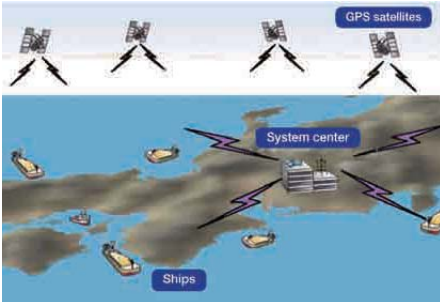


RESEARCH & DEVELOPMENT

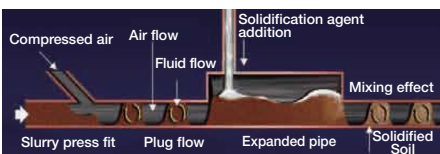
Operations

COS-NET (Construction On the Sea Network)



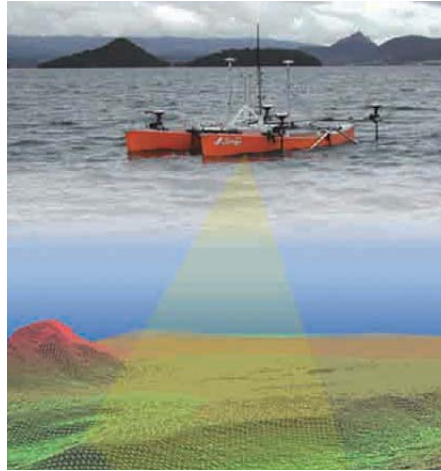
COS-NET (Construction On the Sea Network) is a system for monitoring and controlling work vessels through a combination of GPS and IT technology. Utilizing this system makes it easy to obtain accurate positions and other operation data.

Plug Magic Method



TOA developed an engineering method called the "Plug Magic Method." This method enables soft dredged soil to be solidified efficiently for reuse as a filling material. This method requires no mixer, reducing the operating cost by as much as 10 to 15%. It is also an environmentally-friendly method that enables in-pipe transportation of soft mud from the dredging site to the reclamation site. Plug flow occurs when compressed air is mixed into soft mud in a pneumatic pipeline. This method kneads soft mud and solidification material in the pneumatic pipeline, utilizing the characteristics of plug flow. It has a maximum solidification capacity of 1,000m²/h.

Beluga System



This is an original system developed by TOA for accurate and speedy measurement of the depth of ground level in water by effectively combining the latest measurement devices, including the narrow multi-beam depth measuring sonar and GPS, in order to acquire data in wide spaces.

Wide Grab Bucket Dredging Method -High precision dredging-



A large-scale wide bucket used for effectively carrying out highly precise shallow layer dredging. This equipment is tightly sealed and has a high soil concentration ratio per grab and the trajectory of the bucket blades can be verified on a screen from the control room while carrying out highly precise shallow layer dredging.

Seismic Isolation Method

- Seismic isolation technology for protecting people and building from earthquakes -



A construction method where layered rubber is inserted in between the building and foundation and by separating the foundation from the building, the sharp movements of an earthquake are changed into slower, more gradual movements. This maintains the safety of the people inside the building and protects the building and equipment from damage.

Cutter Suction Dredger -Dredging-



A dredging vessel which excavates sea bottom foundations using the cutter on the tip of the rudder, and dredges large quantities using its pumps. Dredged material is directly transported to the designated discharge areas through soil exhaust pipes. Our company has carried out continual improvement of dredging machinery since the company's founding in order to allow handling of dredging in a wide variety of soil qualities from soft mud to hard soil.

Multiple Angle Swinging Pile Driving Vessel and Crane Ship -Pile Driver Ship-



The company has constructed the “Kakuryu” large scale multiple angle swinging pile driving vessel with a 600t hoisting capacity and superior work efficiency to accommodate the increasing trend towards scaling up of diameter of steel pipe piles for the larger scaling of port facilities both in Japan and overseas.

Cement Deep Mixing Method -Foundation Improvement -



A Cement Deep Mixing method. This method hardens soft foundations by mixing soft soil with a stabilization agent in-situ using a rotating mixing shaft with blades. The method is suitable for providing stable strength quickly in both onshore and offshore works and for various purposes such as massive constructions, narrow space construction and treatment of contaminated soil.

Mangrove Transplanting -mitigation-



In development in Singapore forest that was going to be eliminated was instead transplanted and recreated in accordance with local environmental conditions. The mangrove seeds were grown to saplings and then transplanted for a successful large scale production of an approximately 13 hectare mangrove forest.

*Mitigation: A preservation act for reducing the affect of development projects on the environment.

The Balloon Grouting Method



Depiction of work being carried out on an airport runway (liquefaction countermeasure)

The Balloon Grouting Method is a chemical grouting method used to avoid liquefaction underneath existing structures and leakage of back-fill material behind existing wharfs. This method uses low pressure-injected chemicals into boreholes (96mm diameter) to strengthen foundations.

