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Maritime Accident Investigation Office

REPÚBLICA PORTUGUESA | AGRICULTURA E MAR

MARITIME SAFETY INVESTIGATION REPORT

Mv WORLD VOYAGER
IMO 9871529

VERY SERIOUS MARITIME CASUALTY
31/05/2025
Occupational accident inside engine room
With loss of one life

RELATÓRIO DE INVESTIGAÇÃO DE SEGURANÇA MARÍTIMA
Maritime safety investigation report
MV WORLD VOYAGER
GAMA's registry 2025-185
Draft report circulated – 01/08/2025
Final report homologated – 01/09/2025

Relatório elaborado pelo Gabinete de Investigação de Acidentes Marítimos e da Autoridade para a Meteorologia Aeronáutica (GAMA), serviço da Administração Central do Estado que tem por missão investigar os acidentes e incidentes marítimos, com a maior eficácia e rapidez possível, visando identificar as respetivas causas, fatores contributivos, elaborar e divulgar os correspondentes relatórios e emitir recomendações em matéria de segurança marítima que visem reduzir a sinistralidade marítima.

O presente relatório foi elaborado respeitando as normas da Organização Marítima Internacional (OMI) e seguindo a Metodologia Comum estabelecida pela União Europeia.

Conforme disposto na Lei *n.º* 18/2012 de 07 de maio, que transpôs a Diretiva 2009/18/CE do Parlamento Europeu e do Conselho, as investigações do GAMA são independentes de organismos de regulação, operadores ou outros.

Não é o objetivo de uma investigação determinar culpa ou responsabilidade.

Este relatório não deverá ser usado para ações judiciais e nem ser usado em tribunal como evidência.

As recomendações de segurança que resultam deste relatório não podem, em caso algum, criar uma presunção de responsabilidade ou de culpa. Todas as horas são locais (UTC +1) e todas as posições têm como datum geodésico de referência WGS84.

Informação e relatório disponível em:
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Report by the Maritime Accident Investigation and Aeronautical Meteorology Authority Office (GAMA) service of the State Central Administration whose mission is to investigate marine casualties and incidents with the highest efficiency and possible speed, to identify their respective causes, contributing factors, prepare and issue the corresponding reports and make recommendations on maritime safety that reduce maritime accidents.

This report has been prepared in compliance with the standards of the International Maritime Organization (IMO) and following the common methodology established by the European Union.

As provisions of Law No. 18/2012 of 07 May, which transposed Directive 2009/18 / EC of the European Parliament and of the Council, the GAMA investigations are independent of regulatory bodies, operators or others.

It is not the purpose of an investigation to determine guilt or liability.

This report should not be used for legal proceedings and not be used in court as evidence.

The safety recommendations resulting from this report may in no case create a presumption of liability or guilt.

All times are local (UTC+1) and all positions have the geodetic datum WGS84 reference.

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CONTENT

1. SUMMARY

On the 31st of May 2025, at 11:20 hours, whilst the Portuguese flagged passenger vessel WORLD VOYAGER (WVO) was made fast alongside at pier 2 Cheviré Amont, Nantes, France, maintenance works were being performed in the engine room – inspection and cleaning of the injector of the starboard main engine, as in figure 1 on the left – view of starboard side of engine in maintenance - cylinder n.º3. During the inspection and cleaning of the injector, the indicator cock was covered by the engine cadet using a metal bucket to avoid oil spillage around the engine room. When the engine was blown, the pressure released launched the metal bucket onto the cadet's head at a high speed. The cadet fell from the top of the engine where he was seated and was immediately assisted by the engine room team. Code Mike sounded on the public announcement system (PA) and medical assistance was called, onboard medic and medical shore team. The shore medical team pronounced the cadet deceased on arrival on board. Figure 2 below, shows the position of motor vessel WORLD VOYAGER (WV) made fast and starboard side alongside at Nantes and on the top left the interior of the engine room – view from the starboard side engine where the maintenance was performed (figure 1).

2. INTRODUCTION

On 01st June at 09:10 hours the Portuguese Marine Safety Investigation authority (MSIA), GAMA, was informed by Mv WORLD VOYAGER (WVO) ISM Company – Mystic Cruises, S.A.- about the occurrence with an engine cadet, a Portuguese national, inside the engine room while replacing an injector, in the French port of Nantes.

