



## *Meeting the Future: the German Experience*

### **Multi-Role Capability for Three Oceans: The MEKO® A-400 Evolved MOTS Frigate**

Rear Admiral (JG)(Ret) Jonathan Kamerman, Canberra, April 2015

ThyssenKrupp Marine Systems



**ThyssenKrupp**

# New German Naval Solutions for New Operational Challenges

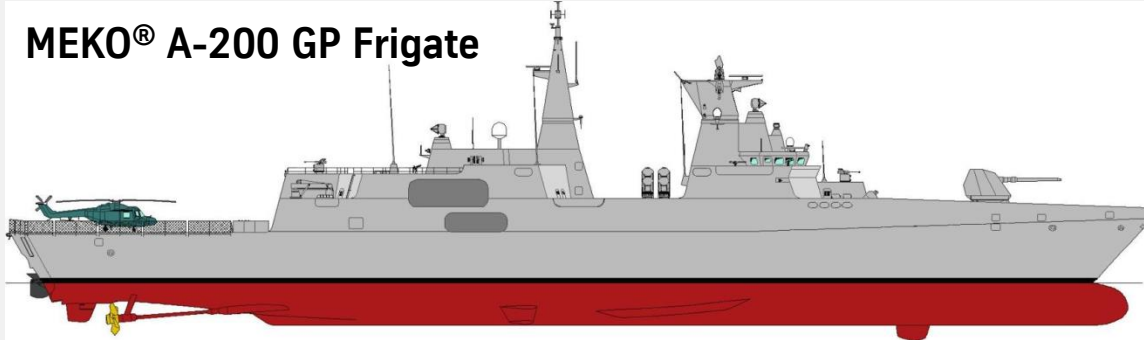
- Since the late 1990's the German Navy's horizons broadened radically beyond the localised protection of the Baltic and Atlantic SLOCs with 'traditional' surface vessel roles and threats, to the support of distant **world-wide operations** with **new roles and threats**, e.g.:
  - stabilisation operations for peace keeping/enforcement in unstable regions
  - long-term counter-terrorism and piracy operations with asymmetric warfare threats
  - sustained and graduated dominance in the littorals of failed states
  - sustained presence with flexible, graduated options in crisis and tension zones
- This horizon shift required **radical new operational and logistic thinking** and the renewal of the German surface fleet with new and **different types of combat ships**.
- German naval industry, led by ThyssenKrupp Marine Systems took the technical lead to design a ship to meet our parent Navy's new fleet doctrines and demands.
- The four primary **design challenges** arising from these new concepts were to incorporate:
  - ***Sustained, distant, intensive-use and cost-effective operations capabilities***
  - ***Force multiplication by multi-role, concurrent -role, mission modular capabilities***
  - ***Full embarked CTF and large Special Force facilities and capabilities***
  - ***Enhanced Survivability: floating, moving and fighting after sustaining damage***



## Size Does Matter!

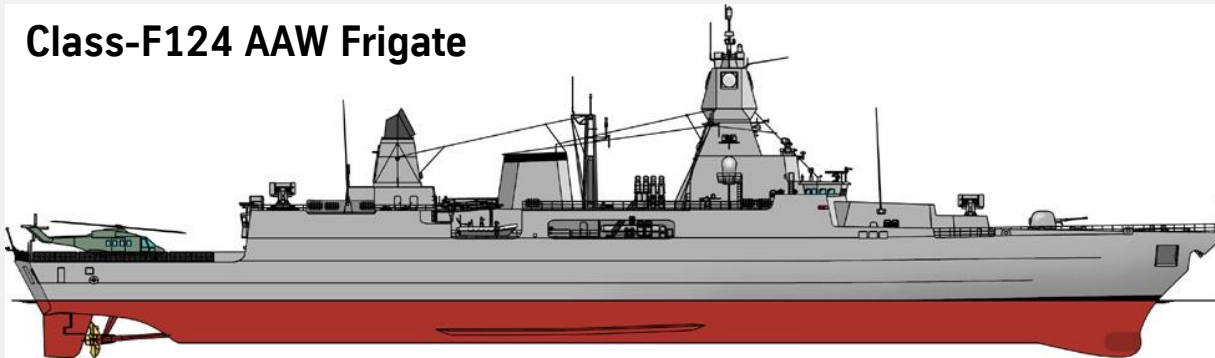
The combination of these design challenges **simply could not be met concurrently** by the post-2000 German Navy or export MOTS/Evolved MOTS frigate designs, notwithstanding the excellence of these ships in their designed roles: they were **too small for the job**, even if evolved to the viable design margins

### MEKO® A-200 GP Frigate



121m; 3700 tons (evolved potential to 4300 tons); CODAG WARP

### Class-F124 AAW Frigate



143m; 5600 tons (evolved potential to 6200 tons); CODAG

#### Size too tight for concurrent:

- redundant long-range fixed phased array radar
- SR+LR SAMs + LA VLMs
- redundant sensor-effector islands
- large organic SF group
- Mission-Modularity
- Organic TF/TG C&C

#### Core Design and technology era unviable for :

- Efficient, quiet propulsion
- Low manning
- Sustained intensive use
- 3 DC Sections with 6 autonomous DC Zones



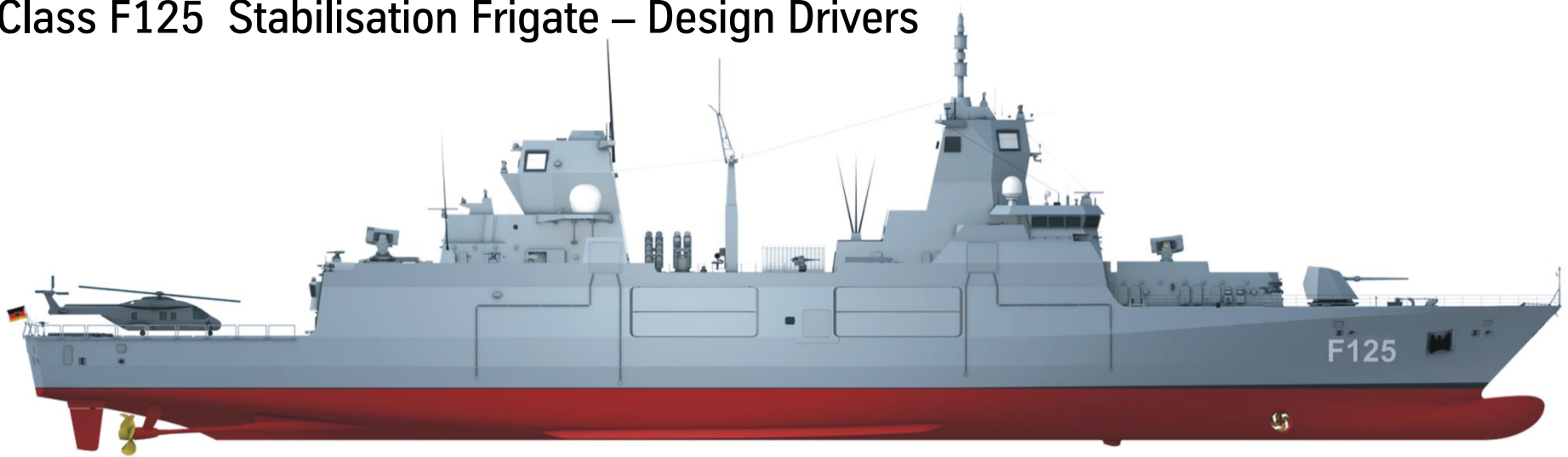
The German solution: a new class of ship for the German Navy:

**The Class-F125 Stabilisation Frigate:** the new benchmark in frigate design that is both evolutionary and revolutionary



- Enhances the toughness, stealth and proven features of the MEKO A-200 and F124
- Adds in a larger platform the new operational, engineering and logistic design features for sustained, distant, intensive-use operations and multi-role, concurrent-role capabilities at Task Force level

# Class F125 Stabilisation Frigate – Design Drivers



- **Stabilization frigate: littoral staying power off failed states/crisis zones:**
  - Sustained presence and power projection by rapidly-deployed embarked special forces
  - Long-range (100km), high-precision land attack with VULCANO 127mm gun
  - Full and separate Embarked Task Force Command and Control facilities
  - Very high survivability to stay floating, moving and fighting even after damage
  - Comprehensive asymmetric warfare self-defence suite
  - Efficient CODLAG propulsion with a high speed on electric propulsion
- **Lean manning:** *half* of current frigate crew size, with minimization of daily maintenance workload
- **Intensive use:** *double* the planned running hours at sea compared to current generation frigates
- **Very high RAM:** *two years* in-theatre away from base maintenance facilities

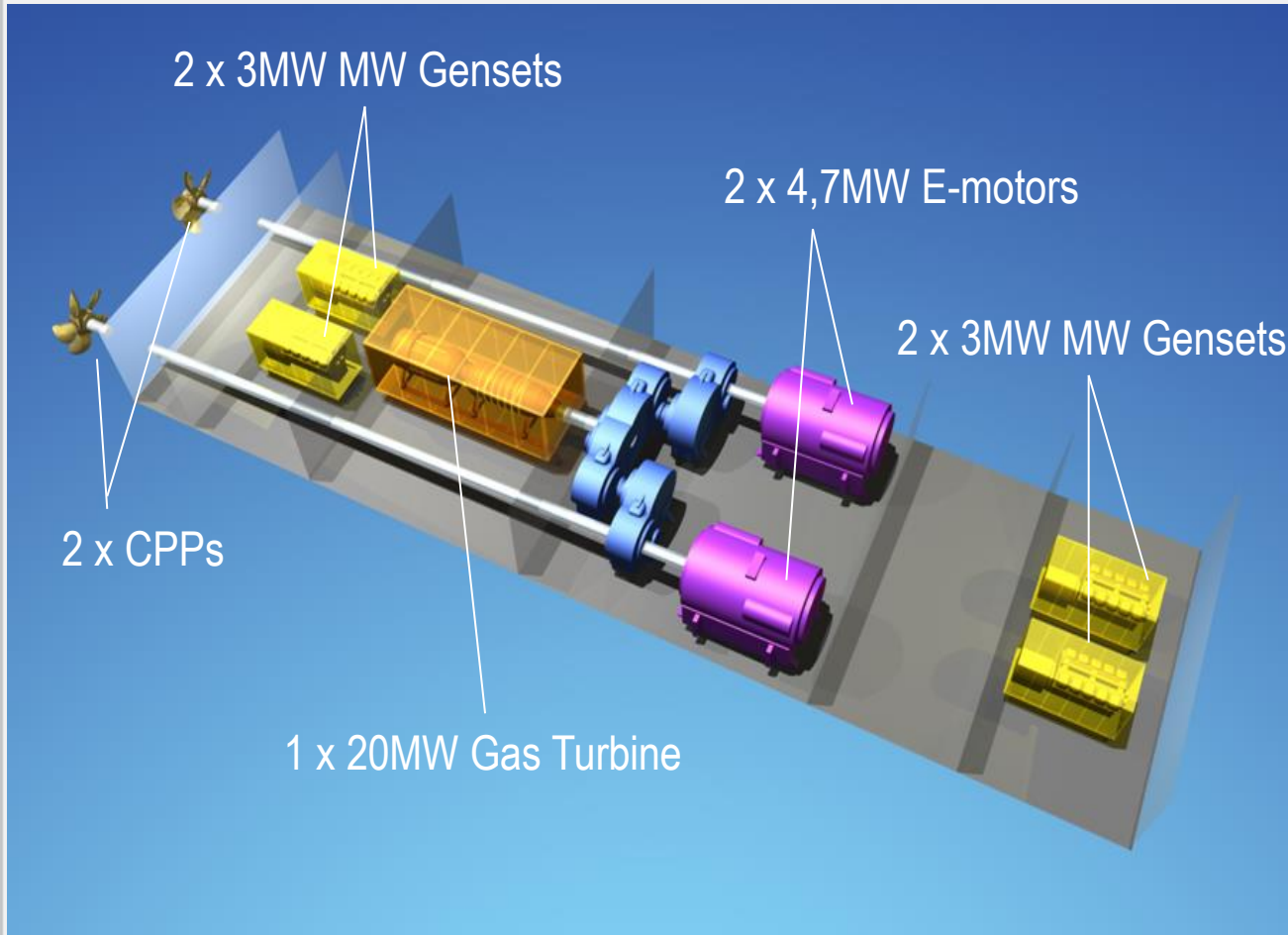
# Stabilisation Frigate F125 – Overview Main Data



<b>Length</b>	<b>:</b>	<b>149m</b>
<b>Beam</b>	<b>:</b>	<b>18,8m</b>
<b>Draft</b>	<b>:</b>	<b>5m</b>
<b>Propulsion</b>	<b>:</b>	<b>CODLAG</b>
<b>Speed, D/Electric</b>	<b>:</b>	<b>20 knots</b>
<b>Speed, CODLAG</b>	<b>:</b>	<b>26+knots</b>
<b>Range @ 12 knots</b>	<b>:</b>	<b>&gt;5000 nms</b>

