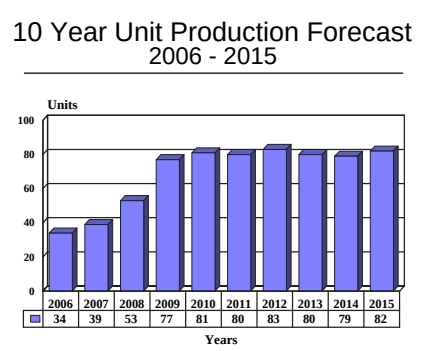
MIN Mk 2 - Archived 10/07

Outlook

- Production of MIN ROV series completed
- Italy decided not to procure the MIN Mk 3
- Existing MIN Mk 2 systems being replaced by Pluto ROVs
- WASS is developing decoy and target systems
- SLAT decoy system will be installed on the warships of the French and Italian navies



Orientation

Description. Unmanned underwater vehicle.

Sponsor. The Italian Ministry of Defense, Rome, Italy.

Status. In production.

Total Produced. Approximately four Mk 1 and 12 Mk 2 systems were completed by the end of 2005. Some 48 SLAT decoys have been built. The MIN Mk 3 never made it into production.

Application. Small, self-propelled underwater vehicle for mine countermeasures operations.

Price Range. No specific information is available concerning the per-unit cost of the MIN Mk 2, although sources have said it could be in the area of $400,000 to $600,000.

Contractors

Prime

Calzoni S.r.l.	http://www.calzonispa.com, Via Bargellino 25/A, Calderara di Reno, Bologna, 40012 Italy, Tel: + 39 0514 1377, Fax: + 39 0514 1375 55, Email: calzoni@calzonispa.com, Prime
Whitehead Alenia Sistemi Subacquei (WASS)	http://www.whiteheadaleniasistemisubacquei.com/az_pro.html, Via di Levante, 48, Livorno, 57128 Italy, Tel: + 39 0586 8401 11, Fax: + 39 0586 8540 58, Email: marketing@wass.it, Prime
Thales Underwater Systems, HQ	http://www.thales-naval.com, 525 Route Des Dolines, BP 157, Sophia Antipolis, 06903 France, Tel: + 33 4 92 96 30 00, Fax: + 33 4 92 96 39 50, Email: TUS@thales-underwater.com, Second Prime

NOTE(S): WASS and Thales will build the SLAT decoy system under the EuroSLAT consortium.

Comprehensive information on Contractors can be found in Forecast International's "International Contractors" series. For a detailed description, go to www.forecastinternational.com (see Products & Samples/Governments & Industries) or call + 1 (203) 426-0800.

Contractors are invited to submit updated information to Editor, International Contractors, Forecast International, 22 Commerce Road, Newtown, CT 06470, USA; rich.pettibone@forecast1.com

Technical Data

Design Features. The different members of the MIN series all use the same remotely operated vehicle (ROV), but each new model has added enhancements. The information listed below is for the MIN Mk 2.

	Metric	U.S.
Dimensions		
Length	3.57 m	11.7 ft
Width	976 m	3.2 ft
Height	1.68 m	5.5 ft
Weight	1,180 kg	2,600 lb
Performance		
Speed	6 kt	6 kt
Duration	1+ hr	1+ hr
Max Depth	350 m	1,148 ft

Propulsion. The MIN ROV uses a single hydraulic motor fed by built-in oleopneumatic accumulators. This system is provided by Calzoni (formerly Riva Calzoni SpA).

Control & Guidance. The MIN ROV is teleoperated via a coaxial or fiber-optic link. The system uses an acoustic tracking system that is displayed on an operator's console for control of the remotely operated vehicle. The mothership's sonar gives the position relative to the target mine.

Launcher Mode. The MIN ROV is launched using a naval crane with a lifting capability of 2,800 pounds. The crane is made by Calzoni (formerly Riva Calzoni SpA).

Recovery. This ROV is recovered with the same equipment used to launch it.

Warhead. The MIN ROV carries both an explosive charge and an explosive cutter.

