

# Kongsberg HUGIN AUV Sensor Suite



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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

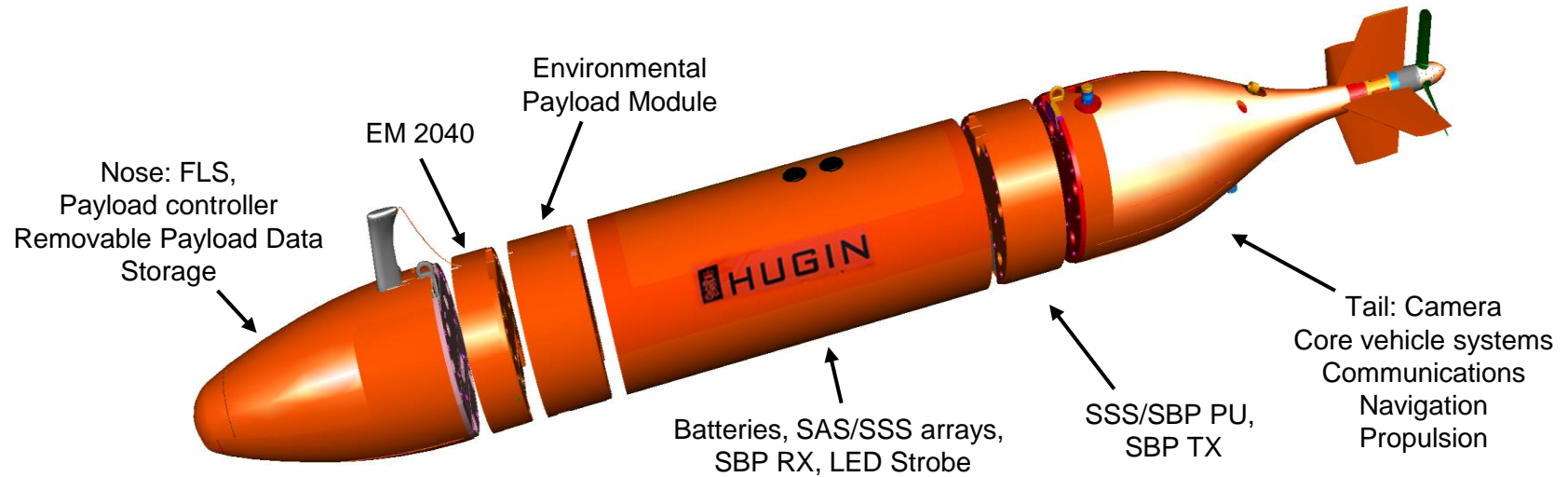
## Power Supply:

- 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



## Key Navigation System Components



Forward Looking Sonar



Inertial Measurement Unit



Doppler Velocity Log

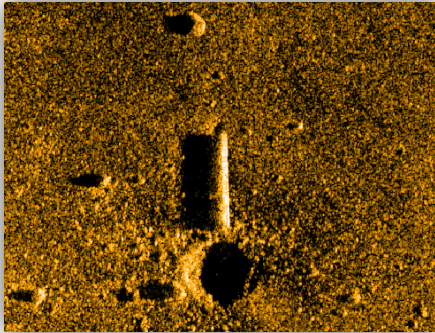


cNODE Transponder

**IHO Quality positioning ensures data relevance**

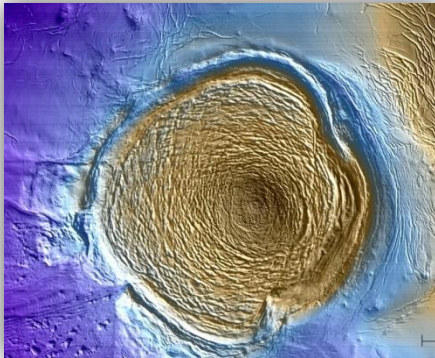


# HUGIN AUV Payload Sensors



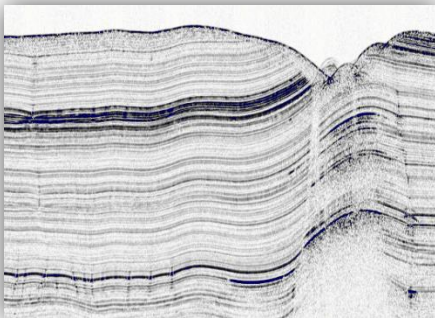
## Synthetic Aperture Sonar: *HISAS 1030/1032*