This operation can be carried out without damaging existing facilities and disturbing their operational activities. As the equipment is relatively compact, this method is particularly useful where space is restricted.

FRP Protective Permanent Form Method -Salt Damage Deterioration Restoration-



A restoration method for concrete port structures suffering from salt damage. Highly rigid FRP* panels are used as a framework when restoring the deteriorated parts, and the panels are left in place after completion of the work to prevent penetration of external chloride ions, making for a durable structure.

*FRP: Fiber Reinforced Plastics

Dokodemo(Anywhere and Everywhere) Dry Method -Maintenance of Underwater Work Spaces-



A technology for creating workspaces around waterside structures. A sponge type water proofing material is installed in the joints between the main structures and work structures which are then connected to create an air filled space in water. The technology provides superior waterproofing and strength properties and can handle even structures with very complex shapes allowing for repair and reinforcement construction to be carried out earlier.

RESEARCH & DEVELOPMENT

Operations

Soil Separator-Multi Method for Tsunami Deposits

The 15th Infrastructure Technology Development Award (Best Excellence Prize)

The Soil Separator-Multi Method is a method developed by our company to reduce the volume of and also recycle dredged sand and soil.

The vast quantity of soil and sand, which had trash and rubble mixed in, generated by the tsunami caused by the Great East Japan Earthquake is referred to as tsunami deposits. Delay in the treatment and disposal of such tsunami deposits is one of the factors that is hindering the recovery and restoration of the areas devastated by the disaster. To resolve this situation, our company employed the soil separator-multi method to develop a recycling technology for separating and removing minute pieces of trash and rubble,

measuring a few millimeters in size, from the tsunami deposits, and further sort through the soil and sand to remove as much of the clay components as possible.

Our company will continue to make use of its technologies, such as the soil separator-multi method, in its efforts for the early recovery and restoration of the areas devastated by the disaster.



Tsunami deposits



A panoramic view of the facilities

Technology for Removing Radiation-Contaminated Bottom Mud From Bodies of Water

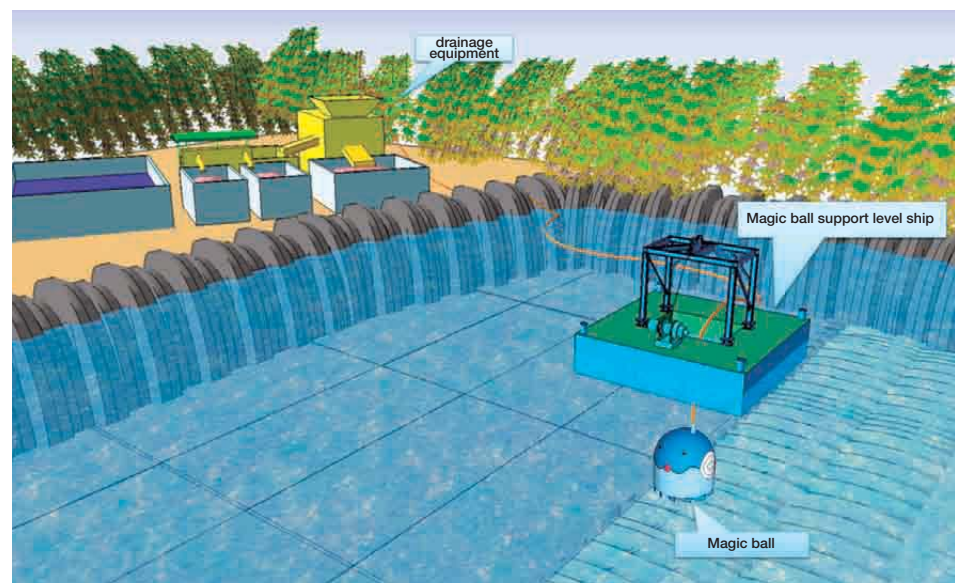
Toa Corporation and Fukushima University have firmly established through verification tests conducted in Fukushima Prefecture a technology for removing radiation-contaminated bottom mud from bodies of water, such as lakes, marshes, and the sea. Utilizing this technology, the top layer of bottom mud, which had a high cesium concentration, was removed while keeping turbidity to a minimum and also reducing the volume of soil and sand that needed to be removed.

The verification tests made use of a modified "magic ball," which is a deposit removing device for suctioning soil and sand, and an aggregation agent was used in the solid-liquid separation treatment in order to reduce

the final volume of sludge for disposal.

The test results showed that 88% of the radioactive substances deposited in the storage reservoir was successfully removed.

Furthermore, cesium was not detected in the discharged water following the solid-liquid separation treatment.



Depiction of removal work