Submarine and Naval Ship Design for the Littorals - Saab Kockums

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Submarine Development in Sweden since 1960
- Some Details

1960
- Kockums Sjöormen Class
  - Hull shape
  - X-rudder
  - One helmsman

1970
- Kockums Näcken Class
  - Automation

1980
- Kockums Västergötland Class
  - Sensors
  - Platforms
  - Weapon handling

1990
- Kockums Gotland Class
  - Firepower
  - Computerised

2000
- Kockums Södermanland Class
  - Modernisation

2010
- Kockums Archer Class
  - Modernisation

- Kockums Stirling AIP
  - Endurance / AIP / Survivability
  - Flexible Payload / Special Forces

- Kockums Class A26

- Kockums Stirling AIP
  - Signatures
  - Endurance

- Kockums Challenger Class

- Kockums Stirling AIP
  - Tropicalisation

- Kockums Collins Class
  - Modernisation

- Kockums Stirling AIP
  - Endurance / AIP / Survivability
  - Flexible Payload / Special Forces

- Kockums Södermanland Class
  - Modernisation

- Kockums Archer Class
  - Modernisation

- Kockums Stirling AIP
  - Signatures
  - Endurance
Saab Kockums A26 Submarine
– Designed for Littoral Operations with Ocean Going Capabilities

- Long Submerged Endurance - Stirling AIP
- High Level of Survivability – Stealth, Shock Resistance, Safety
- Excellent Manoeuvrability and Hydrodynamic Design
- High Performance Sensor and Communication Suite
- Large and Flexible Payload Capacity
- Special Operations Forces Support
The Stirling AIP System

Increases submerged endurance dramatically

- High efficiency – Further increased through waste heat recovery

Low signatures

- Low noise - No IR signature

Proven

- Operational since 1989
- Used in all RSwN submarines and by other navies
- High availability

Low life cycle cost

- Cost effective solution
- Easy to maintain

Simple logistics

- Low sulfur diesel and standard LOX

Can be refitted into existing submarines

- Self-contained AIP plug with all systems

New generation developed for Kockums A26

AIP replenishment at sea
(LOX, fuel & weapons)
Submarine Signature Management

- Submarine design with extremely low signatures
- Long experience – Co-operation with FMV/Navy/FOI, ranging data
- Advanced modelling capabilities – Prediction and reduction
- Stringent signature management process
- Measurement and analysis capabilities
Shock Resistant Design

SHOCK REQUIREMENT → SHOCK DESIGN → SHOCK RESISTANT SUBMARINE

TESTING → SIMULATION

Full scale testing since 1961
Full Scale Shock Test – First of Class Since 1961
The Kockums A26 Flexible Payload Concept

- Optional outboard TCM system or other system
- Flexible Stowage Compartment
- Extra bunks
- SOF equipment
- Weapons, Mines, UUVs, etc.
- Multi-Mission Portal (MMP) configured for diver lock in and lock out
- Multi-Mission Portal (MMP) configured for UUV launch and recovery

Flexible Payload Space, e.g. SOF equipment containers

SAAB Underwater Systems
The Visby Class Corvettes
Designed for Littoral Operations

➢ True stealth – Above and below the surface

➢ High speed and excellent maneuverability
  - Light Carbon Fibre Construction
  - Gas turbines and water jets

➢ Multi-mission capabilities
  - ASuW, ASW, MCM
  - Excellent sensor and effector suite

➢ High shock resistance
The Kockums FLEXpatrol Family – Based on Proven Solutions

- **Mission Modules**
  - (Kockums StanFlex)

- **Unmanned Vehicles**
  - (Kockums SAM3, Kockums Piraya)

- **Stern Launch & Recovery**
  - (Swedish Coast Guard)

- **Steel / Hybrid Design**
  - (P28 corvette)

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**FLEXpatrol Family**
- FAC
- ASW
- MCM
- Stealth

**Littoral Mission Vessel**
- Hybrid (steel / composite)
- Multi-mission
- Agile (speed/firepower)
- Helo / Stern Ramps

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- **Shock Resistance**
  - (Kockums Koster Class)

- **MCM Technologies**
  - (Kockums SAM3, Kockums Koster Class)

- **ASuW Systems**
  - (Kockums Gothenburg Class, Kockums Visby Class)

- **Stealth Technologies**
  - (Kockums Smyge, Kockums Koster Class)

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- **Kockums Visby Class**
  - Stealth Technologies, Multi-Role
  - Composite Hull, Waterjet Propulsion
Why Carbon Fibre Sandwich?

- **Lightweight**
  - Structure -50% / Displacement -30%
- **Stealth/signature reduction**
  - Radar, IR, Acoustics, Pressure
  - 100% non-magnetic
- **Shock-resistance**
  - Proven from MCMVs and in live tests
- **Low life cycle cost**
  - Low fuel consumption
  - No corrosion
  - Long life span
Confirmation of structural strength by shock trials
SAM 3 for autonomous influence minesweeping

- Keeping ship and crew outside the mine danger area
- Autonomous control and sweep programming
- Container based systems enable rapid deployment
- Efficient minesweeping in confined and shallow waters
The Piraya USV Demonstrator

Unmanned Systems

- Technologies for autonomous and remotely controlled surface vehicles
- Network technologies for USV control
- Technologies for operation of multiple USV (swarming)
- Exercises with NPS on interdiction simulation and situation awareness