Using technology towards a better preparedness to HNS Spills

Aerial observation of HNS Spills with UAV

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CEO

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MSC Flaminia, Atlantic Ocean, 2012

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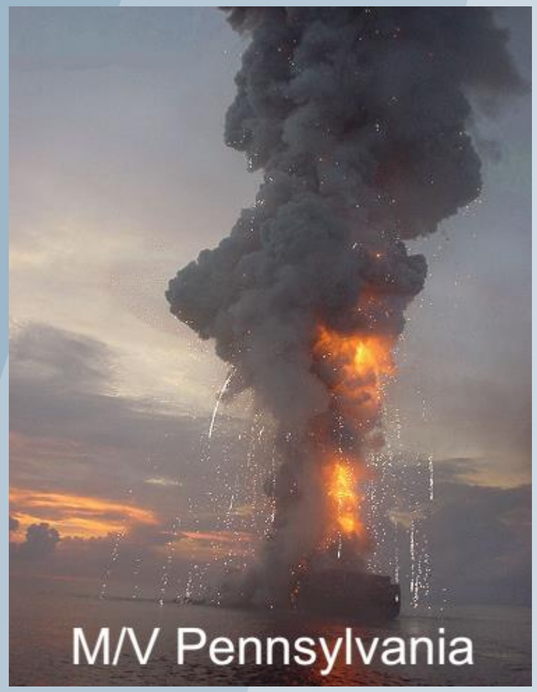
Maritime Transport



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Oil Spill

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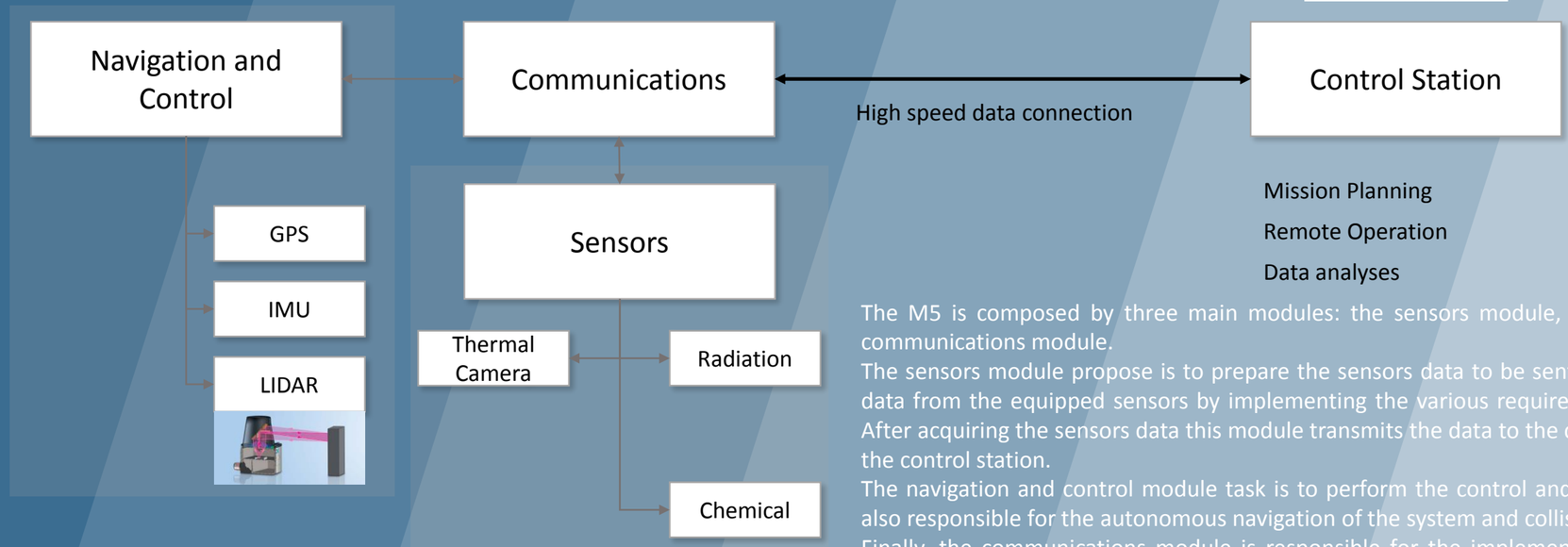

Mission Planning

Remote Operation

Data analyses

The M5 is composed by three main modules: the sensors module, the navigation and control module and the communications module.

