# CODEVINTEC
Tecnologie per le Scienze della Terra e del Mare

# Caris
# Hydrographic Survey



Photo: João Ventura da Cruz

**TELEDYNE CARIS**
Everywhere**you**look™

**CODEVINTEC**
Tecnologie per le Scienze della Terra e del Mare

# CARIS Hips and Sips 10.4
## The most comprehensive Hydrographic data processing system

**Backed by over 25 years of excellence, the HIPS and SIPS™ suite of products offers essential capabilities and professional grade tools for hydrographic data processing.**

Supporting over 40 industry standard data formats, HIPS and SIPS can easily integrate into any workflow. It enables you to simultaneously process multibeam, backscatter, side scan sonar, single beam and Lidar data. It incorporates the latest in 3D visualization technology for the purpose of hydrography, oceanography and marine science. As part of the Ping-to-Chart™ workflow, HIPS and SIPS can be easily expanded to meet your wider geospatial needs.

### Automatic Boresight Calibration
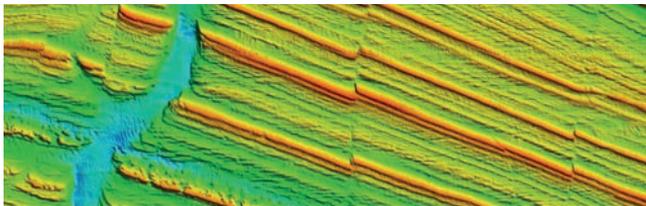


Borrowing adjustment techniques from the Lidar industry, the new Multibeam-IMU Automatic Calibration (MIBAC) algorithm developed by CIDCO is now available in HIPS™. The Automatic Boresight Calibration tool is designed to simplify both survey planning and post-processing for calibration requirements, requiring fewer survey lines in the field and providing a repeatable, robust calculation of the boresight angles between the IMU and sonar in post-processing in just a few clicks. The algorithm also provides immediate feedback to the processor on the quality and confidence of the calculation.

### R2Sonic TruePix™ Imagery



By popular demand, R2Sonic TruePix™ imagery is now supported through two distinct workflows: for processing as flat imagery similar to side scan processing, or in full 3D as part of our Multiple Detection workflow, where points are imported as Additional Bathymetry for use in target identification, feature development and more.

### New Formats
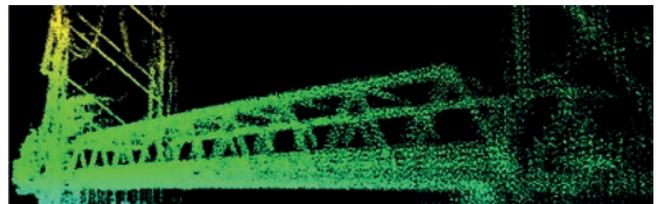


To support better integration with 3rd-party acquisition and processing systems, support for the Triton XTF format has now been extended for advanced processing in SIPS Backscatter. This includes support for Teledyne RESON and R2Sonic sonars as stored in the XTF format from common acquisition systems. Note not all system configurations are fully supported by the XTF format.

**TELEDYNE CARIS**
Everywhere**you**look™

# Which Package Fits Your Needs?

Teledyne CARIS™ knows that accuracy and efficiency are all-important in your business, which is why the HIPS and SIPS solution integrates the processing of Sonar and Lidar bathymetry, water column and sea-floor imagery in a single application.

## Additional Modules and Utilities

**Engineering Analysis Module™ (EAM)**: A set of analysis tools aimed at supporting port and waterway operations.

**Total Propagated Uncertainty (TPU)**: TPU Computation Resource.

| | SIPS Essential | HIPS Essential | HIPS & SIPS Essential | HIPS Professional | HIPS & SIPS Professional | |
|---|:---:|:---:|:---:|:---:|:---:|---|
| Single Beam Bathymetry | | ● | ● | ● | ● | **Sensor data** |
| Multibeam Bathymetry | | ● | ● | ● | ● | |
| Side Scan Imagery | ● | | ● | | ● | |
| Multibeam Imagery | ● | | ● | | ● | |
| Water Column Imagery (WCI)/ Multiple Detections | | | | ● | ● | |
| Lidar | | | | ● | ● | |
| Multi-user Processing | | | | ● | ● | **Features** |
| Calibration | | ● | ● | ● | ● | |
| Post-processed Auxiliary Data | | | | ● | ● | |
| Total Propagated Uncertainty (TPU) and CUBE | | ● | ● | ● | ● | |
| IHO QC Tools | | | | ● | ● | |
| Variable Resolution (VR Surfaces | | | | ● | ● | |
| Contouring and Soundings | | ● | ● | ● | ● | |
| Additional GIS Tools | | | | ● | ● | |

