

# Dredging Post-processing Software

*After data acquisition and storage, the final numbers and associated presentation of the gathered data, and the success of a dredging operation depends for a large part on the post-processing software.*

Hydro INTERNATIONAL has published previous product surveys on software products varying from Swath bathymetry data acquisition, to data processing and navigation software. Although this survey focuses on software, in particular, post-processing capabilities for dredging works, we see that each product combines acquisition, navigation and processing capabilities. Only Caris products are specialised in processing capabilities alone and, therefore, support various standard sonar data formats from numerous acquisition packages. Viking Survey is the only product working on a non-Windows platform. Although DOS and UNIX were until recently much used, Windows may nowadays be considered the most stable operating system for these combined packages, and will be so for the foreseeable future. Huge amounts of data are being processed, especially with the use of swath bathymetry systems. Data has to be edited, but even minimal manual editing slows down the process to unacceptable levels. Thus automated filters and data-cleaning algorithms improve the efficiency of processing. The operator judges which filter and what settings are to be used in order to guarantee data integrity. This product survey gives wide insight into the various automated editing, algorithm and other mathematical tools in use with the various products. Hypack, QINSy and PDS-2000 provide the operator with the greatest choice. Presentation of data in 3D has become standard and even fly-through imaging is expected to become standard in the near future. Modern techniques and evolution in the development of software packages means these tools come within the reach of any user. If we look at Hypack, the user does not necessarily need to be educated in the English language, but can choose from nine languages. However, for the not-so-demanding requirements on dredging post-processing the market still offers simple and efficient packages just right for purpose. Although we try, it remains difficult to benchmark and independently review the many software products, and therefore we rely on manufacturers to provide the relevant information.

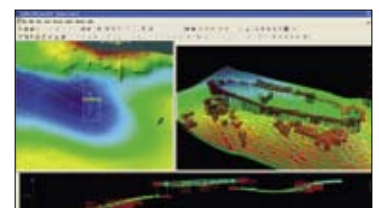
Hydro INTERNATIONAL is much indebted to all software manufacturers who contributed to this product survey by filling in the questionnaire. ■

<b>Supplier</b>	<b>Caris</b>
<b>Name of Product</b>	HIPS and SIPS
<b>Year of initial development</b>	1995
<b>General Specifications</b>	
<b>Latest version no. &amp; date</b>	6.1 (26th January 2007)
<b>Software platform</b>	Windows
<b>Minimum hardware requirements</b>	[1]
<b>In what languages is the software available?</b>	English
<b>Part of Data acquisition package</b>	
<b>Does it work in conjunction with Data acquisition package?</b>	Y
