

KRONOS® DUAL BAND

ELECTRONICS DIVISION



 **LEONARDO**

KRONOS DUAL BAND

UNRIVALLED PERFORMANCE

- › Local Area and Self Defence
- › Fire Control & Missile Guidance
- › Littoral Warfare
- › Electronic Attack
- › Anti Tactical Ballistic Missile Defence

Multifunction Active Electronic Scanning Antennas, M-AESA, in X and C Bands. Antennas' designs are based on extensive experience of Electronics Division of Leonardo in developing multifunctional radar systems.

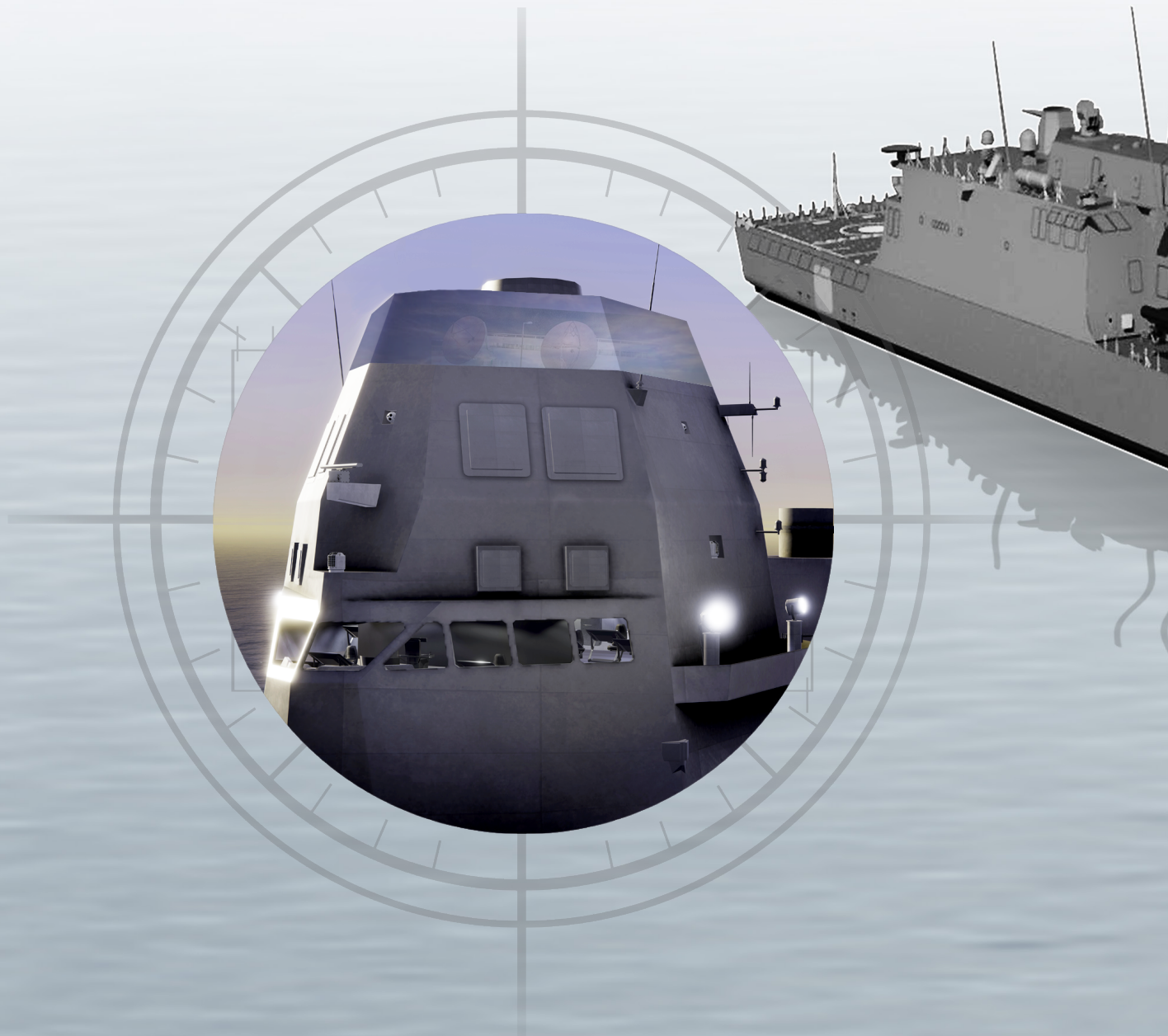
All radar components are fully solid-state, offering unrivalled detection performance and high reliability of the overall mission system.

