

NATO's Research Ships: Alliance and Leonardo

NATO's SACLANT Undersea Research Centre (SACLANTCEN), La Spezia, Italy, conducts research in support of NATO's undersea operational requirements. It operates the only ship jointly owned by all the NATO nations, the purpose-built acoustically silent, NRV ALLIANCE. It has been in continuous and productive service since its delivery in 1988 and has received much praise for its flexibility and operational performance.

Since the end of the cold war, a shift of emphasis into the shallower littoral waters has caused a significant increase in the use of SACLANTCEN's existing leased shallow water research work-boat MANNING in increasingly complex and sophisticated experiments at sea. In 1998, funding for a new Coastal Research Vessel (CRV) was approved and the new 28-metre ship LEONARDO will be delivered to SACLANTCEN in July 2002.

ALLIANCE, now 14 years in operational service and having undergone continuous upgrade, provides to her users what has often been described as the near-perfect vibration-free and stable platform for scientific operations at sea. As a public vessel of the Federal Republic of Germany but yet manned and operated commercially, the vessel enjoys continuity of crew - and therefore of specialist experience - almost unrivalled in this type of operation. This is crucial for successful and well orchestrated scientific and engineering experimentation at sea and for which the ALLIANCE is internationally respected.

Acoustics

Since one of the major impacts on undersea system performance is acoustic propagation, the ship was constructed with the aim of satisfying the lowest possible Underwater Radiated Noise (URN) levels at all speeds and in all operating conditions. This requirement influenced every aspect of the construction, operation and maintenance of the vessel. The acoustic specification of the vessel is monitored by means of a Hull Vibration Monitoring System (HVMS), backed up with both static and underway noise ranging. The HVMS also provides an excellent equipment health monitoring system in the ship and is of great benefit to the engineering staff in identifying degrading items of equipment. The Planned Maintenance System (PMS) and the HVMS are, therefore, indispensable systems in the acoustic management of the ship.

Deployment Systems

The following scientific deployment/ recovery systems are available on deck:

- 4 cranes (2 each of 5t SWL with 13m outreach, 2 each of 2t SWL of 10m outreach)
- 2 A-frames (1 forward 16t SWL, 1 aft 10t SWL (50t snap load))
- 2 towing winches - 20t @ 12 knots
- 2 diesel jet drive rigid inflatable workboats
- space and power for 5 x 20ft containers.
- 4 oceanographic array winches
- 2 towed body winches (aft)

Sensors

A wide variety of acoustic and oceanographic sensors, including vertical and horizontal towed arrays, self-recording oceanographic devices, towed oscillating systems, and mine counter measures research tools, are deployed from ALLIANCE, which is also fitted with a 75 kHz acoustic doppler current profiler for underway sub-surface current profiling. An 80-beam Atlas MD (49 kHz) multibeam swath mapping system is also installed; integrated with time-tagged precise position, it provides the means of determining seabed site morphology in specific areas of acoustic and scientific interest down to depths of about 1,000m.

Communications

High-speed digital data exchange can be effected by means of Inmarsat B whilst Inmarsat C and M are also fitted. Internet is on-line on the ship.

Navigation Management

State-of-the-art Integrated Navigation systems (INS) and Information Management Systems (IMS) are installed. The INS provides high-precision positioning (± 5 metres @ 95 per cent of time) within 500 km of the differential reference stations by utilising duplex wide area DGPS spot beam technology with reference station corrections being received in RTCM 104 Rev.2 format. The WADGPS provides precise navigation throughout the Mediterranean and North Atlantic waters. Precise track keeping is facilitated by direct computer steering between prescribed waypoints. Variable rate navigation sampling is broadcast on a LAN to various workstations in key sites on the vessel. The system operates in a Windows NT environment which also allows a high level of quality assurance monitoring and rigorous standards of navigational control. A comprehensive data-recording suite is installed.

An Electronic Chart display System (ECS) utilising the BA ARCS electronic raster charts is integrated. DX90 format vector charts and NOAA format raster and vector data can also be run on this system. An electronic digitising pad to facilitate paper chart fix plotting and route planning is installed.

The entire system provides a precise time-tagged navigation string to other fixed vessel sensors such as the swath mapping system

and the ADCP. Six further configurable RS422/232 out-ports are available for additional sensors/devices as may be installed. Substantial mass data storage facilities form part of the system.

Charter Work

ALLIANCE is used for NATO scientific research projects for 170 days per year, which allows some flexibility in the programme for time charter work. This is available to interested organisations, military, government or defence related commercial companies, within the NATO alliance for about 70 days per year. The Ship Management Office, SACLANTCEN, undertakes the co-ordination and management of all charter contracts.

LEONARDO - A New Vessel for NATO

In 1998, funding for a new Coastal Research Vessel (CRV) was approved and following a seven-month design phase executed by Burness, Corlett and Partners, UK, and an international competition, a shipbuilding contract was awarded to McTay Marine Ltd, UK, on 19 December 2000 to construct a 28-metre CRV. The vessel will be delivered in July 2002 to SACLANTCEN.

The CRV is vessel number 128 built by McTay Marine, which has a long history of producing steel work vessels for commercial and defence related applications. The new vessel, to be named "LEONARDO", will be the first vessel to operate as an Italian public vessel and will eventually be listed on a special register within the Italian Ministry of Defence, Rome. She will be classed and certified by the American Bureau of Shipping (ABS).

LEONARDO will replace SACLANTCEN's leased 20-metre workboat MANNING which, now being 47-years old, has reached the end of her useful contribution to the increasingly sophisticated demands of modern science at sea now being undertaken by SACLANTCEN. LEONARDO, with one silent low speed working condition, will enjoy the benefits of diesel electric propulsion driving twin azimuthing thrusters and one azimuthing bow thruster controlled by a fully automated "Dynamic Positioning" (DP) and Power Management System. Wet and dry Laboratories, diving facilities and an impressive suite of deck handling cranes, winches and A-frames, will provide the necessary facilities to undertake all the required shallow seas scientific research operations. Comfortable sleeping and messing accommodation for up to ten scientists and crew is incorporated.

The building programme for the vessel is progressing well and during the early summer it will undertake a series of builders and owners' sea trials. Incorporated in this will be noise ranging to ensure that the vessel meets the very stringent radiated noise requirements for the research work she will undertake. After a delivery voyage in July she will be formally commissioned as a NATO vessel in early September before commencing a busy programme of scientific work.

Embracing technology from numerous NATO nations, LEONARDO will be a technological step change, which will significantly enhance NATO's defence-related undersea research capabilities and further contribute to military requirements.