<b>If Y, what is the name of this package(s)?</b>	HIPS and SIPS supports over 40 industry standard sonar data formats can support data from numerous acquisition packages
<b>Does it process propriety data?</b>	Y
<b>Does it process exported 'open' data?</b>	Y
<b>Geodetic details</b>	
<b>Is conversion database included?</b>	Y
<b>Does it reprocess to other datums?</b>	Y
<b>Does it create own datum conversions?</b>	Y
<b>Are Geoid conversions available?</b>	Y
<b>Ability to select different Survey Unit</b>	Y
<b>Seven Parameter shift supported</b>	Y
<b>Mean Water level model supported</b>	Y
<b>Additional Height correction model supported</b>	Y
<b>Tidal reduction facilities</b>	
<b>Does it support Real-time reduction to survey datum (Tide and RTK height)?</b>	N
<b>Is it capable of off-line reduction using on-line recorded information (Tide or RTK height)?</b>	Y
<b>Reduction using Tide files</b>	Y
<b>Calculate Tide level using models (ATT etc)</b>	Y
<b>Capable of using Tidal network solution</b>	Y
<b>Additional waterlevel correc. model applicable</b>	Y
<b>Processing details</b>	
<b>Maximum Load (dataset) (Nr of Mbytes or Nrof Points)</b>	HD and RAM Dependent
<b>Manual editing capability</b>	Y
<b>Type of automatic cleaning algorithm(s)</b>	Polynomial Surface Cleaning, Swath Filters, Surface Filtering
<b>Observation Editor (filter bad data per sensor)</b>	Y
<b>CUBE gridding</b>	Y
<b>Interpolation techniques</b>	Weighted Mean
<b>Gridding techniques</b>	Tiling, Sonar Beam Footprint Modelling, CUBE, Total Propagated Error weighted mean Swath Filters
<b>What other mathematical tools (filters) can be used?</b>	
<b>Multibeam/Swath processing capability?</b>	Y
<b>Real-time Sound velocity profile support</b>	N
<b>Off-line change of SVP</b>	Y
<b>Multiple SVP solution</b>	Y
<b>Recalculation of survey with different settings (ie c-o adjustment, change in geodetic system)</b>	Y
<b>What other sensor data can it process / present?</b>	Bathy LiDAR, MB, SSS, SB, Sweep
<b>Overlay Charts capability</b>	Y
<b>Merge datasets from different sources and quality</b>	Y
<b>Assessment of IHO Cat. Performance spec</b>	Y
<b>Presentation details</b>	
<b>2D Profile</b>	Y
<b>3D visualisation</b>	Y
<b>Create fly-through imaging</b>	Y
<b>Create movie scenes</b>	Y
<b>Volume calculations by profile and area</b>	Y
<b>Spot heights presentation</b>	Y
<b>Tinting</b>	Y
<b>Charting</b>	
<b>Create contouring charts</b>	Y
<b>Create profile sheets</b>	Y
<b>Create Reporting charts</b>	Y
<b>S57 ENC support</b>	Y
<b>Digital export Data Formats Supported</b>	
<b>DXF</b>	Y
<b>DGN</b>	Y
<b>XTF</b>	N (Imports XTF)
<b>GeoTiff</b>	Y
<b>XYZ ascii</b>	Y
<b>Other</b>	GSF, HTF, BAG, Shape, etc
<b>What is the typical application for your package? (max 30 words)</b>	HIPS and SIPS is a comprehensive bathymetric data cleaning and validation tool integrated with powerful vector product creation. Proven automated data cleaning filters and algorithms assist in today's high data volume environments.