The very serious marine casualty occurred in French inland waters and after assessing the initial data provided by the Portuguese flagged vessel and coordinating activities with the French Marine Casualties Investigation Board (BEA mer). Considering the seriousness of the marine casualty, taking also into consideration the context, local impact on daily activities and consequences, GAMA launched a marine safety investigation and informed all parties.

BEA mer gathered information and material elements from various French shore authorities and Portugal dispatch a marine safety investigation team to collect data and interview the crew in Antwerp.

The marine safety investigation on the occupational accident inside the engine room of mv WORLD VOYAGER led by GAMA with the cooperation of BEA mer, acting as Substantial Interest States (SIS).

Evidence was collected and the purpose of the marine safety investigation was to:

- Establish the course of the events.
- Determine the causal factors[1].

The marine safety investigation report presents the evidence collected and considered, by GAMA, relevant for understanding the serious marine casualty[2]. The marine safety investigation is based on various types of data from various sources, comprising witness interviews and statements, photos, documentation, VDR recordings, AIS data, internal technical reports, alarm logs and shipboard/port facility CCTV and procedures.

3. NARRATIVE

The narrative of the course of events is based on the testimony of crew members from WVO and digital data collected.

The reconstruction of course of events covers the period from the start of the injector's replacement until the moment the shore medical team assisted the engine cadet.

[1] Causal factor (contributing factor) means actions, omissions, events, or conditions, without which:
1. the marine casualty or marine incident would not have occurred; or
2. adverse consequences associated with the marine casualty or marine incident would probably not have occurred or have been as serious.
3. another action, omission, event or condition, associated with an outcome in .1 or .2, would probably not have occurred.

[2] Serious casualties are casualties to ships which do not qualify as very serious casualties and which involve a fire, explosion, collision, grounding, contact, heavy weather damage, ice damage, hull cracking, or suspected hull defect, etc., resulting in: - immobilization of main engines, extensive accommodation damage, severe structural damage, such as penetration of the hull under water, etc., rendering the ship unfit to proceed, or pollution (regardless of quantity); and/or a breakdown necessitating towage or shore assistance.

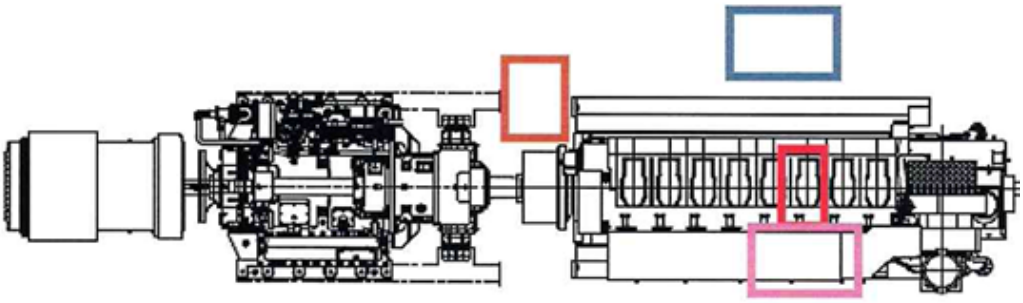
3.1. Background

The engine cadet had been on board the passenger vessel WVO for four months when the casualty occurred, and as such, the WVO's activity during that period will be referred to. As in figure below, between 1st of February and the 31st of May 2025, the WVO performed several voyages between Ushuaia in Argentina and Antarctica, and then, after crossing the Atlantic, performed voyages between Portugal, Spain and Portugal. The engine cadet did not have a specific watch or task. The tasks were distributed by the chief engineer according to daily needs.

