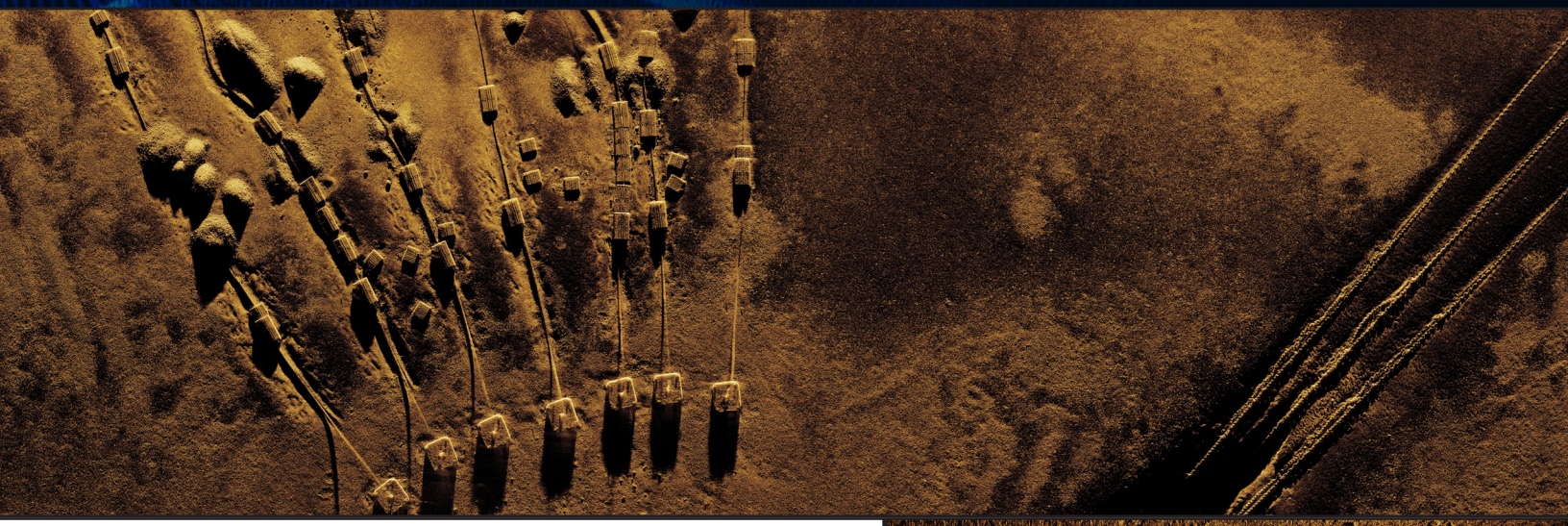
AquaPix® MINSAS

Seeing with Sound

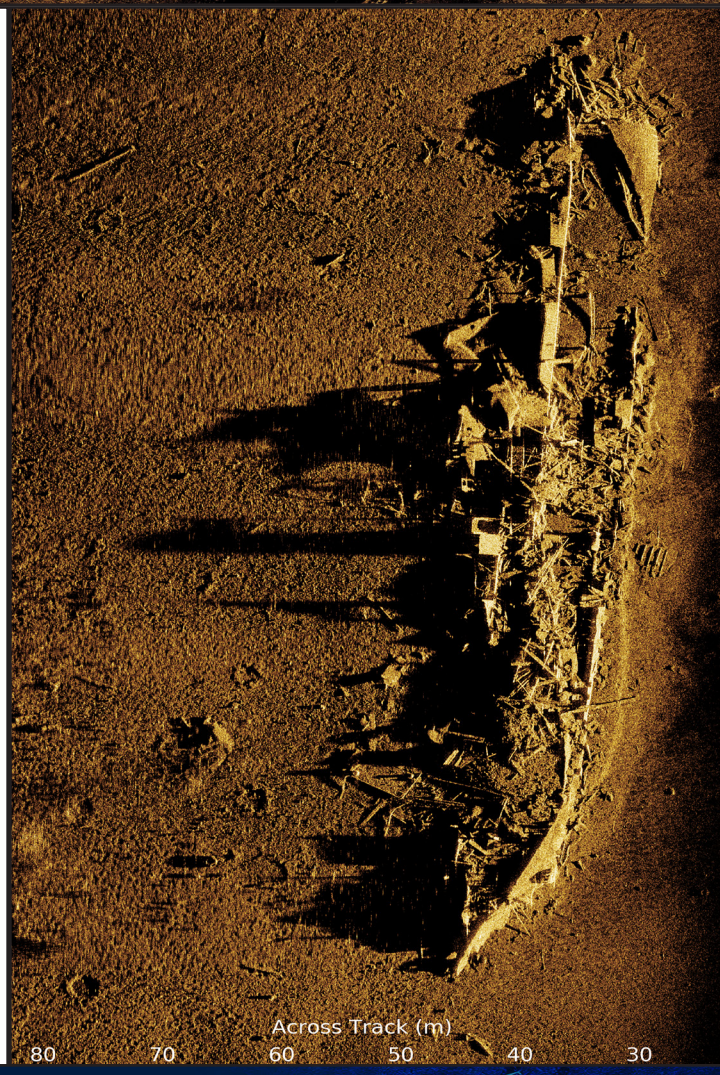


AquaPix® MINSAS is an off-the-shelf configurable Miniature Interferometric Synthetic Aperture Sonar (SAS) which replaces high end sidescan systems at an affordable price, while delivering significantly higher resolution, range, 3D bathymetry and the industry's best Area Coverage Rates (ACR).

MINSAS provides 3.3 cm x 3.0 cm or 2.1 cm x 1.9 cm Ultra High Definition (UHD) constant resolution out to ranges of 200 meters per side, along with simultaneous 6 cm x 6 cm bathymetry. Innovative and unique features of the MINSAS make it the ideal sonar for a wide range of underwater platforms and UUVs. MINSAS is based around a modular array system which allows for array lengths of 60 cm to 180 cm depending upon platform size and requirements. This modularity along with the industry's smallest SAS processing module allows the MINSAS to be integrated into vehicles ranging from man-portable to large diameter.

Another unique feature of Kraken's AquaPix® sonars is our Real-Time SAS (RTSAS) processing module. This industry-first capability processes raw sonar data into SAS tiles in real-time during the mission, to the internal storage hard drive or optional removable data pod. RTSAS allows for Automatic Target Recognition (ATR) and data exfiltration capabilities of processed SAS data, along with greatly reduced post mission analysis.

With SAS once dedicated to only expensive military platforms, Kraken's AquaPix® now makes it available to commercial and research-based companies looking to increase their capability while reducing survey costs and time.



