Newsletter – *March 2016*

ASB Systems Pvt. Ltd.

Grab-this-probe!

"A Rupee saved is a Rupee earned", is an old saying, but still holds true in this modern age. And to be able to save both time and money would indeed be divine.

Modern day gadgets enable us to save time and money. Traditional mail has been replaced by online messaging, which delivers messages in an instant, at a fraction of a cost. The smart phone doubles up as a Camera, Torchlight, Navigation device…and is set to replace the humble PC in the near future! The smart watch allows its wearer to not only use it for making and receiving calls, but also for health monitoring such as heart rate sensor, measuring calories consumed, providing a workout summary, including a reminder to stand up if you have been sitting for too long!

And then there are those devices which harvest the power of Nature: Solar cells use sunlight to generate electricity, Wind turbines use wind's force for the same and Hydro-electric dams use the river's flow to generate power sufficient to cater for small and large settlements.

DotOcean's "Graviprobe" is one such device, which employs modern-day technology, and nature's gravitational force to do its work. This free-fall penetrometer analyzes the underwater sediment layers during intrusion. Under its own weight it accelerates and penetrates fluid and consolidated mud layers.

Read on, to understand the potential of this amazing instrument!

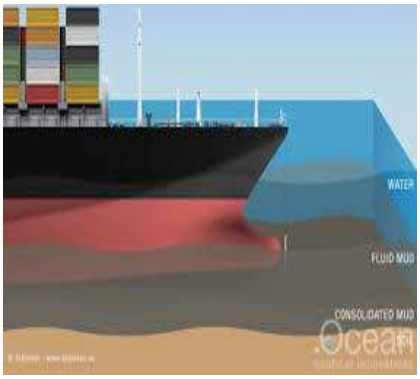
In this issue…

Lets get to the point: Graviprobe saves Time and Money

The obvious question is HOW??
One needs to get to the Bottom of it (no pun intended). A white paper available on the net describes how “Fluid Mud Density” measurements saved Harbour Dredging costs amounting to thousands of Pounds for a British Port. A brief excerpt in the following paragraphs.
It is difficult to obtain a useful profile of fluid mud density by acoustic methods. Echo sounders respond to both the density and the acoustic velocity gradients of the medium. Any abrupt change in density, eg at the interface between 'dirty water' and freshly settled fluid mud, will give a signal, but progressive density changes do not register.

In most scenarios, the 'bottom' is composed of soft material such as silt or fine sediments which gradually increase in density with depth.

Tidal currents or storms continually erode cohesive sediments and carry them into navigation channels. As the wave energy dissipates, initially mobile suspensions stagnate to form denser static suspensions, often called **'fluid mud'**, or sometimes 'slib' or 'sling mud'. Such static suspensions can appear very suddenly after a storm. They may have two or more layers and may reach up to three metres in depth, which can take them significantly higher than the channel datum.



Experience indicates that although manoeuvring characteristics may change somewhat, ships can still navigate safely through fluid mud containing up to about 15 per cent by volume of dry sediment, corresponding to a density of around 1200kg/m3. **The challenge is to detect the depth at which the fluid mud reaches this critical density.** A standard leadline will always indicate the greatest depth, usually at a mud density of over 1300kg/m3, while an echo sounder with a 210 kHz transducer will indicate the least depth, where the density is around 1060kg/m3. This appears to be the case regardless of the consolidation of the silt.

An echo sounder will often return at least two signals: a 'hard' echo from the denser, well-consolidated mud of the seabed, and a 'soft' echo from the interface between the seawater and the top of the fluid mud. With a 3.0m static suspension, the first echo would come from a depth of 19.5m below chart datum in a channel maintained at -22.5m through which tankers drawing 20.7m regularly pass. **Thus the true navigable depth of a channel may be significantly deeper than the depth indicated by the first reflection of the echo trace.**

This is an important consideration when deciding whether or not dredging is required.

Let's understand the working with an Example:

An access channel of 5km by 200m needs to be 21m deep to be navigable. A high frequency echo sounder survey provided an image of the seabed and shows reflection at 20m water depth, a low frequency echo sounder provided a reflection at 21 m water depth. So we see a difference of 1 m between the two systems and assume a mud package of 1m thickness.

