DAMEN

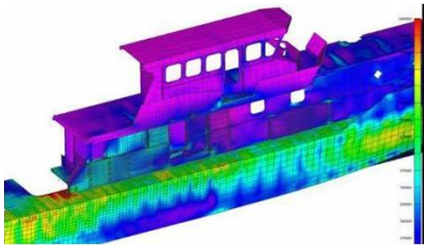
SEA AXE

Stan Patrol 5009

Executive Summary

Stan Patrol 5009

Contents



Stan Patrol 5009

Contents

Stan Patrol 5009

Typical patrol boat requirements

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Typical patrol boat requirements

Patrol boats worldwide are used for very different tasks. To name some:

- Counteract smuggling, terrosism and piracy
- Protect the Exclusive Economic Zone
- Carry out Search & Rescue operations
- Inspect compliance with laws, e.g. concerning the environment or fishery

Although these tasks are very different, the requirements to perform these are similar:

- Patrol speeds of 10-16 knots, but capable of high speeds, even in severe weather conditions
- Fitted with a high-speed tender, for boarding operations
- Extensive communication systems
- High quality radar systems for various conditions
- Comfort for the crew during operations for prolonged periods of time

Stan Patrol 5009

Proven design

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Proven design

Damen has a long history in high-speed patrol vessels. Since the beginning of the seventies, Damen has delivered significantly more than 1000 high speed craft, half of which is patrol boats.

The Stan Patrol 5009 is based on the Sea Axe FCS 5009 design. This 50 meter vessel was developed by Damen in 2006 as a Fast Supplier for the offshore industry. Since 2007, 22 orders were booked, in various configurations:

- Standard Fast Supplier for the offshore industry
- Safety Rescue Vessel for the offshore industry
  - Fitted with extra accommodation, FiFi 1, rescue boat and towing arrangement
- Fast Yacht Support Vessel
  - Fitted with extra accommodation, a crane and luxury decks and carpentry
- Security Vessel
  - Fitted with extra accommodation, armour plating/windows and a high-speed interceptor in a davit

Although the looks of the Stan Patrol 5009 differ significantly from the FCS 5009 (basically the superstructure), the major systems of these designs are very similar, i.e. well proven.

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Hull form

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Hull form

The Damen Stan Patrol 5009 is the first “Sea Axe” patrolboat, which means that the hull is designed according to the “Axe Bow Concept”. This “enlarged” hull shape is the result of years of research by Delft University of Technology, the US Coast Guard, the Royal Netherlands Navy, the Maritime Research Institute Netherlands and Damen.

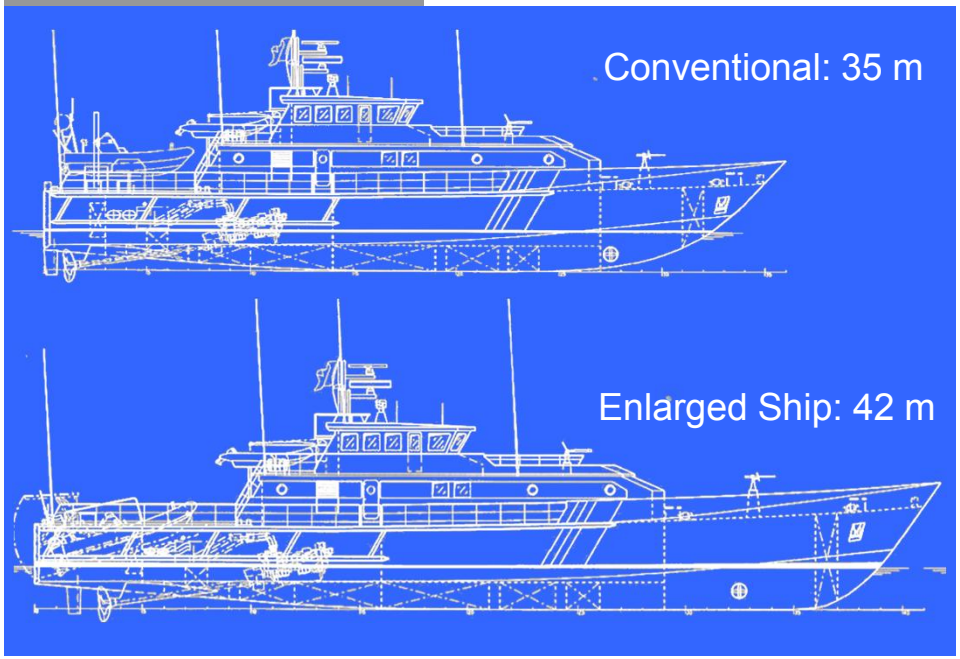
As a result, a relatively light, long and slender design with a very fine entry is obtained, free from flare and with an extremely deep-V – all focussed on improving seakeeping capabilities of the vessel. This hull slices through the waves effortlessly, with very low vertical acceleration levels and completely free of slamming.