3.2. Course of events

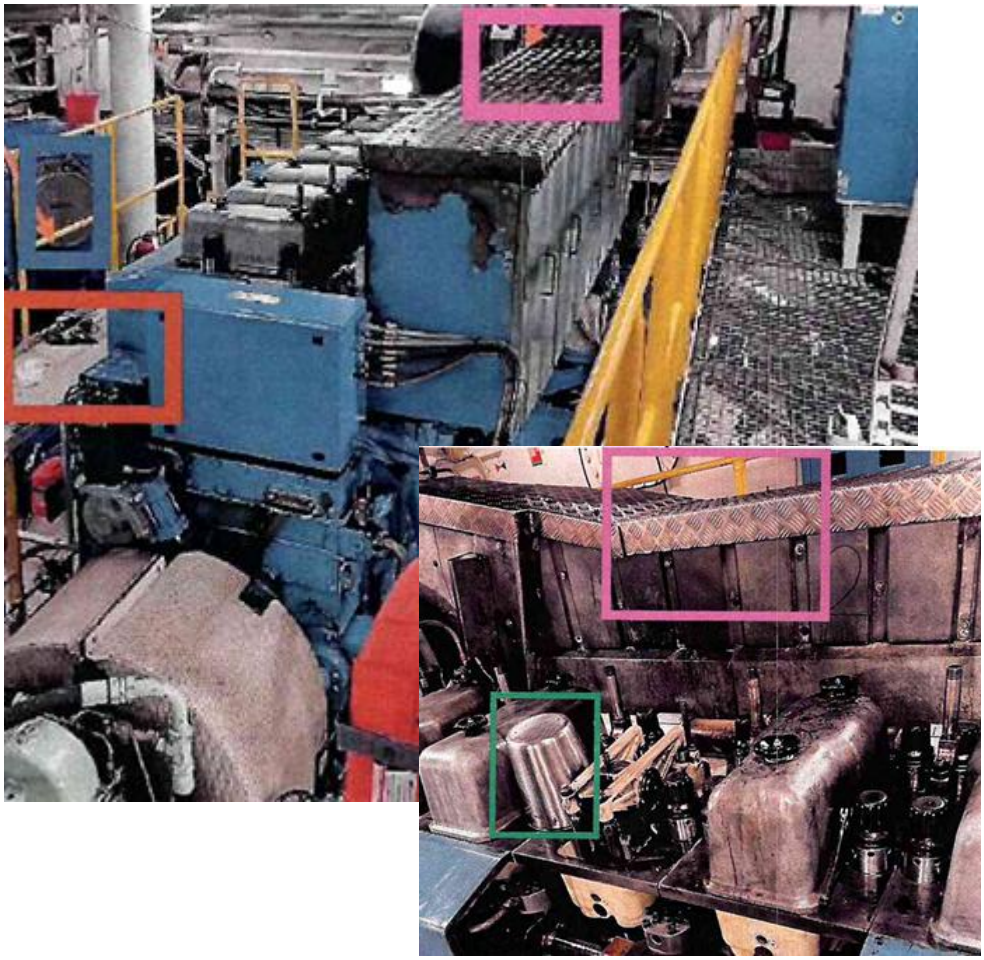
The planned maintenance involved removal of injector n. º 3 for inspection and cleaning. Following removal, the engine was barred over, using compressed air to clear oil residues. A metal bucket was used to cover the open cylinder to prevent oil spray.

The cadet, acting on informal instruction, held the bucket manually over the injector opening. When compressed air was applied, the bucket was expelled upward at high speed and struck the cadet. He collapsed and was pronounced dead after failed resuscitation. The figure below indicates the location of the casualty.



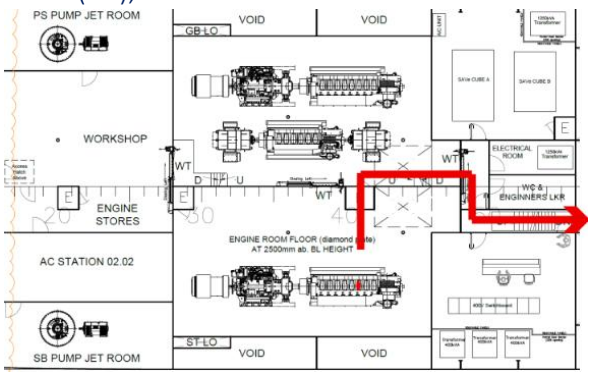
***Picture 2** – Location of the accident.*
Injector number 3 - Marked in red.
Engine cadet position – marked in purple. Sitting on top of the engine exhaust.
Motorman position – marked in blue. On the lower platform.
First engineer position – marked in brown.