The DBR suite consists of two radars integrated with a common controller, the System manager, and interface to the combat management system.

The System Manager, acting as a central brain, manages one or more M-AESA sensors ensuring that the overall performances of the entire system will be greater than the sum of the single radar components thanks to the ability to dynamically and adaptive allocate the resources to the current operative scenario.

KRONOS Dual Band combines two AESA radar architectures:

- › KRONOS Quad - four fixed panels in C Band
- › KRONOS StarFire - four fixed panels in X Band



KRONOS QUAD AND STARFIRE

These use a multifunction capability to simultaneously and independently perform their tasks by electronically scanning the beams both in azimuth and elevation.

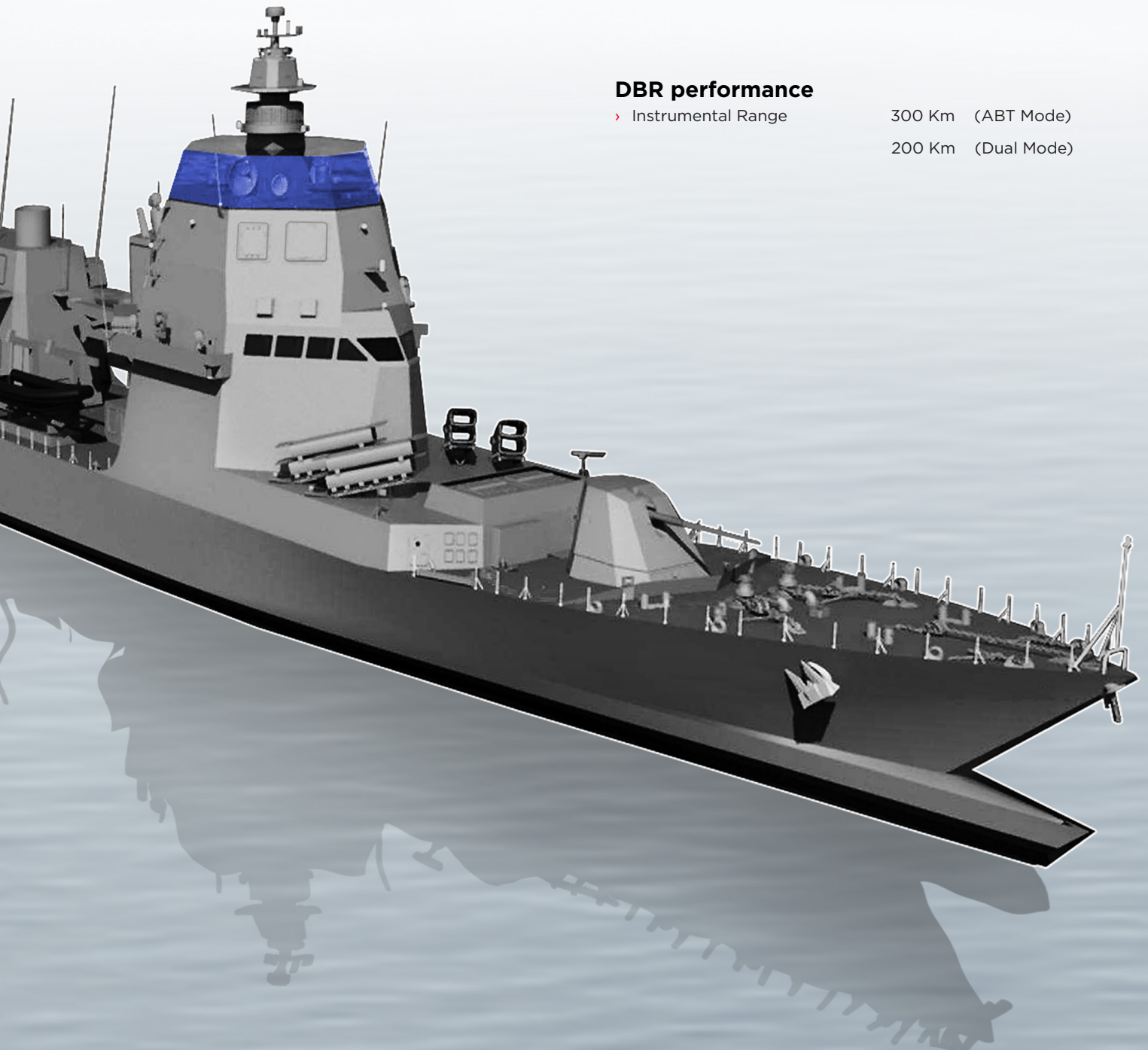
KRONOS DUAL BAND COMBINES

Quad and Star Fire capabilities to provide Surface Combatant Vessels with 360°Az/90°El high level performances in detection and tracking with extensive ECCM features ensuring:

- › simultaneous early warning surveillance and low altitude missile defence;
- › simultaneous BMD and low altitude missile defence;
- › reduction of the time of passive surveillance via the integration of information from the Electronic Support Measurement;
- › electronic jamming and deception (electronic attack function) of hostile sensors.

DBR performance

- | | |
|----------------------|--------------------|
| › Instrumental Range | 300 Km (ABT Mode) |
| | 200 Km (Dual Mode) |



SYSTEM MANAGER

To effectively manage all available resources through the execution of specific tasks on a priority base allowing the implementation of suitable operative modes for each mission as:

- › Dual Band Search and Multiple Tracking
- › Fire Control
- › Missile Guidance
- › Electronic Attack
- › Main Beam & Side Lobe Cancellation
- › BITE, Calibration
- › Environment Monitoring

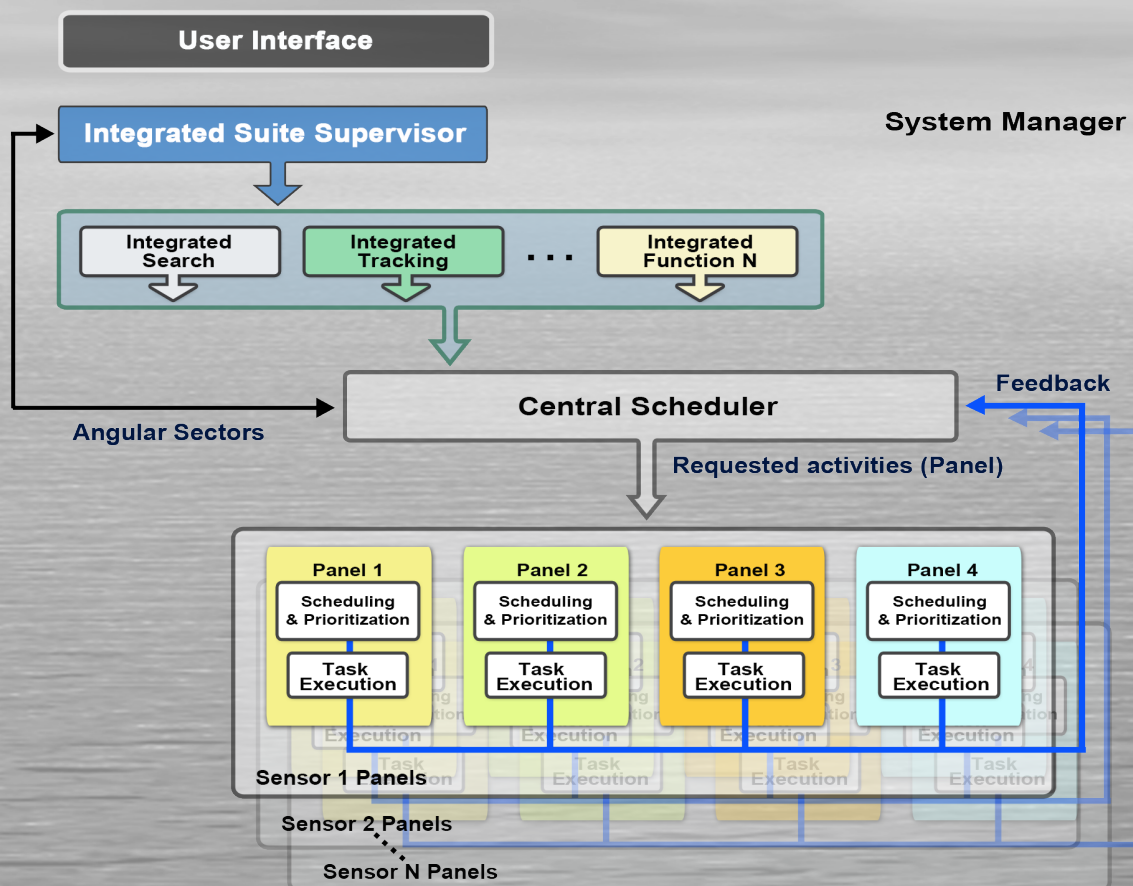
The AESA fixed panels are coordinated by the system manager to minimize electromagnetic interferences and to allow the most effective coverage of the entire $360^{\circ} \times 90^{\circ}$ surveillance volume.

