

An Indian-Australian research partnership

Project Title: **Laser Cladding Technology to Repair Structures**

Project Number **IMURA0213** (will be inserted by The Academy)

Monash Supervisor(s) **Dr Wenyi Yan** *Full names and titles*

Monash Primary Contact: **Wenyi.yan@eng.monash.edu.au** *Email, phone*

IITB Supervisor(s) **Dr. Ramesh Singh/Dr. Suhas Joshi** *Full names and titles*

IITB Primary Contact: **ramesh@me.iitb.ac.in, ssjoshi@me.iitb.ac.in** *Email, phone*

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)

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

Laser cladding is proposed to repair structures, such as aircraft components. To successfully develop and apply this technology, many fundamental issues need to be solved. In this research project, theoretical analysis and numerical simulation will be carried out to investigate the laser cladding technology to repair structures. After literature review, a typical laser cladding procedure will be analyzed and numerically simulated. The effects of laser cladding on the specimen, especially the deformation and residual stress due to laser cladding repair will be examined. This model will then be experimentally validated with the laser cladding setup. An experimental setup for laser cladding will be fabricated along with the optics and material feeding system and integrated with the existing high power fiber laser.

Project aims

Define the aims of the project

The project aims to theoretically and numerically investigate laser cladding technology so as to provide fundamental understanding of this technology and to provide basis for optimizing this technology to repair structures. It also aims at developing a test bed for validating the simulations and demonstrating the process capabilities.

Expected outcomes

Highlight the expected outcomes of the project

The following outcomes are expected with the progress of this research:

1. To develop an finite element model to simulate a laser cladding process.
2. To design, fabricate and develop associated instrumentation for laser cladding system to experimentally study the process capability and validate the numerical model developed
3. Applying the validated model to investigate the process/laser parameters on the desired response of laser cladding method to repair structures.