

MARIN offers unique capabilities as partner

Horizon-CL5-2021-D6-01-12: Controlling infection on large passenger ships

In the spring of 2021, the European Commission (EC) released the Work Programme 2021-2022 for the funding programme Horizon Europe. Within the cluster “Climate, Energy and Mobility” – which is part of the Pillar II “Global Challenges and European Industrial Competitiveness” – the EC has opened the call HORIZON-CL5-2021-D6-01-12: Controlling infection on large passenger ships. With a total indicative budget of 8 million euro, the EC is willing to fund research programmes that address on the one hand the prevention, mitigation and management of infection control on-board of large passenger ships and on the other hand, promote a so-called “Healthy ship design”. MARIN, as one of the world’s leading maritime research institute, is interested in participating in this call and is actively looking to partner up and join collaborations in order to provide solutions to the societal problem addressed in this call.



The problem at hand

During the course of the ongoing pandemic, passenger ships and in particular cruise ships (with their high occupancy rates and elevated passenger and crew numbers of up to 8000 persons) have been implicated in the spread of SARS-CoV-2 – the virus responsible for the disease known as COVID 19.

This situation becomes even more worrisome when one considers that upon disembarkation in a particular region, both crew and passengers can potentially become vectors of infection within this region and naturally, within their own home countries. In addition, SARS-CoV-2 is not the only infectious pathogen that causes concern. Passenger ships have also been hosts for the rapid spread of Norovirus illness, influenza and legionella infections. This can be particularly problematic for smaller passenger ships that undertake longer expedition-type cruises away from population centres, as they rely predominantly on on-board medical services and facilities.

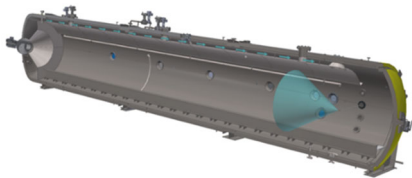
Europe is the world’s largest and almost exclusive producer of large and medium-sized passenger and cruise ships and home to a large number of important cruise destinations. Therefore, it must ensure a healthy on-board environment which is crucial for the viability and the sustainable growth of the industry. Although guidelines to control the spread of some on-board infections have been made public, these are not fully effective and lack an evidence base that underpins the effectiveness of certain mitigation solutions.

Information on the Horizon Europe Call

- Expected EU contribution per project: An estimated EU contribution of between 3 and 5 million euro. Nonetheless, this does not preclude submission and selection of a proposal requesting different amounts.
- Indicative budget: Total indicative budget is 8 million euro.
- Type of action: Research and Innovation Actions.
- Technology Readiness Level (TRL): 5



The Atmosphere (ATM) facility at MARIN.



A render of the autoclave of the ATM. Here, a spray nozzle can be placed in order to generate aerosols of a particular size distribution which can mimic the ones produced by humans while performing different activities like talking, singing, coughing, sneezing, etc.

Who are we?

MARIN (<https://www.marin.nl/>) is a world-leading research institute for the maritime industry, making ships and offshore structures cleaner, safer and smarter. We carry out advanced hydro-structural research through model testing, numerical modelling, and in-service measurements. MARIN works for the Dutch and international maritime sectors, such as shipyards, operators, oil and gas companies, consultancy firms, contractors and governments. We continuously extend the boundaries of our expertise and know-how so that we are able to offer our clients timely solutions in a fast-changing maritime market. We take a leading role in solving complex issues in cooperation with clients and partners around the world.

Interested in jointly answer this call?
Or having us on board?
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Thus, initiatives like the one presented in this call, are crucial in order to close the gap in our knowledge of mitigation strategies on-board of ships. This in turn, gives us the opportunity to provide both evidenced- and knowledge base solutions that can contribute to safer environments on-board.

MARIN as one of the world's leading maritime research institute is interested in participating in this call and is actively looking for partners who wish to contribute to the societal problem addressed in this call.

Who is this for?

The scope of work contains infection control on-board large passenger ships (prevention, mitigation and management) along with the so called "healthy ship design". As such, this research is relevant to shipyards, cruise ship operators, ferry operators and ship interior designers who wish to obtain a better understanding of how mitigation strategies like ventilation, waste water analysis, aerosol measurements can help to prevent the spread of airborne pathogens on board.

Our network of experts

During the course of 2020, MARIN has been at the centre of the formation of MIST, a large research consortium whose purpose is to provide society with up-to-date, effective and widely accepted mitigation strategies for infection control. The research core of this Dutch public-private cooperation is formed by four universities (Univ. of Twente, TU Eindhoven, Univ. of Amsterdam, TU Delft), two medical research centers (Univ. Med. Center Groningen, Radboud Univ. Med. Center, RIVM), three independent research centers (TNO, NLR, MARIN), the Federation of European Heating, Ventilation and Air Conditioning Associations (REVHA) and several businesses. In MIST, we develop fundamental knowledge on virus infectivity, spreading of airborne droplets and ventilation. In addition, we develop mitigation technologies, assessment methodologies and generalize the output of the programme by issuing proposals for standards that can be applied in both business and society. The technological strategies include local/global ventilation concepts, sanitization methods (UV-C, air-purification) and mechanical filters (facemasks, HEPA filters, liquid infused membranes for virus removal).

Due to our involvement in MIST, we as MARIN have developed a vast network of experts in in the fields of epidemiology, virology, fluid mechanics, ventilation and engineering. This network, will naturally become available to any future partner that wish to join us in this endeavour.

Experiments at the atmosphere facility

In addition, we can contribute to the project by providing access to our new facility the Atmosphere (ATM) (<https://www.marin.nl/atmosphere>). The autoclave of the ATM is cylindrical in shape and has a length of 15 m. and a diameter of 2.5 m. In this facility, we can control and monitor independently the temperature ($T \in [15, 200]^\circ\text{C}$), relative humidity ($RH \in [0, 100]\%$), ullage pressure ($p_u \in [0.005, 10] \text{ bar}$) and gas composition ($H_e, N_2, SF_6, \text{water vapor}$).

This is of particular interest as it has been shown that the lifetime and distance of expelled droplets that form aerosols – similarly as with respiratory events – strongly depends on both the temperature and humidity of the ambient. Thus, it is of extreme interest to conduct full-scale experiments of aerosol dispersion in this facility and study their dependence with these environmental factors.