To each task is associated a specific radiated waveform, time of execution and frequency for each direction of the surveillance volume.

Scheduling /Prioritization and Task Execution are key blocks of the system architecture.

Scheduling and Prioritization set the sequence of tasks to be executed by each panel. Task Execution manages the physical implementation of all microevents (e.g. transmit/receive modules programming, gate enabling, etc.) which make up the task itself.

All functions operate typically on a time scale of seconds, except Scheduling and Prioritization which operate on a msec time scale and Task Execution which operates on a nsec base.





ENVIRONMENTAL
AWARENESS

ATBM

LITTORAL WARFARE

HORIZON SEARCH

MULTIPLE DEDICATED
TARGET TRACKING

FIRE CONTROL

ASYMMETRIC WARFARE

VOLUMETRIC SEARCH

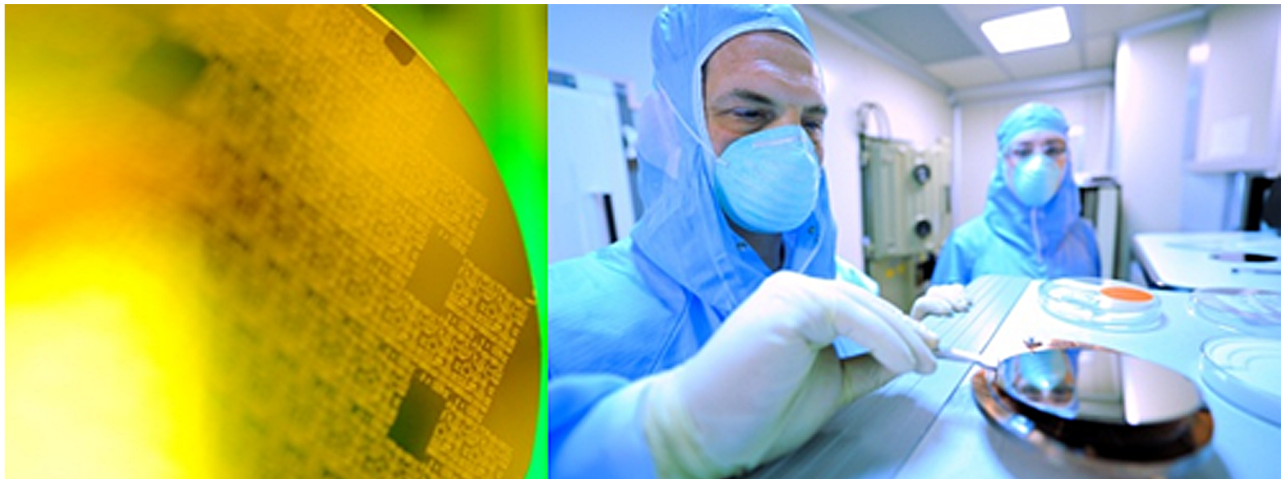
OWN MISSILES TRACKING

MAIN BEAM & SIDE LOBE CANCELLATION
ELECTRONIC ATTACK

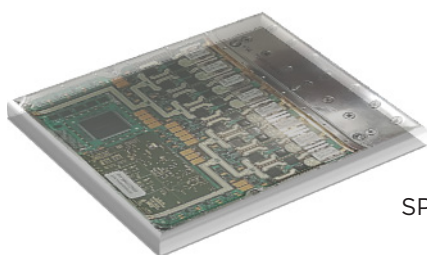
In-house foundry highlight

All transmitter Receiver Module (TRM) are manufactured in our in-house foundry

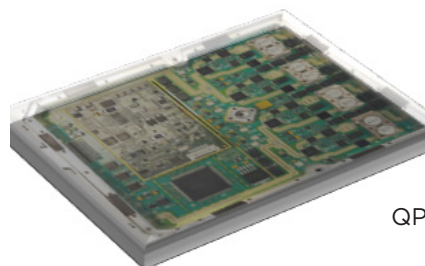
- › More than 500m2 of ISO5 clean-rooms
- › CMMI Level 3 Certification