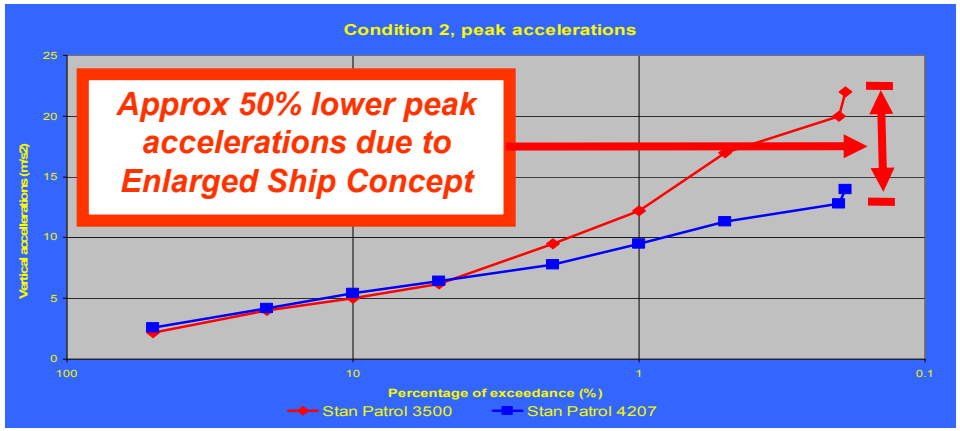
As spin-off, the long hull yields several more advantages:

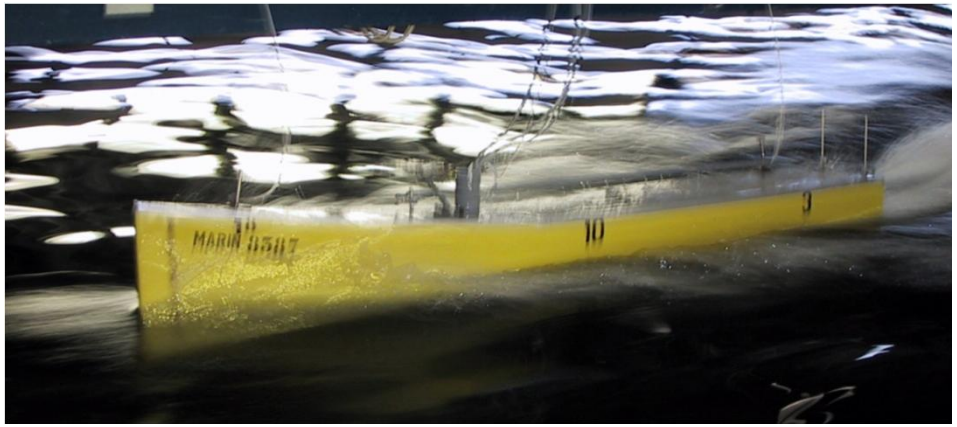
- Significantly decreased resistance, both at patrol speed and maximum speed
- The wheelhouse is located in the region where the level of accelerations is low, thus improving working conditions and decreasing crew fatigue
- A high-speed tender can be accommodated easily on the aft deck, which can be launched from and recovered into an integrated stern slipway
- The oversized hull offers ample space for maintenance

