Unmanned Surface Vehicle (USV)

SAM 3

for unmanned, remote controlled or autonomous influence minesweeping

A company of
ThyssenKrupp
Marine Systems

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SAM 3 Minesweeping USV

MISSION

Today, any successful minesweeping is based on the accurate imitation of both the magnetic and acoustic signatures of target ships, wether they be extremely low as of a degaussed MCM vessel, or large as emitted by a big commercial vessel.

Now in its third generation, SAM 3 has proven its effectivity with thirteen units operated by four navies.

MAIN FEATURES

- Unmanned, remote or autonomous control
- Keeps ships and crews outside mine danger areas
- Highly suited for minesweeping operations in confined waters, ports, archipelagos, narrow shipping corridors, etc.
- Easily shipped by land, sea or air in a 40ft container
- Programmable sweep signature output against “smart” mines
- Unmanned technology delivers on-site persistence
- Ops in 3 – 60+ meter (10 – 200+ ft) depths
- Superb shock resilience to close proximity mine detonations
- High redundancy and sustainability

CONSTRUCTION

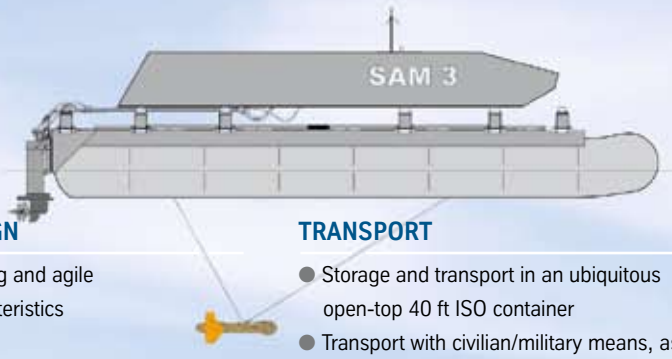
- Almost all structures are of non-ferrous, non-magnetic, non-corrosive composite Carbon fibre or GRP materials.
- Inflatable RIB-collar type floats, each with 10 air chambers that absorb high shock loads. The deckhouses are resiliently mounted to the vehicle’s main frame.

MINESWEEP SYSTEMS

- Magnetic and acoustic influence minesweeping
- Platform-integrated magnetic sweep gear
- Two-axis electromagnetic signature effectors (coils)
- Clip-on acoustic sweep gear
- Towed acoustic generator (e.g. Thales AAG or similar)
- Optional electric (UEP/ELFE) sweep gear (electrodes)

COMMAND & CONTROL (C2)

- C2 options:
  1. SAM 3 stand-alone C2 system in a PC laptop with radio and portable antenna
  2. Integrated into external C2 system onboard for example, a MCMV or other C2 container module
- Mission planning, execution and evaluation
- After mission planning data is transferred to SAM 3’s on-board system, its mission is conducted in a remote controlled or semi-autonomous mode. Tracks, turnarounds etc. are followed in full synchronization with the signature generation system
- Up to four SAM3 drones working in formation can interact in a multi-SAM-mission mode to generate realistic signatures corresponding to targeted ship types and sizes



CATAMARAN DESIGN

- Excellent sea-keeping and agile manoeuvring characteristics
- High payload
- Less platform pitch and roll movement delivers a steadier distribution of the deck-coil generated vertical magnetic field.
- Increased area for the deck-coil enables higher signature levels
- Wide beam counteracts explosion induced capsizing
- Minimized impact to engines and MCM equipment housed in the twin deckhouses, the spray dome generated by underwater explosions easily passes through the meshed platform floor

TRANSPORT

- Storage and transport in an ubiquitous open-top 40 ft ISO container
- Transport with civilian/military means, as well as airlifting, reduce reaction time to a minimum.
- Rapid deployment, independent of distance as mounted/dismounted within 24 hours
- Fast launching from a support ship or with a 14 ton crane

MAIN DATA

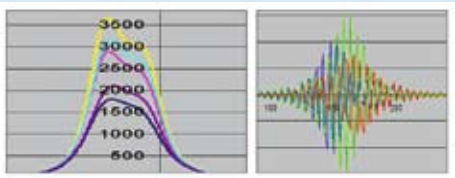
Length over all	14.4 m
Beam	6.7 m
Draught (propellers)	1.2 m
Draught (acoustic generator)	3.8 m
Displacement	14 tons
Speed (transit)	12 knots
Speed (sweeping)	8 knots
Power/propulsion (diesel)	2 x 140 kW

MODULARITY

- Highly flexible customizing of components
- Easily installed equipment upgrades
- Simplified maintenance, fast replacement of damaged equipment

MINESWEEP SIGNATURE CONTROL

- Choice of constant or variable/programmable sweep signature outputs
- Flexibility to sweep in both Target Setting Mode (TSM) or Mine Setting Mode (MSM)

