

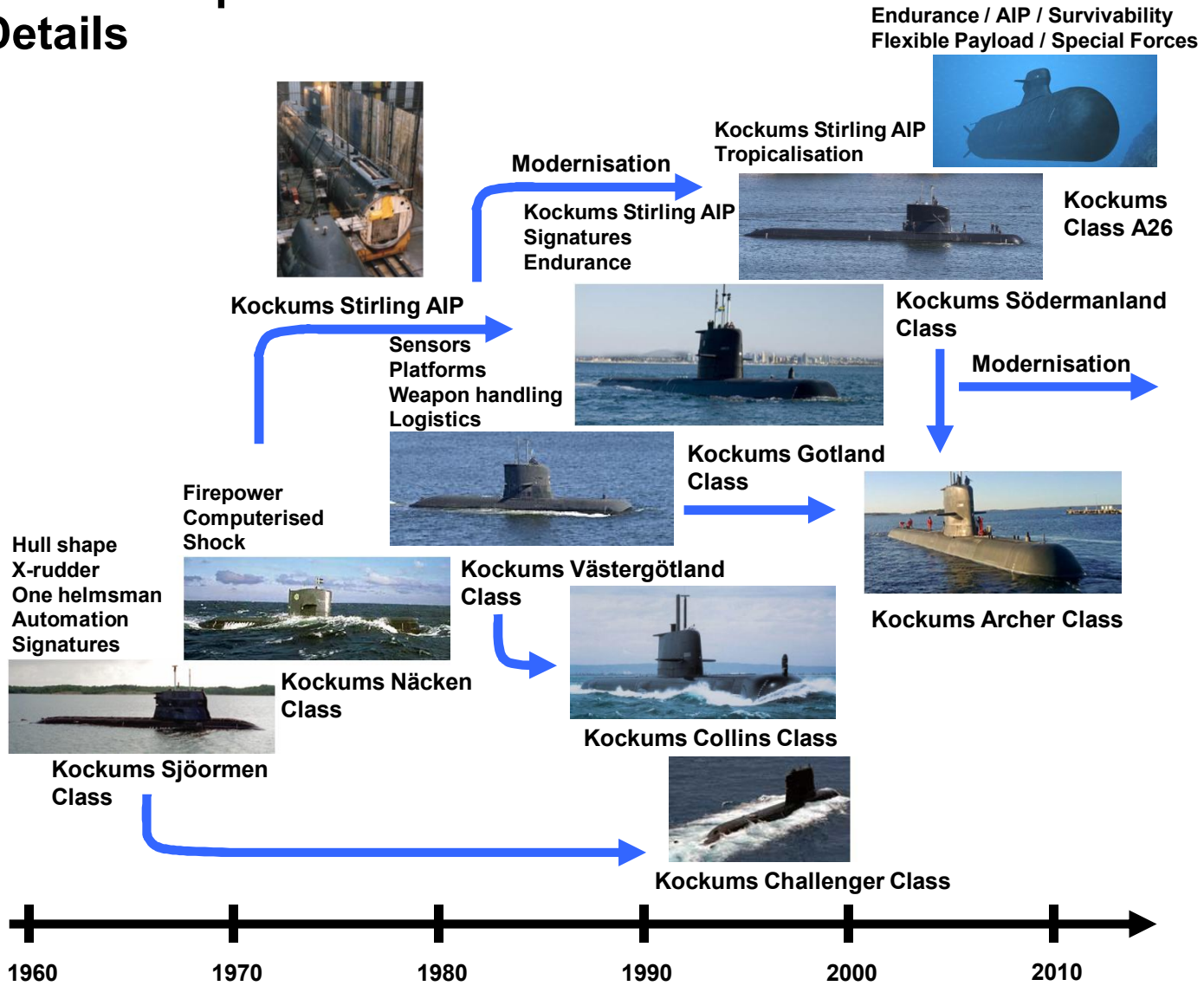
Submarine and Naval Ship Design for the Littorals - Saab Kockums



