to client specifications and washing such material, which is an important factor in asset resale.
- Stage three continues the process by salvaging sand. The sand recovery system that provides the greatest flexibility utilizes the dual technologies of sand screws and hydro-cyclones working in tandem. This process, too, allows for the classification, washing, and stockpiling of sand for reuse or sale.

11) Is polymer used in the process?

Yes. The three-stage process of removing sand and coarse material yields a slurry of liquid and fine grained particulates that is suitable for polymer dosing, flocculation, and instant dewatering. By removing heavier solids prior to polymer introduction, polymer is reserved for only the finest grain solids, resulting in significant cost savings.

12) How does Genesis dewater fine grain particulates?

Fine grain sediment removal represents the most challenging aspect of waterway restoration. No other technology can begin to approach the real-time capacity for high-speed dewatering of ultra-fine solids that Genesis has achieved. The patented Genesis RDS recovers and classifies solid material down to ultra-fine clays, silts, and organics (7-

14 angstroms in size) and simultaneously returns clear water (<30 parts per million (ppm) of total suspended solids) to the waterway.

Once coarse debris, gravel, and sand have been removed from the dredge flow, polymer is introduced into the mix. Genesis has developed a precise, agile technology that continually monitors the slurry and provides instant response to varying flow rates and densities. Our state of the art technology measures the density of the remaining solids to be processed. This data, coupled with the flow rate, is fed to a programmable logic control system, which in turn controls a variable speed pump that injects polymer into the slurry at very close tolerances.

The slurry and polymer are gently blended, initiating a flash-flocculation process that provides for polymer extension, contact time, and particle capture. The flocculated substrate is then distributed over a micro-screen system that enables water to drain away from the accumulated flocs, instantaneously separating the clear water phase from the accumulating cake. The accumulated cake, which at this point has a consistency of cottage cheese, is gravity fed into Genesis dewatering cells for final dewatering, if desired.

The recovered cake is stackable dirt and ready for disposal or reuse. The turbidity of the clear water phase is continually monitored, as clear water is returned to the waterway.

The speed and agility of the Genesis RDS make it superior to other technologies, enabling the dewatering unit to operate in steady state balance with a hydraulic dredge. Thus, production and recovery occur in a synchronized, operational rhythm.

13) How clean is the return water from the Genesis system?

In addition to speed, lower cost, greater mobility and smaller footprint, the Genesis RDS produces another benefit that is unique among all sediment dewatering technologies: Clear, aerated water released from the sediment going through the RDS, can be returned immediately to the waterway, providing natural, oxygenated water to the habitat.

14) Is the Genesis system noisy, odorous, or messy?

Ideal for urban settings, the Genesis system uses sound attenuated equipment, so the only noise heard resembles a gentle waterfall. Decibel levels of less than sixty can be expected at 100 feet. Since the sediment is dewatered so rapidly, there is no odor associated with the process, which also distinguishes it from other dewatering technologies. The system is designed to contain any spillage, which is automatically reprocessed through the system, so the entire staging area remains clean. The RDS is so passive, that passers-by often stop to watch. On a California harbor project, walrus even napped on rocks next to the unit during operation.

15) Can Genesis be used on contaminated waterways?

Yes. Contaminates can be a significant issue for certain waterway clean-ups, particularly in large, urban areas, or in areas of intense agricultural use. The flocculation process of the Genesis system has an added benefit of locking up many contaminants in the dewatered sediment, or dirt.