The engine cadet was sitting on top of the engine exhaust, holding the metal bucket with both hands, between his legs. In the engine room there was also the chief engineer, working in his office, the 1st engineer, who at 1120 hours started the engine, the 2nd engineer who called the bridge from engine control room (ECR) at 1121, requesting medical assistance and the motorman, in the position indicated in the above and below figures.



3.3. Shore authority involvement, emergency response and cause of death

Immediately after the occurrence with the engine cadet vessel's Code Mike sounded on the PA. Ship's doctor went to the engine room and shore medical assistance was called. The engine cadet was transferred – as indicated in figure below - from the engine room to mudroom, on deck 3, on the entrance to engine room (ER), for medical resuscitation.



The record of events, was as indicated below:

- 31 may, 2025, at 1121 hours
  Call received from ECR. The 2nd engineer called the bridge to request medical assistance.
- 1122 hours
  Medical emergency. Code Mike sounded on the PA to all ship by safety officer.
- 1124 hours
  Medical team on site and medical procedures initiated.
- 1133 hours
  Call made to 112, requesting shore medical assistance. Nantes port agent also informed.
- 1154 hours
  Fist ambulance on site and four local medical staff on board.
- 1210 hours
  Four local medical cars on the pier. Medical operations undertaken by ship medical team and shore medical team.
- 1225 hours
  Cardiopulmonary resuscitation (CPR) manoeuvre stopped. Engine cadet pronounced dead.
- 1243 hours
  Authorities on board.

The autopsy report was performed by French authorities, *Medecine legale*, at

Institut medico-légal du Chu de Nantes, and the final report was issued on 16 June, 2025. The cause of death was a severe craniocervical trauma.

4. INVESTIGATION

In the investigation of data collected, the company/vessel safety management system (SMS) and procedures were not assessed with the goal to find deviations from procedures. Deviation from procedures is not the cause of an accident. Procedures consider work as a linear sequential process, in changing circumstances, it becomes necessary for the crewmembers to adapt the content of the procedure with the situational context. This negotiation brings crewmembers to a non-compliance situation. Whether or not non-compliance is an acceptable part of the everyday works depends on the outcome.
GAMA's marine safety investigations seeks to understand why it was considered necessary to deviate from procedures, meaning the crewmembers had the ability to bridge the gap between work as prescribed and work as done (in a dynamic context).

Scope of the investigation
The narrative, course of events and analysis of data collected, showed that the search for immediate causes is less important than understanding how the system performed. GAMA's marine safety investigation focused on determining how the engine cadet was exposed to a recognized hazard which arose in a planned operation by using resilience engineering, namely the four resilience abilities, responding, monitoring, learning and anticipation.

4.1. Portuguese higher educational institution for maritime careers, Escola Superior Náutica Infante D. Henrique (ESNIDH)

Upon completing their university training in marine engineering, cadets receive a record book that accompanies them throughout the training period. This record book must be completed with ship characteristics and tasks performed during the training. At the end of the training period the on-board training record book (as in figure below) must be signed by the ship's Master and delivered to the Portuguese maritime administration.

The Portuguese Maritime Administration, after assessing the information contained in the book, issues an opinion, which, if favorable, allows career progression and the issuance of the respective certificates with the category of

second engineer. The engine cadet finished his nautical studies and was registered as a seaman – engine cadet officer on 20-09-2024.

4.2. Work practice in engine compartment

4.2.1 The ISM (International Safety management) Code

The ISM Code applies to the engine room of ship's, requiring a documented system for safe operation and maintenance of machinery and includes procedures for identifying and controlling equipment, as well as the implementation of safety instructions.

The ISM Code mandates that companies establish and maintain a Safety management System (SMS) that covers all aspects of operation in the engine room, such as, but not limited to, operating main engine and auxiliar engines and emergency procedures.

