SEA VIEW SYSTEMS

The Pipeline Periodical

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Welcome to all

Welcome to this first issue of what will be a quarterly newsletter. Thanks for the interest you have shown in subscribing for the newsletter on our website www.seaviewsystems.com. If you have come by this newsletter by some other means I invite you to subscribe by visiting our website.

I hope you find the contents informative and applicable to your enterprise.

It is my intent that each issue will discuss our activities over the last quarter and also cover some aspect of our operation in detail. I invite any comment or questions that may arise from these articles.

In addition, I will briefly cover any advances in technology and operations that SeaView has accomplished over the previous quarter.

First, Introductions…

What is SeaView all about?

SeaView Systems, Inc. consists primarily of me, Matthew Cook operating full time and a growing fleet of ROV's and a considerable resource pool of underwater sensing equipment and expertise. Since 2002, when I started operating in the inland ROV market I have been successful in building an excellent network of specialists around the US who are also operating on an individual or very small business basis. As a general rule, I sub-contract specialist support on a project-by-project basis. This approach allows SeaView to execute projects that would otherwise be beyond the scope of a single individual while maximizing the quality of the service.

Though in time it is my intent to build the company to have the capacity to support two in-house field teams consecutively, the current approach is proving to be flexible and efficient. As I will discuss in the chapter "Last Quarter", we have recently covered projects ranging from long distance pipeline inspections to high resolution/restricted access bathymetric surveys to deep water scientific research support. This variety of activity has only been possible by calling on my network of experts.

Being a small, primarily service oriented business our success is directly tied to how we perform on the job and the quality and content of our final

report. I am dedicated to exploiting available technology to go the extra mile to provide the best service possible. I believe much of our success to date can be attributed to the effort put into providing novel solutions and unique capabilities while building strong relationships with our clients.

Yours truly, Matthew Cook

Matthew Cook: President

As this is the first newsletter it's probably a good time to introduce myself and provide a quick biography.

I started my career as a weapons systems technician in the Royal Australian Navy. After 7 years either at sea or in the classroom, it was time to make a move. In '91 I left my warship in Sydney, Australia on a Friday afternoon and I was on a seismic research vessel in Singapore by the following Monday morning. Out of the fat…

This trend of working with maritime electronics has continued to the present day. The major change being that in '93 I was in harbor in Singapore aboard that seismic vessel when along the wharf came an amazing looking contraption. I had no idea what it was at the time but it looked like something I could get interested in. This first impression was no mistake; the contraption was a work-class ROV and I have been embedded one way or another in the industry every since.

While working offshore you get to work on some pretty amazing projects but there is a lot of travel which is not great for family life, so in 2002 I set to working inshore as SeaView Systems, Inc. This move has allowed me to exploit my systems engineering skills and follow avenues that are not only commercially viable but of interest to me. To this end, I settled on specializing in long distance pipeline and tunnel inspections and so developed our Long Distance ROV (LDROV), now capable of inspections to 8000'. My years "on the sticks" running ROV's offshore comes in handy when we perform general ROV operations.

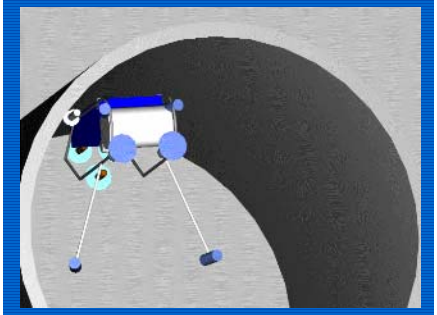
In addition to systems engineering, I am able to call on the geodesy skills that I learned back in my seismic survey days to project manage and assist with the execution of hydrographic survey operations. The real powerhouse of this branch of our operations, however, is Mr. Jeff Snyder of SeaVision Marine Services with whom I team up whenever possible.

Last Quarter

It has been a great start to the year. This quarter I have come on full-time working for SeaView Systems, Inc., having reluctantly resigned from my 50% position with the University of Michigan Marine Hydrodynamics Lab., moved into a 1400 sq ft workshop office, taken delivery of a Seaeye Falcon DR ROV, completed a major refit of the LDROV (Long Distance ROV) and performed a number of projects from San Diego, CA to Newport, RI.

Seaeye Falcon DR in delivery crate

LDROV console desk



Sketch of LDROV in pipe performing crown inspection.

