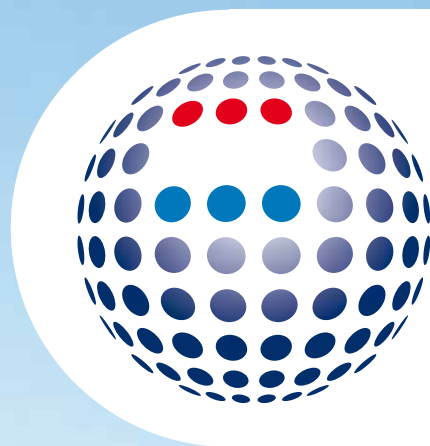


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# Maritime by Holland.

Magazine

Vessels highlighted  
Greenstream  
Astra-G  
Amadeus Silver

The vision of  
Sytze Voulon  
Regional Director NWE Imtech Marine

Special  
Safety





Photo by Flying Focus, Bussum, the Netherlands

When Rederij Groen, a Scheveningen-based service supplier to the offshore industry, secured a long-term charter contract for two chase vessels for seismographic research, the question arose whether to refit two fishing cutters - as had been done in the past - or to build new ships. The scale tipped in favour of newbuilds, and together with Saltwater Engineering and Maaskant Shipyards, the first purpose-built Seismic Research Support Vessels were built.

In seismographic research at sea, typically several research vessels trail an array of streamer cables, often a kilometre or more long. At certain intervals, a vessel emits a sonic boom with an airgun, and through the reception in the sensor field, data can be obtained about the geology below the seafloor, for example to find oil or gas deposits. The fleet of research vessels usually travels at around four knots and follows a pre-determined route. Because of the costly array of sensory equipment, it is essential that the flotilla can travel undisturbed by other traffic or obstacles. Two or more chase vessels circle the fleet to chase away other ships and to temporarily remove objects such as fishing nets or buoys in the path of the flotilla.

#### Trawlers

Usually, chase vessels are converted fishing trawlers (cutters) because of their good seakeeping characteristics, although they can get wobbly at low speed. With offshore industry regulations continuously lengthening the list of requirements for chase vessels (for example redundant propulsion, ship's age below ten years), Rederij Groen figured that scale tipped in favour of a new building. To achieve a good purpose-built design, they approached the naval architects at Saltwater Engineering to produce a preliminary design, consisting of the hull lines, a general arrangement and a technical specification. The initial design brief called for a tonnage below 500 GT, comfortable accommodations above

# ASTRA-G

WORLD'S FIRST PURPOSE-BUILT SEISMOGRAPHIC RESEARCH SUPPORT VESSEL

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<b>Builder</b>	
Maaskant Shipyards, Stellendam, the Netherlands	
<b>Owner</b>	
Rederij Groen, Scheveningen, the Netherlands	
<b>Naval Architect</b>	
Saltwater Engineering, Papendrecht, the Netherlands	
<b>Principal particulars</b>	
Length o.a.	40.00 m
Breadth mld.	9.30 m
Depth mld.	4.60 m
Draught	3.30 m
Gross Tonnage	499
Main engines	2 x 970 kW
Generators	3 x 99 kW
Max speed	14 knots
Fuel tanks	230 m <sup>3</sup>
Lub oil tanks	2 x 2.5 m <sup>3</sup>
Waste oil tanks	3.0 m <sup>3</sup>
Fresh water tanks	35.5 m <sup>3</sup>
Black water tank	10.4 m <sup>3</sup>
Grey water tank	5.1 m <sup>3</sup>
Bilge water tank	2.9 m <sup>3</sup>



The covered foredeck creates an imposing frontal view

the main deck, a practical aft working deck and a spacious wheelhouse with good views both forward and aft.

## Tender

After a tendering procedure, Rederij Groen chose Maaskant Shipyards, where they had ample positive experiences with the maintenance of their fleet. The location in Stellendam, less than an hour from Scheveningen, was another advantage, as this significantly reduced the cost for oversight from the owner's side. Both the design and build were a collaborative effort of Rederij Groen (father Henk and son Erik Groen) and their technical superintendent Dirk Klok), Saltwater Engineering, and Maaskant Shipyard,

part of the Damen Shipyards Group. Maaskant Shipyards is a bit of an outsider in the Damen Shipyards conglomerate, as in recent years it has become specialised in one-offs and short series rather than the standard vessels built-for-stock in most of Damen Shipyards' other yards.