Roger Berg
2014-09-24

Submarine Development in Sweden since 1960

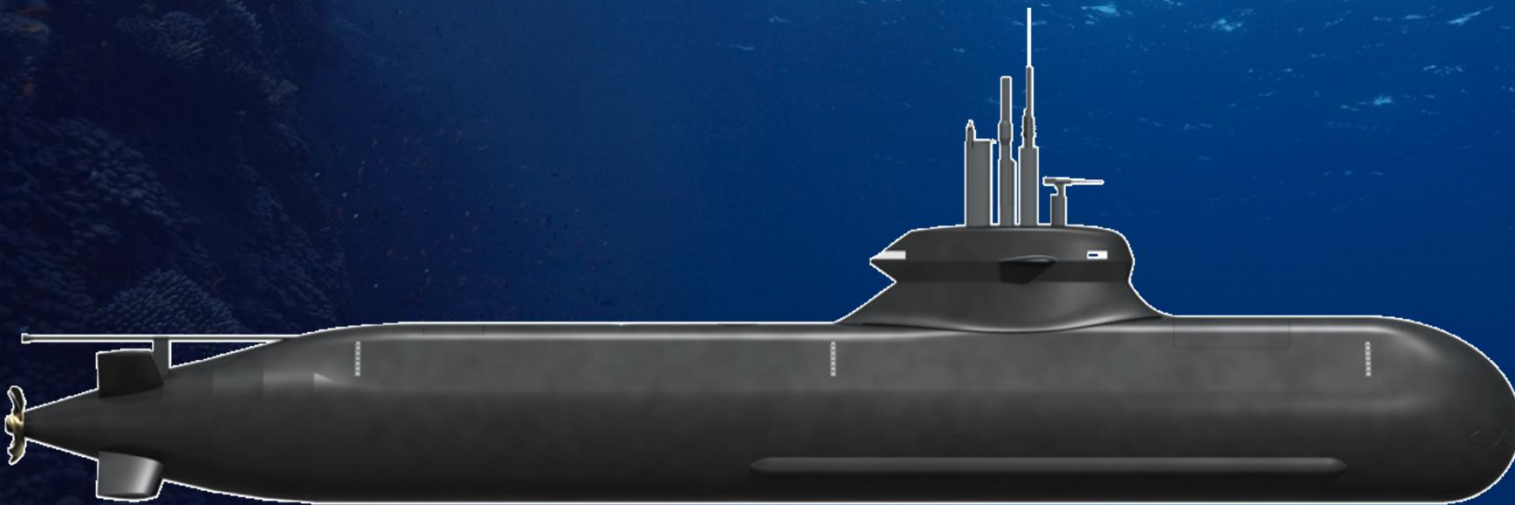
- Some Details



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

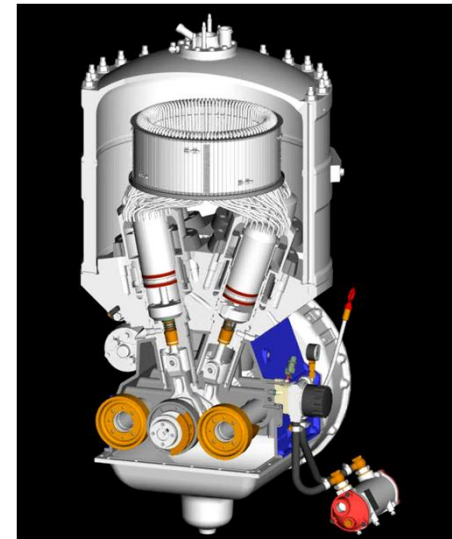
Can be refitted into existing submarines