MULTICHANNEL TRANSMIT - RECEIVE MODULE

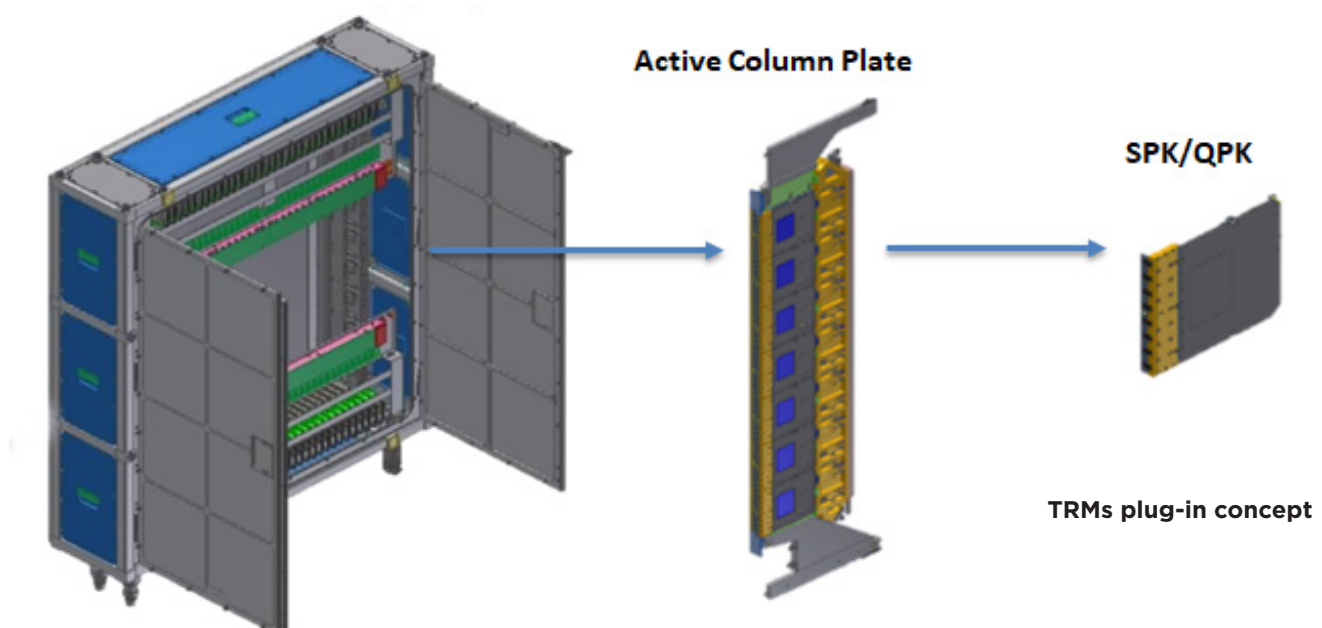


SPK



QPK

SAME MAINTENANCE CONCEPT FOR X AND C BAND RADAR ARCHITECTURE



Kronos Quad

The principal asset of the Anti Air Missile System for multiple active-missiles guidance. The Ballistic Missile Defence is the distinctive function of Kronos Quad having autonomous capability of search and tracking Tactical Ballistic Missiles up to the 600 km class and of tracking TBM of the 1300 km class upon external designation.

Main features are:

- › capability of operating as a stand-alone sensor or cooperating with Kronos Starfire in the DBR configuration;
 - › ability of operating highly integrated with the Early Warning radar on board the ship exploiting the best performance of the two sensors.
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- › Mission
 - › Ship Self Defence
 - › Naval Area Defence
 - › BMD Defence
 - › Air & Sea Surveillance
 - › Gunfire Support
 - › Active Missile Guidance (Uplink)



More than 2000 modules per each fixed panel to perform long range detection and anti-tactical ballistic missile defence



Kronos Star Fire

Featuring superior performance in the so-called Littoral Warfare scenarios carrying on operations in close proximity of the coast where targets of interest are small ships and sub-marines, rockets and mines.

Distinctive features are:

- › Periscope detection to detect, classify and track submarines, thanks to a proper enhancement of the surveillance function;
 - › Fire Control thanks to innovative tracking function and impressive accuracy performance.
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- › Mission
 - › Ship Self Defence
 - › Naval Area Defence
 - › Air & Sea Surveillance
 - › Gunfire Support
 - › Electronic Warfare System Integrated functions



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