- 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*

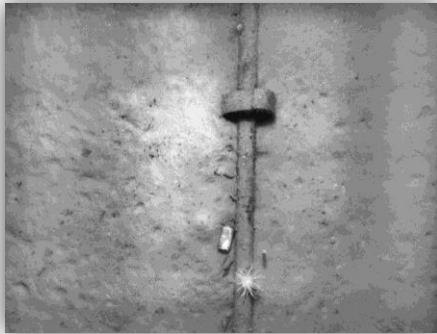
- Frequency: 200, 300 & 400 kHz
- Single or dual receiver
- Beam angle: 0.7° x 0.7°
- Swath: 140° (single Rx)



## Sub-Bottom Profiler: *EdgeTech Chirp SBP*

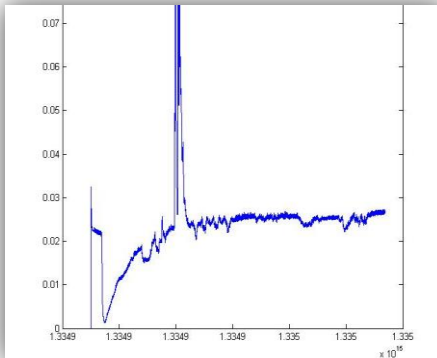
- Frequency: 1-6, 2-16 or 4-24 kHz
- Analogue hydrophone or PVDF receivers
- Multiple transmitters available as custom integration
- Available with traditional sidescan sonar (105/410 kHz plus other frequency options)

# HUGIN AUV Payload Sensors



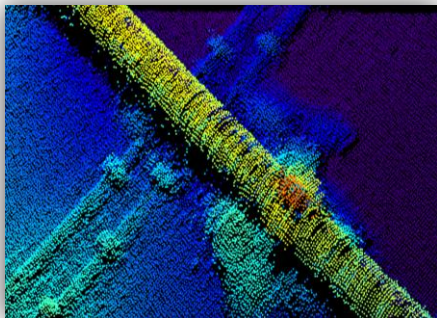
## Camera: *Tilecam*

- 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 Aromatic Hydrocarbon
- Contros HydroC carbon dioxide
- Franatech METS methane
- SeaBird SBE63 dissolved oxygen



## Other Options:

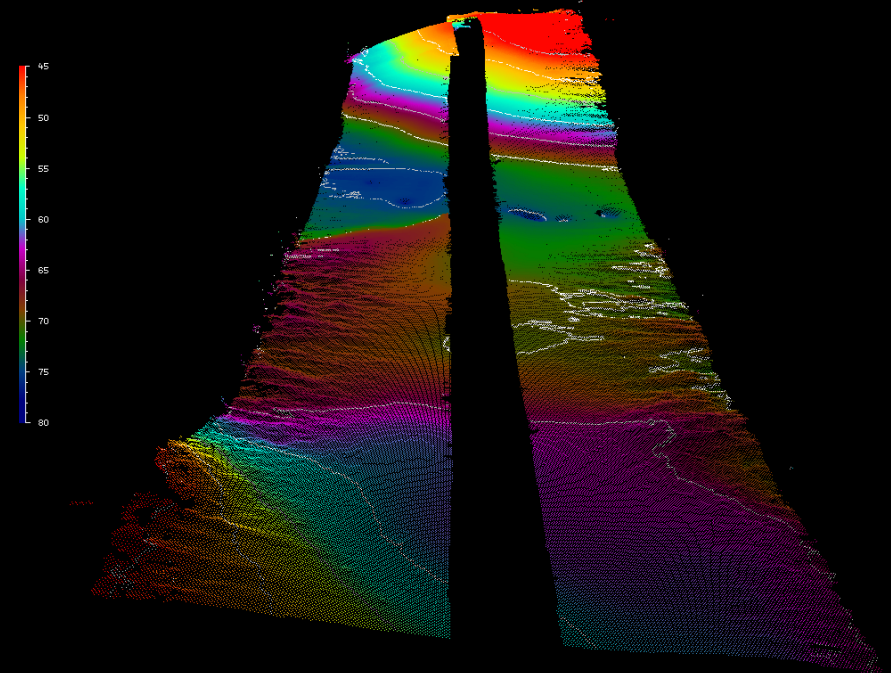
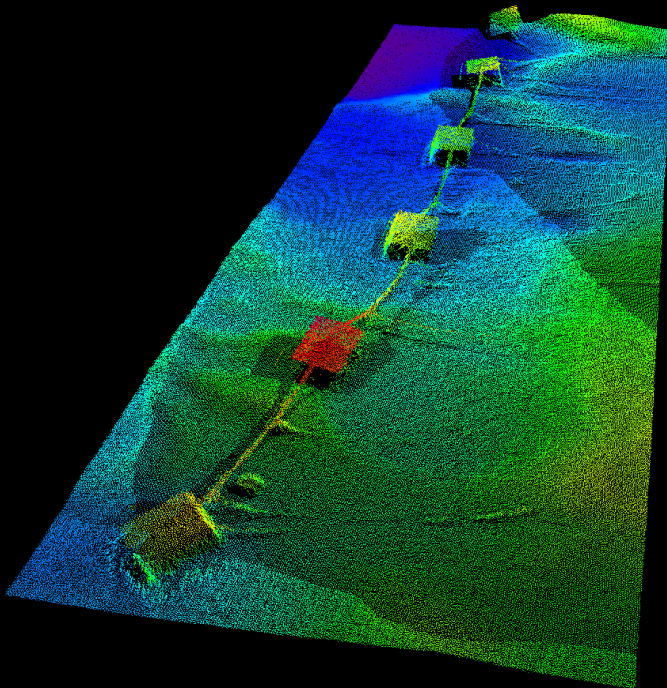
- CathX Ocean colour camera with laser profiler
- OFG internal magnetometer
- ADCP (as option on DVL or up-looking stand alone sensor)
- Custom integrations on request