Stan Patrol 5009

Sea Axe / Axe Bow







Stan Patrol 5009

Sea Axe / Axe Bow

Worldwide, the majority of high speed vessels are designed for “trial conditions”. This is the condition in which the promised speed of a ship has to be proven to the customer. To limit speed degradation due to wind and waves, “trial conditions” basically means “no wind” and “no waves”.
As a result of designing for “trial conditions”, many high speed vessels worldwide perform well on flat water, but show serious shortcomings in the “real world” of our customers: on the sea. In waves of some significance, these vessels have to slow down to keep the crew – and the ship – in one piece.
In the beginning of the 80’s, Damen and Delft University joined forces to change the high speed craft design philosophy and started to design for “operability at sea” instead of “trial conditions”.

The Axe Bow earns her name from the side view of the bow: the keel line slopes down forward and the sheer line slopes up – strongly resembling the blade of an axe.
The Axe Bow is a further development of the “Enlarged Ship Concept”.
This concept is based on lengthening the hull of a ship, without increasing the functionality. A more slender hull shape is the result, which cuts through the waves more easily - without a serious price consequence.
The Axe Bow takes this philosophy to the limit. The extremely slender and deep bow, without any flare, provides unprecedented soft seakeeping characteristics. Where a conventional high speed vessel bounces over the waves, the Axe Bow effortlessly cuts through the waves. As a result, the Axe Bow can sail at maximum speed, independent of the circumstances, without damaging the crew or the ship’s construction.
The Axe Bow is the result of five years of research, initiated by Delft University and carried out in cooperation with the Royal Netherlands Navy, the Maritime Research Institute Netherlands, US Coast Guard – and of course Damen. Damen uses “Sea Axe” as a commercial name for the Axe Bow designs.

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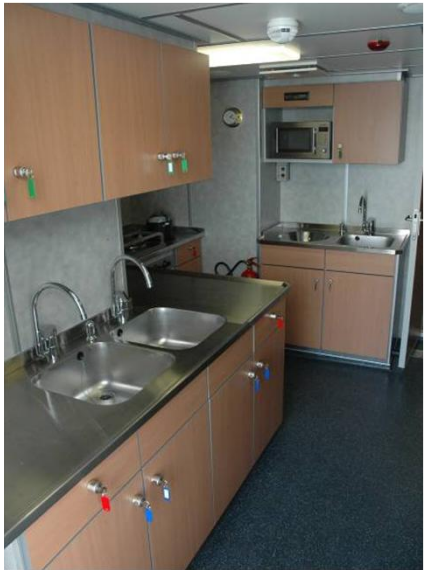
Crew ergonomics



Stan Patrol 5009

Crew ergonomics

Due to the oversized hull of the Damen Stan Patrol 5009, it was possible to place the wheelhouse at the position where the ship motions are least: approx one third from the stern. This creates the best possible working environment for the crew.

Throughout the vessel, flexible carpentry and floating floors are applied to reach very low noise levels.

The engines are flexible mounted, to obtain low vibration levels.

The major controls and communication devices have been integrated in the helmsman's seat. Even in the worst conditions, the helmsman can control the ship from this safe and comfortable position.

On the main console, three large flat screens are integrated which can show conning, electronic chart, X-band radar or S-band radar.

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Navigation & Communication

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Navigation & Communication

The wheelhouse is fitted with a proven technology state of the art Integrated Navigational System (INS). In combination with the spacious and ergonomically arranged wheelhouse, this offers a high level of flexibility and workability, creating less diversion for the operators from their patrol duties.

