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PROJECT BACKGROUND

- Laser cleaning is an ideal technology that replace **conventional** chemical technique for coating removal process.
- This **unique technique** can remove coating layer without defect the metal substrate surface.
- Laser cleaning process can be use in many industrial application such as Automotive industries and **petrochemical industries**.
- **Archaeological** sites of restoration possible with laser cleaning



Fig 1: UMP JW Lab laser cleaning to remove paint from rock and proton wira bearing corrosion removal

PROCESS OF LASER CLEANING

- Laser cleaning process is depend on the control of **30W Pulsed Wave mode** nanosecond Fibre laser machine.
- **Precise** parameter control include, Laser power, Scanning Speed, Focal distance, Frequency, Pulse width and hatching distance is **essential**

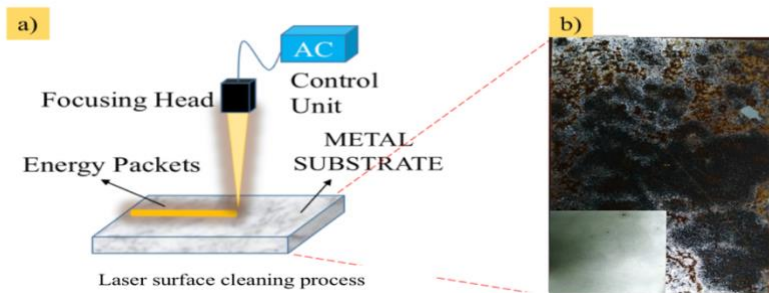


Fig 2: (a) Schematic diagram of laser marking and (b) Laser corrosion removal sample

IMPACT OF THE INNOVATION

- **TECHNOLOGY**
 - Novel technology in Malaysia as a new **alternate** cleaning process
- **SOCIAL ECONOMY**
 - Upturn **implementation** of laser based manufacturing technologies in industries to move closer to I.R 4.0

PUBLICATION AND CONFERENCE

1. "The laser cleaning process for the removal of surface corrosion developed over 1 year on stainless steel SS304". **(Under Review)** for International Journal of Technology and Engineering Studies.
2. "The Influence of nanosecond laser on the removal of painted surface". **(Under Review)** for International Journal of Technology and Engineering Studies.

FINANCIAL SUPPORT

- The work was supported by Universiti Malaysia Pahang Research grant RDU1903118.

MECHANISM OF LASER ABLATION

- Laser ablation is a mechanical process achieved by applying **higher intensity** pulse during laser irradiation.
- Advantage of this mechanism is **no mechanical contact** to the component , rapid cleaning time and no damage to the metal metal substract.

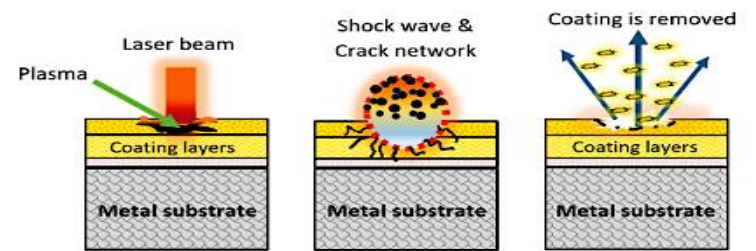


Fig 3: Graphical illustration of laser ablation mechanism

RESULT

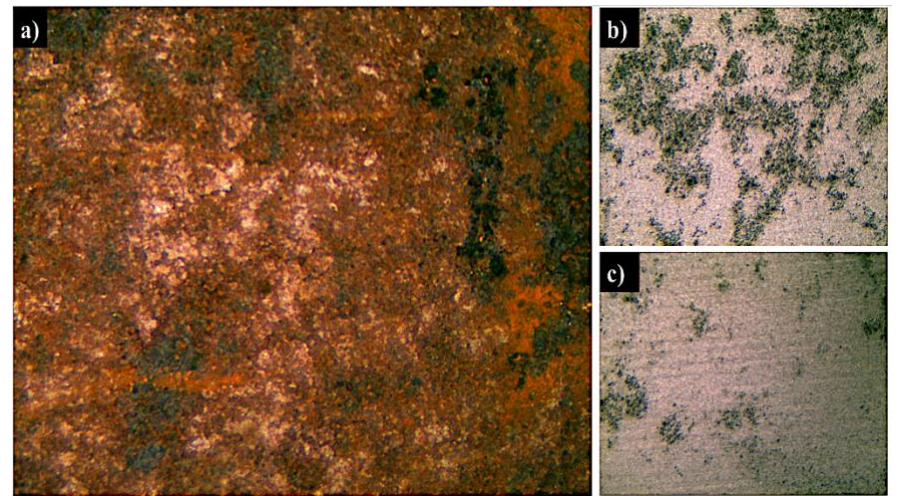


Fig 4: Optical microscope image of laser cleaning (a) Corroded sample, (b) LCR with retained black stains and (c) more cleaner portion of LCR

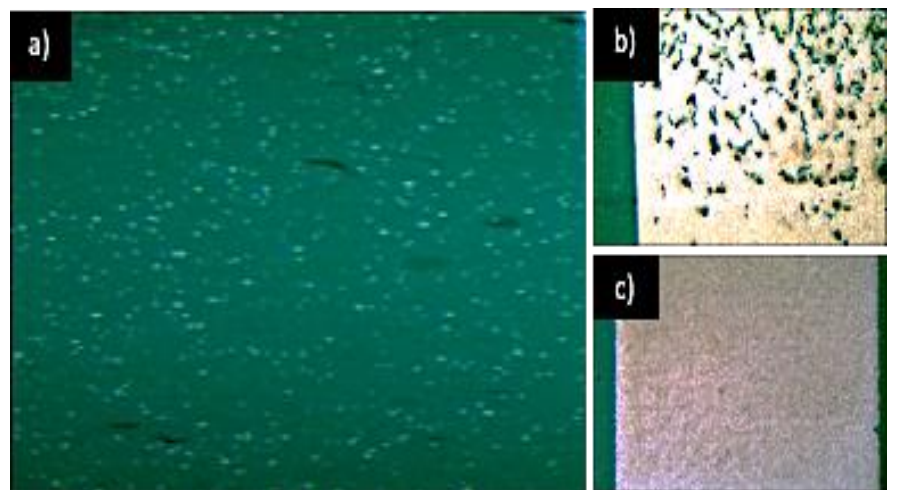


Fig 5: Optical microscope image of laser paint removal (a) Painted surface, (b) Paint not fully remove and (c) Fully remove paint surface

MARKETABILITY

- Pulse wave mode **precision laser machine** can perform **marking cleaning, texturing** and **engraving technique**.
- It is a rapid photon based manufacturing technology as a true potential in a market segment that has virtually no competitor.
- The market lies in petro-chemical industries where corrosion is a reliability issue for tanks pressure vessels as well as in car industries.