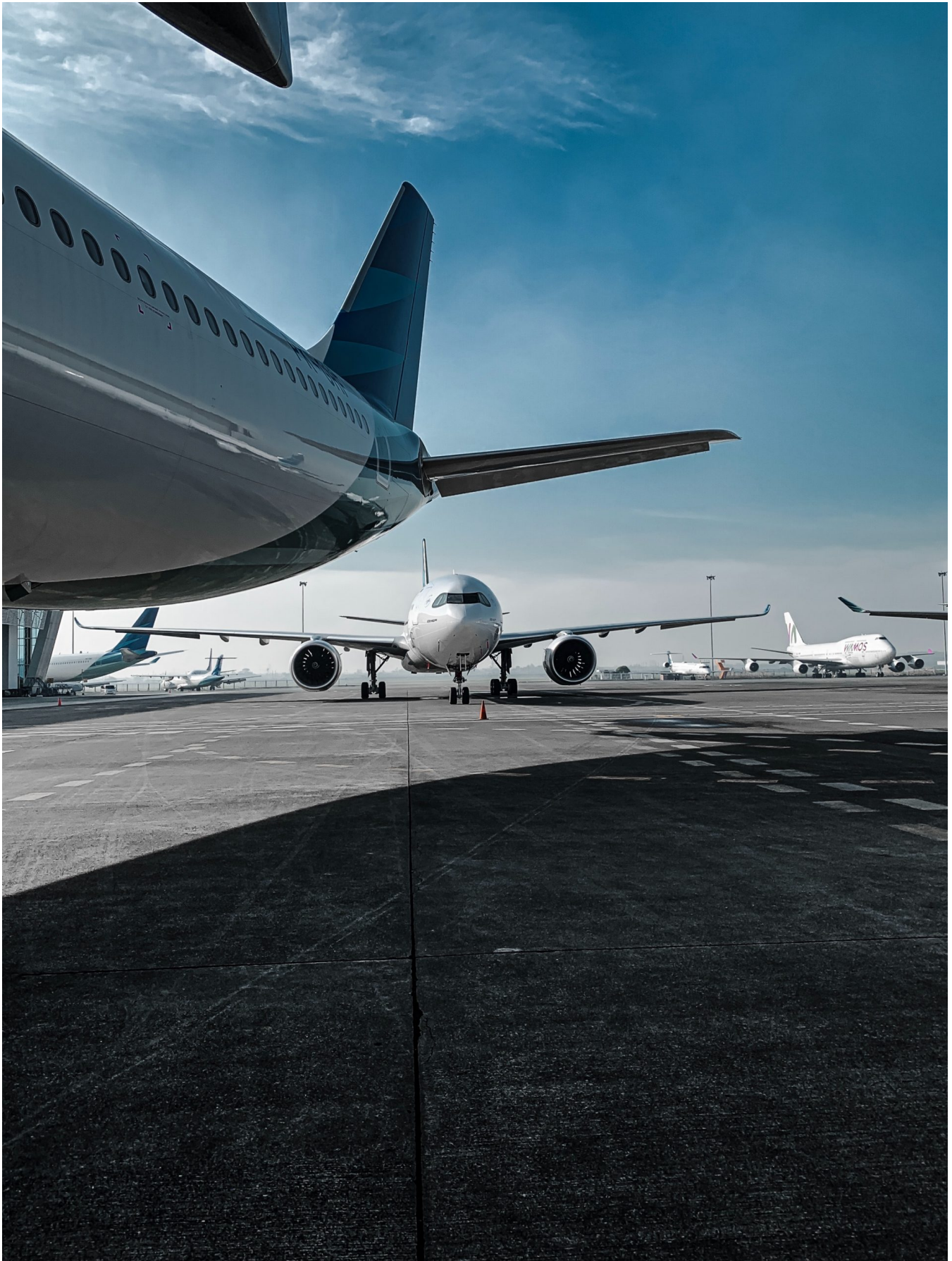
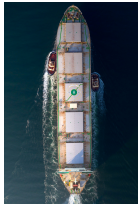


# Aero-Marine DMFC Designer®

Tool to help with the design of direct-methanol fuel cell (DMFC) stacks for naval and aeronautical applications.





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## Technological Offers type

[Technological solutions](#)

## Research and innovation areas

- [Climate, Energy and Mobility](#)

## ODS



**Available from:** 2018

## Where?

[Fuel Cells, Hydrogen Technology and Alternative Engines](#)

## Files

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Keywords: | [Airplane](#) | [Boat](#) | [DMFC](#) | [fuel cell](#) | [methanol](#) | [stack design](#)

## Brief description of the solution and the added value it delivers

Aero-Marine DMFC<sup>®</sup> Designer is a tool to help with the design of direct-methanol fuel cell (DMFC) stacks for naval and aeronautical applications. The mass and volume of on-board components in naval vehicles and aircraft are crucial factors. Lower masses can allow the vehicle to carry higher payload masses or fuel quantities. The volume of such components can also limit the payload's dimensions, as well as influencing the size of the vehicle itself, which could give rise to greater drag. The purpose of this tool, therefore, is to quickly provide the functional stack of DMFCs with a lower mass, a smaller volume or a lesser linear ratio between the two, based on certain stack design criteria set by the user (mainly power and intensity). Moreover, this tool makes it possible to study four types of stack design, depending on whether the flow has a U or Z configuration and whether the cathode of the fuel cell is active or passive.

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## Description of the technological basis

Aero-Marine DMFC<sup>®</sup> Designer is based on a genetic algorithm that looks for the optimum stack according to the characteristics

established in advance by the user. The tool has been programmed in Matlab and is offered in the form an independent executable (EXE) file compatible with the Windows 10 operating system.

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### Business needs / application

- Need to optimise the design of DMFCs, with a particular focus on naval and aeronautical applications.
- DMFC manufacturers and developers require high-value solutions for making these fuel cells.
- The problem of obtaining the optimum stack, which has to be solved in the early stages of the design process in order to save time and effort in later stages. With this tool, users can generate DMFC stack designs tailored to their needs in just a few minutes' time.
- The design process does not start from scratch and users get a good idea of the end result from the beginning, which saves time and effort.

Aero-Marine DMFC Designer<sup>®</sup> is an extremely valuable tool for DMFC manufacturers and developers.

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### Competitive advantages

- The tool's ability to pre-design DMFC stacks quickly and with minimal effort. For example, the tool takes four minutes to find the optimum design when configured with an initial population of 1,600 individuals.
  - This tool drastically reduces development risk and time for application-driven DMFC stacks.
  - The tool is easy to use, with an intuitive user interface.
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### Past performance references

These references are subject to strict confidentiality agreements. Within the work of PiCoHiMA, this tool has been used in various publications and doctoral theses. The data provided by this tool have served as the basis for studies and the design of power plants based on DMFCs applied to robot submarines.

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### Protection

- **Software register (Registration no. 16/2018/5707)**
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### Stage of development