Seaeye Falcon DR

This is the latest addition to the growing SeaView fleet of ROV's. Manufactured by Seaeye Marine in the UK, the Falcon DR is a 1000 meter rated, fiber optic version of their successful Falcon range of ROV's. The initial purpose of this vehicle is to perform inspections of hydro-electric penstocks requiring deep water capability, but the vehicle's versatility has already shown itself in the range of projects we have performed with it to date.

Refit to LDROV

Over the holidays, in preparation for two pipeline inspection projects, I performed a major refit to the LDROV system that I have developed. This ROV is a custom machine especially designed for performing long distance pipeline inspections. The unit uses a small diameter, fiber optic umbilical to transmit 3 channels of video along with a host of sonar data. The refit involved a major rework of the prototype electronics design as well as fitting out a 10' x 5' covered trailer with a 19" rack mount equipment console, monitors etc.

The improvements made were:

- Side cameras on spring loaded booms to provide images close to pipeline walls after deploying through manholes as small as 20".
- Installation of parallel scaling lasers.
- Dual profiling and forward looking sonars.
- Pitch and Roll.
- Individual video overlay on each video channel showing camera name, time, date, pipe name, station position, penetration distance, pitch and roll.

San Diego County Water Authority

Among SeaView's more major projects this quarter has been a tunnel inspection project performed for the San Diego County Water Authority. This project involved inspecting two large pipelines running under Lake San Marcos near Escondido in CA. The project required the LDROV be inserted through manholes as small as 20" and then closely inspect a 6' and then a 9' aqueduct performing penetrations out to about 2300 ft.

Using the recent modifications made to the LDROV I was able to use the collected profiler data to build Out-of-Round charts of the pipelines showing any deviation from round.

Given a situation where there was sediment we would also be able to model the depth and volume of the sedimentation.

Newport, RI

Falcon DR with IMU preparing to launch for inspection under mothballed aircraft carrier.

This was the maiden project for the Falcon DR. Contracting to Seavision Marine Services, we were required to map and model the area directly below two mothballed aircraft carriers laying alongside in Newport, RI. Due to the very shallow clearance between the bottom of the vessel's hulls and the seabed (about 5 ft), conventional hydrographic survey methods could not be brought to bear.

Instead, we opted to use a novel approach for performing restricted access bathymetry where the position and attitude of the ROV is provided by use of an inertial measurement unit (IMU) assisted by a Doppler velocity log. By using this system in conjunction with profiling sonar, we were able to model the underside of the two carriers. The method was to make multiple passes under the hulls of the carriers in a "mowing the lawn" pattern while recording both the seabed and the vessels hull with the profiling sonar. This data along with the single beam altitude recorded with the Doppler sonar and a precision depth measurement were used to build both a high resolution chart of the area directly below the hulls and a 3D "fly –through" display of the area below the ships hulls.

Battery Park, New York

Falcon DR with IMU skid at Battery Park

Following the Newport project we ran the equipment down to New York City to perform an inspection of the pile field under Battery Park. This is in preparation for the building of the "Freedom Towers" which are to be built on the site of the World Trade Center.

NOAA

Cardinal fish at 825m videoed off of Buck Island, St Croix USVI

This project was one of the highlights of my 13 year career with ROV's. SeaView was sub-contracted by Seavision Marine Services to provide ROV services in support of NOAA's project "Benthic Habitat Characterization and Bathymetric Mapping in the U.S. Virgin Islands (USVI) and Puerto Rico" .

This project required that we fit the Falcon with a range of cameras, lighting and lasers and perform dives down to 800 msw. Racing back to Michigan after finishing up in New York we quickly reconfigured the Falcon for deep water operations and shipped everything down to St. Croix in the US Virgin Islands.

Once on location, we mobilized onto NOAA's research vessel Nancy Foster which was our home for the 13 day project. We used the ROV to perform a baseline investigation of a region of reef dropping off from Buck Island off of St. Croix into deep water. With excellent visibility

and "exciting" terrain it was not unlike one might imagine flying about the Grand Canyon were it flooded! Once our time in St. Croix was up we transited to Puerto Rico where we performed several days of survey covering shallow reefs to deep drop-offs.

