PROSAS™

Synthetic Aperture Sonar System
Oil & Gas • Seabed Survey • Hydrography

www.appsig.com
SURVEY, MEASURE, AND CHART

OFFSHORE OIL AND GAS
Numerous tasks in support of offshore oil and gas development require detailed survey, imaging, and charting of the seafloor, including pre-pipeline and cable route survey, routine pipeline survey and inspection, cable burial and inspection, template and jacket installation, site survey, and post-operation clean-up survey.

These tasks are best accomplished with wide-area, ultra-high resolution sonar systems that provide geo-referenced data with high-accuracy navigation, and that interface with industry-standard mosaicking, charting, and visualization software.

SEABED SEARCH AND SURVEY
A wide range of commercial undersea applications such as marine resource management, EEZ surveys, fisheries management, seabed search and recovery operations, undersea archeology, and scientific and oceanographic research programs, require accurate, high-resolution, geo-referenced seabed imagery. This sonar imagery is co-registered with bathymetry information and the output from additional sensors, including magnetometer and other oceanographic sensors.

HYDROGRAPHY
Worldwide hydrographic organizations require high-resolution, precision seabed survey data for activities including charting, topographic and revetment surveys, and survey support of dredge operations. These systems and the data derived from them are required to meet the various international and local hydrographic performance standards.

TRANSFORMING UNDERWATER IMAGING

SYNTHETIC APERTURE SONAR
Synthetic aperture sonar (SAS) is transforming underwater imaging, and Applied Signal Technology, Inc. (AST) is at the forefront of exploiting this exciting new technology. SAS provides constant high along- and across-track resolution acoustic imagery at ranges that are orders-of-magnitude greater than conventional sidescan sonar systems with unequaled area coverage rate. Building on more than a decade of research and development in SAS systems for a wide range of applications, AST now offers the first fully proven, long-range, real-time SAS system.

PRO SAS™ SURVEYOR
PRO SAS Surveyor is a fully integrated, modular SAS system that meets the requirements for seabed survey and hydrography applications. Designed for autonomous underwater vehicle (AUV), remotely operated tow vehicle (ROTV), or tow fish applications, PRO SAS Surveyor provides constant high-resolution imagery of the seabed, independent of range. Operating at 175 kHz, PRO SAS Surveyor can provide up to 500 m swath, with area coverage rates over 3 km²/hr, with 3 cm resolution. It provides bathymetry data in addition to multibeam sidescan and synthetic aperture sidescan images. A gap filler sonar covers the nadir gap normally associated with sidescan systems.
PROSAS Surveyor provides wide-area, high-resolution, undersea imaging for commercial and military applications, including seabed survey in support of offshore oil and gas development, maritime resource management, hydrography, and search and recovery tasks.

**HIGH RESOLUTION IMAGERY – REDUCED SURVEY TIME**

**PROSAS Surveyor**
- 500 m swath width
- Integrated gap filler
- Bathymetry channel
- Constant 3 cm resolution
- Coverage rate ~3 km²/hr

**System Modularity**
- Underwater components
  - Sonar, Inertial Navigator, Data Recorder, In-vehicle Processor
- Modular packaging in 8” diameter pressure vessel(s)
- Low size, weight, and power for AUV applications
- Configurable for specific applications

**Coventional Sidescan Swath**
- Nadir gap
  - Requires 100% overlap
- Resolution deteriorates with range
- Typical coverage rate 0.75 km²/hr

**SYSTEM MODULES**
- Inertial Navigation System
- Sonar Electronics
- Ultra-short Baseline System
- Sonar Data Recorder
- In-vehicle Processor
- Conductivity Temperature Depth
- Doppler Velocity Log

**VEHICLE INTEGRATION**
- FOCUS 2 ROTV
- REMUS 600 AUV
- SAAB SAROV
- ECA Tow Fish

**PROSAS SURVEYOR HAS A PROVEN RECORD OF INTEGRATING WELL WITH THE FOLLOWING VEHICLES:**
- FOCUS 2 ROTV
- SAAB SAROV AUV
- REMUS 600 12.75-inch AUV
- ECA dynamically controlled tow fish
- Passive tow fish
### Features and Capabilities

- High-resolution seabed survey
- High area coverage rate
- Waterfall display with data storage
- Multibeam and SAS
- Data replay with zoom capability
- Multibeam and SAS bathymetry
- Fully integrated high-accuracy navigation system
- Constant 3 cm along- and across-track resolution
- Operation from shallow water to 6,000 m (option)

### Operational Benefits

- System modularity allows operation on AUV, ROTV, ROV, tow fish
- Constant resolution provides greatly improved imagery over sidescan
- Interfaces with industry-standard mosaicking and charting software
- High coverage rate with high-speed/long-range operation
- Gap filler sonar eliminates unnecessary overlaps
- Bathymetry for hydrographic applications

### Operational Performance

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area coverage rate</td>
<td>~3 km²/hr</td>
</tr>
<tr>
<td>Tow speed envelope</td>
<td>4–10 kts</td>
</tr>
<tr>
<td>Operating speed envelope</td>
<td>4–1010 kts (7.5 kts @ 100 m)</td>
</tr>
<tr>
<td>Depth rating</td>
<td>400 m (FOCUS vehicle); 1,000 m sonar; 6,000 m/full ocean depth option</td>
</tr>
<tr>
<td>Multipath suppression</td>
<td>Tx and Rx vertical beamwidth management for shallow water operations</td>
</tr>
<tr>
<td>Range scales</td>
<td>50, 75, 100, 150, 200, 250, 300 m</td>
</tr>
<tr>
<td>Maximum operating range</td>
<td>250 m per side</td>
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</table>

### Imaging Performance

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
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<tbody>
<tr>
<td>SAS processing</td>
<td>3 cm resolution at all ranges along/across track; redundant phase center micro-navigation and autofocus</td>
</tr>
<tr>
<td>Output data geo-registration</td>
<td>&lt;3 m accuracy in real time without post processing</td>
</tr>
<tr>
<td>Data display</td>
<td>Real-time waterfall plus output to XTF for charting and mosaicking</td>
</tr>
<tr>
<td>Bathymetry</td>
<td>Co-located interferometric processing 20 cm vertical resolution</td>
</tr>
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### System Characteristics

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
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<tbody>
<tr>
<td>Frequency of operation</td>
<td>175 kHz</td>
</tr>
<tr>
<td>Pulse length</td>
<td>1.5, or 10 mS wideband chirp</td>
</tr>
<tr>
<td>Number of beams</td>
<td>7 port, 7 starboard</td>
</tr>
<tr>
<td>Array length</td>
<td>1.36 m</td>
</tr>
<tr>
<td>Receive aperture</td>
<td>Main receive aperture 48&quot;; bathymetry aperture 18&quot;</td>
</tr>
<tr>
<td>Topside processor</td>
<td>Windows® XP64, 8-Core Xeon® Processor, 16 GBytes RAM</td>
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<tr>
<td>Power</td>
<td>110/240V AC, 50–60 Hz, Sonar 70W + TX; recorder 45W, processor 70W, INS 50W</td>
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<tr>
<td>Data recording</td>
<td>40 hours</td>
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<tr>
<td>Data output</td>
<td>Fiber optic Ethernet link</td>
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<tr>
<td>Auxiliary sensors</td>
<td>DVL, CTD, USBL, INS</td>
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