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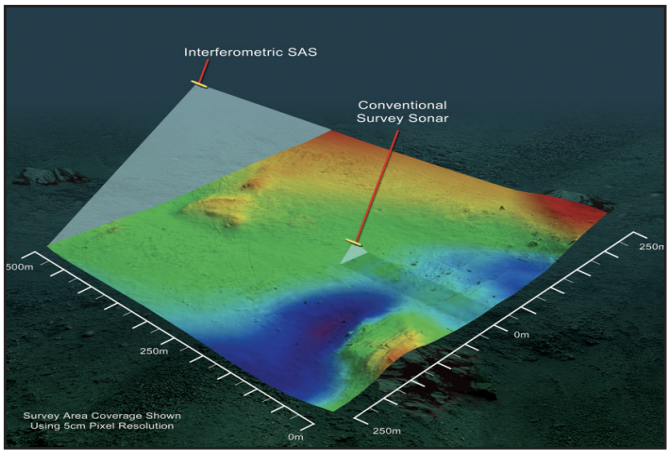
System Specifications	MINSAS 60	MINSAS 120
Platform speed	2-5 kn	2-6 kn
Receiver array dimensions - L/W/H	53.0/6.1/9.5 cm	109.0/6.1/9.5 cm
Receiver array weight - air / water	6.4 kg/3.2 kg	12.8 kg/6.4 kg
Transmit array weight - air / water	0.5 kg/0.19 kg	
Electronics module dimensions	47 cm x 17 cm dia.	
Electronics module weight - air / water	12.4 kg/1.4 kg (1000 m)	
Total system weight - air / water	19.3 kg/4.79 kg	25.7 kg/7.99 kg
Depth rating	1000 m (3000 m and 6000 m optional)	
System power, no SAS processing	58 W	70 W
RTSAS processing power	75 W	
Power supply	48 VDC (24 VDC optional), 250 W peak power	
Along track SAS image resolution	3.3 cm*	
Across track SAS image resolution	3.0 cm*	
SAS bathymetry resolution - Real Time	25 cm x 25 cm	
SAS bathymetry resolution - Post Proc.	6 cm x 6 cm	
SAS bathymetry vert. accuracy @ 100m	10 cm	
Source level	210 dB dB re 1µPa @ 1m	
PRF	8 Hz	4 Hz
Center frequency	337 kHz	
Pulse length	configurable 1 ms -> 10 ms	
Pulse bandwidth	40 kHz	
Pulse type	Linear FM	
SAS robustness against yaw	±4° over 20 m track length	
SAS robustness against sway	±10 m	
Max crab angle	20°	

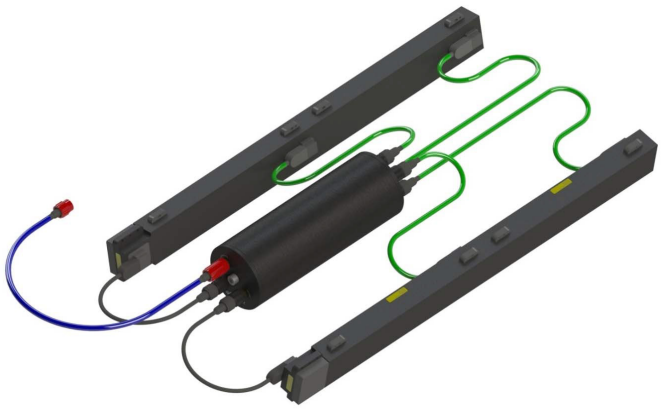
**Note: 2.1 cm x 1.9 cm resolution also available*

Speed		MINSAS 60			MINSAS 120		
Knots	**m/s**	**Range meters (per side)**	**ACR w/o Gap Filler km²/hr**	**ACR w/ Gap Filler km²/hr**	**Range meters (per side)**	**ACR w/o Gap Filler km²/hr**	**ACR w/ Gap Filler km²/hr**
3.00	1.54	118	0.9	1.31	220	1.71	2.44
3.50	1.80	100	0.9	1.30	208	1.88	2.69
4.00	2.06	87	0.91	1.29	181	1.88	2.68
4.50	2.32	77	0.90	1.29	160	1.87	2.66
5.00	2.57	69	0.90	1.28	143	1.86	2.65
8.00	4.12	42	0.87	1.24	87	1.80	2.57



The image above represents the area coverage rate of a conventional side scan survey (bottom vehicle) vs. an interferometric synthetic aperture sonar survey (top vehicle).

To achieve the same level of resolution, conventional survey sonars have a lower altitude which limit the area coverage rate in a single survey pass. In contrast, AquaPix® can fly at higher altitudes and achieve high resolution SAS and bathymetry data simultaneously across the entire swath when compared to conventional survey sonars.



Above: AquaPix® MINSAS 120 1000 m rated system shown with RTSAS processor

Left: Typical ACR of AquaPix® MINSAS based on speed and array length.

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