The sensors module propose is to prepare the sensors data to be sent to the control station. This module receives data from the equipped sensors by implementing the various required interfaces and signal conditioning systems. After acquiring the sensors data this module transmits the data to the communications module for retransmission to the control station.

The navigation and control module task is to perform the control and stabilization of the platform. This module is also responsible for the autonomous navigation of the system and collision avoidance using LIDAR data.

Finally, the communications module is responsible for the implementation of a high bandwidth and low latency communication system to transmit both control information as well as the sensors data between the M6 platform and the control station.

The control station is comprised of a rugged computer system running a set of specialized software systems. These systems provide the control station with the ability to remote control the M6 operation but also allow for advanced mission planning for autonomous operations. The base station is also fitted with specialized data analyses software for interpretation of the sensors data.

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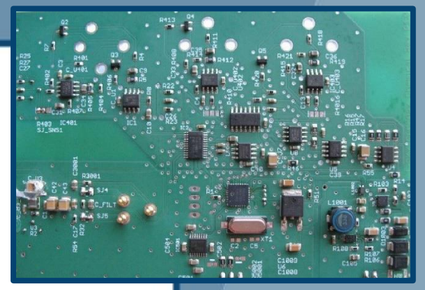
MODEL 02 - SWB 9200 HNS



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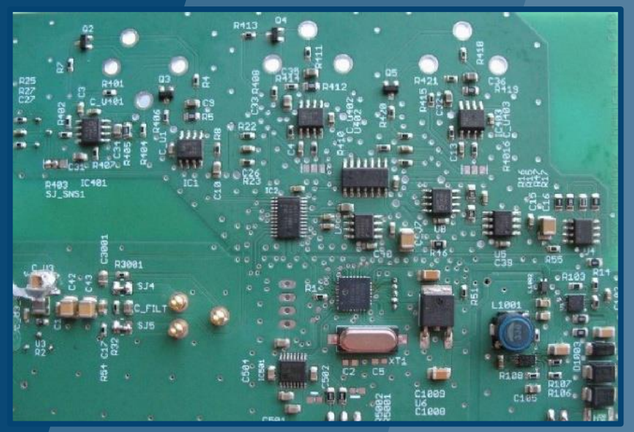

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  - Pollution Prevention
    - Oil Pollution
    - Chemical Pollution
    - Sewage
    - Garbage
    - Air Pollution and GHG Emissions
  - Pollution Preparedness and Response
  - Ballast Water Management
  - Biofouling
  - Anti-fouling Systems
  - Ship Recycling
  - Port Reception Facilities
  - Special Areas Under MARPOL
  - Particularly Sensitive Sea Areas
  - London Convention and Protocol
  - GESAMP
  - Support to Member States
- Legal Affairs
- Human Element
- Facilitation
- Member State Audit Scheme & Implementation Support
- Technical Cooperation
- Conferences
- Reduction of administrative burdens
- Circulars

Sulphur oxides (SOx) – Regulation 14

SO_x and particulate matter emission controls apply to all fuel oil, as defined in regulation 2.9, combustion equipment and devices onboard and therefore include both main and all auxiliary engines together with items such boilers and inert gas generators. These controls divide between those applicable inside Emission Control Areas (ECA) established to limit the emission of SO_x and particulate matter and those applicable outside such areas and are primarily achieved by limiting the maximum sulphur content of the fuel oils as loaded, bunkered, and subsequently used onboard. These fuel oil sulphur limits (expressed in terms of % m/m – that is by mass) are subject to a series of step changes over the years, regulations 14.1 and 14.4:

Outside an ECA established to limit SOx and particulate matter emissions	Inside an ECA established to limit SOx and particulate matter emissions
4.50% m/m prior to 1 January 2012	1.50% m/m prior to 1 July 2010
3.50% m/m on and after 1 January 2012	1.00% m/m on and after 1 July 2010
0.50% m/m on and after 1 January 2020*	0.10% m/m on and after 1 January 2015

* depending on the outcome of a review, to be concluded by 2018, as to the availability of the required fuel oil, this date could be deferred to 1 January 2025.

The ECAs established are:

1. Baltic Sea area – as defined in Annex I of MARPOL (SO_x only);
2. North Sea area – as defined in Annex V of MARPOL (SO_x only);
3. North American area (entered into effect 1 August 2012) – as defined in Appendix VII of Annex VI of MARPOL (SO_x, NO_x and PM); and
4. United States Caribbean Sea area (entered into effect 1 January 2014) – as defined in Appendix VII of Annex VI of MARPOL (SO_x, NO_x and PM).