## Seakeeping

The design of Astra-G's hull was primarily based on her seakeeping behaviour at low speed.

Saltwater Engineering concluded that a sharp bow, with U-shaped sections and minimal bowflair, along with V-shaped stern sections would yield the best result. At low speeds, stern slamming becomes an important issue, and V-shaped stern frames help reducing the force of the impact. As a spacious aft working deck was a prerequisite, the accommodation was placed forward. Naval architect Sander Broekmeulen of Saltwater Engineering: "Most

*"Up until Astra-G, every chase vessel was a converted fishing vessel"*



The hull was primarily designed with low-speed seakeeping in mind

*"Chase vessels ensure that seismographic research vessels can do their work without interruptions"*

a crew of five, additional cabins are provided for nine passengers, allowing her to transfer relief crews for the seismic research vessels. A first-aid room is provided, which can be converted into another two-person cabin if needed. Every cabin has a private en-suite bathroom, with a gravity toilet draining either overboard, to the Hamworthy sewage treatment system, or to the holding tank.

#### Bollard pull

An important add-on on *Astra-G* is her quick-release towing hook. Should one of the seismographic survey vessels lose her propulsion, the chase boat must be able to quickly provide assistance by towing her at a minimal speed, enough to keep the expensive array of streamers tangle-free. The bollard pull of the *Astra-G* was tested at 21.5 tons. The aft deck can easily be equipped with davits for a fast rescue boat, in case the *Astra-G* is used as a standby vessel, another field in which Rederij Groen is active. To pick up nets, buoys or other floating objects, a Heila Crane is mounted on the aft deck.

offshore supply vessels have a high GM, which translates to fast transverse accelerations and thus uncomfortable motions. With this design, we have taken care to keep the centre of gravity high enough, resulting in a GM below one metre, and thus gentler motions. The hull is more akin to those of cable laying vessels, which also spend most of their time at low speeds, than to those of offshore supply vessels."

#### Autonomy

Two other important aspects in the design of *Astra-G* are her range and autonomy. This resulted in ample fuel tank volume at 230 m<sup>3</sup> in total, and in features such as watermakers - producing 5,300 litre of freshwater per day - and a bioreactor sewage treatment system, which is approved for use also in zero-discharge zones. Although *Astra-G* will be normally manned by

#### Propulsion

For efficiency, *Astra-G* is propelled by two direct diesels coupled to the propeller shafts. Her Caterpillar C32 Acert main engines have electronically governed injectors, which ensure that the combustion is still good even when she is sailed at very low speeds for extensive periods of time. With one engine running, the idling speed is about six knots, which can further be

Twin-screw propulsion is required for redundancy



A quick-release towing hook is installed on the aft deck





*During normal service, one of the three generators is running*



*The wheelhouse has both forward and aft-facing consoles*

reduced to four knots by giving the rudders opposing rudder angles. For this purpose, the rudders can be individually operated, as well as synchronised. The oil-lubricated propeller shaft installations, supplied by Rubber Design, have the screw shaft condition monitoring (SCM) notation, which means that the shafts have to be pulled only once every five years, reducing the time needed for intermediate dockings.

### Construction

*Astra-G* is entirely built of steel. The hull and superstructure were built in at shipyard Crist in

Poland and then towed to the Netherlands for outfitting at shipyard Maaskant. Her light ice class notation 1E allows her to operate safely in broken ice, which is a big advantage as oil exploration expands in the polar regions. Her bilge keels dampen the rolling movement, but there is no active stabilisation system. Crew comfort was a key priority to the owners, and a lot of attention was paid to the reduction of noise and vibrations onboard. The wheelhouse, for example, has a noise level of only 56 dB(A) at full speed. In the public spaces, the ceiling panels are perforated for added noise reduction.

### 60 Hz

As 60 Hz power is more common worldwide than 50 Hz, the power distribution onboard is along a 60 Hz network. Electric power is generated with three 122 kVA Caterpillar C4.4 gensets, of which one is normally enough to supply the house load. When the bowthruster is operated, a second genset is brought online, still leaving the third as a backup. Because *Astra-G* spends a lot of time at low speeds, and also in warm tropical waters, her boxcoolers are sized larger than average.