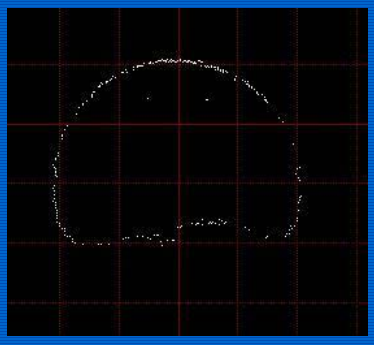


Figure 1: x,y points from scan of pipeline showing sedimentation.

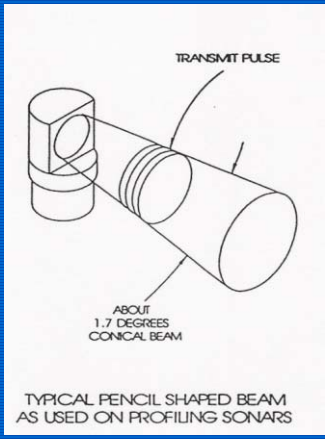


Figure 2: sketch showing pencil beam of profiling sonar (sketch courtesy Imagenex)

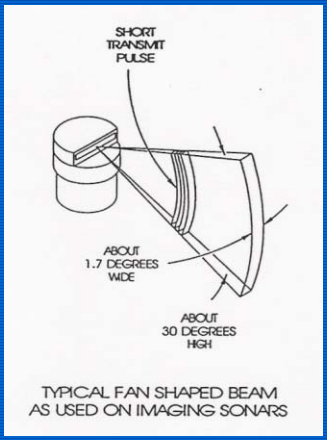


Figure 3: sketch showing fan beam of imaging sonar (sketch courtesy Imagenex)

Sonar Summary

When first discussing profilers with the uninitiated, there is sometimes some confusion as to how they differ from an imaging scanning sonar or a sidescan sonar.

First of all, let's look at the difference between a scanning sonar and a sidescan sonar. With a scanning sonar, a small transducer emitting thousands of ultra sonic audio pulses per second is rotated about an axis using a small motor to drive it. The transducer rotates around an axis much as a lighthouse lamp rotates. In contrast, a sidescan sonar has a fixed transducer which also emits thousands of pulses per second but its movement is a linear one generated by towing the transducer through the water rather then an angular movement achieved with a motor.

Next we must differentiate between an imaging sonar and a profiling sonar. Imaging sonars are typically used to provide an image of the seabed or water column much as a radar does on land. They provide a multicolored (chromatic as its called) display which shows stronger echo returns as brighter colors then points with weaker echos. E.g. you may get a bright yellow return off from a strong return off of the side of a steel shipwreck and dark blue off of the weak return from a smooth sand bed.

A profiling sonar on the other hand provides a digitized version of the echo returns. The sonar's processor looks at the return signal for each pulse and decides where along that pulse's return time lays the strongest return. Rather then providing an analog range of colors for each pulse it provides a single dot or x,y point at the point of strongest return.

Another differentiating factor between imaging and profiling sonars is the shape of the transducers beam pattern. An imaging sonar is typically a fan beam whereas the profiler emits a beam pattern like a spot or pencil beam.

The imaging sonar fan beam (typically around half power +/-15 deg from horizontal) is so configured to ensure that all targets above and below horizontal are detected while retaining an angular resolution (about 1.7 deg). The profiler on the other hand is a very specific tool for performing engineering measurements. Its spot or pencil beam (half power about 1.7deg from both horizontal and angular rotation) means that it is able to provide high resolution measurements both in terms of the horizontal plane and of angular displacement around its motor axis.

OK, so what does all this mean to you? When we are inspecting a pipeline, our profiler takes very specific measurements of the internal dimensions of the pipe at that location. Not an average over the fan beam as it would be if we used and imaging sonar. The profiler then provides us with either a series of digitized "dots" in a screen shot (as in figure 1) or it can save those thousands of digitized points as an ASCII file which can then be imported into CAD software for post

processing.

If combined with the recorded penetration depth we now have the necessary x,y,z points required to build a 3D model of the pipe (x & Y from the profiler and z from the umbilical counter). Once input to CAD, such parameters as volume of sedimentation or percentage restriction in pipe can be calculated.

If you would like a further, more detailed description of sonar theory, Imagenex provide an excellent summary on their website www.imagenex.com or you can click this link to download it directly Basic Sonar Theory.