Most ships which operate both outside and inside these ECA will therefore operate on different fuel oils in order to comply with the respective limits. In such cases, prior to entry into the ECA, it is required to have fully changed-over to using the ECA compliant fuel oil, regulation 14.6, and to have onboard implemented written procedures as to how this is to be undertaken. Similarly change-over from using the ECA compliant fuel oil is not to commence until after exiting the ECA. At each change-over it is required that the quantities of the ECA compliant fuel oils onboard are recorded, together with the date, time and position of the ship when either completing the change-over prior to entry or commencing change-over after exit from such areas. These records are to be made in a logbook as prescribed by the ship's flag State, in the absence of any specific requirement in this regard the record could be made, for example, in the ship's Annex I Oil Record Book.

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- Maritime Safety
- Maritime Security and Piracy
- Marine Environment
  - Pollution Prevention
    - Oil Pollution
    - Chemical Pollution
    - Sewage
    - Garbage
    - Air Pollution and GHG Emissions
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IMO / English / Our Work / Marine Environment / Pollution Prevention / Air Pollution and GHG Emissions / Nitrogen oxides (NOx) – Regulation 13

Nitrogen Oxides (NOx) – Regulation 13

The control of diesel engine NO_x emissions is achieved through the survey and certification requirements leading to the issue of an Engine International Air Pollution Prevention (EIAPP) Certificate and the subsequent demonstration of in service compliance in accordance with the requirements of the mandatory, regulations 13.8 and 5.3.2 respectively, NOx Technical Code 2008 (resolution MEPC.177(58) as amended by resolution MEPC.251.(66)).

Related Links

GISIS
(Registration required for public users)

The NO_x control requirements of Annex VI apply to installed marine diesel engine of over 130 kW output power other than those used solely for emergency purposes irrespective of the tonnage of the ship onto which such engines are installed. Definitions of 'installed' and 'marine diesel engine' are given in regulations 2.12 and 2.14 respectively. Different levels (Tiers) of control apply based on the ship construction date, a term defined in regulations 2.19 and hence 2.2, and within any particular Tier the actual limit value is determined from the engine's rated speed:

Tier	Ship construction date on or after	Total weighted cycle emission limit (g/kWh) n = engine's rated speed (rpm)		
		n < 130	n = 130 - 1999	n ≥ 2000
I	1 January 2000	17.0	$45 \cdot n^{(-0.2)}$ e.g., 720 rpm – 12.1	9.8
II	1 January 2011	14.4	$44 \cdot n^{(-0.23)}$ e.g., 720 rpm – 9.7	7.7
III	1 January 2016*	3.4	$9 \cdot n^{(-0.2)}$ e.g., 720 rpm – 2.4	2.0

The Tier III controls apply only to the specified ships while operating in Emission Control Areas (ECA) established to limit NOx emissions, outside such areas the Tier II controls apply. In accordance with regulation 13.5.2, certain small ships would not be required to install Tier III engines. A marine diesel engine that is installed on a ship constructed on or after 1 January 2016 and operating in the North American ECA and the United States Caribbean Sea ECA shall comply with the Tier III NOx standards.

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RULES	DNV HIGH SPEED, LIGHT CRAFT AND NAVAL SURFACE CRAFT	**SPECIAL EQUIPMENT AND SYSTEMS: NUCLEAR BIOLOGICAL AND CHEMICAL PROTECTION**		
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IPE - INDIVIDUAL PROTECTIVE EQUIPMENT SUCH AS:	**NBC PROTECTIVE SUIT.**	**GLOVES, PROTECTIVE, NBC (INNER AND OUTER).**	**OVER-BOOTS, NBC, (WORN OVER SEAGOING WORKING BOOTS).**	**NBC RESPIRATOR WITH CARRIER FOR USE OUTSIDE THE CITADEL**
CHEMICAL DETECTORS	**IN CITADEL WITH COMMUNICATION MODULE IN REAL TIME**			

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The use of ATEX certified UAS can play an important role in the near future considering its use in several types of risky interventions, namely on HNS Spills response.

It may open a wide range of possibilities of applications, offering a cutting edge framework of opportunities in applied robotics

Thank you