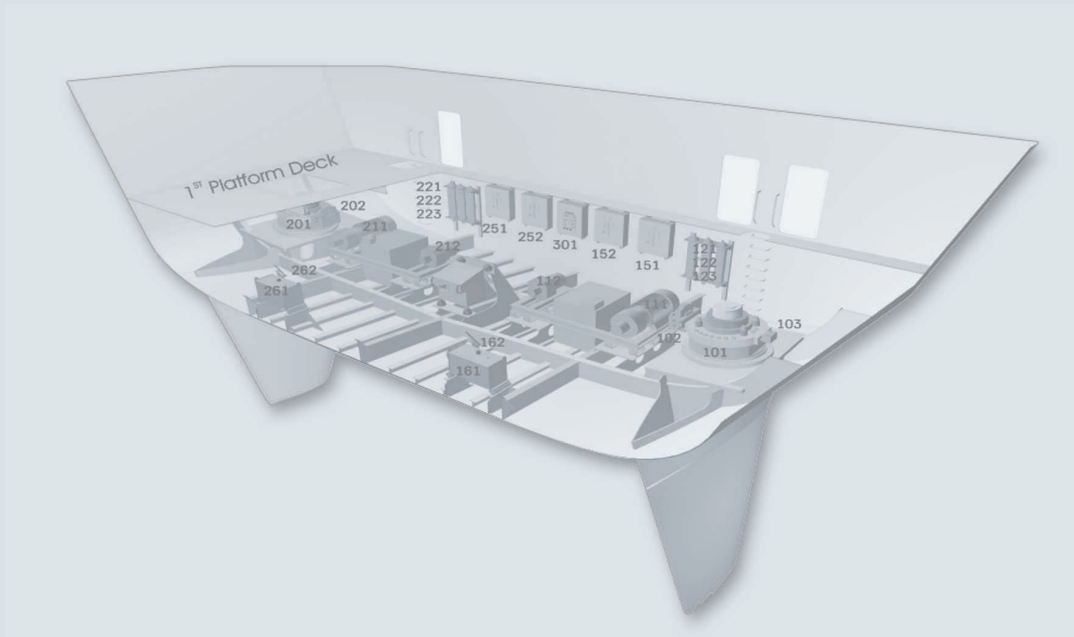


R-R-S

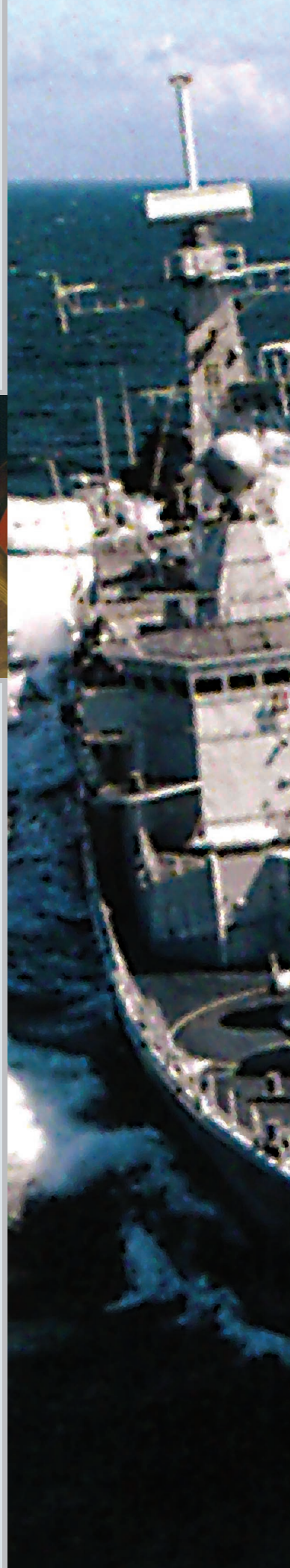
RUDDER ROLL STABILIZATION



R-R-S

B+V Industrietechnik GmbH, Imtech and Becker Marine Systems are all known for their expertise in the engineering and shipbuilding field and have positions as their sectors of ship products, known for high standard of quality and reliability.

Together we offer you the latest technology in roll reduction systems. Guaranteeing unrestricted operations of all equipment, including weapons and sensors with our joint Rudder-Roll-Stabilization (RRS) system solution.



B+V Industrietechnik

B+V Industrietechnik GmbH (BVI), a ThyssenKrupp Technologies Company, is located in the port of Hamburg. Due to state of the art technical solutions and constant innovations, BVI's ship components have attained a worldwide reputation under the trade name SIMPLEX-COMPACT®. SIMPLEX-COMPACT® rotary vane steering gears for RRS are in accordance with GL rules and proven designed in use on NATO naval ships.

Imtech

As a leading Platform System Integrator for Naval Ships, Imtech Marine & Offshore (since 1860) has provided state-of-the-art Integrated Bridge Systems for numerous Naval Customers all over the world. The Imtech Adaptive Steering and Stabilising Autopilot design for RRS operation is based on a system as delivered for the German Frigate F124 and the Netherlands Navy M-Frigate and Air Defence Command Frigates (LCF).

becker marine systems

The business philosophy at Becker has been the application of extensive expertise into producing technologically perfected rudders that provide optimum maneuverability. Research and development work has been focused on this goal ever since. Today, Becker Marine Systems is the global market leader for high performance rudders of all kind of profiles and all sizes with more than 4,000 references.