# Technical Specifications

| Component | Recommended |
|---|---|
| **Processor** | Recent generation multi-core CPU |
| **Memory** | 16 GB of RAM |
| **Disk Space** | 7200 RPM disk drive or Solid State Drive, minimum 1 GB available or installation |
| **Display** | NVidia® or AMD® display adapter with 512MB of memory or greater |
| **Operating System** | Windows 7® Professional 64-bit with Service Pack 1 or later, Windows® 10 64-bit |
| **Other** | USB port for software key. A standards-based PDF viewer |
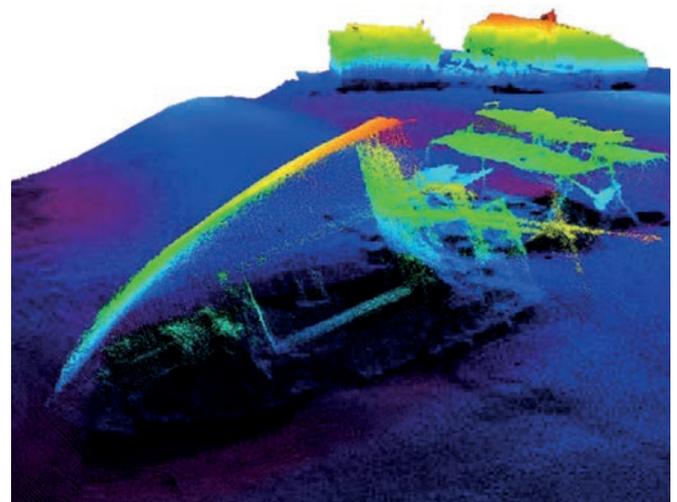
# CARIS Onboard

Take the next step with automated Onboard data processing







**Built on decades of hydrographic data processing expertise and supported by the highly scalable CSAR framework.**

CARIS Onboard™ enables users to process data from a range of sensors in near real-time to minimize data conversion and processing times. Designed with autonomous operations in mind, CARIS Onboard can also save valuable time and resources when used on survey vessels and launches.

# Real-time data processing

## Using CARIS Onboard

CARIS Onboard supports the same range of sonars and acquisition formats as CARIS HIPS™ and SIPS™. Large volumes of data are automatically imported and the trusted HIPS and SIPS algorithms are applied. CARIS Onboard generates a HIPS project and can be easily configured to output other products, such as DEMs and image mosaics. All of which are kept up to date as new data is processed.

By the time the survey platform has completed its mission a fully geo-referenced DEM and mosaic, along with a HIPS project, are available for final quality control and use in survey deliverables.

## System Overview

The CARIS Onboard software has three main components:

**Process Designer** provides a graphical interface to design and configure data processing workflows. It allows users to add, customize and save a variety of processing tasks. This includes data import, tide and sound velocity corrections, creation of output data products and automated data cleaning (e.g. using CUBE). Standard processing workflow templates are also provided.

**Onboard Service** is an automated service that monitors for raw data files from an acquisition system and batch processes the acquired survey data. As new data is detected it is automatically processed using the workflows defined through the Process Designer. The output data products (e.g. HIPS project, DEMs and mosaics) are also registered for remote access. Products and quality information generated by the Onboard Service are streamed to the dedicated Control Centre or to desktop applications, such as HIPS and SIPS. This enables the hydrographer to view the geo-referenced survey in near real-time for quality control and decision support while the survey is underway.

**Control Centre** provides a single access point for users to configure, manage and monitor the Onboard Service. Status information about the processing is displayed alongside a map window showing survey coverage



CARIS Onboard Workflow
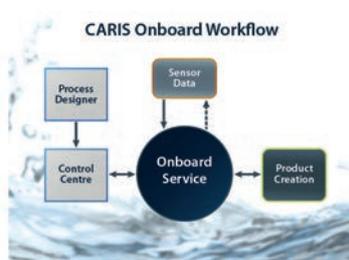
and data quality. The Control Centre can be used on a vessel or accessed remotely from an office location, via an internet connection.

