



## Naval Technology from Rheinmetall Air Defence AG: A powerful partner of the world's navies & coastguards



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## Company Profile

For many years, Rheinmetall Air Defence AG, the former Oerlikon Contraves AG, has been among the most trusted names in the international defence technology and security industries. The ground, air and naval forces of many nations know they can rely on Rheinmetall's robust, high-performance systems and customized solutions to provide a critical edge in a whole host of security, conflict management and combat situations.

Rheinmetall Air Defence AG supplies a wide array of products specifically designed for maritime applications, responding to the new, constantly evolving challenges posed by current and future naval warfare scenarios.

Rigorously holistic in approach, Rheinmetall systems reflect the company's tried-and-tested capacity for innovation, closely aligned with the defence policy guidelines of the German and international governments and the capability categories: intelligence gathering and reconnaissance, scalable lethality and combat effectiveness as well as survivability and force protection.

In designing its naval systems, the company takes a highly modular approach, employing redundant, functionally interlinked subsystems that can operate in all weathers. For the user, this results in major technical, financial and economic advantages; it also saves time when ships/boats and their systems have to be retrofitted or modified to meet changing operational requirements. Moreover, by enabling subsequent midlife conversion system evolutions, modularity is a critical design feature, significantly extending the service life of legacy systems.

The company's range of maritime products covers a wide spectrum of highly effective, flexible systems. These include radar surveillance systems, optronic sensors, medium-calibre automatic cannons coupled with state-of-the-art ammunition.

## Oerlikon Seaguard<sup>®</sup> Biax – two-axis radar and electro-optical tracking and fire control system



The Oerlikon Seaguard<sup>®</sup> Biax is a powerful tracking system intended for integration with any naval fire control or combat management system. It is available with either X-band or Ku-band radar and a scalable electro-optical sensor fit. It uses active and passive sensors for multi-purpose engagements. Oerlikon Seaguard<sup>®</sup> Biax offers all weather performance against small surface targets in littoral waters and is capable for tracking highly agile anti-ship missiles. The systems meets both, the performance and growth requirements of surface combatants in today's symmetric and asymmetric threat environments. The complete design is focused on easy installation with reduced integration

efforts. Minimal below deck equipment eliminates the need for specific radar service rooms.

### Key characteristics

- Aimed at application from supporting homeland security, search and rescue, antipiracy to anti-terrorism missions
- Offering comprehensive inner layer defence capabilities to protect crew and ship against symmetric and asymmetric threats
- Multi-role fire control system (FC) against missiles, aircraft and surface targets
- Use of same radar unit as Oerlikon Seaguard<sup>®</sup> Triax

### Status

- First contract signed in 2012

## Oerlikon Seaguard<sup>®</sup> Triax – three-axis radar and electro-optical tracking and fire control system



The Oerlikon Seaguard<sup>®</sup> Triax is a versatile and highly effective naval tracking system. It is the only 3-axis system available today and is a multi-purpose tracker suitable for all weather conditions. With its superior velocity and acceleration capabilities it is designed specifically to deal with highly-agile anti-ship missiles and can also counter the diverse range of above water symmetric and asymmetric threats that exist today. This unique construction allows to track targets beyond zenith relative to the ship's deck

even at roll and pitch angles of up to  $\pm 25^\circ$ . Leading edge radar technology fits behind the antenna without sacrificing performance and improving reliability.

### Key characteristics

- Superior dynamics for rapid reaction and engagement of high speed targets
- The third axis located between azimuth and elevation allows fully stabilized target tracking beyond zenith
- Integrated electro-optical line of sight sensors for passive target tracking
- Use of same radar unit as Oerlikon Seaguard<sup>®</sup> Biax. Either with X-band or Ku-band radar

### Status

- In service in several countries

## Oerlikon Seaguard® TDS – Target Designation Sight



The Target Designation Sight is specially designed for observation and optical target acquisition, and as an aiming device and casualty mode weapon control for remotely controlled naval gun systems such as the Oerlikon Millennium Gun®. It enables manual designation and tracking of air, sea and land targets. No deck penetration is required as the system is bolted directly to the deck. In the basic version, the TDS features 7x50 Zeiss naval binoculars, handgrips with push button controls as well as an indicator unit. If required, a laser rangefinder, thermal imaging device or TV monitor can be integrated into the TDS.