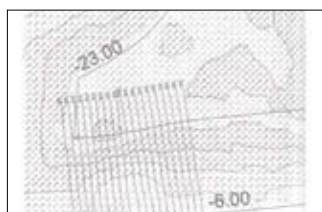
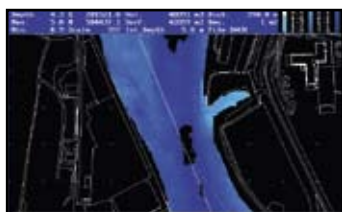
**Notes**

- [1] Processor: Intel® Pentium4® 2.4 GHz or faster processor - Memory: 512 MB of RAM - Hard Disk: 1 GB of available hard disk space for installation with additional space required for sample data files - Display: 128 MB video card capable of displaying 32 bit colour - Peripherals: 3-button mouse - Other: USB or Parallel port for software key
- [2] Y. Standard database supplied includes >60 spheroids, 14 prime meridians, >300 datums, >200 projected coordinate systems. Others can be supplied, in addition users can add their own.

N/A Not Applicable  
 No information received



CT Systems	Damen Dredging	Damen Dredging	Fugro
Viking Survey 1982	Navguard GeoPlot 2000 (Win32)	Navguard Model 2000 (Win32)	Starfix.MBE 1995
V20.0, January 2007	04.06 : 13th November 2006	04.10 : 05th February 2007	8.1, December 2007
DOS IA-32, Propriety OS MOS-Technology Pentium, 64MB RAM	Windows Follow Windows XP Professional recom- mendations or higher	Windows Follow Windows XP Professional recom- mendations or higher	Windows PC that is able to run XP
English, Dutch, French, German, Danish, Italian, Russian	English (others on request)	English (others on request)	English
Y	N	N	Y
Viking TDS, Viking STPM	N/A	N/A	Starfix.Seis
Y	Y	Y	Y
Y	Y	Y	Y
Y	[2]	[2]	Y
Y	Y	Y	Y
Y	N (but user may define additional datums)	N (but user may define additional datums)	Y
Y	N	N	Y
Metric, Imperial	Metre, Foot, US Foot, Yard, German Metre, Link, plus any others may be added	Metre, Foot, US Foot, Yard, German Metre, Link, plus any others may be added	Y
Y	Y (Bursa-Wolf and Helmert), also 3 param- eter, 10 parameter and simple lat/lon shift)	Y (Bursa-Wolf and Helmert), also 3 param- eter, 10 parameter and simple lat/lon shift)	Y
Y	N	N	Y
Y	N	N	Y
Y	N/A	N/A	Y
Y	Y	N/A Raw data processed with Geoplot first.	Y
Y	Y	N/A Raw data processed with Geoplot first.	Y
N	N	N	Y
Y	N	N	Y
Y	N	N	Y
1,000,000 m <sup>2</sup>	No inherent limit. Dependant on memory available.	No inherent limit. Dependant on memory available.	No limit
Y	Y	Y	Y
Propriety Interpolation Algorithm	Sounding rejection and selection by Admiralty method. Weeding of text overwrites.	N/A	All
Y	N/A	N/A	Y
Y	N	N	N
Propriety Interpolation Algorithm	N/A	Linear on TIN	Y
	Tiling, Rectangular	Rectangular; TIN	All
□	N/A	N/A	□
N	Import	Import	Y
Y	N/A	N/A	Y
Y	N	N/A	Y
Y	N/A	N/A	Y
Y	N	N	Y
Almost every Dredging and Survey sensor(s) on the market	SSS, SBP	N/A	SSS, SBP, ADCP, INS, LBL, USBL, ...
Y	Y	Y	Y
Y	Y	Y	Y
N	N	N	□
Y	Y	Y	Y
Y	N	Y	Y
N	N	Y	Y
Y	N	N	Y
Y	N	Y	N
Y	Y	Y	N
N	N	Y	Y
Y	N	Y	Y
Y	Y	Y	Y
Y	Y	Y	Y
N	N	N	Y
Y	Y	Y	Y
N	Y	Y	Y
N	N	N	Y
N	Y	Y	Y
Propriety data formats	CADDs, E00, DAF, SQD, ESRI World File	CADDs, E00, DAF, SQD, ESRI World File	□
Dredger, Hydraulic Excavator, Backhoe Dredger, Production Calculator, Suction Tube Position Monitor, Survey, Post-Processing	Survey data processing and plotting	Surface modelling, contouring, DMA genera- tion, profile generation, volume calculation	Offshore Survey

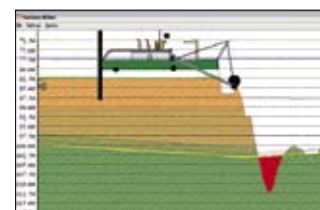
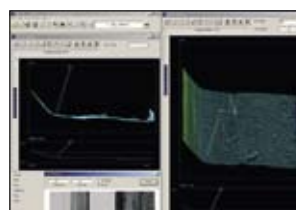