The SMS should also outline maintenance procedures and define duties and responsibilities, such as:

- written procedure existed for turning the engine with open injectors.
- Equipment's and guards to be used - a metal bucket was used as an improvised splash guard.
- Protective equipment - the cadet held the bucket in place manually without protective equipment.
- Define safe areas and areas to be avoid - there was no exclusion zone established around the engine.
- Risk assessment - a toolbox talks, or risk assessment was not documented prior to the operation.
- To whom should be assigned each specific task and why -the cadet had four months onboard and was not certified to supervise or participate in high-risk operations involving stored energy.
- The ISM Code (International Safety Management Code) and the SMS (Safety Management System) onboard ships do not directly refer to personal biases like overconfidence. However, these concepts are implicitly addressed through the code's principles and objectives -the cadet had previously supported a dry dock, contributing to an overestimation of his competence.

4.2.2 The ETTO principle[3]

The investigation revealed a distinct tendency towards efficiency over thoroughness in this engine maintenance operation, namely by placing a metal

[3] "People and organisations must constantly make trade-offs between being efficient and being thorough, because it is rarely possible to be both at the same time. Efficiency is about achieving goals with the least effort or cost. Thoroughness is about ensuring risks are considered, procedures are followed, and safety is maintained. When time or resources are limited, there is a tendency to favour efficiency, even at the cost of thoroughness."
— Hollnagel, E. (2009), "The ETTO Principle: Efficiency–Thoroughness Trade-Off," Ashgate Publishing

bucket to avoid oil spill – this issue is directly related to Porst State Control inspections. The metal bucket is an informal method — placing and holding a bucket over an open injector port —that had become normalised as a practical solution to avoid oil spray during engine barring with compressed air.
This method appeared efficient and during the safety investigation the data collected lacked any form of formal risk evaluation, procedural control, or technical verification, specially related to the position of the engine cadet.
The trade-off prioritised completing the task quickly over ensuring control of energy release, containment of objects, and protection of personnel.

4.2.3 Relation to the four resilience abilities mentioned:

- Responding

The response was reactive, occurred only after the casualty.
A resilient system would include a prepared response such as preparing the operation and containment in case of protocol failure.

- Monitoring

The engine cadet position was noticed by the 1st engineer, responsible for the operation. The information collect verbally for the present indicates there were evidence that the engine cadet position was verbally identified as a potential danger.

- Learning

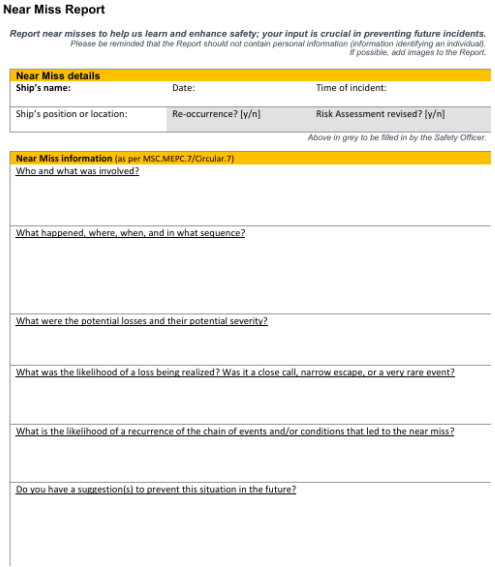
Previously successful outcomes, probably during the dry-dock in engine maintenance operations created a false sense of safety and overconfidence, namely in competency and expertise not related to the engine cadet time on board.

- Anticipation

No safeguards were applied on the engine.

4.2.4 Company Near-Miss Reporting

On board the passenger vessel WEO Near-Miss Reporting is encouraged and implemented by SMS B6, Analysis of Accidents and hazardous Situations, guided



Near Miss Report

Report near misses to help us learn and enhance safety; your input is crucial in preventing future incidents.
Please be reminded that the Report should not contain personal information (information identifying an individual).
If possible, add images to the Report.

Near Miss details		
Ship's name:	Date:	Time of incident:
Ship's position or location:	Re-occurrence? [y/n]	Risk Assessment revised? [y/n]

Above in grey to be filled in by the Safety Officer.

Near Miss information (as per MSC.MEPC.7/Circular.7)

Who and what was involved?

What happened, where, when, and in what sequence?

What were the potential losses and their potential severity?

What was the likelihood of a loss being realized? Was it a close call, narrow escape, or a very rare event?

