DESIGNING FOR FUTURE SUBMARINE CAPABILITY

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Submarines are Important for Swedish Security Policy

- Control of the underwater domain is of strategic importance
- Sweden has long and successful experience of submarine operations
- Sweden has long and successful experience of AIP submarine design and construction (A14S, A17S, A19)

Swedish Government has decided to acquire the Next Generation Submarine
Customer Requirements - Design Influencing Factors

- Operations will take place anywhere in the world
  - Engagement focus in the littorals with effective ocean transit
- The Submarine will be part of a larger network
- New payload types, with new capabilities, sizes and shapes, will be used
- Special Operation Deployments will gain importance
- Threat environment will be in the full spectrum of conventional - asymmetric and high - low
- Adversary sensors will gain performance
- Traditional ASW/ASuW capability
- New types of submarine missions will emerge
- High level of availability
Kockums A26

- Next generation submarine for Royal Swedish Navy
- Swedish Government decision to acquire 2 units
- Design contract placed in 2010
- Construction contract in 2012
- Deliveries in 2019-2020
The Design Challenge

- Multi-Roles and Missions
- Long Submerged Endurance
- Good Crew Comfort
- Extreme Stealth
- High Survivability
- High Performance Sensors
- Good Maneuverability
- Shock Resistant
- Long Range
- Flexible Payloads
- SOF Capable
- High Availability
- Modular Design
- Low LCC
- Future-proof
- Cost Effective

Kockums A26 Submarine
Kockums A26 Specifications

- Length overall: ~ 62 m
- Draught, surfaced: ~ 6 m
- Displacement surface: 1 800 tonnes

- Propulsion: Stirling AIP & diesel-electric
- Standard complement: 26 persons
- Weapons: 53 & 40 cm torpedoes, mines
- Multimission Portal™: L >6 m, diameter >1.5 m
Modular Design

- Kockums design philosophy
  - Used in previous submarine generations
  - Developed further in A26
- Efficient construction
  - Modules outfitted and tested before assembly
- Distributed construction
- Resilient platforms
  - Reduces radiated noise
  - Reduces shock loads
- Designed with design margins
  - Prepared for future upgrades
- Allows for adaptation to customer requirements
Modular Design – Variants of A26

Adaptations to other customer’s requirements
  - Range and endurance
  - Crew size
  - Submerged endurance
  - AIP speed
  - Indiscretion rate
  - New payloads

Example of extending the A26 with a new hull module for e.g. more fuel or new payloads
Modular Design – Platforms

Cabins
Mess rooms
Galley
CO-cabin
Control room
Fwd Auxiliary
Machinery Space

Propulsion
Motor
X-rudders

Propulsion
Electronics
Cabinets
Stirling Modules
Electronics
Cabinets
Aft Auxiliary
Machinery Space
Diesel Genset
Modules
Aft Machinery
Control
Console
The Stirling AIP System

- **Increases submerged endurance dramatically**
  - High efficiency
- **Low signatures**
  - No increase in indiscretion range
  - 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

**Stirling module**

**AIP replenishment at sea (LOX, fuel & weapons)**
A26 Flexible Payload Concept

- Optional outboard TCM system or other system
- Modular mast system
- Flexible payload space, e.g., SOF equipment containers
- Flexible stowage compartment
- Extra bunks
- SOF equipment
- Weapons, Mines, UUVs, etc.
- MMP configured for diver lock in and lock out
- MMP configured for UUV launch and recovery
Kockums A26 – Various Ongoing Design Tests

- Bulkhead welding tests
- Habitability mock-ups
- Hydrodynamic tests
Conclusions

The Next Generation Submarine (A26):

- Building on the success of A17S and A19
- Including many more features and abilities

The submarine design must be innovative and future-proof

Modularity and flexibility key design elements

- Modularity in general arrangement and hull design
- Modularity in systems and sub-systems
- Modularity in systems integration
- Modularity and flexibility in payload integration

Delivery of the first batch of two submarines in 2019-2020

“The world’s most modern submarine designed for future challenges”
Thank you for your attention!