### Key characteristics

- Directly mounted to the deck, high reliability and rugged design
- Easy to integrate into existing systems (standard interfaces)
- Provides causality operation for 76mm, 40mm, 35mm guns, etc.
- Equipped with a collimator for acquisition
- Coarse and fine synchros for training and elevation angles
- Various equipment options available

### Status

- In service in several countries

## Oerlikon Seaguard® C&CC – Command and Control Console



The Command and Control Console is an integral part of the Oerlikon naval fire control system. It provides the necessary capabilities to control and manage all sensors and weapons within the scope of modern naval engagements and the naval tactical environment. The situation display presents a complete overview of the tactical picture. It displays all local and system track data and operator-set track labels. An automatic threat evaluation of the tactical situation enables the operator to get an overview of threats and their

capabilities. For operator training, tactical scenarios with artificial tracks and pre-defined movements can be simulated.

### Key characteristics

- Surveillance sensor, tracker and weapon management
- Situation display for tactical overview
- Threat evaluation, track management and surveillance
- Tactical recording and simulation
- Supports all state of the art naval guns via weapon control modules

### Status

- Under development

## Oerlikon Seaguard® WCM – Weapon Control Module



The Weapon Control Module is a multi-function stand-alone electronics cabinet that interfaces between combat management system and weapon for relaying target training and elevation angles for weapon pointing. Furthermore, the WCM provides feedback signals for gun position and signals related to gun readiness, misfire and error conditions and performs ballistic calculation based on commanded position, ammunition and environmental variables to determine optimum weapon aim points on surface and air. The WCM uses a COTS based hardware solution with customized software to provide the optimum interfacing and control between weapon management system and all types of naval guns.

### Key characteristics

- For 25–127mm guns (MK45 5", 76mm, AK-176, 40mm, 35mm, 30mm, AK-630, etc.)
- Customized software to support most state of the art naval guns
- Naval gun fire support for direct, indirect and blind firing
- Target state estimation, kinematic and ballistic lead angle calculations to control gun position and status
- Kinematic and ballistic lead angle calculations

### Status

- In service in several countries

## Oerlikon 20mm naval gun GAM-B01



This high performance gun is designed for mounting on any type of boat or ship. Apart from its use on light patrol and combat boats, these small calibre fast-firing cannons are an ideal complement to automated weapon systems on larger vessels and play an important role in close-range defence.

The gun is manually operated. Aiming the gun in elevation and traverse is carried out with the shoulder rests which are attached to the cradle elevation brackets. The gun design allows easy

compensation for the ship's movement and accurate target engagements. The ammunition container holds 200 rounds of belted ammunition which can be changed rapidly by two men.

### Key characteristics

- Based on the Oerlikon 20mm belt-fed automatic cannon type KAA
- High fire power – approx. 1,000 rounds/min
- Simple operation and maintenance
- Fast deployment, high reliability and rugged design
- No external power source, no deck penetration

### Status

- In service in several countries

## Oerlikon Millennium Gun® 35mm naval gun system



The Millennium Gun system is an innovative and cost-effective solution for both air and surface inner layer and close-in defence and is unequalled in price/performance terms by any other gun. It offers a unique opportunity to counter two core threats in ship defence with one product. Firstly, it is an outstanding weapon for use against all types of air threats. Due to its high rate of fire and the use of Ahead ammunition, Millennium is the only medium-calibre naval gun capable of engaging agile incoming air targets with a high probability of

mission kill. Secondly, it is unsurpassed as a surface target effector. The Millennium is designed to counter swarming attacks by high speed surface targets such as Fast Intruder Attack Craft, Jet-Skis and other potential littoral threats.

### Key characteristics

- Effective at ranges of up to 3,500m for air targets and up to 4,500m for surface targets
- Highly accurate due to short projectile flight times
- Rate of fire: single-shot, burst up to 1,000 rounds per minute
- Optional ISO or Octagonal-Mount: No below deck equipment, fast installation and mission module capability

### Status

- In service in several countries

## Oerlikon Ahead® Ammunition Technology



The 35mm Ahead ammunition technology consists of measurement and programming units, control electronics and programmable Ahead ammunition. It can be fitted to any suitable automatic cannon and then successfully engage small, fast aerial targets with a high kill probability. Each Ahead round contains a high number of tungsten sub-projectiles which are ejected immediately in front of the oncoming target. The measurement unit determines the velocity of each

round prior to muzzle exit. Based on this data, the control electronics calculates the sub-projectile ejection time, which is transmitted via the programming unit to the time fuse in the projectile.

### Key characteristics

- Highly effective against modern threats from the air and on the ground
- Excellent for engaging extremely small targets
- Impervious to electronic countermeasures
- Safe ammunition handling
- Standard for all 35 mm fire units (including retrofits)
- Available in calibre 30mmx173 and 35mmx228

### Status

- In service in several countries