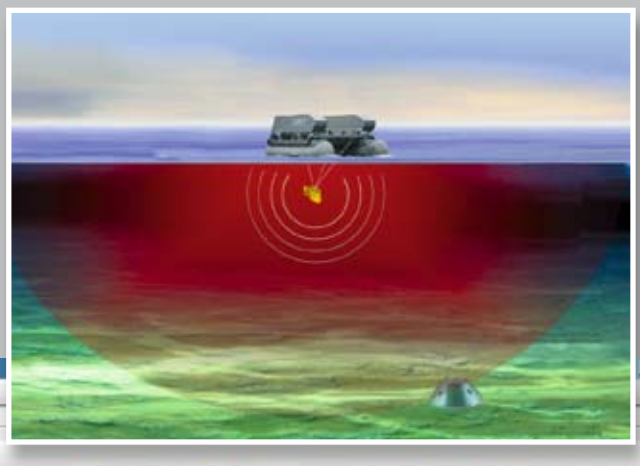


Sweep signature flexibility

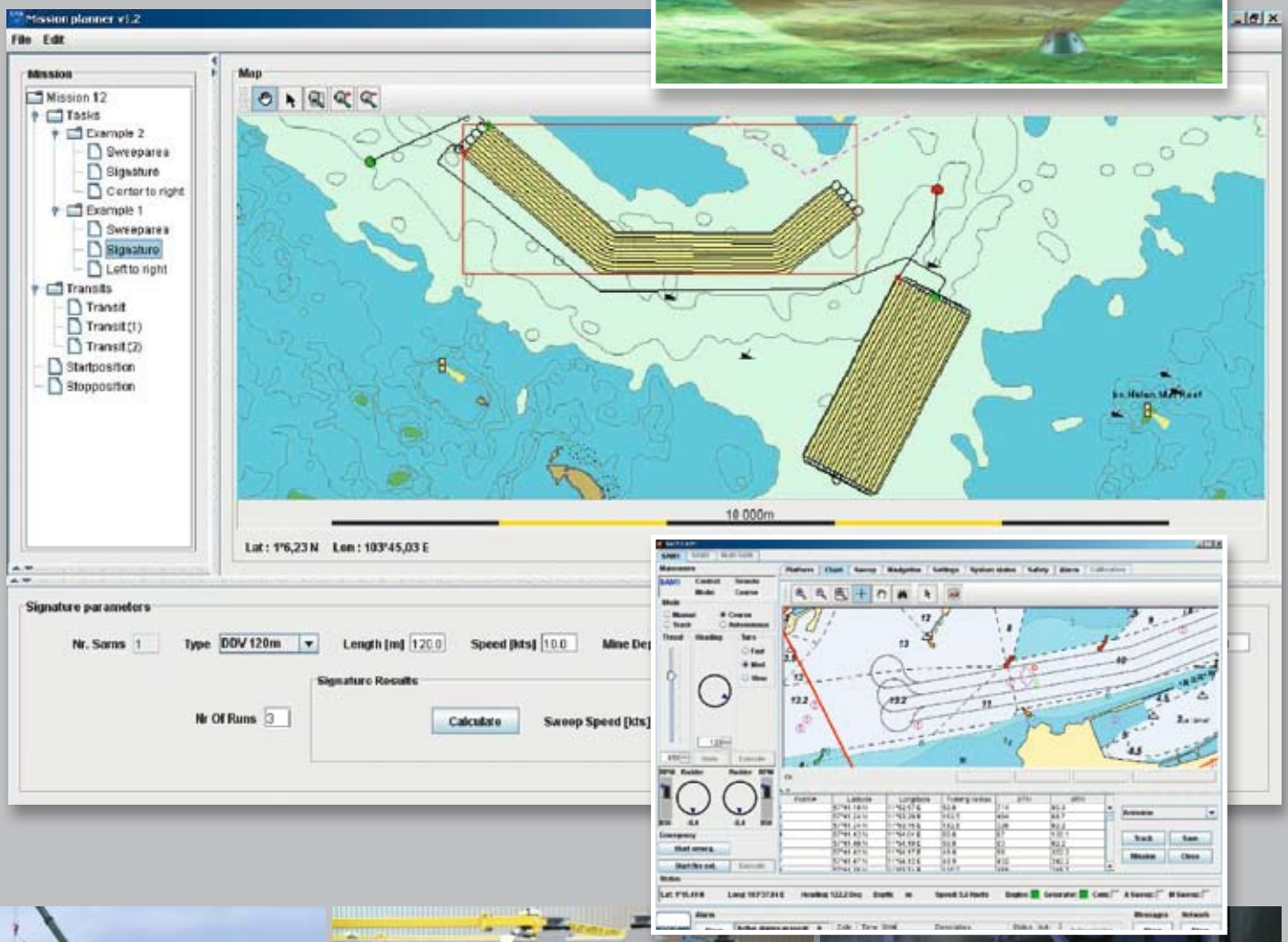
- Unique capability to simulate TSM with authentically simulated signatures
- Unique capability to simulate MSM with known mine trigger parameters
- Magnitude and shape tuning of both magnetic and acoustic signatures
- Correct levels, variation and duration for a specific target vessel type, size and speed
- Synchronisation of magnetic and acoustic signature output