Italian Gaeta class MHC

Source: Intermarine

Variants/Upgrades

Three versions of the MIN are known to have been developed: the Mk 1, Mk 2, and Mk 3. These are all reusable systems. WASS is offering a line of torpedo decoy systems: the submarine-launched C303 stationary jammer and decoy; the submarine-launched C303/S stationary jammer and mobile decoy; the shipborne C309; the shipborne C310; and SLAT (Système de Lutte Anti-Torpille). WASS is also marketing an underwater mobile target known as BSS and the reusable MIST (Multi Influence Self-propelled Target).

For more information on the system, please see the pertinent entries in the **Program Review** section.

Program Review

Background. The MIN (Mine Identification and Neutralization) system program commenced in 1977 to provide the Italian Navy with a mine disposal system for its Lerici class (and later Gaeta class) mine warfare vessels.

Development of the initial MIN Mk 1 system began in 1979, and testing was under way by 1983. The first Lerici class ship entered service in 1985, followed by the initial Gaeta class vessel in 1993.

New ROVs Being Researched

New Ships. Italy does have plans to procure a new class of oceangoing mine countermeasures ships outfitted with minehunting and deep sweeping equipment. The design could be based on an improved Gaeta class ship or the U.S. Navy's MCH-51 Osprey, which itself is based on the Lerici/Gaeta series. Budgetary shortfalls have forced a delay in this program.

Still, Italy is examining proposals to support and eventually replace its MCM ships. The new MCM ships are expected to be equipped with remotely operated vehicles for locating naval mine fields. These new ships could also be outfitted with a mine disposal vehicle (MDV), similar to the Atlas Seafox. No specifics have been released concerning when Italy would begin construction of this new MCM ship. In the meantime, Italy is planning to upgrade its existing fleet of MCM vessels.

Vehicle Models. There are currently three members of the MIN family: the Mk 1, Mk 2, and Mk 3.

MIN Mk 1. The MIN Mk 1 is designed to have a minimum magnetic signature, and to this end, it uses pneumatic motors instead of electric motors for propulsion. The ROV uses a single-ducted propeller capable of being oriented in two planes for steering. Vertical and horizontal thrusters are installed fore and aft.

The MIN Mk 1 can be equipped with either a low-light-level television or a sonar. These items are powered by onboard batteries. Command and control is via a tether connected to the mothership.

The ROV is capable of reaching a speed of 5 knots, although normally it will cruise at 3 knots. The MIN Mk 1 has a maximum range of 400 meters and depth of 200 meters. Endurance is 40 minutes at 3 knots.

Four MIN Mk 1s were manufactured for use by the Italian Navy.

MIN Mk 2. The Mk 2 offers superior performance over the original Mk 1 system. The upgrade reduces the time for the repositioning phase from 20-40 minutes to 10-15 minutes. Also, the Mk 2 is capable of moving much closer to the intended target, within centimeters by some descriptions. The vehicle's endurance has also been increased to 60 minutes.

Nine MIN Mk 2s were produced for use by the Italian Navy.

MIN Mk 3. The Mk 3 was intended to improve the performance of the Mk 2 without having to resort to the development and procurement of an all-new system. The Mk 3 had a very low acoustic and magnetic signature due to the use of a hydraulic power pack. Two auxiliary propulsion units, batteries, and motors enabled the Mk 3 to perform longer relocations and operations far from sensitive magnetic devices.

The vehicle had a top speed of 8 knots and a 3.5-hour endurance at 3 knots. The MIN Mk 3 used a fiber-optic command link and offered the added features of a color sonar display, navigation aids, and better transmission at great depth (300 meters).

This upgrade kit was offered for installation on existing Italian Navy mine countermeasures ships equipped with the MIN Mk 2. Despite reports to the contrary, the MIN Mk 3 was not procured by the Italian Navy.

Precursor. This could be the ultimate replacement for the MIN series. A project definition contract was awarded in 1998. The system is likely to be based on a modified MIN Mk 3 ROV body, with hydraulic propulsion replaced by electric motors that are powered from the mothership. The Precursor could be fitted with the SQQ-14-IT sonar by FIAR.

This new system could be used on Italy's new mine countermeasures vessels that may be procured in the near future.

