Newsletter – *August 2015*

ASB Systems Pvt. Ltd.

Dig into it!

Hydrographic Surveying has come a long way from the days of Lead-line surveys and Wire-drag surveys.

WW-II saw the development on Sonars, mainly for use in wars. The 80s saw the advent of the GPS systems, for military and civilian use. As technology advanced, and the demand for higher accuracy increased, more and more complex instruments were developed. Dual frequency Echosounders, Multi-frequency GPS receivers, various options for differential corrections and peripheral sensors for Motion, Sound velocity and Heading are all part of this revolution.

But today, we intend to take you back to the basics. Can there be a system which is sophisticated, can deliver what is required, and yet be simple to understand and implement…we are talking about Dredgepack software. We unravel how Dredgepack smartly merges simplicity and sophistication, and provide answers to the following questions:

-Can Dredgepack be installed and used on a Dredger not already equipped with a hi-fi Dredge monitoring system? Yes
-Can the Dredger activity be remotely monitored in real-time? Yes
-Can Dredgepack measure the TDS (Tons Dry Solids)? Yes
-Can the existing sensors be interfaced with Dredgepack? Yes
-Can Dredgepack generate the desired reports? Yes

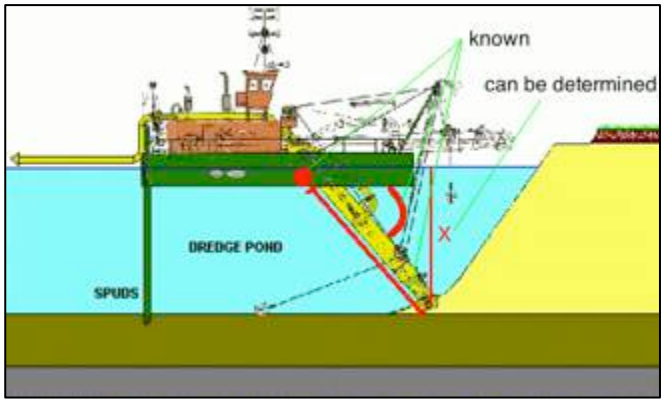
In this issue, we try and simplify how Dredgepack works….all without using any complex instrumentation !! Read on to find out how…

In this issue…

DREDGEPACK®

What does the Dredgemaster need to monitor?

1. Position and Depth of the Dredge head
2. Info about locations already dredged and to be dredged
3. Whether dredged to the correct depth or not



Additionally:

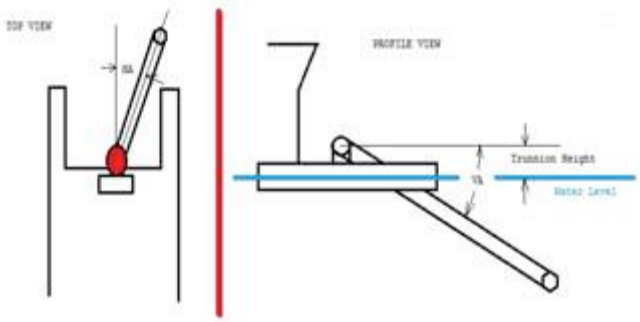
1. Monitoring Load and Draft for Hoppers
2. Provide Load reports
3. Determine Volume of material in Hopper
4. Calculate the tons dry solids
5. Calculate the volume of dry solids in hopper
6. Generate a report containing above information

Dredgepack is designed to work with Cutter suction, Hopper, Bucket and Excavator Dredges.

THE LOGIC

What is known:

- Dredger dimensions
- Dredger position
- Dredger heading
- Ladder arm angle
- Tidal level



What can be found out:

- Cutter head position
- Cutter head depth

What instrumentation is required:

- DGPS cum Heading sensor
- Tilt Sensor - to measure ladder arm angle

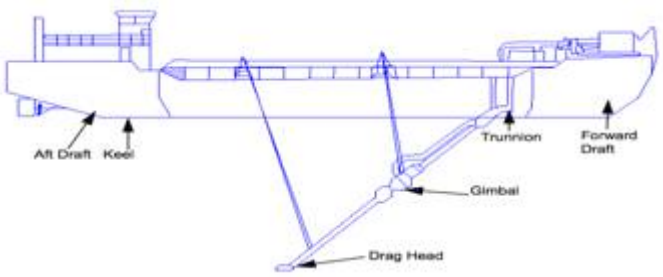
How: Using the Trignometric formula for "Angle of Depression"!!

Simple, isn't it??

Ok, so how about Hopper Dredgers, where Load Draft monitoring is also required? No Problem!

A Bubbler System & Hopper level sensor will do the required tasks.

A Bubbler system is a simple "Air Bubble Depth Gauge", and is designed to provide accurate depth measurements without the need for costly sensors to be located underwater.



A complete bubbler level measurement system consists of a source of compressed air, an air flow restrictor, sensing tube, and pressure transmitter.

A constant flow of pressurized air is applied to a tube (or multiple tubes known as "channels"), which is routed to suitable points on the Dredger arms. A pressure transducer monitors the air pressure in the tube. The pressure in the tube is equal to the pressure at the bottom point of the routed tube.

As the arms are lowered into the water, the corresponding increase in pressure is measured as the arms' depth.
The Vessel's Forward and Aft draft can also be monitored by installing the Bubbler tubes at suitable locations.

Hopper Level sensor (also called Ullage sensors)
It is a level monitoring system using ultrasonic (radar) sensors which are installed above the hopper. As the Hopper level changes, the distance from the sensor to the surface of the contained material is measured.