<b>FL Displacement</b>	<b>:</b>	<b>7276 tons</b>
<b>Crew</b>	<b>:</b>	<b>120</b>
<b>Supernumeraries</b>	<b>:</b>	<b>50 + 20</b>
<b>Endurance</b>	<b>:</b>	<b>30 days</b>
<b>Helicopters</b>	<b>:</b>	<b>2 x MH90</b>
<b>Combat Boats</b>	<b>:</b>	<b>4 x 10m</b>
<b>Containers</b>	<b>:</b>	<b>2 x TEUs</b>

## F125 – CODLAG Propulsion, an energy- and maintenance-efficient solution



	Cylinders in use at 10 kts	Cylinders in use at 20 kts
CODOG F123	72	72
CODAG F124	44	64
CODLAG F125	12	24


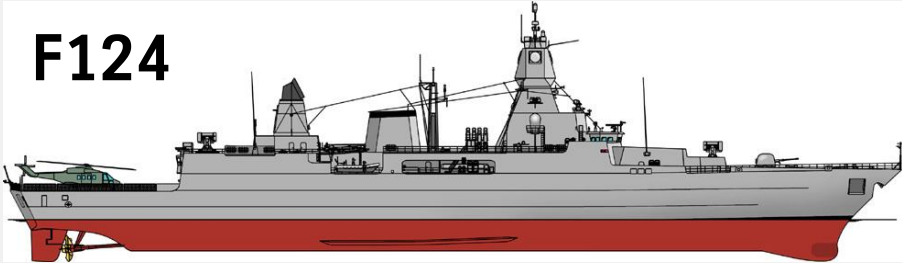
- Medium-speed diesel engines
- Common energy pool
- 20 knots on Diesel Electric only
- 26+ Knots on CODLAG

CODLAG = **C**Ombined **D**iesel **e**lectric **A**nd **G**as turbine



# F125 – Intensive Use Concept: double the availability vs today's frigates

- Long Deployment in Operations Area: 24 month
- Increased Hours of Operation at Sea: 5000 h/year
- Reduced Personnel operates / maintains ship: 120\* Crew

	Deploy- ment [months]	Hours of Operation [h/year]	Crew
<b>F125</b> 	24	5000	120*
<b>F124</b> 	6	2500	235

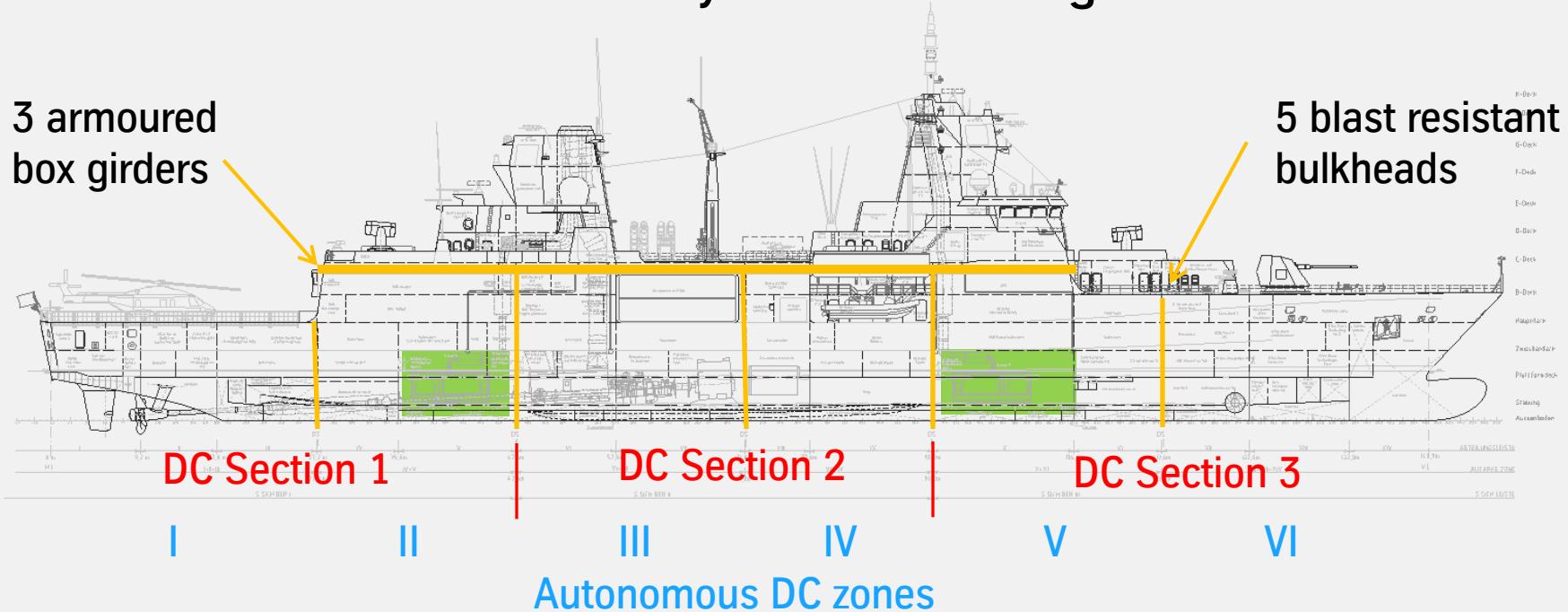
\* Two Crew Concept = Crew Exchange every 4 month in Operation Area = greatly increased availability and morale