The Integrated Navigational System (INS) includes:

- X-band radar + S-band radar
- Autopilot
- Differential GPS
- Electronic Chart System (ECDIS)
- Automatic Identification System (AIS)
- Echo sounder and Speed log
- Gyro compass and Magnetic compass
- Communication equipment (GMDSS A2/A3)
- VHF radio telephone with DSC watch receiver
- VHF handheld radio telephone
- MF/HF radio telephone with DSC watch receiver
- Navtex
- Epirb
- Sart

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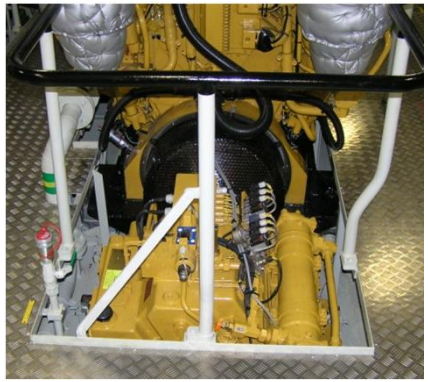
Propulsion



Stan Patrol 5009

Propulsion

The Damen Stan Patrol 5009 can be equipped with Caterpillar or MTU engines.
For flexibility, efficiency and redundancy, four Fixed Pitch Propellers, two hydraulic bow thruster and two rudders are installed.

All controls of the engines, bow thruster and rudders are integrated in the helmsman's seat.

Besides, the ship can be controlled from the flying bridge.

Depending of the choise of engines, the maximum speed of the Damen Stan Patrol 5009 varies between 22.5 and 32 knots. See below the standard options with Catrpillar and MTU engines.
The range at patrol speed (10-16 knots) is approx 3,000 nautical miles.

Option	Engines	Power	Speed
1	4x CAT C32 TTA C-rating	4,324 kW (5,800 bhp)	22.5 kts
2	4x CAT 3512C TA HD D-rating	7,050 kW (9,454 bhp)	27 kts
3	4x CAT 3516C TA HD D-rating	9,400 kW (12,600 bhp)	30.5 kts
4	4x MTU 16V4000 M63L 1A-rating	8,960 kW (12,016 bhp)	30 kts
5	4x MTU 16V4000 M93L 1DS-rating	10,300 kW (13,840 bhp)	32 kts

Stan Patrol 5009

Deck equipment & High speed tenders

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Deck equipment & High speed tenders

The Damen Stan Patrol 500 is fitted with high quality deck equipment, which has proven its practical suitability to many previous customers already.