*A complete 3D model of the vessel was built before construction*



## Looks matter

To perform as a chase vessel, *Astra-G* needs to look the part. The superstructure design went through several iterations, each with photorealistic renderings, to obtain the right look. In particular the covered foredeck merits attention. In addition to protecting the anchoring and mooring gear, the cover creates an impressive frontal view. The spacious wheelhouse features navigation positions facing both fore and aft, for manoeuvring during pick-ups of buoys and other objects. Notable is the access to the wheelhouse through a watertight deck hatch, which waived the requirement for permanently fixed deadlights for the windows.

## Barents Sea

Maaskant Shipyards' project manager Ben Boot: "The owners and even the charterers were very involved at every stage, and this has resulted in a very satisfactory outcome. *Astra-G* and her sister vessel *Aquarius-G*, which is in the final stages of construction, are the first purpose-built chase vessels, and it is expected that they will set the standard in this niche for years to come." At the time of writing, *Astra-G* is en route to the Barents Sea for her first assignment of six to eight months.

*Bruno Bouckaert*



## Subcontractors and suppliers of equipment fitted on board the *Astra-G* - YN 609

Ajax Chubb Varel, Amsterdam	: CO <sub>2</sub> fire extinguishing installation, fire detection equipment
Amero Compressoren, Badhoevedorp	: air compressor
Apotheek Lagaay, Rotterdam	: medical kit
Aqua Control, Bergen op Zoom	: freshwater treatment system
Corrosion & Water-Control, Moerkapelle	: ICAF system for boxcoolers
Crist, Gdansk, Polen	: hull construction
<b>Damen Marine Components,</b> Hardinxveld-Giessendam	: rudders
Datema Nautical Safety, Delfzijl	: nautical inventory
Double D marine equipment, Waalwijk	: <i>Heila</i> deck crane
E&K Electronics, Yerseke	: electrical installation; galley equipment
EMCE machinefabriek, Voorhout	: anchor winch; capstans
GEA Westfalia Separator Nederland, Cuijk	: gas oil separator
Hamworthy, Rotterdam	: sewage treatment unit
Helder & May, Rotterdam	: floors
Ijtama, Scheepstimmerbedrijf, Stellendam	: carpentry
Imtech Marine Netherlands, Rotterdam	: complete navigation and communication package including Vsat
International Paint, Rhooen	: coating system for the hull and for outfitting
Jotun, Spijkenisse	: paint supplier
Lloyds Register of Shipping, Rotterdam	: classification
Leroy Somer, Soesterberg	: generator sets
Mampae Offshore Industries, Dordrecht	: towing hook
MarteO, Rotterdam	: gangway
Miele Nederland, Vianen	: washing machine and dryer
Ned Marine Services, Ridderkerk	: aluminium anodes
NR Koeling, Krimpen aan den IJssel	: HVAC installation; proviand installation
NRF Nederland, Mill	: boxcoolers
Pon Power, Papendrecht	: <i>Caterpillar</i> main engines; <i>Leroy Somer</i> generator sets
Promac, Zaltbommel	: steering gear; MOB boat and davit
Reintjes Benelux, Antwerp, Belgium	: gearbox main propulsion
Rubber Design, Heerjansdam	: propeller shafts
Saltwater Engineering, Papendrecht	: design and drawings
Schavicast, Stellendam	: painting
Sterling Fluid Systems, Beverwijk	: <i>Sihi</i> pumps
Straathof Controls, Dronnten	: propulsion control system
Theunissen Technical Trading, Malden	: <i>Pesch Seematz</i> halogen searchlight
Veth Propulsion, Papendrecht	: <i>Veth-Jet</i> bowthruster
Viking Life Saving Equipment, Zwijndrecht	: <i>Viking</i> liferafts, life saving equipment and fire fighting products
Voorden, Van, Zaltbommel	: propellers
Winel, Assen	: GRP and steel musketeer doors
Wingerden en Zonen, H.K. van, Wijngaarden	: <i>Wigo</i> windows and portholes
Winteb, Winschoten	: air pipe heads

