

EMPACT

A Comprehensive Service
for ElectroMagnetic imPACT – **Naval Expertness**

THE SERVICE INCLUDES

consultancy, design, prediction software and measurement support for robust design of complex systems in harsh electromagnetic environments

EMPACT is useful to naval designers at the early conceptual development stage up to acceptance tests of ships.

EMPACT HAS BEEN USED IN

EMC studies

on naval units of the Italian and foreign Navies providing assistance to the shipyards in defining the antennas topside arrangement and in the RADHAZ assessment

EMPACT provides electric and magnetic fields (in both far and near field regions of the antennas), Power Density, Received Power, AoA, AoD, Channel Frequency and Impulse Responses, Delay Spread etc.

Modern naval units are becoming increasingly sophisticated and complex, having to be able to operate in different missions and scenarios. Therefore, the complexity and the number of sensors and systems (communication, radar, EW, etc.) installed on board have also increased.

These systems, operating in a harsh electromagnetic (EM) environment, must perform their functions without interference and with minimal performance degradation.

EMPACT can be used for on-board EMC/EMI analysis allowing the Risk assessment regarding:

INSTALLED ANTENNA
RADIATION PATTERNS
ALSO FOR LARGE PLANAR
ANTENNAS OVER ISM
(INTEGRATED SENSOR MAST)

RADHAZ
HERP, HERF,
HERO, HERA. HERE

EMPACT

RCS



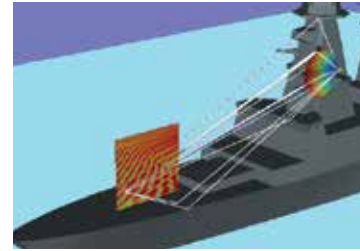
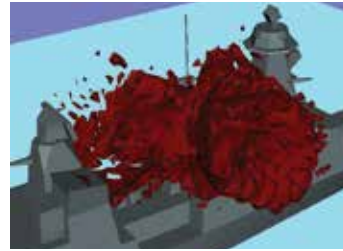
RADHAZ

The evaluation of the EM field levels plays a fundamental role:

- in the assessment of the exposure of **Personnel (HERP)**
- in the assessment of **flammable liquids and fuels (HERF)**
- in the assessment of **ordinances and ammunition (HERO)**
- for the verification of the **equipment susceptibility limits (HERE)**

IMPACT computes the EM fields in both near and far field regions of the sources (antennas).

■ Example of 3D HERP iso-surface due to an UHF antenna and HERO assessment due to a radar source.

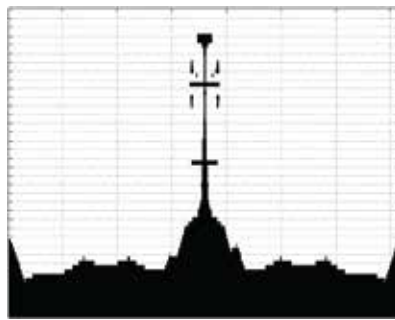
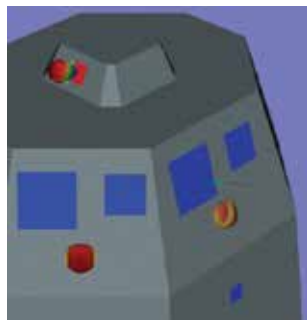
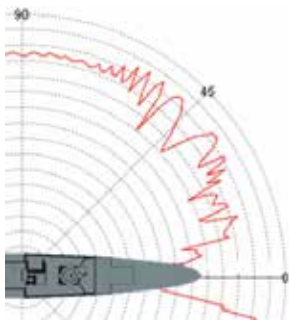


INSTALLED ANTENNA PERFORMANCES (ANTENNA ON PLATFORM)

Starting from the stand alone antenna characteristics **IMPACT evaluates the installed performance** (i.e. in the operative scenario) taking into account the presence of the ship topside structures (e.g. mast).

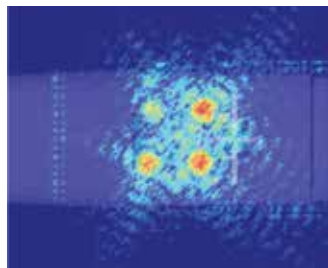
Radiation patterns, Gain, Shadowed Regions and so on can be rapidly computed in several antenna positions to determine the best trade-off between spatial constraints and performance.

■ Example of installed radar antenna radiation patterns and shadowed zones.



RADAR CROSS SECTION (RCS)

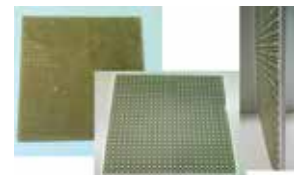
EMPACT has a module dedicated to the RCS evaluation that can be used during either the preliminary and either the final phases of the ship design. Starting from the naval CAD, EMPACT allows the calculation of the RCS **considering both the effect of the vessel geometry and the materials used.**



■ Evaluation example of ship RCS and hot spots

EMC/EMI/RCS RISKS MITIGATION

Once the EMC/EMI/RADHAZ analysis has been carried out Risk Mitigation actions involving **Radar Absorbing Materials (RAM), Decoupling Structures (Shields, FSS, etc.), Shaping and Operative Procedures** can be suggested.



■ Some absorber prototypes.