



Brooke
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Marine Design

Economic Benefits of Moving Vessel Profiler (MVP) Supported Multibeam Surveying

Cost Area:

Cost Saving
(per month):

1.) Ship Time and Expendables

a.) Ship Time

MVP saves a minimum of three (3) hours per day of ship time by eliminating the requirement to stop and use a static cast.

b.) Expendables

A well-designed survey employing expendable probes uses two (2) CTD and twenty (20) temperature probes per day.

2.1 month ROI
or
\$56,250 per month

\$60,000 per month

\$56,250
-or-
\$60,000

2.) Data Processing

MVP allows accurate velocity data collection, eliminating the time needed to examine every scan.

\$12,000

3.) Increased Line Spacing

Line spacing may be increased if reliable data profiles are collected. MVP support provides regular valid sound velocity profiles allowing the hydrographer to eliminate the possibility of data loss in the outer beams.

\$150,000

Total Potential Savings

Based on Ship Time: $\$56,250 + \$12,000 + \$150,000 =$

\$218,250
per month

Based on Expendables: $\$60,000 + \$12,000 + \$150,000 =$

\$222,000
per month

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The Details:

1.) Ship Time and Expendables

a.) Ship Time

MVP saves a minimum of 3 hours per day of shiptime by eliminating the requirement of stopping and using a static cast. With vessel costs at \$15,000 or \$625 per hour (US) and a MVP100 system cost of \$120,000 (US) this translates to a savings of 3 hours/day * \$625/day * 30 days/month = \$56,250 per month. Based upon these savings, the return on expenditure is \$120,000/\$56,250/month or 2.1 months.

For a larger vessel that charges out at a higher daily rate, the return would be sooner.

b.) Expendables

If one is using expendable probes the economics are slightly different. The probes cost \$50 (US) for a simple temperature/ depth probe and \$500 (US) for a salinity/ temperature/ depth probe. The latter is required to actually determine the velocity structure by an extrapolation. The temperature probe only indicates changes in velocity structure and requires double extrapolation to calculate the magnitudes. Assuming that a well designed survey uses two (2) CTD and twenty (20) temperature probes a day : $2 * \$500 + 20 * \$50 = \$2,000/\text{day}$; therefore the monthly costs = $\$2,000/\text{day} * 30 \text{ days}$ or \$60,000 per month.

Some countries require permits for the use of expendables. This is attempt to reduce the number of expendable probes littering the sea bottom with discarded hardware and miles and miles of very thin wire. Complaints could be loud (and justified) in inshore areas, exactly the areas where most frequent velocity sampling is required.

2.) Savings from Data Processing Efficiencies

The second economic benefit comes from the time saved in data processing. If one was confident that velocity structure is always accurately represented, the surveyor would not have to spend so much time examining every scan. The saving of time at this stage could be between 20-50% based upon estimates by professional hydrographers familiar with the system. Confidence in the velocity structure will ease the burden on the surveyor of the requirement of checking every scan therefore reducing the time for this stage of the processing. The Canadian Hydrographic Survey presently spend 4 hours of processing time to every 1 hour of survey time to produce a final multibeam data set.

- assume 1 month survey work therefore 4 months of post processing time

- assume save 20% savings therefore save $20\% * 4 \text{ months} * (\$ 500/\text{day} * 30 \text{ days}) = \$12,000/\text{month}$

For non-hydrographic-survey applications (oil exploration, pipelines) etc. the saving of time is crucial because it would make it possible to have the data preprocessed in real-time, i.e. while the ship is still on the survey line. Many tactical decisions in site surveys etc. depend on real-time information.

3.) Savings from Increased Line Spacing

The third benefit comes from the opening up of line spacing due to the confidence of valid sound velocity data profiles. The availability of regular valid sound velocity profiles allows the hydrographer to eliminate the possibility of data loss in the outer beams. By eliminating this possible loss the survey lines can be increased from 3.5 to 5 times the water depth.

To survey an area 10 km wide (any length) in 100 m of water requires roughly 15 survey lines at 700m line spacing ($2 * 3.5 * 100\text{m}$) and only 10 survey lines at 1000 m line spacing ($2 * 5 * 100\text{m}$). This translates directly into 33% increased survey efficiency or 33% decrease of survey cost for any given area.

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