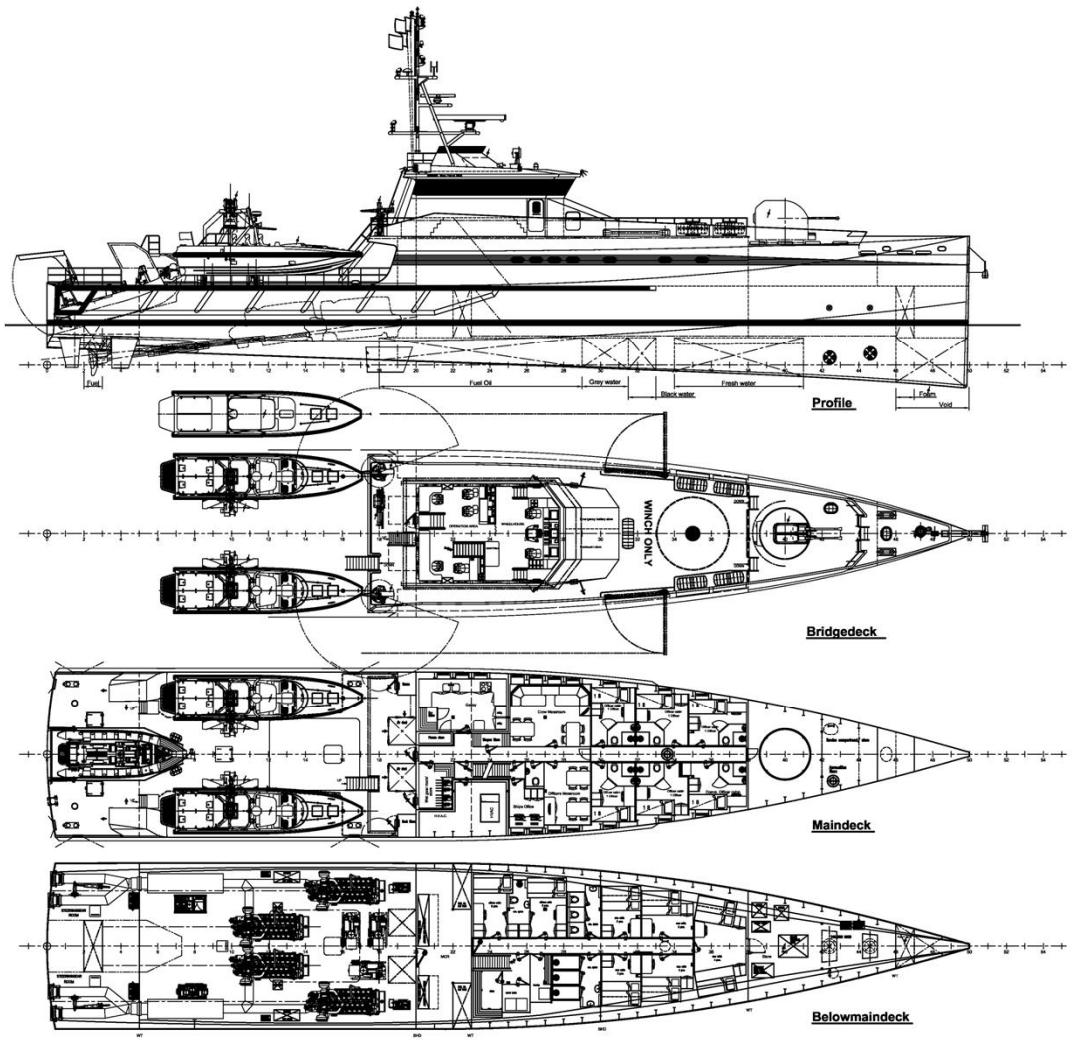
A high-speed Rigid Inflatable Boat (RIB) is one of the most important pieces of equipment on the Damen Stan Patrol 5009. This tender is stored in a stern slipway, from which it can be safely launched and recovered in a matter of minutes.

As an option, one or two Damen Interceptors 1102 can be installed in davits on the aft deck. These Interceptors offer 55+ knots of speed, extremely reliable handling and the maximum of safety an 11 meter boat at 55+ knots could ever offer.

Refuelling and repair facilities for the RIB and the Interceptors are fitted to allow around the clock operation for interception, boarding, inspection and Search And Rescue.

Stan Patrol 5009

General Data



Stan Patrol 5009

General Data

GENERAL

PROJECT NUMBER	
HULL MATERIAL	Steel
SUPERSTRUCTURE MATERIAL	Aluminium
BASIC FUNCTIONS	-Patrol duties -Maritime Safety -Securing economical waters & coastal boundaries -Search and Rescue
CLASSIFICATION	Bureau Veritas I ✠ Hull ● Mach AUT-UMS Light Ship, Patrol boat

DIMENSIONS

LENGTH O.A.	50.20m
BEAM O.A.	9.32m
DEPTH AT SIDES	4.45m
DRAUGHT AFT	3.50m

TANK CAPACITIES

FUEL OIL	95.00 m^3
FRESH WATER	25.00 m^3
BILGE WATER	1.50 m^3
SEWAGE WATER	12.70 m^3
WATERBALLAST	29.70 m^3

PERFORMANCES (TRIALS)

SPEED	25 – 30 kn.