## Deployment Options

CARIS Onboard can be installed on a desktop computer, laptop or directly on to the computer payload of your autonomous vehicle. It is certified on Windows 7 and will soon be available for Linux operating systems. Hardware versions are also available as a rack mount for dedicated vessel operations or as a water tight canister for subsea vehicle use.

The computer specifications for the hardware versions of CARIS Onboard have been designed with tomorrow's survey sensors in mind to provide the processing speed and disk space needed.

OEM agreements can be arranged for sensor or vehicle manufacturers on request.

## System Benefits

CARIS Onboard automates many of the standard processing steps required in a modern sonar survey that not only reduce subjectivity, but allow human resources to work on specialized tasks. It is especially optimal for autonomous operations where traditionally data can only be processed after vehicle recovery, which causes a data processing bottleneck. When used with survey launches or unmanned surface vehicles it becomes a force multiplier allowing surveys to be conducted more efficiently. With the ever expanding volume of data being collected at higher resolutions CARIS Onboard can significantly reduce your Ping-to-Chart™ timeline.

## Ping-to-Chart

CARIS Onboard fits seamlessly into the existing Ping-to-Chart suite of software, providing near real-time seafloor mapping and dramatically reducing the overall project time. Integrating with both autonomous and traditional survey platforms, CARIS Onboard provides an operational advantage and allows your highly skilled workforce to concentrate on getting the best results.
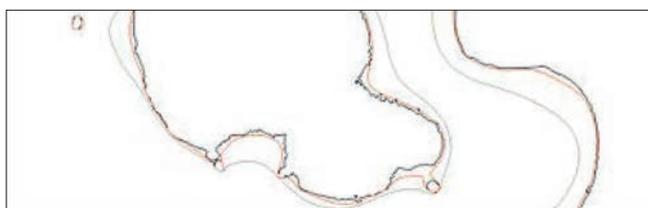
# Bathy DataBASE 4.4
## Bathymetric Data Management for the Future

Bathy DataBASE is able to incorporate all sources of data from historical fieldsheets to the latest high density multibeam surveys in a single space.

Powered by the CSAR engine and backed by proven RDMS technology, Bathy DataBASE delivers a robust

and scalable solution for the storage and analysis of ever-expanding volumes of sonar and Lidar data. Extend the Bathy DataBASE advantage by adding the new Engineering Analysis Module to import, create and maintain theoretical models of the seafloor for dredging and other engineering options.

### New Tools for Generalizing Bathymetry



A collection of new techniques are presented for generalizing bathymetry in the chart compilation workflows in BASE Editor. Two new methods for generalizing elevation surface models and a new safe-side contour smoothing method are available. These can be used to produce hydrographically-safe results, pushing contours to the deeper water.

A new Thin Points process is also included that can be used for general purpose point thinning or to produce a shoal-biased point cloud suitable for chart compilation. The new point thinning and smoothing techniques can be used in isolation or together with other tools in the cartographic bathymetric feature compilation workflow to produce the best results.

### Further Support for Data from LAS
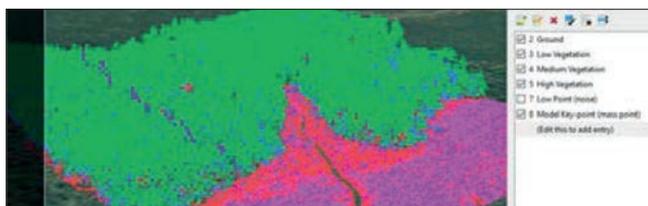


A new workflow for editing classification values on Lidar point clouds is now available in BASE Editor. The new tools are available in the Subset Editor, allowing area based QC and cleaning processes to be followed.

The new Lidar workflow tools allow for quick, toggle on/off visibility, and colouring based on classification as well as editing of flags and classification attributes for points. New classifications can be added or removed. Cleaned and classified could can easily be filtered based on classification and modeled as elevation surface models, exported back out to LAS format or uploaded into BDB Server as appropriate.

