MONASH
ENGINEERING

MONASH University

# Faculty of Engineering
# Summer Research Program 2023-2024

Project Title: 3D micro topographies for anti-microbial solutions

Supervisor(s): Victor J. Cadarso

Department: Mechanical and Aerospace Engineering

Email: victor.cadarso@monash.edu

Website profile of project supervisor:
https://www.monash.edu/engineering/victorcadarsobusto

---

## Objective

The main objective of this project is to analyse how micro topographies can be used to simultaneously deter the formation of marine biofilms on surfaces exposed to the environment over long period of times and to reduce the drag of such surface moving in the fluid.

## Project Details

The emergence of antimicrobial resistance (AMR) has been declared a global crisis that is projected to kill 10 million people per year by 2050 and will cost the world up to 100 trillion USD. AMR leads to the evolution of untreatable superbugs, which transforms common health issues such as gastrointestinal, skin or respiratory diseases that normally could be easily treated into life-threatening infections. While AMR has primarily evolved in response to antimicrobial drugs, it is also promoted by the overuse of antiseptics and disinfectants. This is exacerbated by the microbe's production of biofilms, which protect surface-attached microbes from otherwise effective drug treatments or cleaning strategies, leaving people vulnerable to infection. The sustained use of disinfectants for surface microbe management is therefore not desirable, and we urgently need new, sustainable solutions to suppress cross-contamination and infection that do not contribute to the evolution of AMR.

Micro and nanotechnologies can offer a solution to this issue as they can deter bacterial attachment and prevent biofilm formation without the need for disinfectants, especially when complex 3D micro/nano-topographies are used. In this project we will study the long term effect of such surfaces on marine environment and the effect that such topographies can have on drag reduction when applied on the surfaces of objects moving through fluids.

## Prerequisites

No particular pre-requisite unites are required. An interest in mechanical, biomedical or materials engineering is recommended.

## Additional Information

Applicants may be required to attend an interview.