- Self-contained AIP plug with all systems

▶ New generation developed for Kockums A26



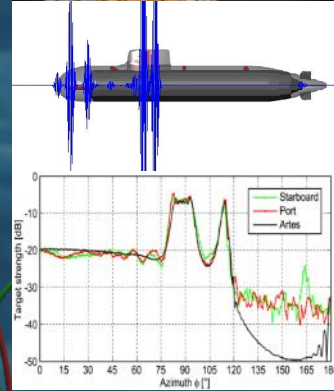
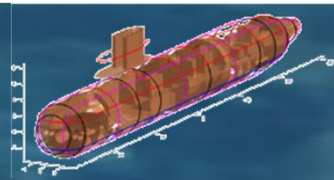
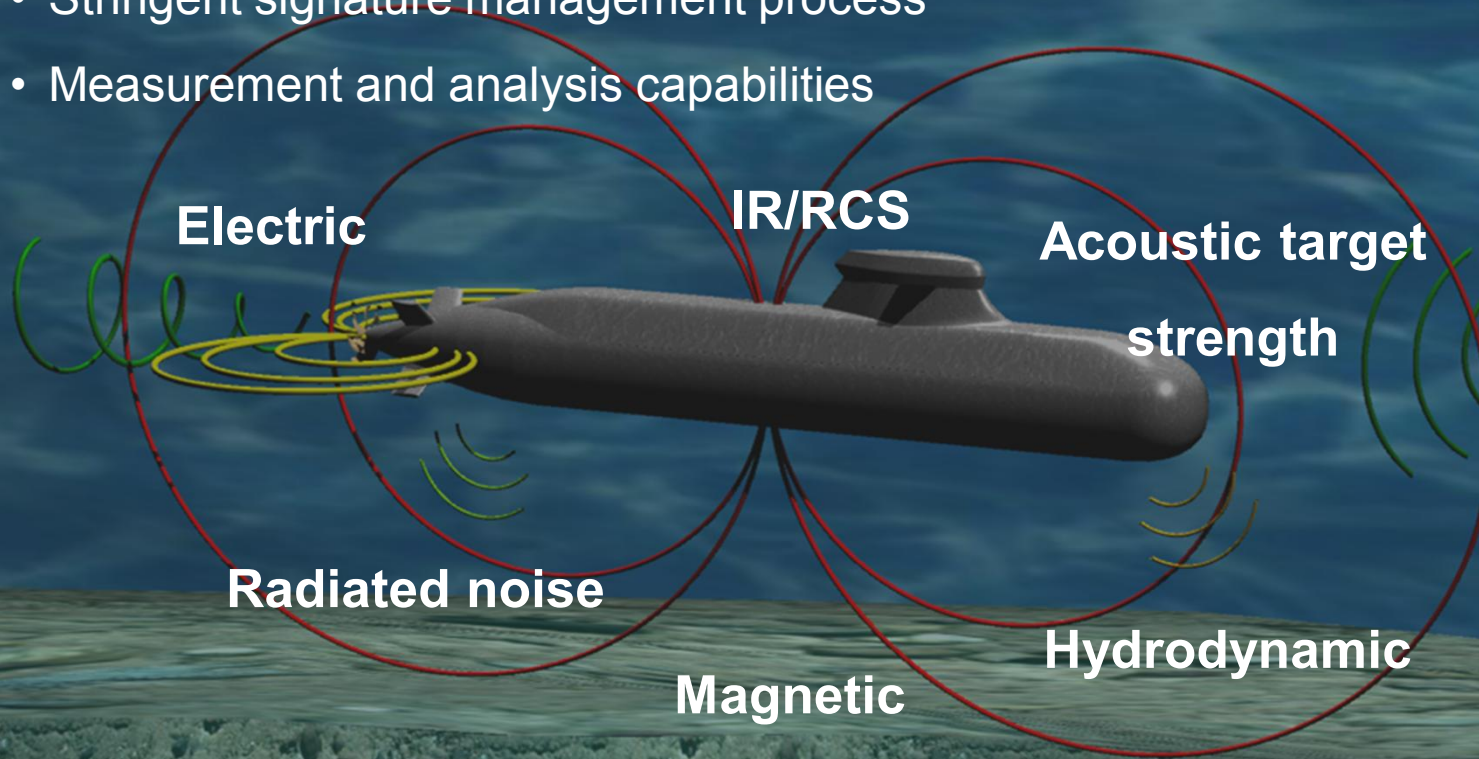
Mk 3 Kockums
Stirling module