What is the likelihood of a recurrence of the chain of events and/or conditions that led to the near miss?

Do you have a suggestion(s) to prevent this situation in the future?

by MSC-MEPC.7/circ.7[4]. The program is implemented by the ship's safety officer and includes, among other, the cadets and new joiners. The aim is to ensure that all crew members remain and are engaged with the program.

4.3. Engine room manning

The engine department on WVO is manned as in the figure below.

Chief Engineer	All crewmembers in the Engine Department are under the command of the Chief Engineer. The Chief Engineer is the Head of the Engine Room Division.
Environmental officer	The Environmental Officer reports to the Master and the Chief Engineer.
First Engineer	The 1st Engineer reports to the Chief Engineer. All crewmembers in the Engine Department are under the supervision of the 1st Engineer.
Second Engineer	The 2nd Engineer reports to the 1st Engineer/Chief Engineer.
Chief Electrician	The Chief Electrician reports to Chief Engineer.
Electrician	The Electrician reports to the Chief Electrician.
Electro-Technical Officer	The ETO reports to the Chief Engineer.
Repairman	The Repairman reports to First Engineer.
HVAC Engineer	The HVAC reports to the First Engineer and the Chief Engineer.
Motorman	The Motorman reports to 1st Engineer for daily routines and the EOOW, for watch keeping.
Plumber	The Plumber reports to the First Engineer.
Repairman / Fitter	The Repairman / Fitter reports to the First Engineer.
Oiler / Wiper	Organization The Oiler / Wiper reports to the First Engineer.
Waste manager	The Waste Manager reports to the First Engineer and collaborates with the Hotel Department.
Engine Cadet	The Engine Cadet reports to the First Engineer.

[4] Guidance on Near-Miss Reporting. Microsoft Word - 7.doc

The functions and responsibilities of the engine cadet are as per image below

The Engine Cadet functions and responsibility shall include, but not be limited to:

- Follows the instructions of the First Engineer.
- The primary role of an Engine Cadet is to gain shipboard knowledge, sea time and experience.
- Assists in the maintenance and repair of engine room equipment, as well as other mechanical equipment throughout the ship.
- Participates in safety training and emergency drills and familiarizes himself/herself with the location, lay-out and use of safety installations and equipment.
- To familiarize himself/herself with regulations and work procedures pertaining to tasks to be executed.
- To execute assigned tasks safely, to the best of his/her ability, and to report hazardous conditions without delay to the First Engineer.
- Hazardous work such as entry into enclosed spaces, hot work and work aloft shall not be undertaken.
- Read and understand the Material Data Safety Sheets, which describe how to use Chemicals and what to do in case of a chemical emergency, splashing in eyes, or ingestion.
- To always use the correct PPE equipment provided.

Although on training, the professional performance of the Engine Cadet will be evaluated for a possible continued long-term career with Company. Upon attainment of a National License and completion of at least one assignment aboard, the most qualified candidates with the best performance evaluations could be promoted to a Second Engineer position depending on the available vacancies in the Company's fleet.

5. ANALYSIS AND CONCLUSIONS

GAMA's principles in marine safety investigations:

As the competent authority for marine safety investigation, and in its capacity as an independent investigative body, GAMA is committed to the following foundational principles throughout its safety investigative work:

➢ Human error is not the cause of accidents.

But rather a signal of deeper, often hidden, interactions within a complex socio-technical system. These systemic dynamics reveal themselves through the actions and inactions of people operating under real-world conditions.

➢ Human error is a retrospective interpretation.

It becomes visible and seems decisive only after the fact — when viewed through the lens of hindsight. Maritime safety investigators instead seek to understand performance from the inside looking out — as it unfolded in real time, within the context and constraints present at the moment.

➢ Seafarers do not cause accidents; they create safety.

By constantly adapting to operational demands, ambiguities, and pressures, mariners close the gap between "work as imagined" (or prescribed in procedures) and "work as done" in practice, often under dynamic and uncertain conditions.

➢ The role of the maritime safety investigator is not to judge actions or assign blame.

But to uncover and explain why decisions — which may appear flawed only in hindsight — were reasonable and locally rational at the time they were made.