PROPULSION SYSTEM

MAIN ENGINES	MTU / Caterpillar
TOTAL POWER	5000 – 10000 bkW
GEARBOXES	Reintjes / ZF
PROPELLERS	Controllable / fixed pitch propellers
BOW THRUSTER	2 x 75 bkW

AUXILIARY EQUIPMENT

MAIN GENERATOR SETS	2 x Generator sets
NETWORK	230/400V – 50 Hz
STABILIZERS	Quantum QC 1200
FIRE FIGHTING (INTERNAL)	Fixed Fi-Fi system in engine room (Novec)
BILGE WATER SEPERATOR	Facet
FUEL SEPERATOR	Alpha Laval
MISCELLANEOUS	Sewage system

DECK LAY-OUT

ANCHOR	184 kg, High holding power, Pool - TW
ANCHOR WINCH	Hydraulically driven
DAVIT CRANE	A single arm Interceptor crane is fitted on the aft deck
DAUGHTER CRAFTS	2 x Damen Interceptor 1102 with 2 inboard diesel engines, 50 kts
LIFE RAFTS	2 x 20 persons

ACCOMMODATION

CREW CABINS	Twelve cabins are fitted: -1 Commander's cabin at maindeck -3 cabins for 1 Officer at maindeck -2 cabins for 2 Officer's below the maindeck -6 cabins for 2 crew below maindeck
AIR CONDITIONING	Air Conditioning in wheelhouse and accommodation

NAUTICAL AND COMMUNICATION EQUIPMENT

SEARCHLIGHTS	
MAGNETIC COMPASS	
GYRO COMPASS	
AUTO PILOT	
DGPS	
ELECTRONIC CHART SYSTEM	
RADAR 2X	
ECHO SOUNDER	
SPEEDLOG	
COMMUNICATION	According GMDSS A3

Note: Some of the items in this specification are optional. Specification and general arrangement can be changed with out notice.

Sustainability – Through the entire lifecycle

The maritime industry is increasingly required to meet the stringent requirements of environmental management and Damen is proactive in developing sustainable and cost-effective vessels and services. Much of Damen's R&D efforts are looking into sustainability issues, both in terms of manufacturing processes and in terms of products. Reducing hull resistance using air lubrication, the impact of different hull forms on resistance and examining new fuel sources such as LNG are current projects.

AIR LUBRICATION SYSTEM

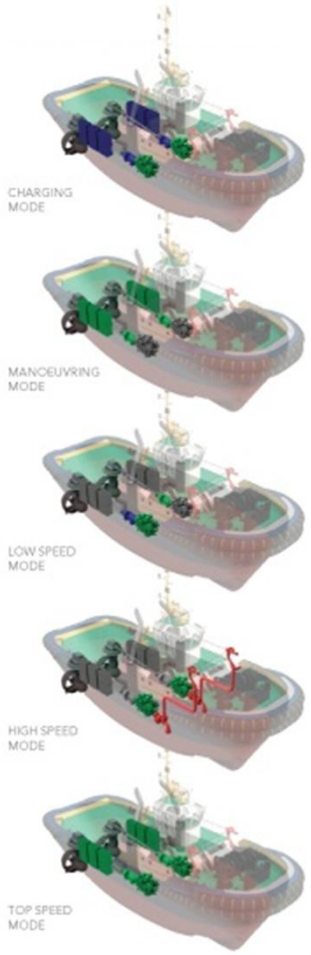
Damen is involved in the Dutch project PELS and the European 6th Framework Programme project SMOOTH which both examine air lubrication.

NOZZLE FLOW RESEARCH

Nozzle cooling facilitates a high velocity of seawater through a nozzle when the engines need to deliver the most power, resulting in a guaranteed, efficient cooling system.

E3 TUG PROJECT

Damen is playing a leading role in the E3 Tug initiative. The emissions during various operating modes have been measured for one Damen ASD Tug 2810 operating in the Port of Rotterdam. In order to reduce the environmental impact of such emissions, the ship's hybrid propulsion is being optimised in relation to its operational profile.



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