- "Ripple" effect for degaussing simulation
- Simulation of multiple passes for mines with ship-counting device
- Multi-SAM mission for signature extension
- Deperming functionality to minimise magnetic remanence

Left: SAM 3 configured for Acoustic-Magnetic influence minesweeping



Below: Screen shots of tracks SAM 3 automatically sweeps, superimposed over electronic sea charts. After all relevant mine threat parameters have been analysed by the SAM 3 Mission Management System (MMS), a Mission Definition File (MDF) is then calculated.



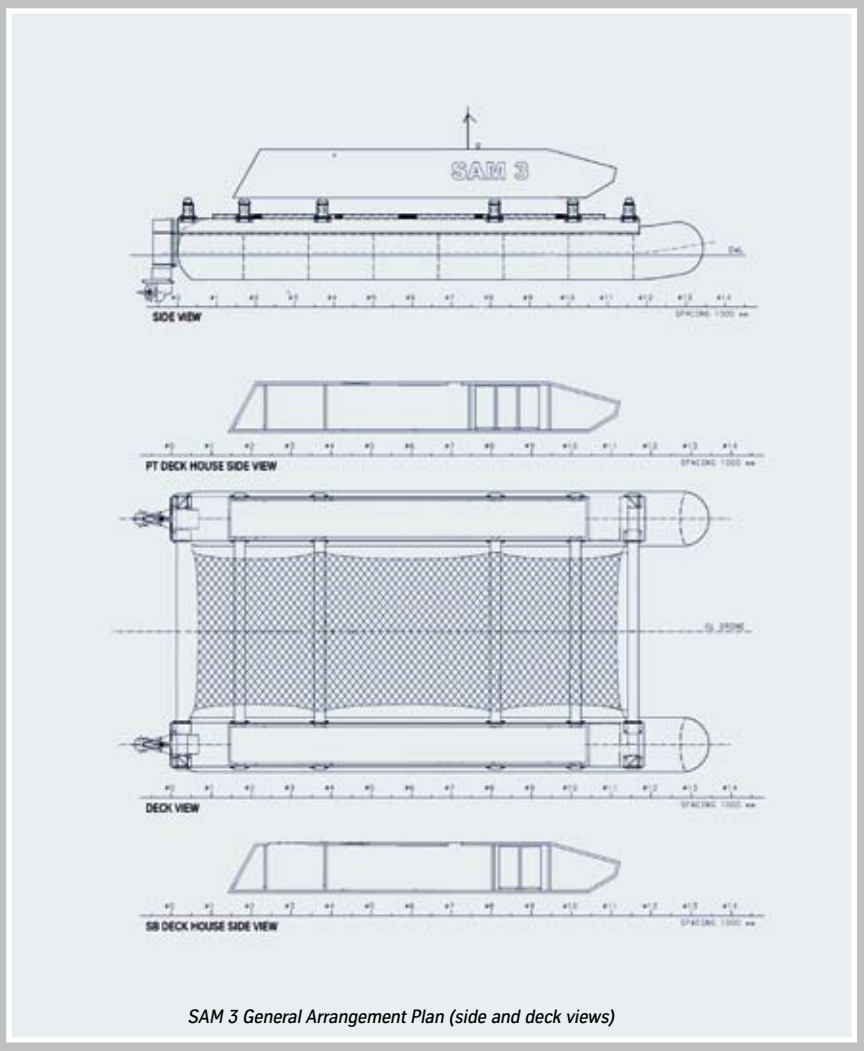
SAM 3 is easily readied for new deployment (above). Dismantled into modules, it is quickly containerized, loaded into a road trailer or prepared for air transport. On the adjacent pictures to the right, the deflated floats are ratcheted up into the saddles, beams dismounted and the superstructure lifted into a 40ft container. SAM 3 can be re-located to arising mine threats at shortest notice.

The common sea mine is a self-contained explosive device denying a vessel its passage through the sea. Mines are deposited and left to wait until triggered by approaching ships.

A mine's flexibility and cost-effectiveness makes it attractive to all forces. Its popularity amongst financially lesser privileged users is notable. Production and laying costs are small. Removing mines is a dangerous task requiring time. Remains of WW II naval minefields still exist with many mines remaining potentially active over extremely long periods.

Enter the SAM 3 Minesweeping USV.

Full scale 525 kg TNT mine explosion test on a SAM 3. Its heavy duty rubber tube hulls comprises of several air filled compartments that are capable of absorbing large amounts of energy which soften the kick-off velocity to on-board equipment and machinery housed in the superstructure. A wide hull base with plenty of buoyancy reduces the risks of capsizing.



SAM 3 General Arrangement Plan (side and deck views)

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