# F125 – Enhanced Survivability as a core design element

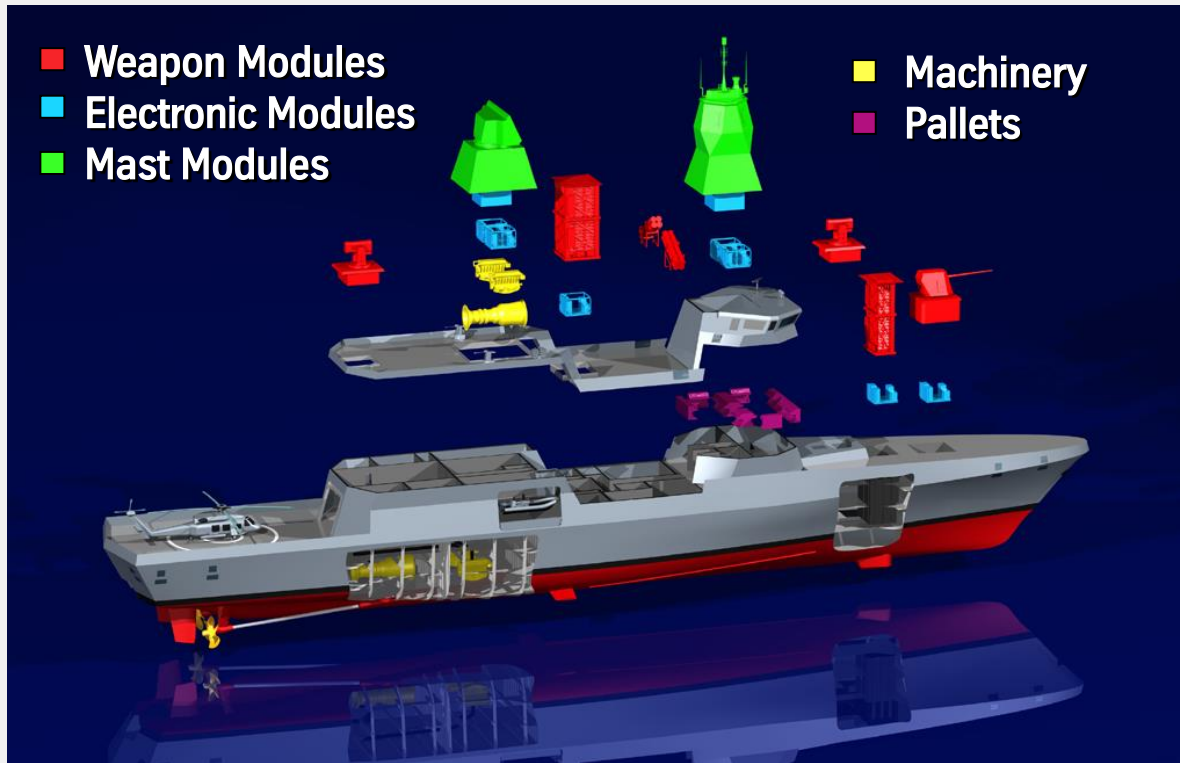
3 armoured box girders

5 blast resistant bulkheads



- Blast resistant double bulkheads and armoured box girders to reduce the extent of a damage
- Armour protection of vital spaces (e.g. magazines, control centres) against heavy splinters
- Critical systems designed redundant and widely separated horizontally and vertically
- 3 x DC Sections, each containing
- 6 autonomous DC zones for vital (fire fighting, HVAC, power distribution and IMCS) systems
- Full German Naval shock standard BV 0230

## MEKO® Technology (1) Build Modularity



= ease, and speed of building (Shipbuilder) and refits/upgrading (Navy)!

## MEKO® Technology (2): Combat System Configuration Modularity

- Class-standard hull and machinery
- Combat systems are modular with standard interfaces
- Customer can specify any combination of combat systems from any supplier

= Customer choice flexibility

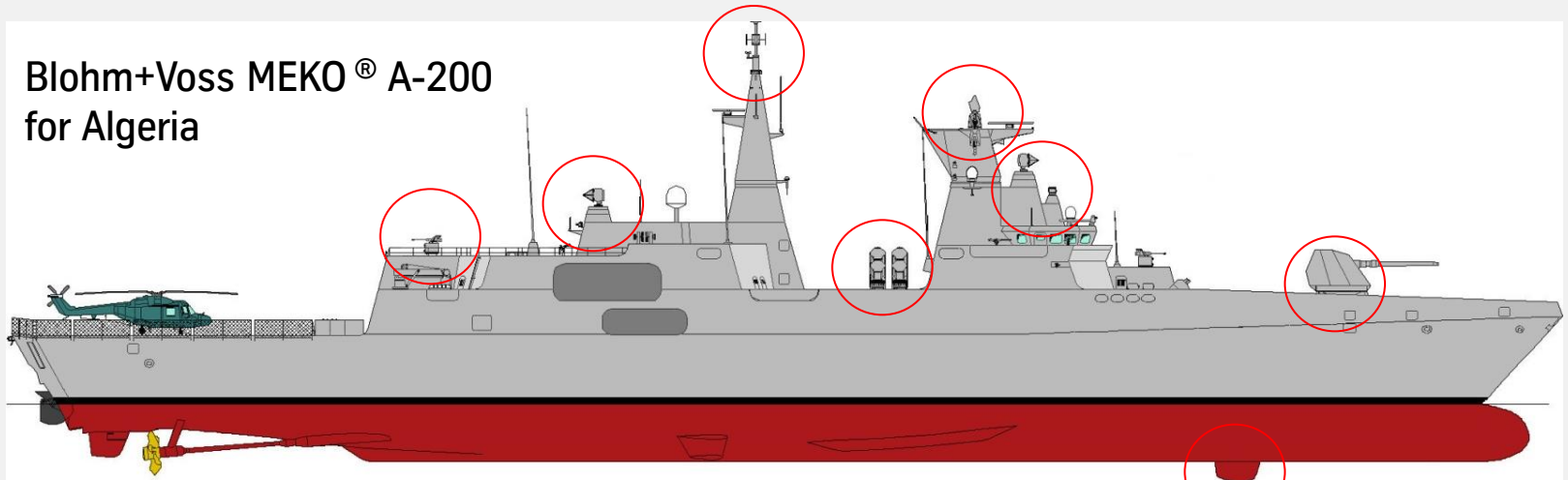
= ease of maintenance and refits/upgrading