# Data Products



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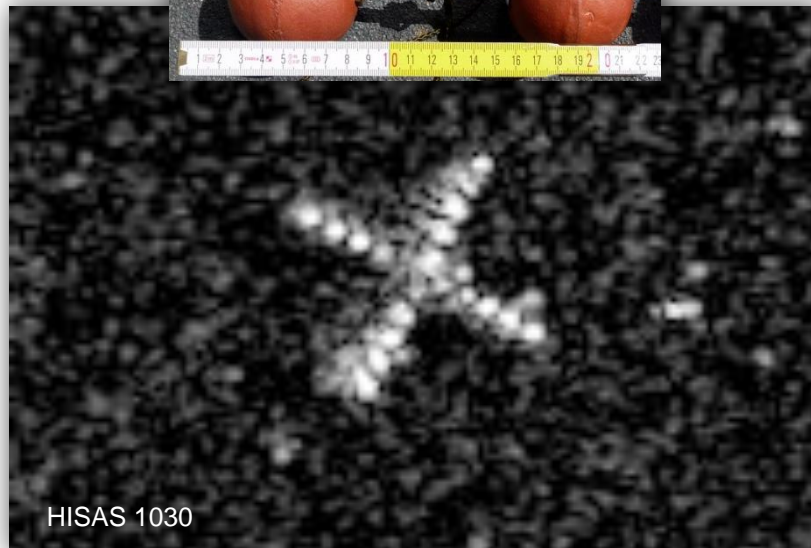
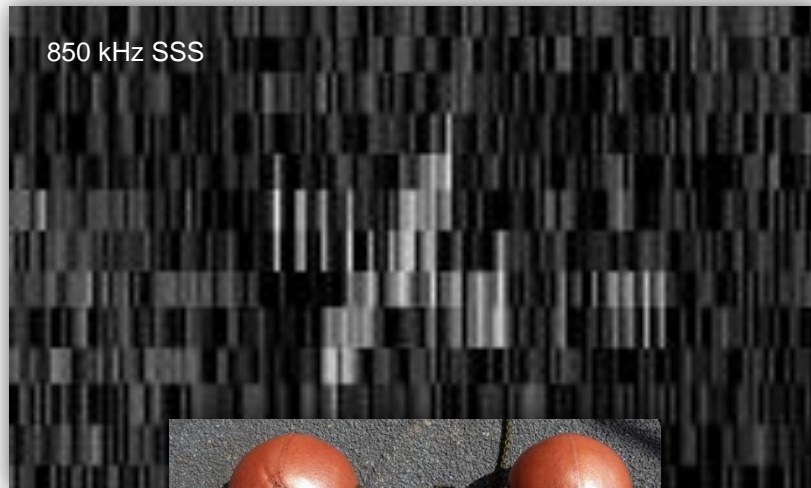
- **Survey Parameters:**
  - Altitude: 3 to 150 m
  - Speed: nominally 1.5 to 2 m/s (~3 to 4 kts)
- **Performance and coverage:**
  - Full swath HISAS: ~600 m total
  - Full swath EM2040 single Rx: ~400 m
  - Full swath EM2040 dual Rx: ~800 m
  - Area Coverage rate: ~2.6 km<sup>2</sup>/hour



