



A METHOD FOR JOINING TWO OR MORE DISSIMILAR METALLIC COMPONENTS AND A SYSTEM THEREOF IITM Technology Available for Licensing

Problem Statement

- The technical problem discussed herein stating that **how to reduce formation of intermetallic compounds around a welded portion in laser welding process.**
- Such an objective technical problem is addressed by a method for joining two or more dissimilar metallic components.

Technology Category/ Market

Technology: Joining two or more dissimilar metallic components;

Industry & Applications: Laser Industry, Fiber optics, Optical Transmission Industries.

Market: The global **Filler metal** market is projected to grow at a **CAGR of 12%** during the forecast period **of 2024-2031.**

Intellectual Property

IITM IDF Ref. 2001;
IN Patent No. 529025 (Granted)

TRL (Technology Readiness Level)

TRL-3/4, Proof of Concept ready, tested & validated in Laboratory

Research Lab

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Technology

- Present invention describes **a method for joining two or more dissimilar metallic components.** (Refer Figs. 1,2 and 3)
- Said method comprises the steps of :

Technology

To be begin with, **aligning**, a first metallic component and a second metallic component;

Further step. **inducing**, a laser beam at an overlapping portion of the first metallic component and the second metallic component, by splitting the laser beam into at least two beams.

- This method **splits the laser beam** into the **first beam** & induced at the first spot is for pre-heating & the **second beam** induced at the second spot is for conduction welding, which **lowers** the interaction time of the laser beam with the overlapping portion of the metallic components & **reduces formation of intermetallic compounds around the welded portion.**
- The reduction of intermetallic compounds during welding **improves** the **joint strength** of the weld.

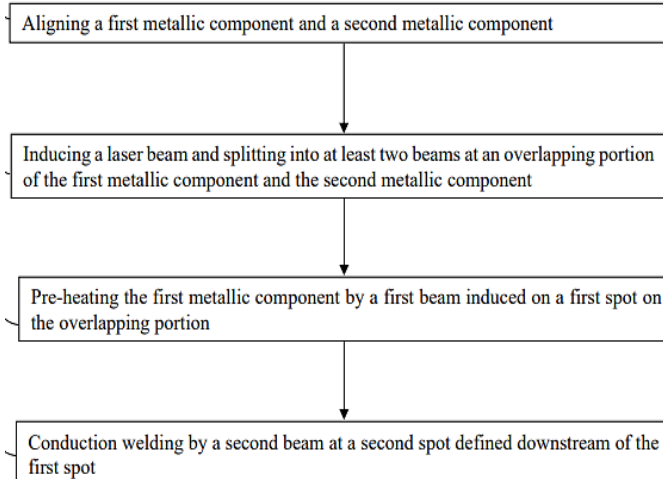


Fig.1 shown a flow chart of claimed method;

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Images

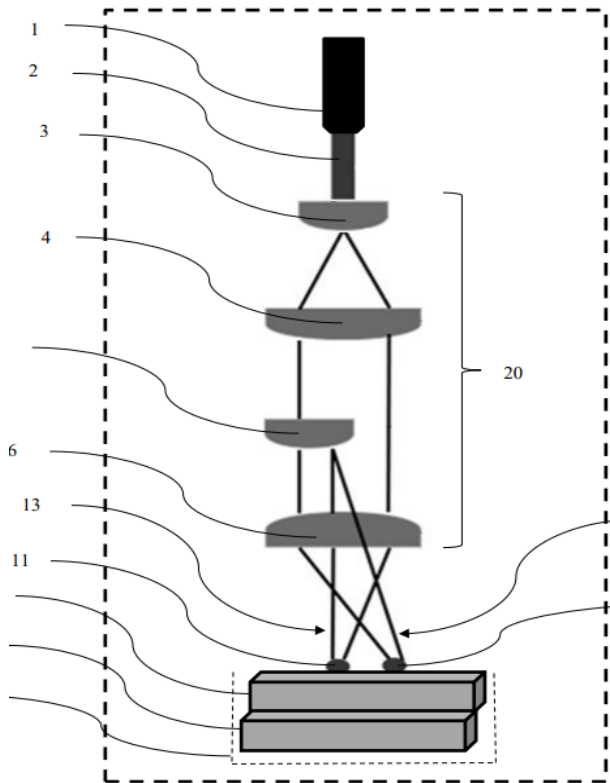


Fig.2 shown a system for joining two or more dissimilar metals;

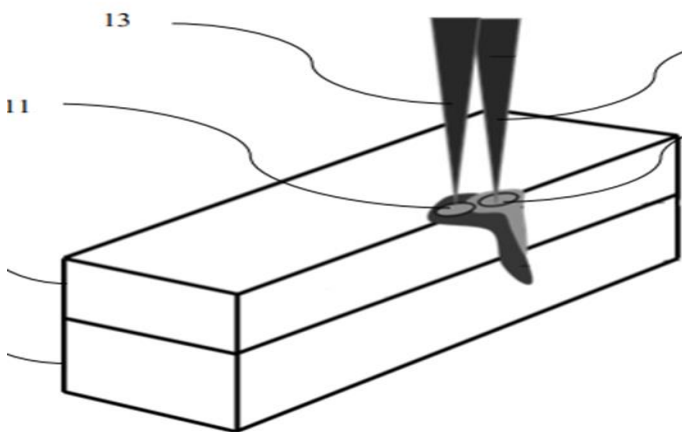


Fig.3 shown schematic view of at least two beams simultaneously induced at a first spot & a second spot over an overlapping portion of a first metallic component & a second metallic component

Key Features / Value Proposition

❖ Technical Perspective:

Important Features:

- Facilitates the splitting of a high-power laser beam into at least two beams results in **higher penetration depth compared to a single laser beam.**
- Further, the metallic components joined by splitting the laser beam exhibits **higher tensile shear strength of the joint.**

Improved Performance:

- The focusing lens is positioned at about **50-100 mm** from the first metallic component.
- (Refer fig.2)
- The distance between the first spot and the second spot is in the range of **0.5-1.5mm.**
- The shielding gas may be supplied at a pressure of **at least 0.5 bar** and a flow rate of at least **25 l/min** to **avoid oxidation** of molten weld pool **during conduction welding.**

Experimental Details:

The splitting of the laser beam by the beam splitter may **improve the conduction of laser beam** between **steel & aluminum alloy.**

❖ Industrial Perspective:

- Universally applicable in the **Optical fiber industries, Optical Transmission Industries.**

Reference Details

SI No	Description	SI No	Description
100	System	4	Collimator
20	Beam Splitter	5	Quartz glass
1	Laser Device	6	Focusing Lens
2	Laser Beam (12, 13) – 1 st & 2 nd beam.	7,8	1 st & 2 nd metallic component
3	Splitting Lens	10, 11	1 ST & 2 nd Spot

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