LDM - Load and Draft Measurement
The Load and Draft Measurement (LDM) program is a part of Dredgepack. After receiving the draft and hopper level from Dredgepack, the LDM program does the following calculations:

- Determine the ship displacement (D). Displacement is interpolated from a load table based on the current draft value.
- Determine the volume of material in hopper (V). Hopper volume is interpolated from the load table based on hopper level.
- Subtract the lightship value (l) from displacement to obtain the load: See "Lightship Calculation" for details regarding lightship calculation.
- Calculate the density of mixture in hopper by dividing the load to the volume of material in hopper
- Calculate the tons dry solids (TDS) Calculate the volume of dry solids in hopper (CUM) by dividing the tons dry solids by the in-situ density:

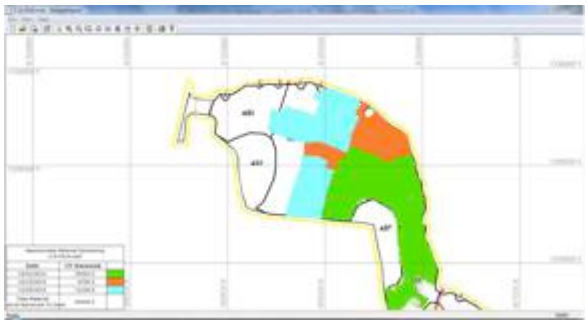
Ok, great, but can it work for Excavators which work from a Pontoon or Barge?
Can the monitoring be done from the Barge? Yes, definitely! How?

Using a wireless KVM (Keyboard, Video, Mouse) switch and a Dredgepack controller box. 3 nos Tilt sensors installed on the Boom, Stick and Bucket help to measure the depth of the digging head. The controller box measures the Excavator's Roll & Pitch. A DGPS cum Heading sensor measures its Position and Heading. Operations can be monitored on the Barge as well as in the Excavator.

Using tools in Dredgepack, your SURVEY data is loaded into a color coded matrix. Your survey data can come from single beam data, multibeam data or multiple transducer data. Dredgepack will monitor the exact position and depth of the digging tool and keep track of an 'As Dredged' surface. You'll be able to see exactly where your digging tool is in plan view and in profile view. You'll also be able to see the channel design depth and channel overdepth in profile view.

So basically, it's all there in Dredgepack!! After all, it has been designed by a Surveyor for a Surveyor

To Summarize:



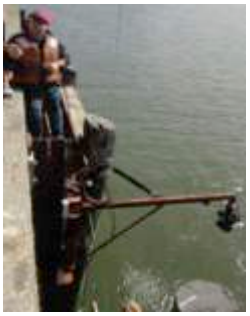
Dredgepack is designed to save you money. It keeps your crew working in the dredge cut and prevents them from wasting time and money by digging too deep or outside the channel. Dredgepack is designed to work with cutter suction, hopper, bucket and excavator operations. Dredging plans can be simple channels or complex surfaces, as created in the ADVANCE CHANNEL DESIGN program.

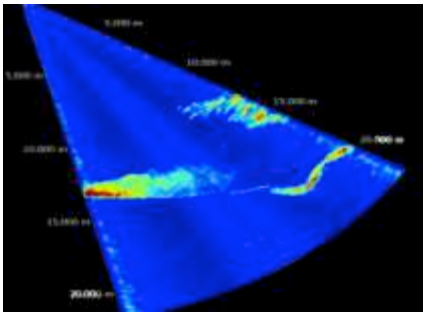
Dredgepack can also interface to existing instrumentation installed onboard, depending on feasibility.
The Matrix Reporter program allows the user to see where the dredging has occurred with a visual representation.

Measuring Sediment build-up using Imaging Sonar

To ensure that the Port of Grays Harbor (Washington, USA) can accept incoming vessels in one or both of the berths of Terminal #4, the sediment level below the water surface must be maintained at a safe depth. The berths of Terminal #4 are bombarded with sediment loading from the Chehalis River, which can build up as much as 20 feet per year. To save Dredging costs of $1 million to $2 million per year, the port installed a jet array pumping system. These pumps supply a flow rate of 13,000 gallons per minute twice per day during tidal ebbing. Individual nozzles on the jet array clear away flocculants (suspended particulates) before they can contribute to sediment buildup. In the 30 years since it was installed, the jet array pumping system has been successful in maintaining the berth depth. But even this system was still costing the Port nearly $230,000 per year in electrical energy costs.

The Port was interested in the potential of reducing the nozzle operations, which would reduce pump runtime and save energy. Because dredging is extremely expensive, the Port could not reduce nozzle times without assurances that detrimental sediment buildup would not occur.





Engineers actively searched for equipment that could be used to prove that the minimum berth depth could be maintained while reducing the nozzle runtime. After extensive research on different methods and technologies, they contacted Teledyne Blueview for a high-resolution 3-D multibeam scanning sonar that should be able to detect changes in sediment buildup with a resolution of one to two inches after operation of the jet array pump nozzles.

Once the BV5000 was deployed, the Port of Grays Harbor was equipped to accurately detect the amount of sediment removed during jet array pumping operations. After training, testing, and adjustments, the Port was able to develop an "as-needed pumping" seasonal operating schedule. The annual energy savings in 2014 alone totaled more than $72,000. Since the beginning of the project in 2011, the Port of Grays Harbor has saved more than $220,000.
Additionally, the port could detect a damaged piling, evaluate bottom conditions, and verify that waterways are clear of debris and obstructions to ensure safety for vessels using the Imaging Sonar.