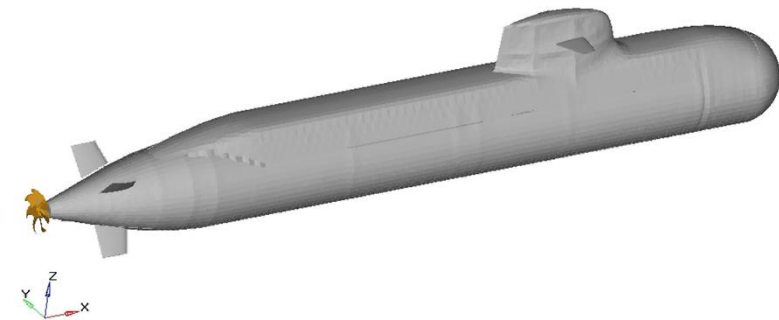
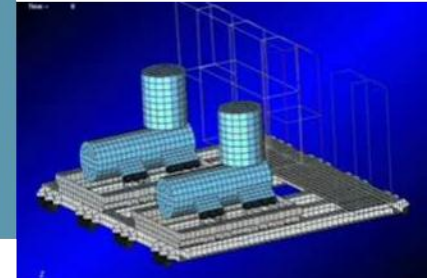
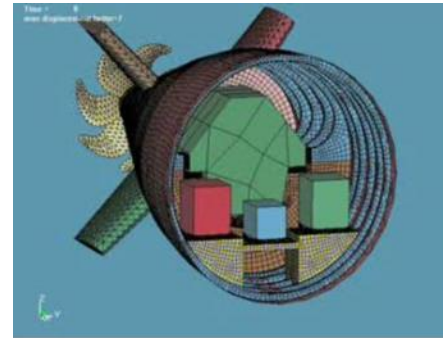
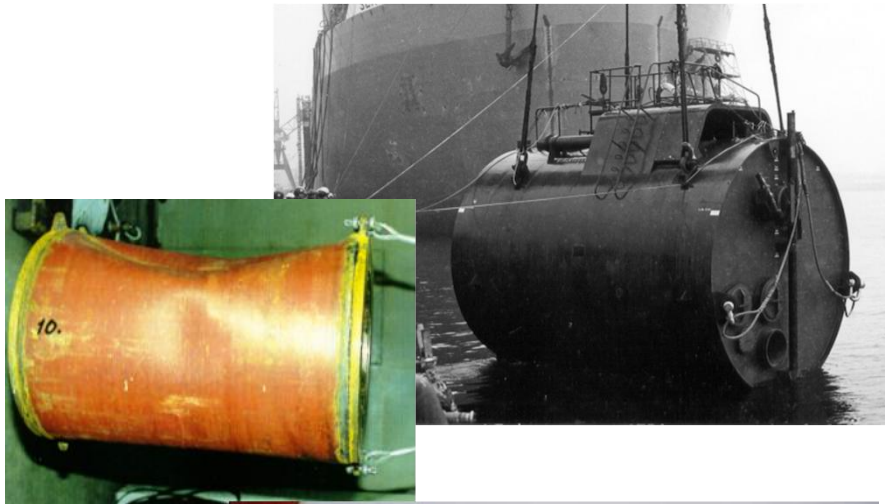
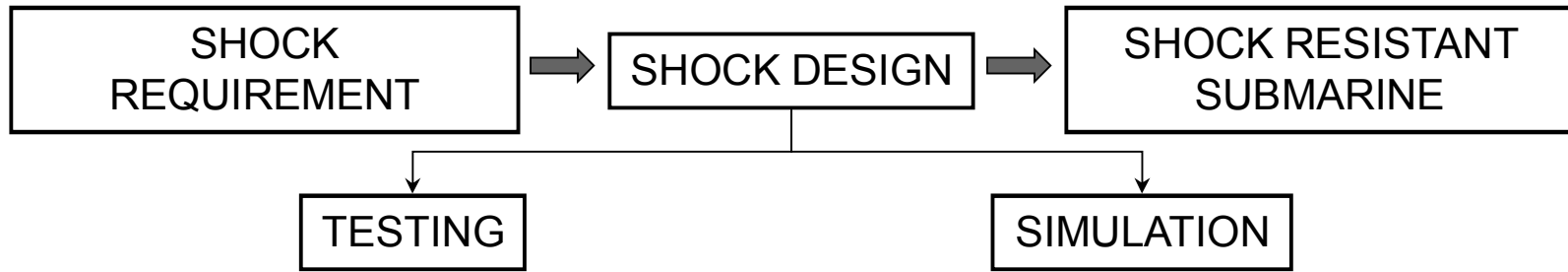
AIP replenishment at sea
(LOX, fuel & weapons)