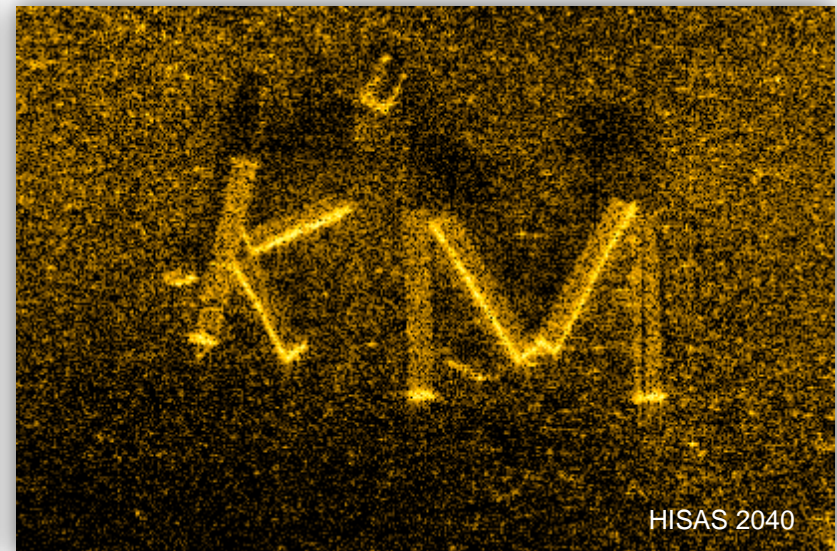
- Sensor combinations improve coverage rates
- All sensors can be used concurrently
  - HISAS/SSS
  - EM2040
  - SBP
  - TileCam
  - Environmental/Geochemical