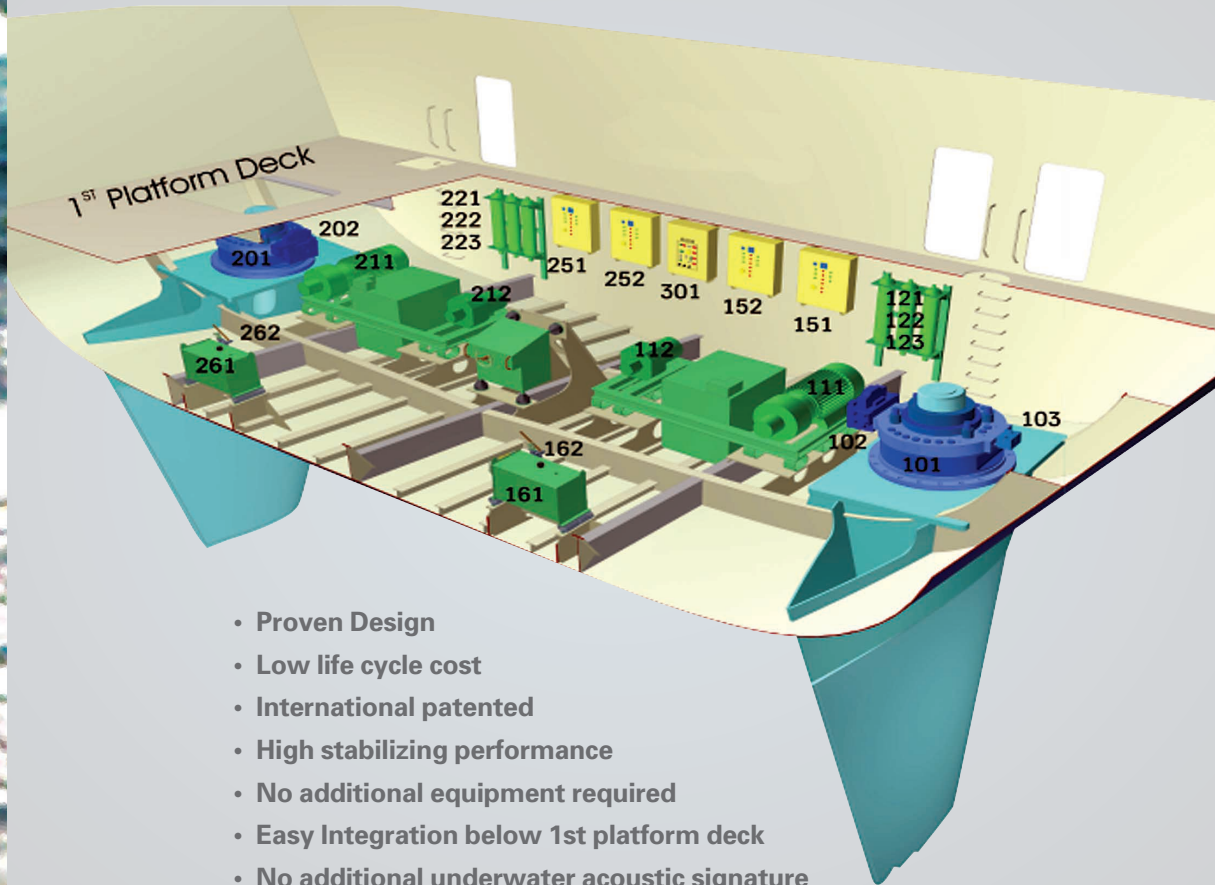
R-R-S

The rudder and steering gear accomplish two functions:

Steering: Keeping and changing of course

Stabilization: Reduction of Roll Amplitude

Stabilization is achieved as the rudder applies a torque against the roll motion. Thereby the rudder works as conventional stabilizer without influencing the steering.



- Proven Design
- Low life cycle cost
- International patented
- High stabilizing performance
- No additional equipment required
- Easy Integration below 1st platform deck
- No additional underwater acoustic signature

Customers' experience. 1992 – First of class trials M-frigate

Objectives were to prove that ASSA met navy requirements for roll motion and course control and to prove that all systems are fully operational in rough opditions.

“Significant roll reductions up to 60 % (variance) were measured during the trials. Higher reductions could not be expected in given conditions. The ASSA system is fully operational in rough weather conditions, and adapted well to changes in speed and heading. Moderate rudder rates and amplitueds were demanded. Yaw motions and ship speed did not decrease using the Rudder Roll control. The course keeping is well within specifications.” (Royal Netherlands Navy Report SB8749)



- | | | | |
|---------|---|--------|---|
| 1982 | Co-operation between Royal Netherlands Navy, Delft University and Imtech | 1990 | Successful sea trials with Adaptive Roll Stabilising Autopilot (ASSA) on board first M-class frigate (no tuning required) |
| 1983 | RRS principle demonstrated on board S-class frigate (RNIN chooses RRS for new M-class frigates) | 1992 | Successful bad-weather trials conducted by RNIN |
| 1984 | B+V patent on the method for stabilizing a ship with the use of rudders | 1994 | Algorithms ported to PC (new RRS autopilot design) |
| 1985 | Imtech patent on essential part of control algorithms- Design and production of SIMPLEX-COMPACT® steering gears for RRS | 1995 | Successful experiments with new system by MARIN for German F124, New autopilot functions added (track control, docking, dynamic positioning, etc.) RRS selected for LCF and F124 New Generation European Frigates |
| 1986 | RRS control algorithms demonstrated at Maritime-Research Institute Netherlands (MARIN) | 1999 - | RRS installed on the 3 German F124 Frigates |
| 1987 | PhD on control algorithms | 2002 | RRS installed on the 4 Dutch LCF Frigates |
| 1988-93 | RRS installed on the 8 Dutch M-Class frigates | 2002 | SIMPLEX-COMPACT® steering gears developed for pressures up to 240 bar |
| | | 2003 | RRS pre-selected for Korean KDX III |
| | | 2004 | RRS selected for German K130 |

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