### 3D View Improvements
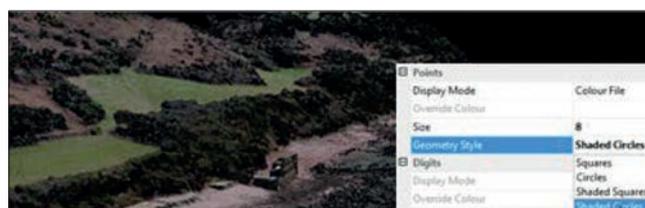


Improved visualization and performance when working with point clouds in the 3D view. In particular, points can now be visualized with new geometry styles, such as 'Oriented Splats', which allow the points to be experiences as a seamless and shaded surface model. As well, the user has new options to go into a Pan Control mode to reposition data in the 3D view. This and other modes are available in the 3D section of the Options settings.

# Bathy DataBASE Server 4.3

Incorporating the latest database driven technology for storing and managing source bathymetry and analyzing source bathymetry

Use batch tools and APIs to load bathymetry datasets into the Bathy DataBASE Server as fully attributed objects. The data model includes a feature catalogue for customized object attribution.

Backed by the proven RDMS technology of Oracle® Spatial and PostgreSQL, the Bathy DataBASE server offers a secure and reliable mechanism for storing and managing bathymetric data.

BASE Manager connects to the Bathy DataBASE Server and provides tools for analyzing, filtering and extracting the contents of the database.

The Bathy DataBASE Server Administration Tools provide configuration control over the Bathy DataBASE Server. These tools allow for user management, logging control, back up scheduling, database creation and other database administrative processes.

The Bathy DataBASE Server, along with the BASE Manager and Spatial Fusion Enterprise clients, is a key component of the CARIS Ping-to-Chart solution.

## Additional Modules

**LOTS Limits and Boundaries**: A geodetic toolset for defining maritime boundaries.

**Engineering Analysis Module™ (EAM)**: A set of analysis tools aimed at supporting port and waterway operations.



## Technical Specifications

### Bathy DataBASE Server 4.3

| Component | Recommended |
|---|---|
| **Operating System** | Windows Server 2012® R2 64-bit |
| **Other** | If using PostgreSQL: |
| | > RDBMS computer: PostgreSQL 9.6 and PostGIS 2.3 Links are provided to the installers for each of these applications. |
| | If using Oracle: |
| | > RDBMS computer: Oracle® 12c (12.1.0.2), Enterprise Edition with Oracle® Spatial BDB Server computer: Oracle® 12c Client, PDF viewer |
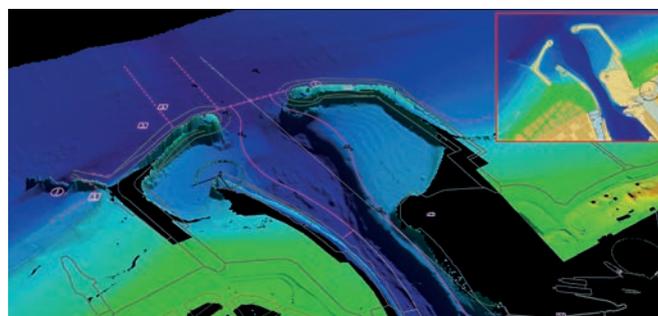
# BASE Editor 4.4

## A desktop application for compiling and analyzing source bathymetry.

Access the latest tools for working with bathymetric data. Use BASE Editor to validate, analyze, and compile datasets in a variety of formats and from multiple new and historical sources.
Integrate the latest high resolution bathymetry and topography with historical data in a user friendly environment. Visualize the data with raster images and vector features in the 3D viewer.

Once the data is prepared, generate products like smoothed contours, depth areas, and selected soundings for use in chart production.

Connect to the Bathy DataBASE Server to provide a complete source bathymetry data management system.

## Technical Specifications

### BASE Editor 4.4

| Component | Recommended |
|---|---|
| Processor | Dual or Quad core CPU |
| Memory | 8 GB of RAM |
| Disk Space | 7200 RPM disk drive or Solid State Drive, minimum 1 GB available for installation |
| Display | OpenGL 3.3 compatible GPU with 512MB of RAM, supporting at least 1,280 x 1024 display resolution with true colour |
| Operating System | Windows® 10 Professional 64-bit |
| Other | USB port for software key. A standards-based PDF viewer |





**Codevintec** Italiana srl

**Milano** via Labus, 13 – 20147 Milano
**Roma** Lungomare P.Toscanelli,64 – 00122 Roma

info@codevintec.it   ph  +39 02 4830.2175
www.codevintec.it   fax  +39 02 4830.2169