= ease of local building

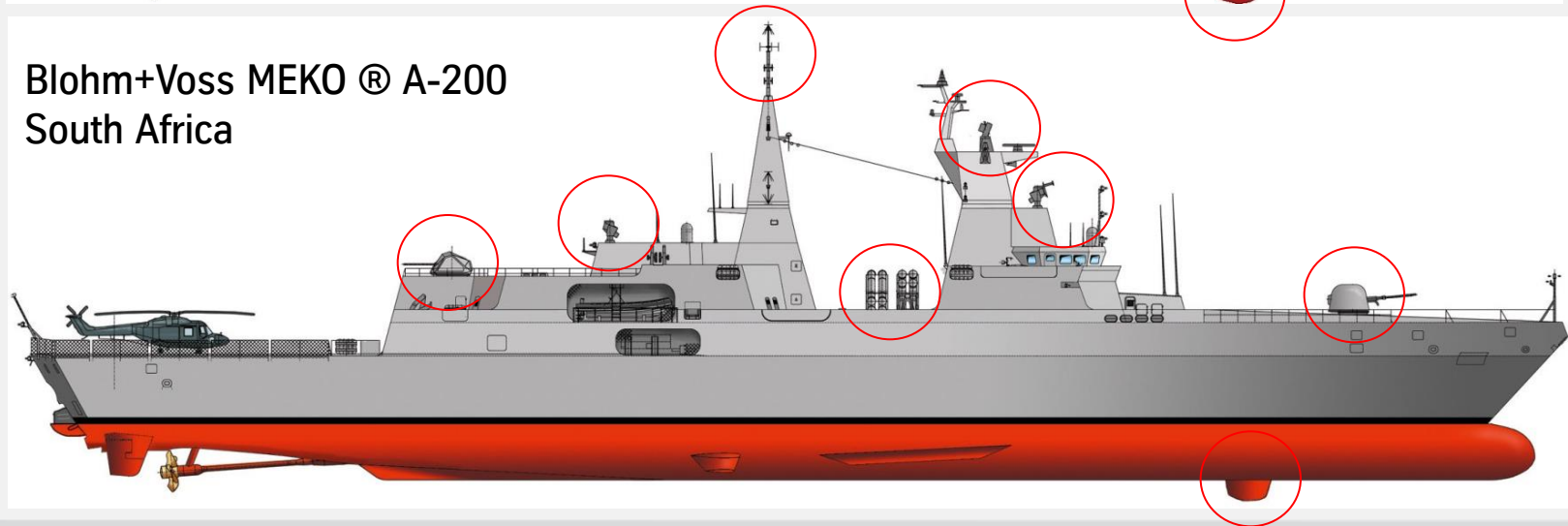


## MEKO® Technology in Practical Example: Same Hull and machinery; very different combat systems fit

Blohm+Voss MEKO® A-200  
for Algeria



Blohm+Voss MEKO® A-200  
South Africa





# F125 Status –Now Building at TKMS in Hamburg

- 1st. Frigate: FGS BADEN – WÜRTTEMBERG Launched: 28.03.2014
- 1st ship delivery 2016
- Followed by 12 month Intensive Use Verification Test Period by German Navy
- 4th ship delivery 2019



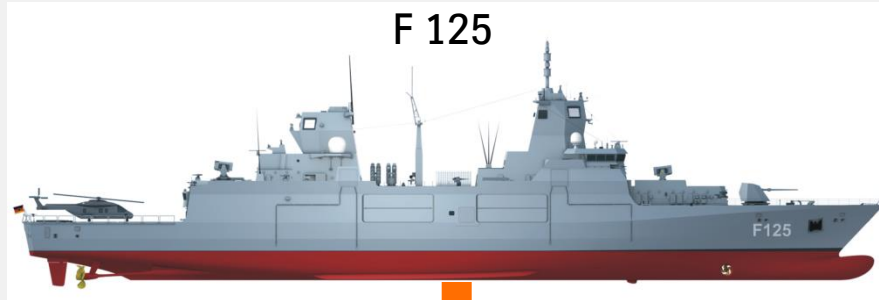
# The MEKO® A-400 Generic Evolved Mots Multi-Role Frigate Design

- The German Naval Industry is currently analysing three important future frigate programmes today:
  - the German Navy MKS 180 Multi-Role Combat Ship
  - the Canadian Navy Surface Combatant
  - The Royal Australian Navy SEA 5000 Future Frigate
- While each of these programmes has unique national requirements, there is a large overlap in primary platform and combat system capability requirements with the F125
- The F125 will reach proven operational maturity by 2017, qualifying it as MOTS
- We therefore envisage the basic F125 platform (hull and machinery) adapted to incorporate generic requirement capabilities of MKS 180, SEA 5000 and CSC, resulting in an Evolved MOTS MEKO® A-400 Generic Design that is >80% common to all
- Specific national requirements would then be incorporated into the design, resulting in class variations such as MEKO® A-400 RAN; MEKO A-400 CAN, etc

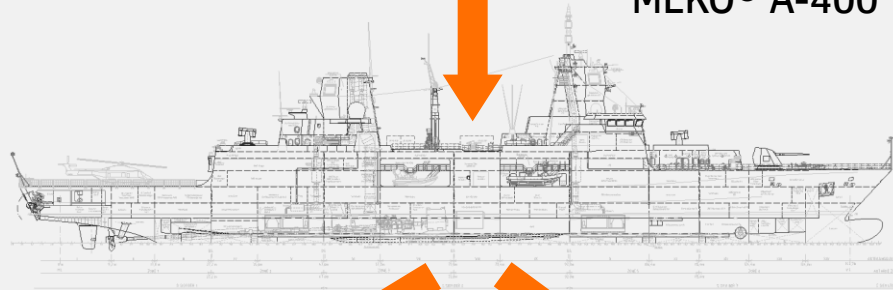


# MEKO® A-400 Generic Evolved from the F125, from which :

F 125



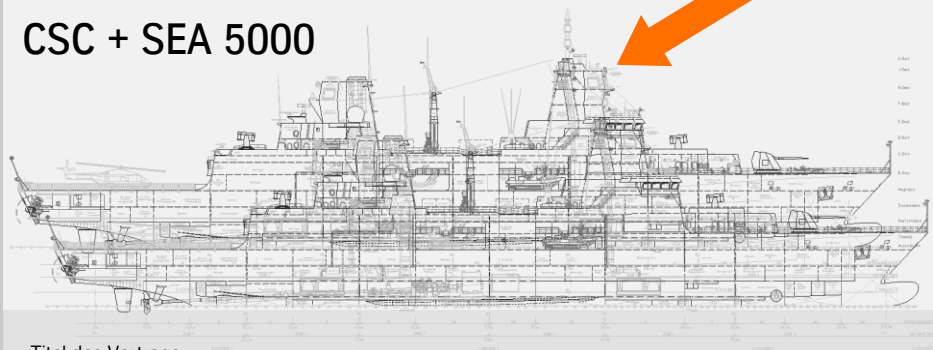
MEKO® A-400



A generic design incorporating design drivers of MKS 180, SEA 5000 and CSC; reaching a commonality of > 80 %