In total 1 vertical meter must be dredged away according the acoustic information. This amounts to a quantity of 5000m x 200m x 1m= 10,00,000 cu. mtrs of material to be dredged.

To increase the accuracy of the survey, the GraviProbe is used in the access channel and data shows that the real difference between the high frequency echo sounder and low frequency echo sounder should be 0.9m instead of 1m. The Graviprobe survey itself takes very little time, as the probe is deployable by one person, and can be deployed tens of times in a single day.

The 0.1m difference obtained results in a straight 10% reduction in Dredging work for this particular example.

This would save a considerable amount of time and money, and shows the significant impact of accurate data to determine the maintenance dredging budget of an access channel or port.

Thus, Graviprobe can accurately determine the correct navigable depth and, in turn, save dredging costs.
The results obtained with a Graviprobe far outweigh its cost of ownership. The instrument is light weight & portable, and has been designed for quick deployments.
Graviprobe is also available in a "Soil" version where the mud layer consists of stiff material and a deep sea version upto

Theory - The rheological conditions of the soil layers determine the probe's dynamical behaviour. The data acquired from on-board accelerometers, inclinometers and pressure sensors are feeding a dynamical model which determines the rheological paramters (dynamic cone penetration resistance and dynamic undrained shear strength). As a result, the GraviProbe is able to distinguish the depth of the different sediment layers very accurately. The high sensor data acquisition rates of up to 2 kHZ in combination with a low drag housing results in the highest quality profiles.

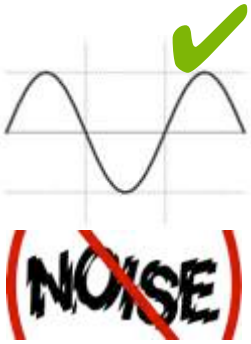
Features - Simultaneous measurement of depth, dynamic cone penetration resistance and dynamic undrained shear strength.

Applications - Determination of the nautical depth in ports, harbors, seaways and estuaries. High accurate depth measurement, improving echo-sounder data. Complementary soil analysis during CPT and core sampling and many more…

Do feel free to get in touch with us for more details on this amazing instrument!

Taking care of Survey equipment

- Installation: As far as possible, the installation should be in the Survey operations room, away from external factors such as sea spray, and and direct exposure to sunlight. For example, Motion Sensors can be installed indoors instead of on the Multibeam transducer pole outside. The feature of Lever arms can be used to offset for the position.
- Try and power on the equipment for a few minutes atleast once a fortnight/ month.
- Clean Power – Invest in good quality Inverter Gensets, Servo Stabilizers, Online UPSes and DC regulated power supplies. They will ensure that your expensive survey equipment lasts longer.



- When not to be used for long periods, demobilise the equipment. Store it in a suitable case and keep it indoors. It is a good idea to pack some silica dessicant packets with the equipment. These packets absorb moisture, something that an electronic instrument can do without.
- While storing equipment with batteries for prolonged periods, remember to disconnect the batteries. If possible, remove them from the equipment and store seperately.
- One important point is to ensure that the equipment is completely clean and dry before packing it into the box. If moisture ingress is suspected (for example, it has just arrived back from the field), just leave it on the table and in standby mode for a day or so. This will ensure the moisture evaporates.
- Tender Loving Care – Ensure that the equipment is handled only by trained personnel. Bad handling can cause problems ranging from minor connection issues to total wreckage. Every instrument has a different shock tolerence.

- Dust - Integrated circuits (ICs) can suffer from overheating due to the insulating effect of dust as well as suffer from electrical shorts caused by dust across their contacts. The most susceptible ICs are those having a metal lid acting as a heatsink cooling surface. To prevent overheating and failure, this metal surface and heatsink need to be essentially dust-free. Dust acts like an insulating blanket, preventing proper convection cooling.
  Solution is preventive maintenance and regular cleaning. Simple steps such as air-conditioning and installing door-mats will help in maintaining a dust-free environment.
- Vibrations – The boat's engine is one of the primary causes of this problem. A general assesment can be done by simply checking the installation platform (table) by the palm of your hand. If you feel a tingling sensation, the vibration is significant. Solution is to use thick rubber pads on the table to place the instrument, in order to damp the vibrations.