Decoy System Developed

SLAT. The Système de Lutte Anti-Torpille (SLAT) is a joint project involving France (Thales) and Italy (WASS) under the EuroSLAT consortium. The SLAT is an auto defense system designed to protect surface ships from torpedo threats. Development work was started in 2000.

The SLAT uses two types of soft-kill countermeasures: a jammer and a Mobile Target Emulator (MTE). The MTE produces an alternative signature for the torpedo to attack. The system uses two dedicated launchers with 12 tubes each.

The SLAT can be installed on various ship classes and is expected to equip the Horizon frigates.

BSS. WASS is offering the BSS, a self-propelled underwater vehicle capable of reproducing signatures of all types of submarines for use in training and weapon systems evaluation. The BSS is derived from the A184 exercise torpedo and tows an advanced acoustic array tail.

Technical Data

Length	6,085 mm
Length, Upgraded BSS	6,000 mm
Diameter	534 mm
Weight	1,222 kg in air
Weight, Upgrade BSS	1,193 kg
Speed	14-28 knots
Endurance	7-30 minutes
Operating Depth	10-400 m

The BSS propulsion system consists of two contrarotating propellers, a three-speed 110-kW DC motor, speed commutators, and a servo system to control the fins. Power is derived from a rechargeable silver oxide/zinc 110-kW battery system.

An upgrade BSS includes the function of an active and/or passive acoustic Sonar Target Emulator and a digital data recording system. This system became available in 2004.

The BSS can be deployed from 534-mm surface air-pulse tubes, 534-mm underwater swim-out or water pulse tubes, or by gravity from tiltable slides.

MIST. The Multi Influence Self-propelled Target (MIST) is a recoverable self-propelled target suitable for ASW (anti-submarine warfare) training.

Technical Data

Length	6,089 mm
Diameter	534 mm
Weight	1,222 kg

The MIST vehicle is derived from the BSS underwater mobile target.

Significant News

Caledonian MacBrayne Buys AC-ROV – AC-CESS has sold an AC-ROV underwater inspection system to Scottish West Coast and Islands ferry operator Caledonian MacBrayne (CalMac). CalMac currently owns and operates a modern fleet of 31 vessels providing passenger, vehicle, and shipping services to the islands off the west coast of Scotland and in the Clyde estuary. There are currently 26 routes within the network. In 2004, more than five million passengers and over one million accompanied cars were carried on the company's services. (AC-CESS, 6/06)

i-Tech Announced Deepwater ROV Build Program – i-Tech, which is part of Subsea 7, has placed a significant order for new-build, deepwater work-class vehicles. These ROVs will be supplied with advanced, lightweight, high-performance handling systems. The systems, to be named Centurion Qx, have been specifically designed and built for i-Tech and its target market. The 125-hp Centurion Qx will be rated to operate at water depths up to 2,000 meters as standard with options to upgrade to 3,000 meters and beyond.

The systems will be built by SMD Hydrovision (SMDH) at their Turbinia works on the River Tyne in Newcastle, U.K. The Centurion Qx is an evolution of the successful Subsea 7 designed and built Centurion work-class series. The new Centurion Qx will incorporate a number of key components used on SMDH's proven Q-Series range of ROV's including DVECS distributed control and the latest generation Curvetech thrusters.

i-Tech has embarked on this build program, as it is confident of securing, in the short term, commitments for a number of these new-build ROV systems, with deployment anticipated to be in deepwater regions including West Africa and North and Latin Americas. This deployment would further consolidate i-Tech's position as a global ROV and intervention provider to the offshore E&P sector. (i-Tech, 5/06)

Stealth Submarine Propelled by Seaeye – Propulsion of the revolutionary Talisman AUV (autonomous underwater vehicle) from BAE Systems comes from thrusters supplied by Seaeye Marine. Talisman is designed to carry out a wide range of underwater operations close to the shore without being detected.

Seaeye was picked for its pioneering work in using brushless DC motors for thruster systems in ROVs. Its task was to provide propulsion that would offer extremely delicate maneuverability in difficult conditions, including strong currents, and over an extended period: the Talisman can be deployed 50 miles offshore and remain in operation for 24 hours.

