

An Indian-Australian research partnership

<b>Project Title:</b>	<input type="text" value="Design and Fabrication of Patterned surfaces"/>	
<b>Project Number</b>	<input type="text" value="IMURA0342"/>	
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## Research Academy Themes:

**Highlight which of the Academy's Theme(s) this project will address?**

*(Feel free to nominate more than one. For more information, see [www.iitbmonash.org](http://www.iitbmonash.org))*

1. **Advanced computational engineering, simulation and manufacture**
2. Infrastructure Engineering
3. Clean Energy
4. Water
5. Nanotechnology
6. Biotechnology and Stem Cell Research

## The research problem

*Define the problem*

Knowledge of physics of interplay between morphologically or chemically patterned surfaces and the fluids flowing over them is very crucial in many technological systems. Normally, the fluids involve multiple phases and the patterning of surfaces can be at various scales. Deeper understanding of the surface-fluid interplay has several implications in drag reduction in aerospace applications and marine transportation, bio-medical implants application, micro-channels and heat exchanger applications.

The proposed research and development approach would involve simulation and modelling of the fluid-patterned surface interfaces, design and fabrication of patterned surfaces, and testing of the surfaces targeting relevant applications.

## Project aims

*Define the aims of the project*

To design a patterned surface for specific applications like biological or marine using mathematical tools.  
To simulate and test the patterned surfaces using numerical tools and obtain the best patterns.  
To use methods like laser and / or electric discharge machining methods to fabricate the surfaces.  
To characterize and test the performance of surfaces for wettability, flow resistance and other characteristics.

## **Expected outcomes**

*Highlight the expected outcomes of the project*

A textured surface for specific application.  
Performance of the surface in specific application.  
Methodology to design and fabricate textured surfaces for specific needs.

## **How will the project address the Goals of the above Themes?**

*Describe how the project will address the goals of one or more of the 6 Themes listed above.*

Design and simulation of the textured surfaces will be carried out using the existing Fluent or COMSOL numerical platforms available.

The experimental work will be carried out on the existing machines or by hiring laser machining centre as and when needed.

Additional set-up will be developed for generating patterned surfaces over larger areas.

## **Capabilities and Degrees Required**

*List the ideal set of capabilities that a student should have for this project. Feel free to be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.*

Masters degree in Mechanical, Aerospace, Production Engineering with excellent academic record.  
Preferably GATE qualified.