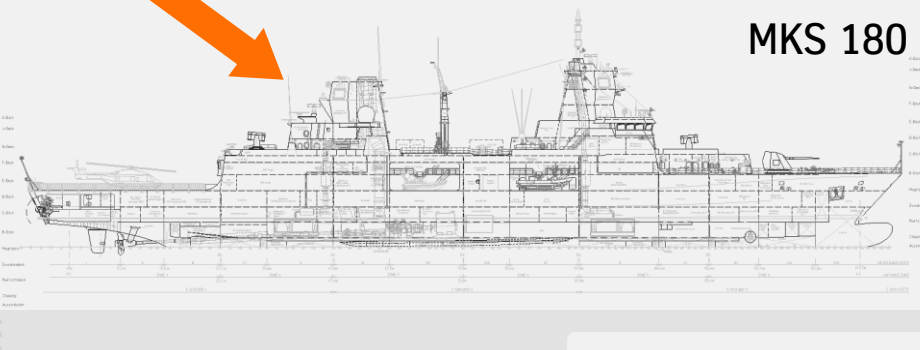
Export

CSC + SEA 5000



National

MKS 180



# The MEKO® A-400 RAN Future Frigate

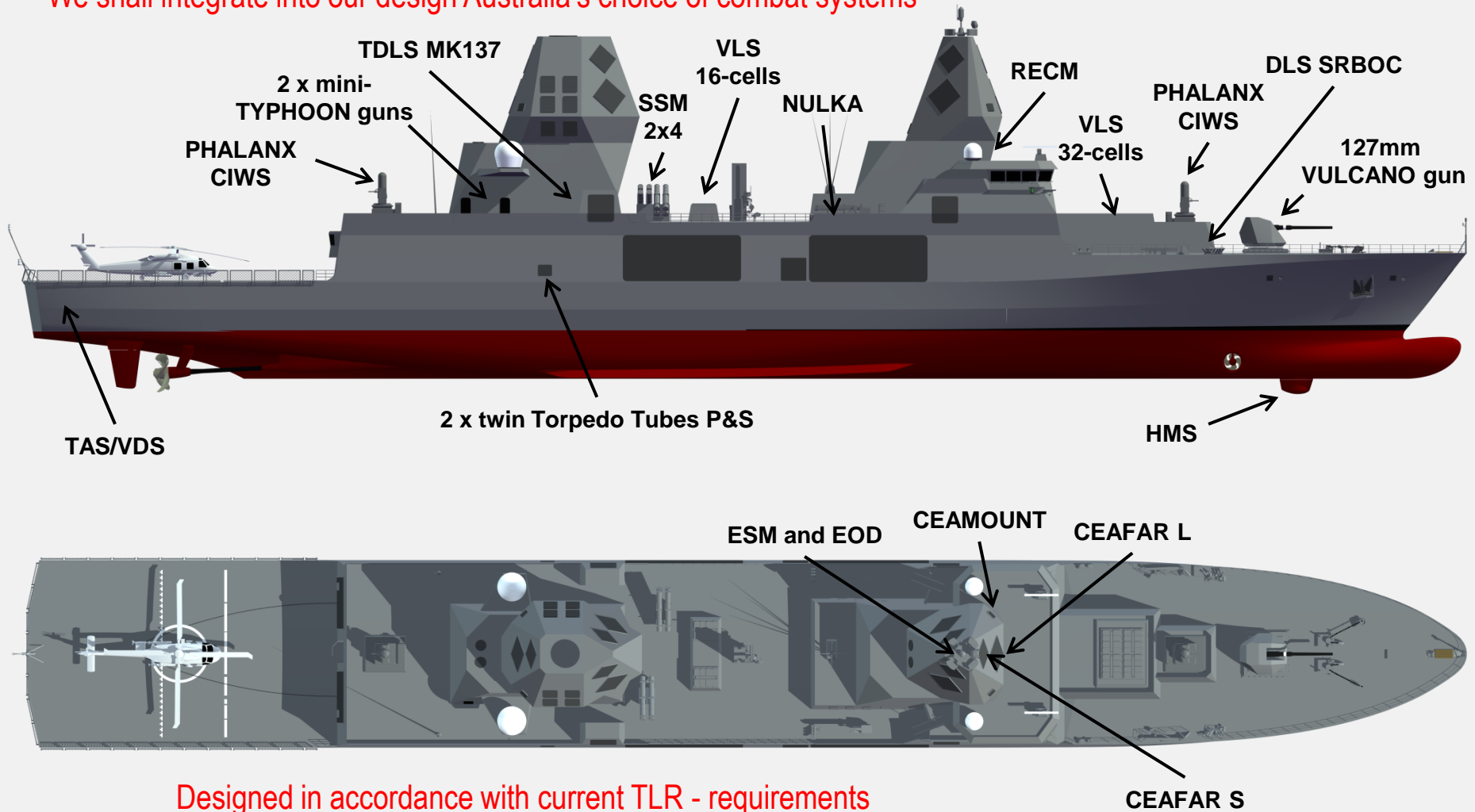
- Analysing what we know of the latest RAN Top-Level Requirements, we confirm that these drive out a ship of **not less than 7000-tons** and conclude that a modified F125, will provide a suitable basis for an evolved MOTS design
- Mapping these requirements onto the F125 design, and taking into account our MEKO experience and track record, we see no difficulties or undue risk in accommodating
  - All of the RAN combat system requirements, including
    - ✓ CEAFAIR –S/X/L
    - ✓ 48 Mk 41 VLS (strike length) cells for SM 2/ESSM/Tomahawk
    - ✓ Integrated sonar suite – HMS and VDS/TAS and TDS
    - ✓ SAAB 9LV CS and Aegis Fire Control
  - All of the RAN platform requirements, including
    - ✓ Efficient diesel electric propulsion
    - ✓ max. speed of 28 knots (maintaining LM2500 at designed power (not de-rated)
    - ✓ Capability to operate 2 helicopters (MH-60R)
    - ✓ Capability to operate unmanned vehicles (UAV/UUV/USV)
    - ✓ Use of modular mission payloads
    - ✓ Measured signature characteristics and low signature design features
    - ✓ Commonality of systems with existing
    - ✓ Adequate growth margins to adapt to changing requirement through the life of the ships
    - ✓ Range 8000NM @ 12 knots (greater fuel load than F125)



