



**SAAB**

# SEAEYE JAGUAR



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The Seaeeye Jaguar represents a new era in ROV design and continues the long tradition of innovation and excellence that Saab Seaeeye is world renowned for.

As the largest vehicle in Saab Seaeeye's range, the Jaguar introduces a new concept in control and power distribution that ensures reliability and complete redundancy throughout the vehicle. Easy self diagnostics and the ability to fix problems while the vehicle is working are a key part of the new control software. It gives precise control and is designed with an easy to use interface so that the system can be easily reconfigured.

The core Jaguar vehicle is split into two identical halves, each half is completely independent and can be isolated from the other. Essentially two ROVs in one, providing total system redundancy throughout.

With a standard operational depth of 3000 msw (and options of up to 6000 msw) and an extensive tooling capability, most subsea applications are within its range and capabilities.



## THE VEHICLE

### CHASSIS

The extremely rugged polypropylene and stainless steel chassis has been designed to maximise free water flow through the ROV. Materials and design are balanced to create an incredibly lightweight chassis, maximising strength and stiffness in support of a 1Te through frame lift capability and rigid mountings for manipulators, TDUs, tools and sensors.

### BUOYANCY

Buoyancy is derived from syntactic foam blocks finished with a tough polyurethane skin. The buoyancy modules contain apertures for vertical thrusters and the main system lift point.

### PROPULSION

Full three dimensional control including pitch and roll is provided by four horizontal SM8 and four vertical SM7 500V brushless DC thrusters, which offer great power density and precise and rapid thrust control.

The thrust vectoring algorithm can accommodate multiple damaged thrusters whilst retaining normal flying characteristics.

### ELECTRONICS PODS

The vehicle has two easily accessible watertight electronics pods manufactured from machined 6082 marine grade aluminium. All pods are fitted with leak and temperature alarms.



**PAN & TILT AND TILT PLATFORMS**

The Jaguar is fitted with both a high-torque oil-filled pan & tilt platform and a tilt platform, manufactured from anodised aluminium (or optionally two pan & tilt units).

The positional information is displayed graphically on the video overlay and/or pilot's dashboard.



**LIGHTING**

Four individually controlled lighting channels are provided as standard, each with their own brilliance control on the pilot's hand control unit. Any light on the ROV and the TMS can be mapped to those controls.

As standard the Jaguar is fitted with 6 high luminosity durable LED lamps, and additional lighting can be readily added to the system.

**NAVIGATION**

As standard the Jaguar is fitted with a combined compass and inertial measurement unit which provides 6 degrees of freedom motion measurement for enhanced azimuth stability, autos and DP.

This core equipment can be augmented by additional high performance sensors which will feed directly into the control algorithms running in the surface control unit.



**AUTOPILOT FUNCTIONS**

- Auto heading
- Auto depth
- Auto pitch / Auto roll and stabilisation
- Auto altitude (optional)
- Full DP capabilities (optional)

**ANCILLARY EQUIPMENT & VIDEO INTERFACES**

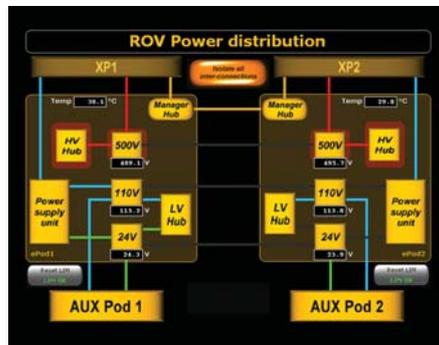
The Jaguar vehicle is fitted with two interface hubs. Each hub is supplied with 24 VDC and 110 VAC - 50 Hz and is fitted with a video/data MUX. Each individual outlet is switchable and fitted with a software configurable/resettable 'fuse'. Each hub is fitted with a series of relays, these are typically assigned to tri-state camera control functions but can be allocated to other equipment as required.