➢ Maritime safety investigations adopt a systemic and holistic perspective. Avoiding simplistic linear models and dualistic reasoning. The focus is on understanding how the system functions as a whole, not isolating individual actions in search of blame or liability.

5.1. Accident contributing factors

- Normalisation of deviation – the use of the bucket had likely worked many times before without consequence
- Assumptions about cadet competency based on time onboard rather than verified knowledge.

The casualty stemmed from both procedural gaps and a systemic tolerance for informal methods (metal bucket instead of proper containment).
The organisational culture did not adequately distinguish between familiarity and certified competence and expertise, concluding that within the vessel's safety culture, there was no clear distinction between being familiar with tasks and being formally competent to perform them. As a result, informal practices gradually became accepted as standard.

5.2. Understanding the accident

The operational context in the engine room whilst the injector was cleaned allowed a hazard to manifest and the system to fail due to a systemic normalization of deviation.

6. LESSONS LEARN AND ACTION TAKEN

- No object should be left unsecured near open injector holes during turning with air.
- Compressed air operations require strict controls and clear zone establishment.
- Cadets must be treated according to their formal training stage, not their apparent familiarity.
- Informal practices must be challenged and replaced with standardised methods.
- Every maintenance step must be risk-assessed, particularly involving stored energy (compressed air).

After assessing the casualty, the ISM company took the following actions:

- Issued a safety circular / bulletin to all fleet explaining the casualty and identifying "*Key reminders for injector and cylinder head maintenance*", clearly stating that "*Handheld tools or open containers must not be used for catching expelled fluids from injector bores*."

- Issued a Lessons Learned bulletin to all fleet with six bullet points and a conclusion.
- Issued a preventive / Corrective action plan to be implemented in all vessels in the fleet with the objective of "*Prevent recurrence of injury or fatality related to piston-driven pressure expulsion during engine maintenance*", were, among others, a "*Mandatory Toolbox talks (safety Briefings) before the task*" and "Task-Specific Training for Cadets on High-Risk Engine Room Activities" are included.
- Review and edit SMS – F5 Safe Workinf Practices, editing and adding, among others, the "*Safe Working Practices for Engine Room Maintenance*" and that "*Every crew member is empowered with stop-work authority, enabling them to halt operations immediately if they perceive imminent danger. This underscores the Company's fundamental principle that safety takes precedence over operational convenience."*

7. SAFETY RECOMMENDATIONS

After assessing the actions taken by the ISM Company and after, in a meeting with the ISM company, the questions to be reflected upon, that appear in the safety investigation report have been answered, GAMA does not issue any additional safety measure.

8. APPENDIX

Ship's particulars

Name	WORLD VOYAGER
IMO number	9871529
Flag	Portuguese
Port of register	Madeira - Funchal
Call sign	CQE4
MMSI	255806150
Length overall	126.00 mts
Max. Breadth	19.00 mts
Max. Draft	7.00 mts
Gross tonnage	9934
Classification society	Bureau Veritas
ISM Company	Mystic Cruises, SA
Year of build	2020 – Portugal
Hull material	Stell
Type of vessel	Passenger
Total Crew (voyage)	119
Total Pax	157

Engine manufacturer	Rolls Royce – Hybrid Propulsion System
Type of engine	2 diesel engines – Bergen C25-33L8P
Propelling power	5330Kw – 4 strokes
ISM Company	Mystic Cruises

Marine Casualty information and conditions at the time of the accident

Date and time	31-05-2025, 11:20 hours
Location	France, Nantes
Classification / severity	Very Serious Marine Casualty
Consequences	One fatal injury
Nationality	Portuguese

Voyage data

Port of departure	Lisbon - Portugal
Port of destination	Nantes - France

Shore authority involvement and emergency response

Ship medical team
Shore medical Team

Circulation of the Safety investigation draft report

In accordance with the Portuguese Law, Act n. º 18/2012, of 7th May, a draft version of the present safety investigation report was circulated among the interested parties providing an opportunity for the report's scope, factual accuracy, and analytical logic to be checked and for comments to be provided.

The correction of factual errors and additions in detail (where relevant) have been included in this final safety investigation report, where deemed necessary. These reactions are not listed separately.