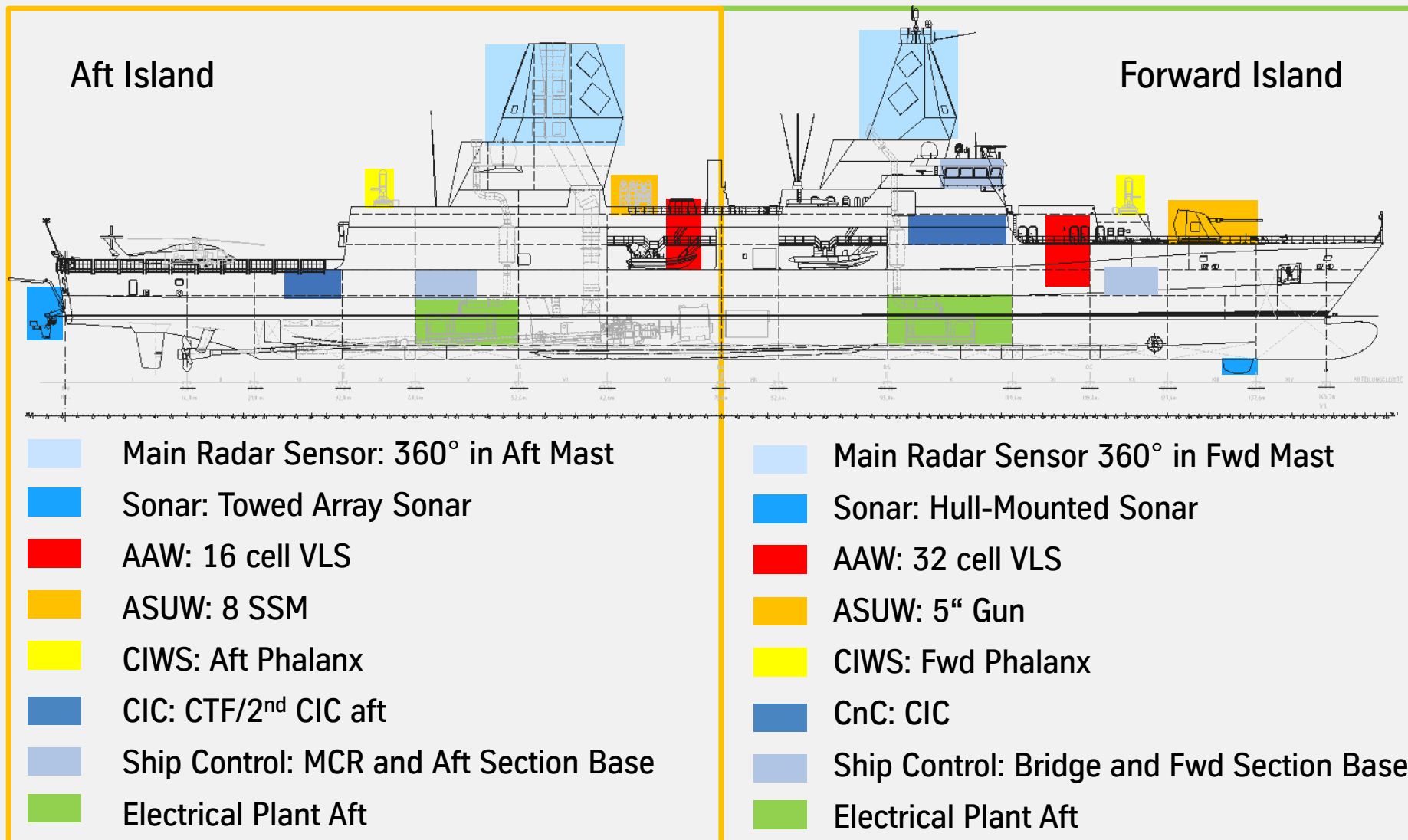


# MEKO® A-400 RAN Combat System – concept fit

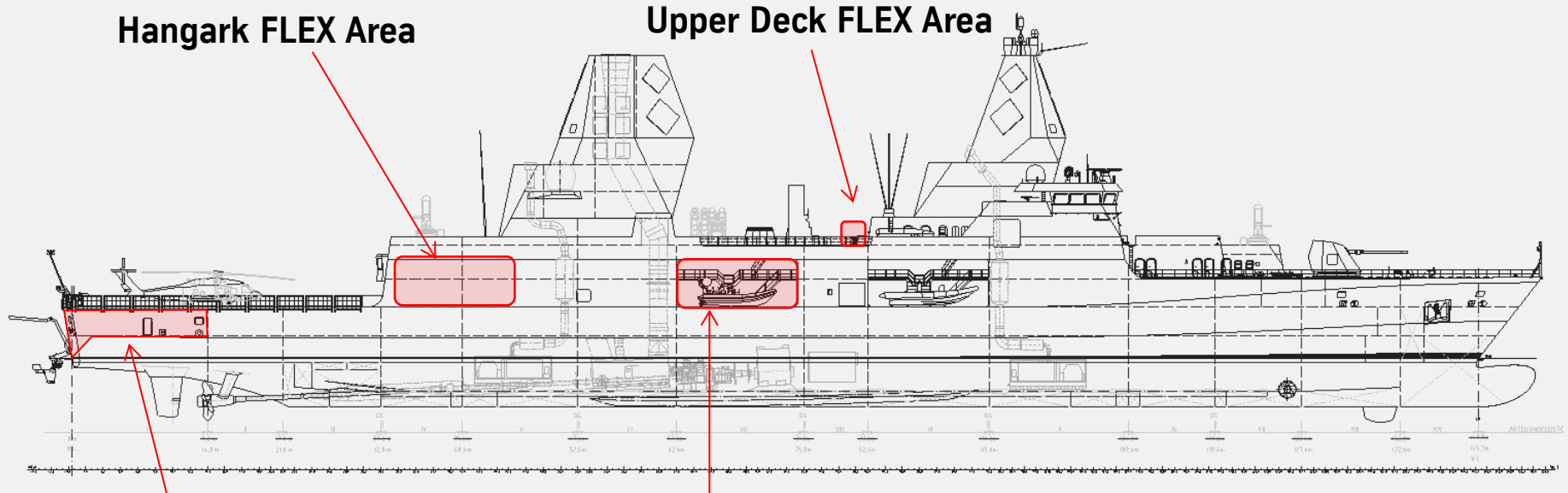
We shall integrate into our design Australia's choice of combat systems