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

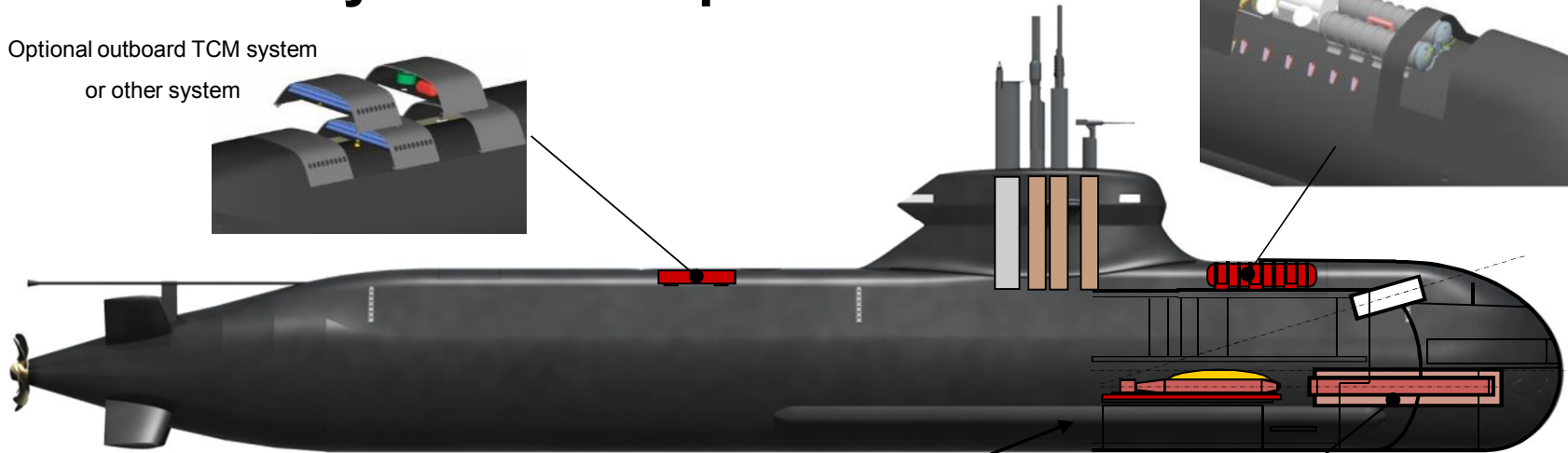
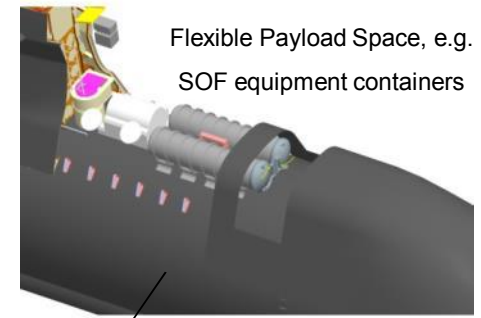
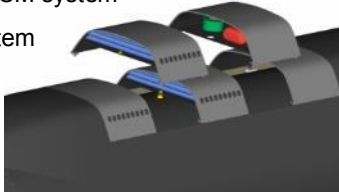


Full Scale Shock Test – First of Class Since 1961

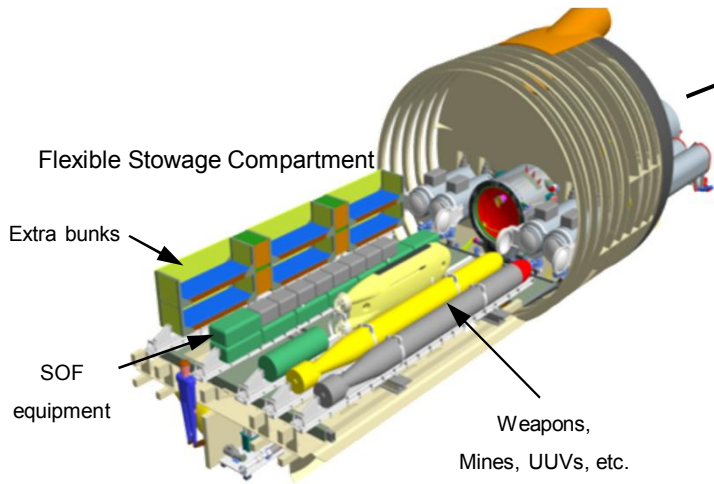


The Kockums A26 Flexible Payload Concept

Optional outboard TCM system
or other system



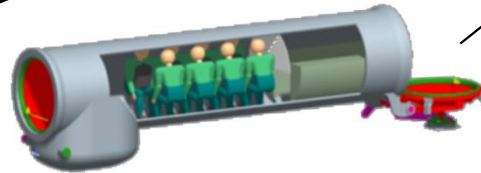
Flexible Stowage Compartment



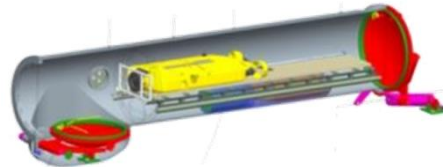
Extra bunks

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



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



Anti-Surface Warfare (ASuW)
Anti-Submarine Warfare (ASW)
Mine Counter-Measures (MCM)

