Kongsberg HUGIN AUV Sensor Suite

AUT 2015
Perth, Australia
HUGIN AUV System

Dimensions:
- Length: 5.2 to 6.6 m
- Diameter: 75 cm

Depth Ratings:
- 3000, 4500 and 6000 m

Power Supply:
- Rechargeable and swappable Lithium Polymer batteries

Estimated Endurance:
- 3 Batteries:
  - 25 hours at 4 knots
  - 34 hours at 3 knots
- 6 Batteries
  - 50 hours at 4 knots
  - 69 hours at 3 knots
- SSS, EM2040, SBP, Camera running 100%
HUGIN AUV System

Nose: FLS, Payload controller, Removable Payload Data Storage

Environmental Payload Module

EM 2040

Batteries, SAS/SSS arrays, SBP RX, LED Strobe

SSS/SBP PU, SBP TX

Tail: Camera
Core vehicle systems
Communications
Navigation
Propulsion

Key Navigation System Components

Forward Looking Sonar
Inertial Measurement Unit
Doppler Velocity Log
cNODE Transponder

IHO Quality positioning ensures data relevance
HUGIN AUV Payload Sensors

Synthetic Aperture Sonar: *HISAS 1030/1032*
- Swath up to 300 m either side
- SAS Imagery theoretical resolution 2 x 2 cm, 4x4 cm in practice
- Interferometric bathymetry across entire swath
- File formats: .SASI, .XTF and .ALL

Multibeam Echosounder: *EM2040*
- Frequency: 200, 300 & 400 kHz
- Single or dual receiver
- Beam angle: 0.7° x 0.7°
- Swath: 140° (single Rx)

Sub-Bottom Profiler: *EdgeTech Chirp SBP*
- Frequency: 1-6, 2-16 or 4-24 kHz
- Analogue hydrophone or PVDF receivers
- Multiple transmitters available as custom integration
- Available with traditional sidescan sonar (105/410 kHz plus other frequency options)
HUGIN AUV Payload Sensors

**Camera:** *Tilecam*
- 10 Megapixel resolution
- Black and white still image
- LED Panels on underside of main body section
- Data timestamped for georeferencing

**Environmental Sensors:** *Individually or as a modular payload section*
- Contros HydroC Polycyclic Aromteric Hydrocarbon
- Contros HydroC carbon dioxide
- Franatech METS methane
- SeaBird SBE63 dissolved oxygen

**Other Options:**
- CathX Ocean colour camera with laser profiler
- OFG internal magnetometer
- ADCP (as option on DVL or up-looking stand alone sensor)
- Custom integrations on request
Data Products

- **Survey Parameters:**
  - Altitude: 3 to 150 m
  - Speed: nominally 1.5 to 2 m/s (~3 to 4 kts)
- **Performance and coverage:**
  - Full swath HISAS: ~600 m total
  - Full swath EM2040 single Rx: ~400 m
  - Full swath EM2040 dual Rx: ~800 m
  - Area Coverage rate: ~2.6 km²/hour

- Sensor combinations improve coverage rates
- All sensors can be used concurrently
  - HISAS/SSS
  - EM2040
  - SBP
  - TileCam
  - Environmental/Geochemical
Data Products - HISAS

- Synthetic Aperture Sonar
- HISAS 1030 theoretical resolution 2 x 2 cm
- HISAS 2040 theoretical resolution 1.2 x 1.3 cm
- Practical resolution 4 x 4 cm
- Range independent resolution
- HISAS 1030 range: 300 m either side
- HISAS 2040 range: 150 m either side
- In-Mission SAS and Bathymetry processing
Data Products – EM2040

- EM2040 0.7° x 0.7° system on HUGIN
- Single or dual receiver on HUGIN
- 200, 300 and 400 kHz
- 140° Swath for single receiver system

- EM2040M 1° x 1° system on MUNIN
- 200, 300 and 400 kHz
- 140° swath at 200 kHz, 120° at 300/400 kHz
Data Products – Pipe Tracking

- Autonomous tracking using HISAS/SSS and EM2040
- Pass 1: alongside pipe to collect SAS/SSS imagery, bathymetry and create a-priori map
- Pass 2: overhead collecting 400 kHz bathymetry and photo mosaic
- No interaction with operator required
- Track points sent to surface in real-time