With BAE Systems wanting commercially available equipment, Seaeye proposed its world-proven SM5 thrusters, the same that propel its Panther Plus ROVs, and similar to that used in the Cougar ROV. The command protocol for the thrusters was made available to BAE for incorporation into the Talisman control system.

Precise handling in all directions comes from six thrusters, two at the front, and four at the back in two pairs. A Seaeye rotary actuator is used to vector each pair of thrusters and to operate the hydroplanes. This actuator was originally developed for pan-and-tilt applications and is widely used in a range of ROVs. It incorporates a brushless DC motor with an harmonic drive output stage that provides high torque with zero backlash, making it ideal for this particular application.

With reliability a vital element in the project, BAE opted for Seaeye's own metal shell connectors. These were developed by Seaeye when rubber-molded connectors had become a major reliability problem in its early ROVs and where a suitable off-the-shelf metal alternative could not be found. (Seaeye Marine, 4/06)

Funding

No specific information is available concerning funding for the MIN program. Italy would like to begin replacing its older mine warfare ships sometime during the decade. Defense budget shortfalls could continue to cause delays in this program.

Timetable

Year	Major Development
1977	Development of the MIN Mk 1 under way
1983	Sea trials commence
1985	First Lerici class ship enters service
1993[(a)]	First Gaeta class ship enters service
1999	MIN Mk 2 production completed
2002-2003	Italy forgoes MIN Mk 3 production

[(a)] Estimate

MIN Mk 2

Worldwide Distribution / Inventories

The main customer for the MIN series has been the Italian Navy. No export customers have been found, despite the sale of Italian-built mine countermeasures ships to other countries.

User Country. The **Italian Navy** was the initial operator of the MIN series of remotely operated vehicles.

Forecast Rationale

The acquisition of new mine countermeasures (MCM) vessels by Italy will probably take an extended period to complete. Budgetary shortfalls and internal bickering is slowing this program's progress.

New MCM Vessel Will Be Slow in Coming

The Italian Navy wants its new class of mine countermeasures (MCM) vessels in service before 2020. This new class may involve the construction of at least six vessels, outfitted with possibly a combination of reusable remotely operated vehicles (ROVs) and expendable mine disposal vehicles (MDVs). Whether WASS will be involved in meeting this need remains to be seen.

MIN Production Ceased

Production of the MIN series has been halted. Reports of the upgrading of Mk 2s to Mk 3 status proved inaccurate. Instead, the Italian Navy is replacing its MIN Mk 2s with Pluto ROVs.

Little new information has appeared concerning any all-new ROV system being developed by Italy. Such a development program is not a high priority since Italy's new MCM class vessels will not be completed until sometime after 2010. Since the Italian Navy's Lerici and Gaeta classes are relatively modern, there is no pressing need for Rome to replace these ships.

Torpedo Decoy Developed for Surface Ships

Italy, specifically WASS, is manufacturing a line of torpedo decoy systems for use by surface ships and submarines. These decoys have been joined by the new Système de Lutte Anti-Torpille (SLAT). The Italian Navy will outfit its two Horizon class frigates and the aircraft carrier *Andrea Doria* with the SLAT and probably its new FREMM frigates. The FREMM is a Franco-Italian program that could involve the construction of 27 multimission frigates. France has not said if it will procure the SLAT for its FREMM warships but will put this system on the *Charles DeGaulle* aircraft carrier and its Horizon class frigates.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

			High Confidence Level				Good Confidence Level			Speculative			
Missile	**(Engine)**	**thru 05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**	**14**	**15**	**Total 06-15**
SMIN													
MIN MK 1	UNSPECIFIED	4	0	0	0	0	0	0	0	0	0	0	0
MIN MK 2	UNSPECIFIED	12	0	0	0	0	0	0	0	0	0	0	0
MIN MK 3	UNSPECIFIED	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal - SMIN		16	0	0	0	0	0	0	0	0	0	0	0
WHITEHEAD													
SLAT	UNSPECIFIED	48	34	39	53	77	81	80	83	80	79	82	688
Subtotal - WHITEHEAD		48	34	39	53	77	81	80	83	80	79	82	688
Total Production		64	34	39	53	77	81	80	83	80	79	82	688