**Product Survey**

Supplier	Hypack	Hypack	IHC Systems
Name of Product	DREDGEPACK	HYSWEEP	Dredge Track Presentation System
Year of initial development	1986	1984	1998
<b>General Specifications</b>			
Latest version no. & date	6.2A	6.2A	1.3.0.9 14th December 2006
Software platform	i.e Windows XP,2000,VISTA	i.e Windows XP,2000,VISTA	Windows NT, 2000, XP
Minimum hardware requirements	500 MHz, 256 Mb RAM, PCMCIA to Serial, PCI to Serial, 20 Gb, 800 x 600	500 MHz, 256 Mb RAM, PCMCIA to Serial, PCI to Serial, 20 Gb, 800 x 600	500MHz, 256Mb RAM
In what languages is the software available?	English, Spanish, French, Italian, Chinese, Japanese, German, Dutch, Portuguese	English, Spanish, French, Italian, Chinese, Japanese, German, Dutch, Portuguese	English
<b>Part of Data acquisition package</b>			
Does it work in conjunction with Data acquisition package?	Compatible with any data-acquisition package, but not required	Y	Y
If Y, what is the name of this package(s)	HYPACK	HYPACK	DTPS
Does it process propriety data?	Y, RAW, ALL	Y, RAW, ALL, HSX, HS2	Y
Does it process exported 'open' data?	XYZ, ASCII	Y - XTF, JSF, GSF, MST	Y
<b>Geodetic details</b>			
Is conversion database included?	Y	Y	Y
Does it reprocess to other datums?	Y	Y	Y
Does it create own datum conversions?	Y	Y	Y
Are Geoid conversions available?	Y	Y	Y (EGM96, GEONZ97, NLGEO04, User Definable)
Ability to select different Survey Unit	Metre International Foot, US Survey Foot, International Yard etc)	Metre, International Foot, US Survey Foot, International Yard etc)	Metre, Foot, US Survey Foot
Seven Parameter shift supported	Y	Y	Y
Mean Water level model supported	Y	Y	N
Additional Height correction model supported	Y	Y	Y
<b>Tidal reduction facilities</b>			
Does it support Real-time reduction to survey datum (Tide and RTK height)?	Y	Y	Y
Is it capable of off-line reduction using on-line recorded information (Tide or RTK height)?	Y	Y	N
Reduction using Tide files	Y	Y	Y (10 max)
Calculate Tide level using models (ATT etc)	Y	Y	N
Capable of using Tidal network solution	Y	Y	N
Additional waterlevel correc. model applicable	Y	Y	Y
<b>Processing details</b>			
Maximum Load (dataset) (Nr of Mbytes or Nrof Points)	No limit. Computer RAM is the limiting factor.	No limit. Computer RAM is the limiting factor.	RAM Based. 60000 Pts./sec
Manual editing capability	Y	Y	N
Type of automatic cleaning algorithm(s)	N	[3]	Median, mean
Observation Editor (filter bad data per sensor)	Y	Y	Y
CUBE gridding	N	Y	N
Interpolation techniques	N	Y, straight line, or none (remove sounding)	(Digipol, ...)
Gridding techniques	TIN	TIN	(Tiling, Rectangular, ...)
What other mathematical tools (filters) can be used?	N	Savitsky-Golay, Statistical Search and Filter	NA
Multibeam/Swath processing capability?	N	Y	DTPS to Qloud Interface
Real-time Sound velocity profile support	Y	Y	N
Off-line change of SVP	Y	Y	N
Multiple SVP solution	N	N	N
Recalculation of survey with different settings (ie c-o adjustment, change in geodetic system)	Y	Y	Y
What other sensor data can it process/present?	N	Side-scan, multi-beam	Y
Overlay Charts capability	Y (DXF, DGN, TIFF, S-57, S-63, Shape, VPF, BSB, ARCS)	Y (DXF, DGN, TIFF, S-57, S-63, Shape, VPF, BSB, ARCS)	Y
Merge datasets from different sources and quality	Y	Y	N
Assessment of IHO Cat. Performance spec	IHO Compliant, USACE standards (performance test)	IHO Compliant, USACE standards (performance test)	N
<b>Presentation details</b>			
2D Profile	Y Real time and post-processing	Y, Real time and post-processing	Y
3D visualisation	Y Real time and post-processing	Y, Real time and post-processing	Y (add-on)
Create fly-through imaging	Y Real time and post-processing	Y, Real time and post-processing	N
Create moviescenes	AVI files that can be replayed with any Media Player	AVI files that can be replayed with any Media Player	N
Volume calculations by profile and are spotheights presentation	Y	Y	Y
Tinning	Y	Y	N
<b>Charting</b>			
Create contouring charts	Y	Y	Y
Create profile sheets	Y	Y	Y (single Plot)
Create Reporting charts	Y	Y	Y
S57 ENC support	Y	Y	Y (7Cs)
<b>Digital export Data Formats Supported</b>			
DXF	Y	Y	N (import only)
DGN	Y	Y	N
XTF	Y	Y	N
Geo Tiff	Y	Y	N
XYZ ascii	Y	Y	N
Other	Y	Y	Y
What is the typical application for your package? (max 30 words)	DREDGEPACK is our dredge management system for real-time positioning and digging efficiency and management of the dredging progress	HYSWEEP is an optional module of HYPACK that integrates multibeam and multiple transducer sonar systems. It provides programs for: • System alignment and calibration • Multibeam data collection and review • Multibeam data editing • QC and performance testing	XYZ, grid points Dredge Monitoring, Survey support

**Notes**

- [3] Depth - Min and max, median, mean, average, mode, Beam number Angle limit and Offset limit, Spike limit, Quality Limit, Undercut and overhang filters, Savitsky - Golay Filter
- [4] Singlebeam Echosounder, Scanning Profiler, Multibeam Echosounder, position, tidal data, Density, Velocity, Doppler, Draft sensor, Hopperlevel sensors, heave, roll, pitch, inclinometers, Compass, Open/Close sensors



