



INTELLIGENT ACQUISITION

Marine towed streamer surveys are becoming increasingly complex, particularly with the advent of 4D and wide-azimuth. While these surveys improve data quality, they require additional time, personnel, and equipment – both scarce and expensive.

To address the technology and resource challenges, ION is developing Intelligent Acquisition™ to improve image quality and simplify and automate complex survey operations. [IA] integrates marine technology to harness all available information for maximum data quality, efficiency, and safety.

NEXT GENERATION COMMAND AND CONTROL

At the heart of [IA] is ION Concept System's Orca®, a central command and control system that centralizes and automates all on-board and in-water technology. This platform provides survey-wide visibility, control, and prediction capabilities to:

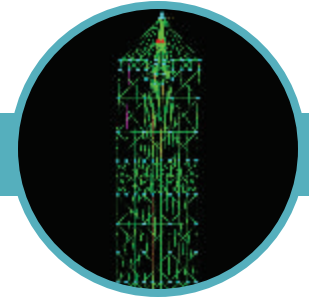
- Actively drive the vessel and spread to optimal parameters
- Reduce the complexity of configuring, controlling and monitoring acquisition
- Reduce the seismic cycle
- Reduce the cost of acquisition

Orca significantly reduces risk associated with operations, equipment failure, and HSE by reducing human intervention and interpretation. Advanced, automated alarm systems incorporate major contributing risk factors and proactively alert the end user when necessary. The advanced data management, planning and spread control supports 2D, 3D, 4D, and wide-azimuth operations with any number of vessels.

DATA MANAGEMENT

Orca maintains all the functionality previously provided by Spectra, Sprint, and Reflex. However, the foundations of Orca were designed to organize and manage data on a survey-wide basis to deliver superior functionality and performance. Improved data management provides a solid platform for future development enabling:

- **Consolidated Configuration** centralizes set up to minimize manual entry.
- **Real-Time Survey Planning** enables the operator to assign and optimize independent continuous tracks with real-time data to reduce infill and evaluate multiple shooting scenarios.
- **Unified Control** automatically executes the real-time plan, updates user-defined displays based on system context (online, deployment, etc.), and automatically coordinates end of line procedures.
- **Centralised Diagnostics/Alarms** enables one user to evaluate the status of all systems on a single screen with the ability to drill down to analyze specific issues.
- **Multi-vessel Management** assigns each vessel an independent track and automatically sets up inter-vessel communication links, automatically merges spread configurations, and QCs data logging.
- **Processed Data Management** delivers final P1/90 data 10 minutes after the end of line and assesses whether each line may benefit from post-processing. The Near Real-Time module creates and populates a database allowing the user to manually view and modify data in real-time. An NRT replay process allows corrections to be quickly applied, however, NRT targets a maximum reprocess rate of 10%.
- **Coverage Data Management** allows the user to visualise predicted coverage. Enhanced functionality has been added to view individual source coverage for WATS surveys.
- **Web Survey Management** provides a survey-wide view of acquisition and enables users to configure and view customized reports, manage logs and edits, regenerate end-of-line deliverables, and monitor production status.



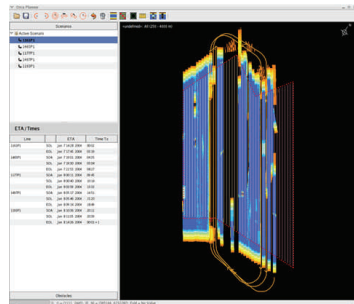
PLANNING

To optimally acquire data, it's important to make correct sail line choices throughout the survey. The Orca Optimizer provides in-field decision-making through advanced prediction functionality allowing:

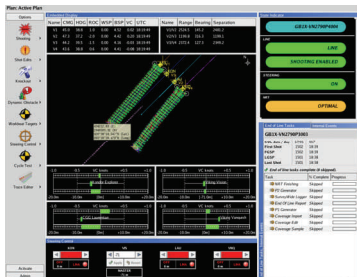
- Feather prediction and matching
- Streamer shape and coverage prediction
- Obstruction modelling
- Line prioritization
- Optimal turns

→ LINE PRIORITIZATION

During a survey, some prime lines and infill contribute little to the overall data quality or repeatability. Pre-survey modelling is combined with in-field data to dynamically select the least number of lines to achieve the desired results.



Thoroughly evaluating choices based on actual and forecasted data in real-time facilitates optimal placement of the vessel, spread and equipment to maximize data quality and productivity. The Orca Optimizer supplies the Real-Time planner with vessel tracks and target feather to enable execution of the plan.



→ SURVEY-WIDE CONTROL

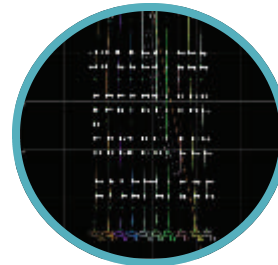
Orca centralizes and integrates all in-water and on-board systems to enable survey-wide control through a single, automated interface.

STREAMER CONTROL

Orca integrates all the necessary systems and data required to dynamically control streamer positioning.

For example, Orca has been closely integrated with DigiFIN™ to control lateral streamer movement in a dynamic marine environment. Based on the optimal plan, Orca drives the DigiFIN lateral controller to position the streamers towards the required feather.

The system integration also reduces cycle time by driving DigiFIN devices to quickly straighten cables coming out of turns. Dynamic acoustic networks are also configured for more accurate positioning during deployment. This spread control improves repeatability coverage and reduces infill.



→ EVEN STREAMER SEPARATION

Orca provides DigiFIN with streamer separation estimates to evenly adjust cable spacing throughout the spread. The increased control enables repeatable, finely sampled seismic data and minimal infill.