The Kockums FLEXpatrol Family – Based on Proven Solutions

o Mission Modules

(Kockums StanFlex)



o Unmanned Vehicles

(Kockums SAM3, Kockums Piraya)



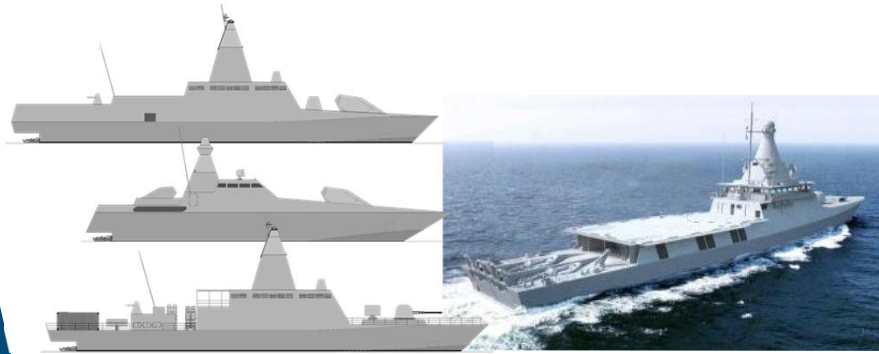
o Stern Launch & Recovery

(Swedish Coast Guard)



o Steel / Hybrid Design

(P28 corvette)



FLEXpatrol Family

- FAC
- ASW
- MCM
- Stealth

Littoral Mission Vessel

- Hybrid (steel / composite)
- Multi-mission
- Agile (speed/firepower)
- Helo / Stern Ramps



o Kockums Visby Class

- o Stealth Technologies, Multi-Role
- o Composite Hull, Waterjet Propulsion

o Shock Resistance

(Kockums Koster Class)



o MCM Technologies

(Kockums SAM3, Kockums Koster Class)



o ASuW Systems

(Kockums Gothenburg Class, Kockums Visby Class)



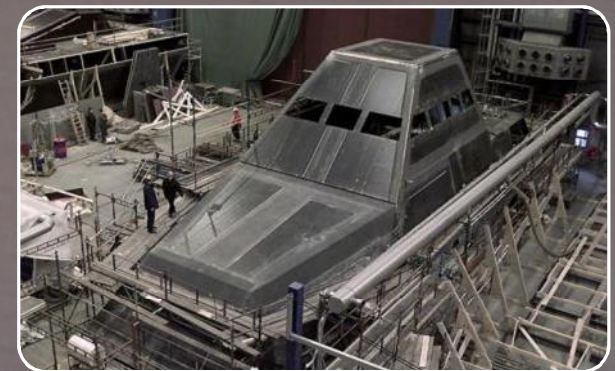
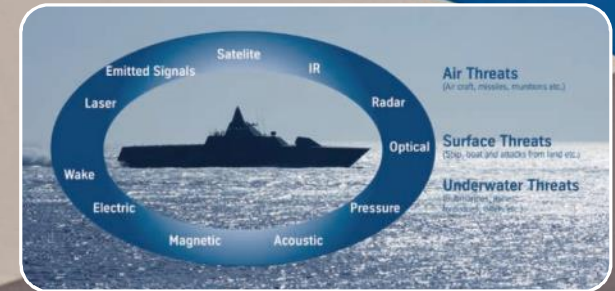
o Stealth Technologies

(Kockums Smyge, Kockums Koster Class)



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



Receiving shared USV drive-by search results in PANYNJ and NPS TOCs: Network controlled USV Piraya in action at Karlskrona, Sweden



View of shared PANYNJ JSAS small vessel interdiction event COP at the TOC in Karlskrona, Sweden



► 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





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