GL Systems	Reson	Tower Software	QPS
Dredge3D 2004	PDS2000 Dredge 2000	Tower Dredge 1997	Processing; QINSy (incl. Qloud) 1996
v6, 2007	Version 3 - February 2007	3.6.8	8.0 - March 2007
all Windows	Windows XP	Windows	Windows XP,Vista (2nd half 2007)
256 MB video card, 3 GHz PCU	Pentium 4 4 ghz, 1 Gb memory,-2 x SVGA output, 2 x 80 Gb Harddisk,Windows XP	Pentium 4, 512 Mb Ram, 80Gb Hard drive	Pentium IV
English	English, German	English	English
Y, provided data exchange is possible	Y	Y	Y
any	Pds2000 Multibeam, PDS2000 singlebeam, other packages via XYZ data	Tower Navigation	QINSy Survey
Y if user wants to	Y	Y	Y
Y, plain ASCII for example	Y	Y	Y (Qloud)
Y, we convert various data types	Y	Y	Y
Y, as long as we have data format we process all kinds of data	Y	Y	Y
Y if neccessary	Y	Y	N
N	Y	Y	Y, Geoids are supported
Y	Metre, International Foot, US survey foot, links (clark's ratio), internationalYard, Fathoms, cm/min, m/s, km/h, knots, nautical miles	N	Y, Full range of internatiouonal standards. (Metre, International foot, international yards, US survey foot, etc.)
<input type="checkbox"/>	Y	Y	Y
<input type="checkbox"/>	Y	N	Y
<input type="checkbox"/>	Y	N	Y
Y, as custom feature	Y	Y	Y
Y, as custom feature	Y	Y	Y
Y, as custom feature	Y	Y	Y
Y, as custom feature	N	N	Y
Y, as custom feature	Y	N	Y
Y, as custom feature	Y	N	Y
2 GB data max, real limit is by video card	No maximum load, No maximum of number of datapoints	Limited by memory and speed of hardware	Unlimited (Qloud); Test with 1.5 billion pts have been performed succesfully
Y	Y	Y	Y
Mask (auto), smooth user-defined, others like, ISO Gaussian, FFT optional	Spline, Butterworth, Kalman filtering, spike finding, interpolation, smooth, bad quality data	Proprietary, using predictive filtering and simple gating	Surface Spline, Butterworth, Mean, Median, adaptive clip, clip above, clip below, clip on flag, clip on boundary
Y	Y	Y	Y
Proprietary	Circular, Linear, Digipol, Triangular tiling	Developed in-house Rectangular	Digipol, 4 point and 8 point grid interpolation
Proprietary XYZ survey to grid, Exact math Delauney			CUBE, regular grid with mean, min, max, hit count, SD values
User defined	Kalman filtering, Butterworth. For MB data: Filtering on range, depth, bad quality data, Cube, statistical filters, IHO order	Some surface and curve fitting	Repair Area Filter (Qloud)
N	Y, as an option	N	Y
N	Y	N	Y
N	Y	N	Y
N	Y	N	Y; SVP Manager sound velocity reduction based on time and place
Y	Y	Y	Y
Custom data of any type	<sup>(4)</sup>	None	Side Scan Sonar, Magnetometer, Scanning Sonar
Y, multiple charts	Y, DXF, Geotiff, Grid models, C-Map	Y	GeoTIFF, DXF, DWG, DGN, PRO, S-57 ENC, C-MAP
Y	Y	Y	Y
<input type="checkbox"/>	Y	N	Y. Processing in Qloud is carried out in direct relation with IHO S-44 standard
Y	Y	Y	Y
Y	Y	Y	Y
Y	Y	N	Future development
Y	Y, using movie creator program	N	Future development
Y	Y, presented in extended reports	Y	Volume calculation based on grid differences
Y	Y	Y	Y
Y	Y	Y	Y
Y	Y, Quick module to plot profiles quickly	Y	N. Currently under development
Y	Y, extended reports available	N	N. Currently under development
N	C-map	N	Y
Y	Y	Y	Y
N	N	Y	Y
N	Y	N	Y
Y	Y	N	Y
Y	Y	N	Y
Y	Y	Proprietary	Y; User-defined export
Survey Data processing (multiple layer), Channel planning, volume removed real-time calculation in multiple channels	Online and offline it is used for production monitoring, position monitoring and efficiency monitoring. Used for Cutter dredgers, Trailing Suction Hopper dredgers, Excavators, Cranes, Bucket dredgers. Each application is specially designed for the needs of the type of dredger. Easy to use.	Used by dredging contractors and clients for creating models for display and real-time calculations on dredgers. Also for QC of dredging process by calculation of volumes, profiles, contours, 3-D models, and charts.	GSF, BAG QINSy (incl Qloud) processing is fully integrated in data acquisition flow and supports any demanding survey job where quality and time are important.