**SURFACE CONTROL & POWER SUPPLY**

**POWER DISTRIBUTION**

Propulsion and instrumentation on each half of the ROV is powered by two separate circuits. Each circuit comprises a surface power supply that outputs a 3 kV 800 Hz single phase supply. At the ROV each circuit terminates in a transformer, the outputs of which supply a series of power converters which create 500 VDC, 24 VDC and 110 VAC - 50 Hz buses.

All devices (thrusters, lights, cameras, sensors, etc) can be individually switched and electrically isolated remotely. The power manager continually monitors the current drawn by each device, this information being fed into the system's diagnostics. The surface power supplies continually monitor earth leakage within the system, and identification of a faulty device is rapid and automated.



The separation in two halves allows all essential systems to remain operable in case of a higher level fault in the power distribution system, with vehicle performance reduced to 50%.

**CONTROL SYSTEM**

The Jaguar operates Saab Seaeeye's latest distributed intelligence control system, which allows control, diagnosis and update of all devices individually (thrusters, lights, pan & tilt platform, camera actuators, etc).



**MAN MACHINE INTERFACE**

The Jaguar's surface control equipment is console mounted. The pilot interface is a combination of physical switches and touchscreens. The primary vehicle controls are ergonomically designed on a pad which can either be mounted within the console desk or removed and operated on a flying lead.



*Example of console layout – the layout can be adapted to customer requirements*



*Jaguar hand control unit*

**FIBRE OPTIC SYSTEM**

Two combined video data multiplexers are supplied as standard providing a total of:

- 8 x composite video channels
- 4 x RS485 channels
- 8 x RS232 channels

### OPTIONS, TOOLS & ACCESSORIES

The Jaguar is designed to make the integration of task specific tools and sensors as easy as possible.

The chassis provides:

- Front mounted equipment frame or “Bull Bar”
- Rigid front mounting manipulator hard points
- Rear Tool Deployment Unit (TDU) mounting points
- Modular floor inserts for equipment mounting
- 1Te (in air) under-slung through frame lift



Jaguar fitted with Schilling Orion 7P and 4R

### TOOLS

A total of 24 kW is available at the ROV for tooling. The tooling power system comprises a dedicated surface power supply that outputs a 3000V 50/60 Hz supply.

#### TOOLING CIRCUIT

- 3 kV HPU providing flow on demand up to 50L/min at 210 bar
- 2.75L compensator
- 2 x 7F solenoid valve pack
- End of rail Quick Disconnects (QD) for high flow tooling
- QDs for deckpack hook-up

#### MANIPULATOR CIRCUIT

- SM8 thruster driven HPU providing 8L/min, 210 bar
- 2.75L compensator
- Schilling Orion 7 Function manipulator (rate or proportionally controlled)
- Schilling Orion 4 Function grabber manipulator (rate controlled)
- 7F valve pack for Orion 7F
- 7F solenoid valve pack for Orion 4F

### TOOLING SKIDS

Job-specific tooling skids are available and are fitted with a system of guides that allow the vehicle to be easily positioned onto the skids even in rough seas.



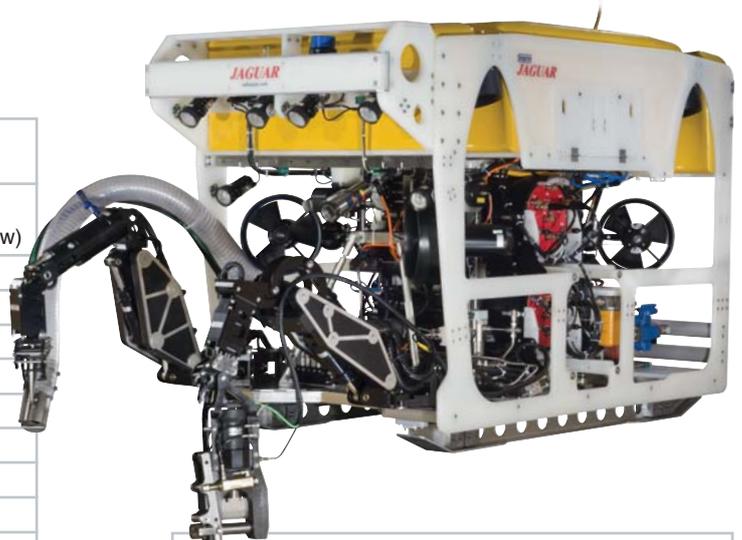
Example of job-specific tooling skid: Pipe tracking wheeled skid