# MEKO® A-400 RAN – Survivability, the Two Island concept



# MEKO<sup>®</sup> A-400 RAN – Mission Modularity



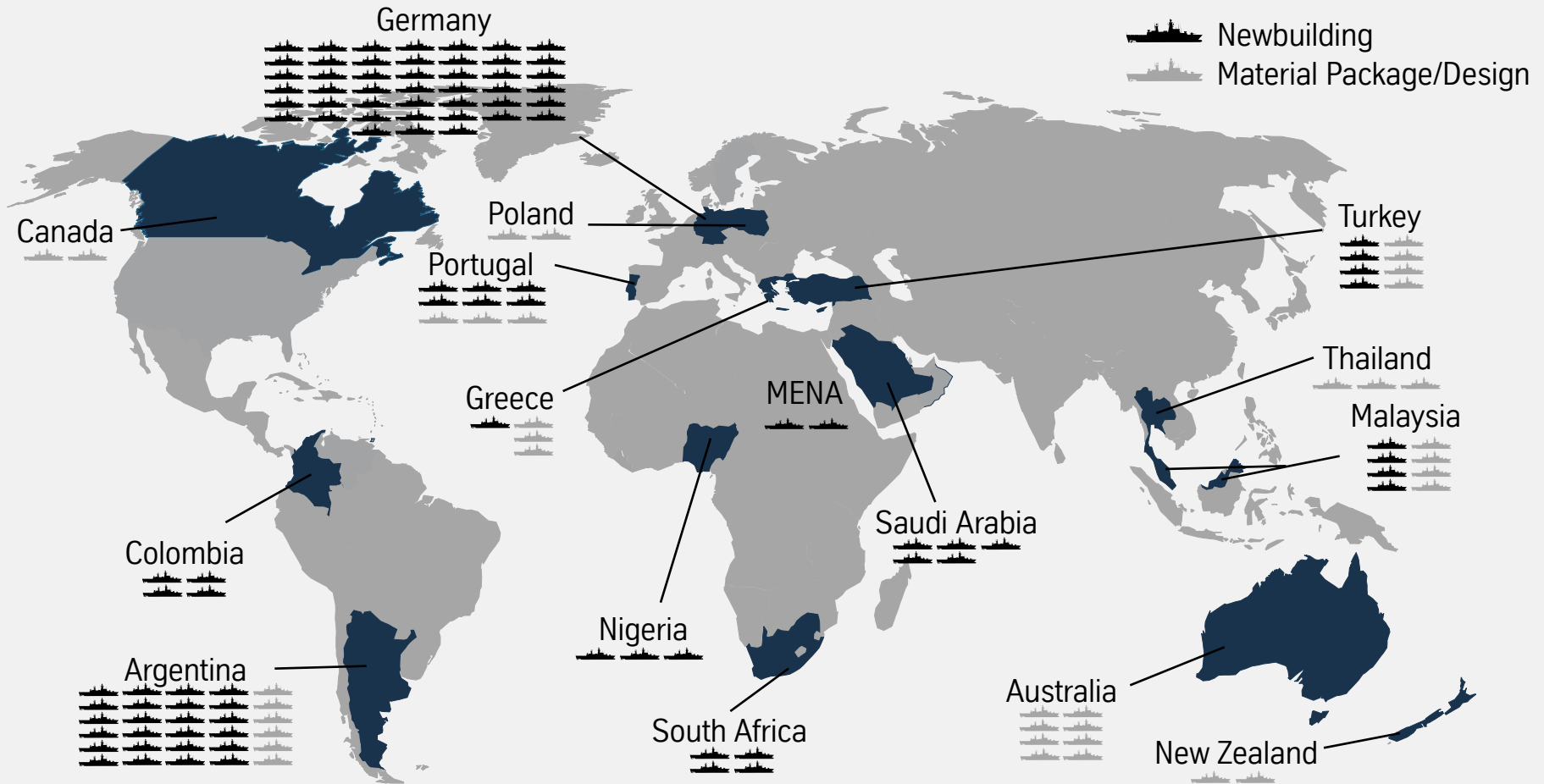
**Aft FLEX Area: 4 TEU**

**Port and Starboard FLEX Areas**

**5 FLEX Areas:**

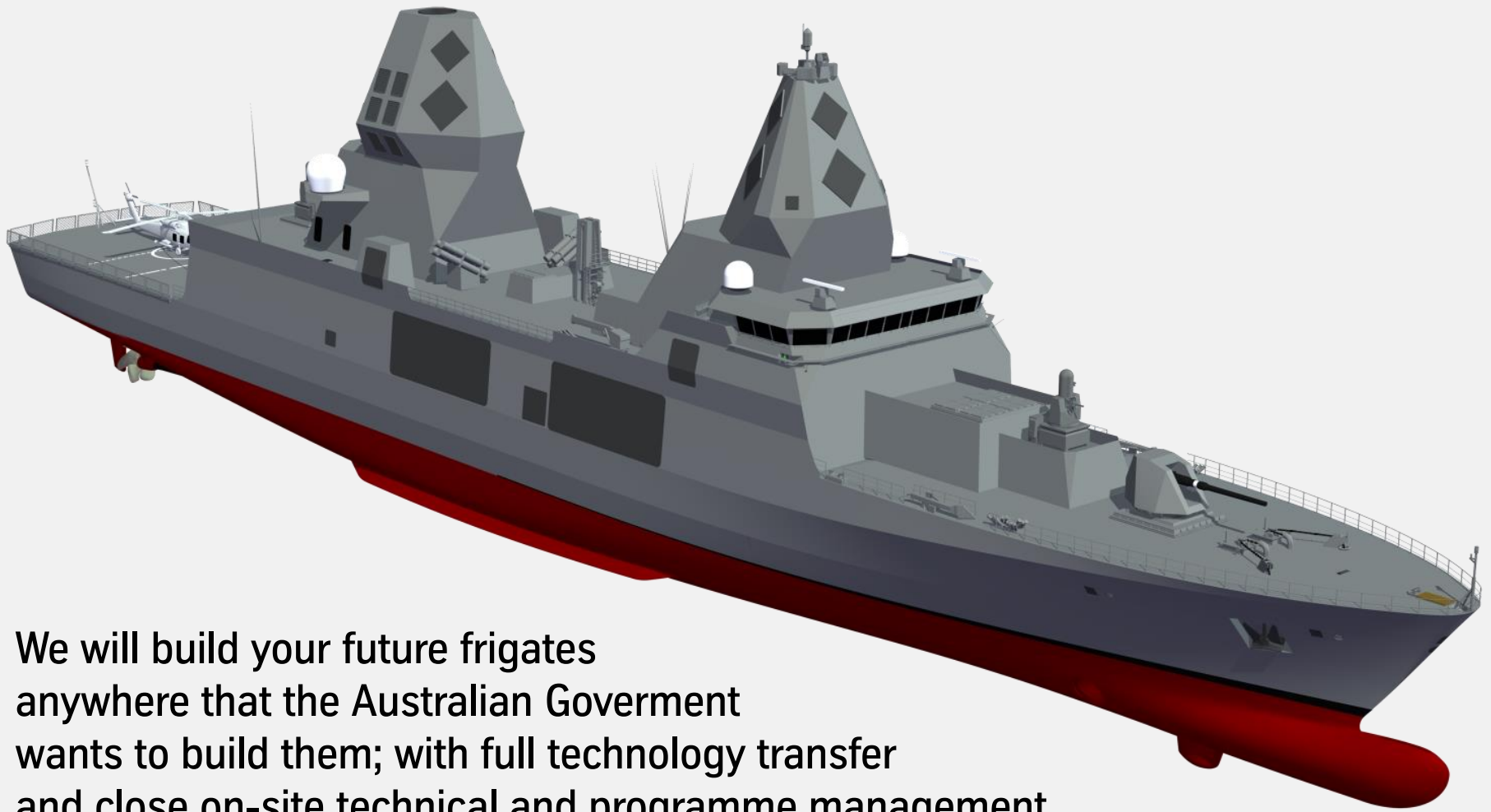
- Aft FLEX Area: Stern door, 4 x TEU, for (e.g.) modular TAS/VDS; mines; UUVs; USVs; special boats
- Port and Starboard FLEX Area: Boat Davit, offboard vehicles up to 11 m in length
- Hangar FLEX Area: one hangar can be configured to take 2 x UAVs and control container
- Upper Deck FLEX Area: 2 x TEU on open deck

# ThyssenKrupp Marine Systems Warship Track Record since 1960



- 139 Warships delivered; >50% of exports built in indigenous shipyards of customer countries
- 90 Frigates and Corvettes in 17 new classes supplied to 13 Navies worldwide (5 NATO Navies)





We will build your future frigates  
anywhere that the Australian Government  
wants to build them; with full technology transfer  
and close on-site technical and programme management  
support and assistance to the Australian Shipyard(s) for the duration of the build