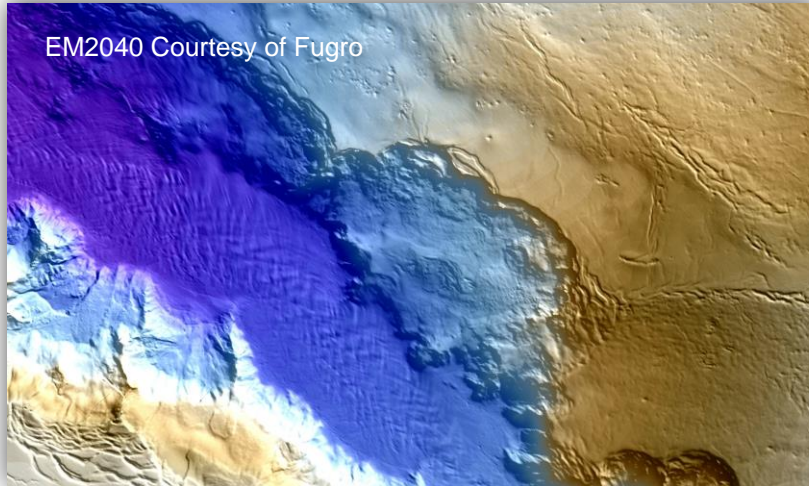
# Data Products - HISAS



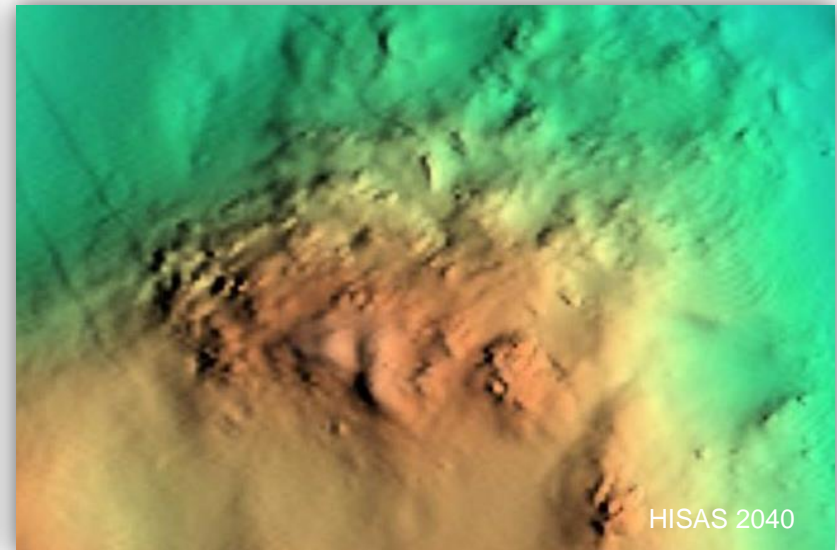
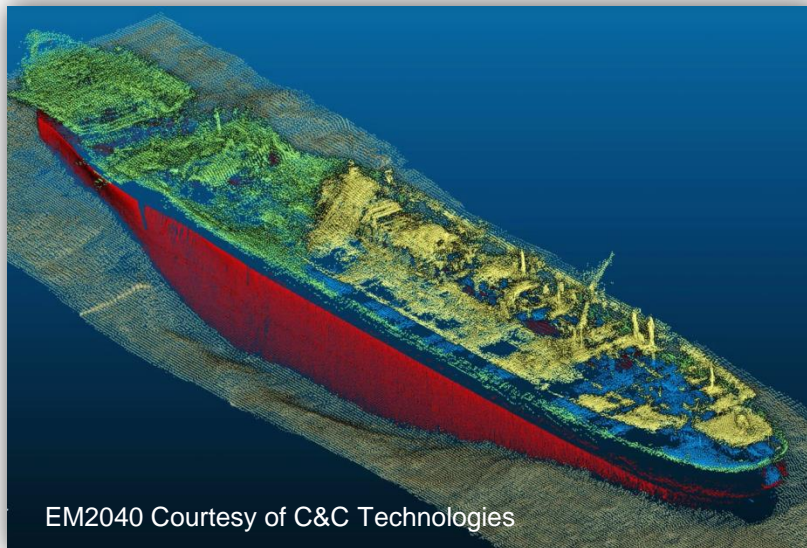
- Synthetic Aperture Sonar
- HISAS 1030 theoretical resolution 2 x 2 cm
- HISAS 2040 theoretical resolution 1.2 x 1.3 cm
- Practical resolution 4 x 4 cm
- Range independent resolution
- HISAS 1030 range: 300 m either side
- HISAS 2040 range: 150 m either side
- In-Mission SAS and Bathymetry processing



# 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

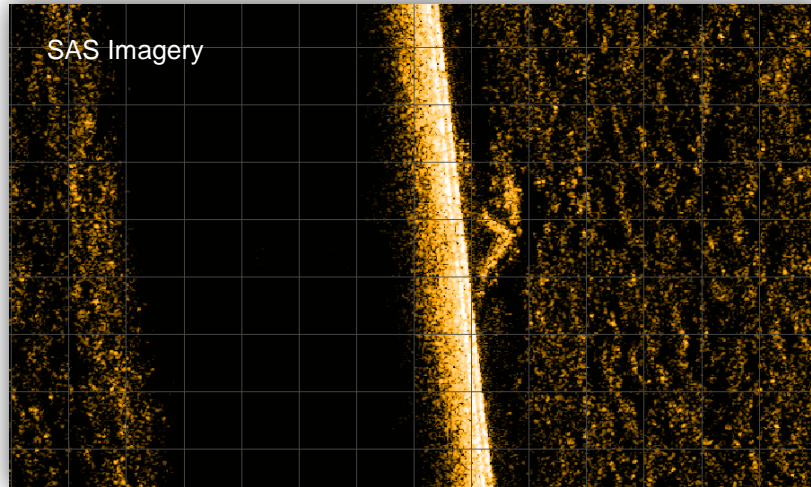




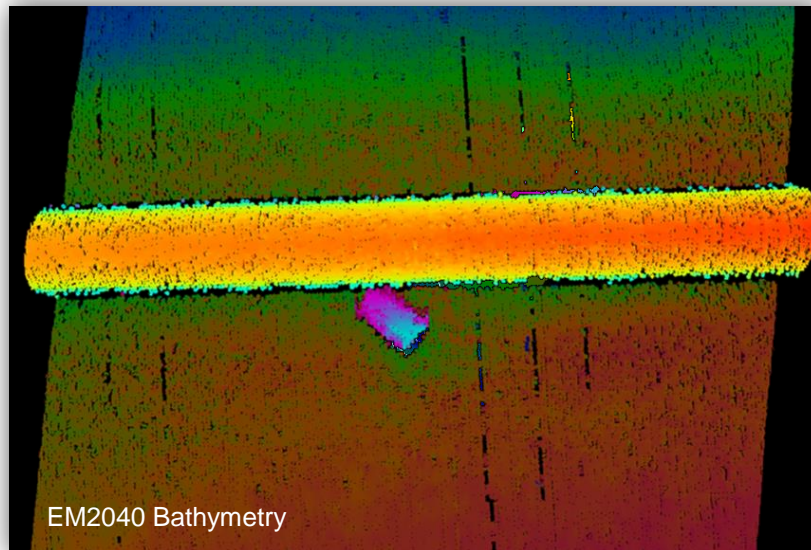
# Data Products – Pipe Tracking



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- 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





[kongsberg.com](https://kongsberg.com)



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