The system can be quickly configured for different task-specific applications, such as:

- Drill Support
- Non Destructive Testing
- Cleaning
- Dredging
- Pipeline Survey
- General Survey
- Submarine rescue

### SEAEYE JAGUAR SPECIFICATIONS

SPECIFICATIONS	
Depth rating	3000 msw (option to 6000 msw)
Length	2200 mm
Height	1500 mm
Width	1325 mm
Launch weight	2100 kg
Forward speed	> 3 knots
Thrust forward	325 kgf
Thrust lateral	290 kgf
Thrust vertical	225 kgf
Payload	225 kg
Through frame lift	1 Te
Tooling circuit	24 kW
Manipulator circuit	5 kW
Instrumentation power - 24 VDC	2 kW
Instrumentation power - 110 VAC, 50 Hz	2 kW
Depth accuracy & resolution	0.01% / 1 x 10 <sup>-8</sup>
Heading accuracy & resolution	±1° / 0.351°



SYSTEM POWER REQUIREMENTS	
Input	3-phase 380-480 VAC, 50/60 Hz
ROV + Tooling	75 kVA
TMS	8 kVA
TMS propulsion (option)	28 kVA
LARS (typical)	150 kVA

## JAGUAR DEPLOYMENT AND OPERATION

### TMS10

To allow work at greater depth and protect the ROV through the splash zone, the Jaguar is launched in a custom designed TMS10. This winch style TMS has an innovative shuttle drum that moves side to side of a fixed power sheave which greatly improves tether life. The 500m capacity drum is fitted with a sealed, oil compensated electro-optic slip ring. The stainless steel main frame of this garage TMS is fully adjustable allowing for easy adjustment to accommodate varying sizes of ROV mounted tool skids. The TMS has its own dedicated surface power supply.



The TMS10 is fitted as standard with two camera and two LED light interfaces. Additional cameras and lights can optionally be added.

An optional snubber-rotator allows the TMS to be locked into position and rotated for a smooth and safe transit through the A-frame.



Long length free-swimming configurations are also available.



### CONTROL CABIN

Custom-built control cabins to house the surface control equipment and the power supplies are offered in both Safe Area and Zone 2 ratings.

Their layout can be tailored to suit customer requirements, as can the layout of the operator/pilot control console.

Workshop cabins and split control cabins/workshops are also available.



### LAUNCH & RECOVERY SYSTEM (LARS)

The Jaguar A-frame LARS has been designed with the following key features:

- Minimal deck footprint
- Ease and speed of mobilisation
- Ease and safety of operation

It is fitted with a dual winch electrical system providing redundancy, LeBus shells and a Focal electro-optic slip ring.

It is available in Safe Area or Zone 2 ratings.



## SAAB SEA EYE LTD

### THE WORLD'S LEADING MANUFACTURER OF ELECTRIC ROVS

With over 25 years experience and 700 vehicle systems sold, the company is at the forefront of design, technology, manufacturing process and support for ROVs across the world.

Providing a range of systems from inshore observation level to full deep-sea work class, Saab Seaeye has pioneered the use of ROVs for many applications, providing customised solutions, developing tools and integrating advanced technologies to achieve results for its customers.

Saab Seaeye is a wholly owned subsidiary of Saab Group, a major supplier of services and solutions to the global defence sector and celebrating its 75th birthday.

Based in the UK with a worldwide network of experienced representatives, Saab Seaeye's 24,000 sq ft headquarters in Fareham, includes in house design using the latest computer aided technology, prototyping, workshops, test tanks, pressure testing, motor rooms, machine shop, electronics and PCB sections, vehicle assembly area, stores, training rooms, offices and meeting facilities.

Accredited with DNV ISO 9001, Saab Seaeye is committed to a safe, clean and efficient working environment, coupled with experienced project management, high quality customer service/offshore support, including 24h emergency contact number and comprehensive stock holding.



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