

Schill's State-of-the-Art Alignment Equipment to Test Weapon Systems Performance



- **Objectives:** Align weapon targeting systems
- **Solution:** Jewell Instruments Custom LCF Inclinometer
- **Benefits:** Extreme precision and repeatability
- **Results:** Highly accurate and repeatable weapons fire

Overview

[SCHILL Reglerteknik AB](#) is in Kista, Sweden, just north of Stockholm. Schill is a world leader with revolutionary products for weapon and sensor alignment, with additional applications for shipyards, navies, and system developers. Their specialty is measuring onboard floating vessels on any system type or size. Schill's equipment and methodology ensure that the vessels' weapon and sensor systems are accurate and precise over time. This is done at a fraction of the time and cost of traditional solutions.



Figure 1 – Jewell Instruments Custom LCF Inclinometer

STATIC Alignment

Static alignment of weapon systems onboard ships is traditionally performed in a dry dock. Besides being expensive, alignment in a dry dock is not as accurate as one would expect. For maximum accuracy, the alignment shall be done in the ship's natural environment, afloat. It is faster, easier, affordable, and more accurate than conventional alignment. [Schill's Aligner 308 Static Alignment System](#) is designed for static alignment of shipboard weapon systems. It enables alignment afloat, simpler, faster, and is always more accurate than conventional dry-dock alignment. Imposing minimal influence on the ship's routines, the Aligner 308 implies huge savings in time and operational costs compared to using traditional methods. The Aligner 308 performs tilt alignment, azimuth alignment, azimuth and elevation alignment.



Figure 2 – Schill Aligner System



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DYNAMIC Alignment

After entering correction values from the static alignment, the dynamic alignment errors should be close to zero. Significant errors indicate the presence of errors in the weapons system. Such errors can emanate from the servos, gyros, electrical components of software in the various stations of elsewhere in the weapons control system. Schill offers a full-featured optical alignment tool capable of advanced and intelligent analysis necessary for a successful dynamic alignment. [The Schill Aligner 224](#) is designed for dynamic alignment of shipboard weapon systems. This highly accurate, full-featured, and easy-to-use system also provides interfaces for the ship's tracker cameras enabling complete alignment tests of both trackers and weapon stations.

The Aligner 224 features two main function groups; static alignment verification and dynamic analysis. As the Aligner 224 contains special calibration features for ship's tracker cameras, accurate alignment is enabled for both trackers and weapon stations. Up to 4 different video windows can be shown concurrently, presenting video from any combination of the ship's tracker cameras or the Aligner 224 Gun Cameras. Measurements can be made by tracking a target in any of the presented video windows either manually by the mouse cursor or automatically by a built-in optionally available video tracker.

Schill also offers gun alignment equipment with its [Aligner 221](#) and the [Aligner 231](#) Gun Camera Systems, and the [Aligner 241 Gun Test Fixture](#). Due to the cost efficiency and simpleness of the gun, the weapon system is generally the most used weapon system on a warship. The effect of poor alignment can be truly disastrous. To combat today's sophisticated missiles, which continuously maneuver during the flight, tracking and prediction of the trajectories must be nearly perfect. In the total error budget, there is no margin for alignment errors in order to succeed. Schill alignment products works with any gun manufacturer and virtually any caliber.

Schill enables accurate and rapid alignment of gun-sight camera and barrel of guns by utilizing collimation. The versatile system works on any gun application (Naval, Land, Tanks etc). The special advantages of the Schill products are that the positioning accuracy is not affected by bore rifling or wear. The product is attached to the bore in a few seconds and is self-aligned with extreme precision. The bore or turret adapter is available for virtually any caliber between 12,7 mm (50 cal) and 127 mm (5 inch).

The Aligner 241 product utilizes collimation and is suitable to perform gun and gun-sight alignment depending on requirements and system configuration, while the most basic Aligner 231 is suitable for quick benchmark tests. Aligner 221 and Aligner 224 products are suitable to perform dynamic gun alignment depending on requirements and system configuration.

Schill utilizes the Jewell Instruments Custom LCF high precision inertial sensor to measure angles during the

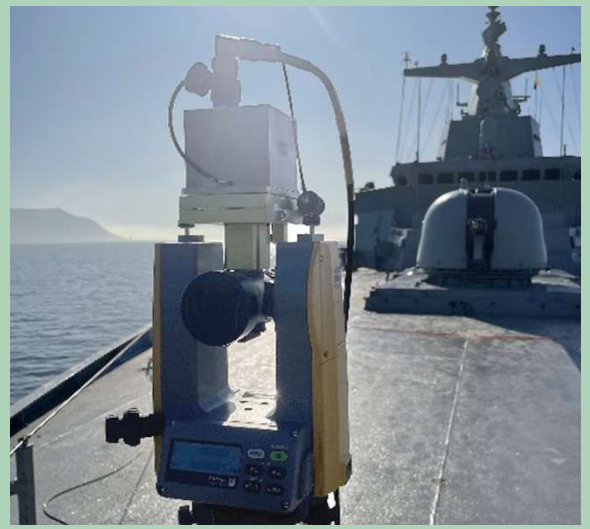


Figure 3 – The static Aligner 308 lets Schill use theodolites on board a floating ship. The system coplanes the theodolites to the reference onboard instead of the horizon.

weapon and sensor accuracy measurement process known as static alignment. The rapid and accurate inertial sensor response is a vital component in the Schill static alignment products, enabling static measurement to be done in hours instead of days or even weeks for conventional methods, and with increased accuracy and precision.

The Jewell Instruments Custom LCF high precision sensor is an extremely rugged biaxial fluid damped flexure suspension servo Inclinator designed for extremely high precision sensing requirements. The seal of the Custom LCF is splash proof making it ideal for outdoor use, and the splash-proof seal meets MIL-STD-202F, Method 112C standards.

According to John Forsell, CEO of Schill, “we have tested other sensors during our 35 years in the industry, but in recent years, we have exclusively used Jewell sensors. Jewell’s sensors meet our requirements perfectly and ensure that our measurements meet the high demands set by our customers”. Forsell further elaborated to say “Jewell Instruments allows us to specify and essentially design our own sensor to meet the unique requirements of our application. We at Schill consider ourselves fortunate to have a supplier like Jewell. Not only do they make excellent products by they are also a great team to work with.”

About Jewell Instruments

Jewell Instruments is a world leader in the design, manufacture, and distribution of high-precision products. Our expertise includes acceleration and tilt sensors, electronic compasses, avionics components, solenoids, and panel meters. The extensive application knowledge we have obtained through decades of experience allows us to provide custom solutions for a diverse group of industries. In fact, customers from all over the globe contact us for solutions to aerospace, medical, industrial, and telecommunications applications - to name a few.

To find out more, visit our website!



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