LC Innoconsult INTERNATIONAL
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Explosive cladding for the electrical industry

ABSTRACT:
A Hungarian company with the know-how of explosive cladding of two different materials for manufacturing electrical components. The company is seeking to find companies with cooperative intents from the electrical appliance or vehicle industry.

TECHNOLOGY OVERVIEW:
Explosive cladding is a solid state process in which controlled explosive detonations force two or more metals together at high pressures, resulting a high quality metallurgical bond between the colliding surfaces (Fig.1). The bonding zone of the two metals has a characteristic wave-form.

Fig.1: Copper-aluminium bimetal sheet sample

Practice of the explosive cladding:

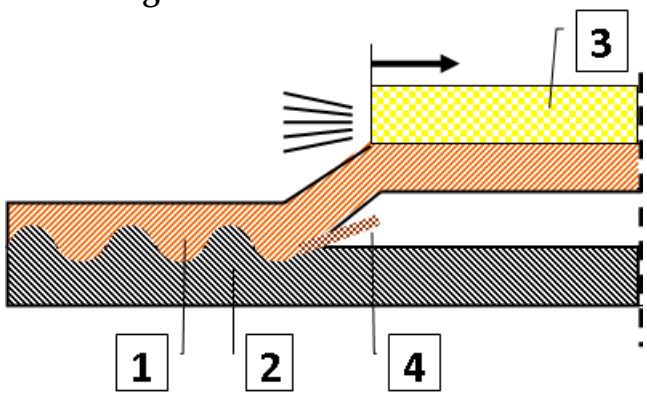

Fig.2: Principle of the explosive cladding:
1) clad plate (copper), **2)** base plate (aluminium), **3)** high explosive, **4)** melted metal spurt

Due to the high pressure during the **3** explosion and collision of the **1** clad plate (*copper*) and the **2** base plate (*aluminium*) the two materials get melted and the **4** melted metal spurt goes through the collision zone, which then shuts the two plates together in a unique wave-like shape.

The major advantages of the explosive cladding process in comparison the conventional ones are that bond can be create between normally incompatible metals (*e.g. aluminium and steel: Figure 3*) and also that there is no practical limit to the ratio of thickness of the metals to be bonded. It is feasible to apply a minimum thickness of the expensive cladding metal on the inexpensive base metal the process requires minimum facilities and tooling.

Fig.3: Aluminium-Steel bimetal plate, sample

POTENTIAL APPLICATIONS:

In the electrical industry, the most commonly used pair of materials is copper and aluminium, which is normally used in electrical current circuits, built-in fittings.

The concept of the know-how is to prepare bimetal terminal connectors that are geometrically identical to the traditional ones. The copper surface of the bimetal plate would be in contact with the copper blade terminal, the other one with the aluminium wire.

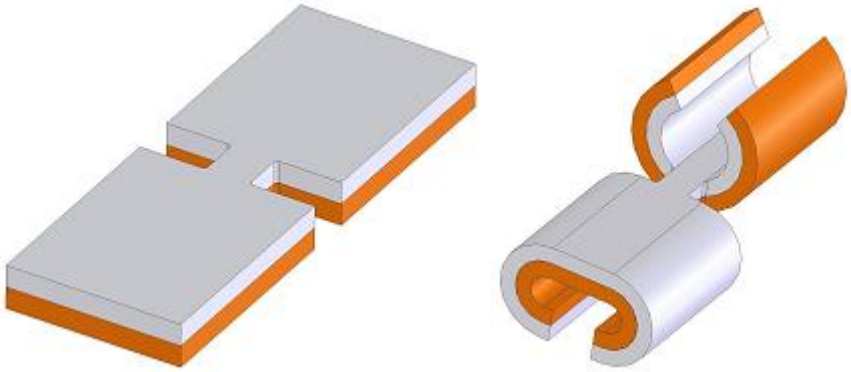

Fig.4: Quick disconnect terminal from copper-aluminium bimetal

The electrical industry, the vehicle production, the nuclear technique use many special multicomponent materials, and component parts as two- or more-layer cladded plates, sheets, wires and component parts. Applying conventional metal processing techniques as stamping, clamping, machining on explosively cladded two- or three-layer metals, different component parts can be manufactured as bimetallic washers, thermos-bimetals, superconducting joints etc.

CUSTOMER BENEFITS:

- Metal combinations possible which are conventionally impossible to weld i.e.: Cu/Al, Al/Steel etc.
- Cost saving: thin layer of expensive material cladded on a thicker layer of cheap material
- Original metal properties remains
- Joint bond stronger than the weakest material
- Low electrical resistance of anode/cathode blocks

TYPE OF COLLABORATION:

The company is looking for partners interested in purchasing the know-how or purchasing the raw material (bimetal sheets) which can be later rolled to reduce its thickness and manufacture optional products (e.g.: washer, cable lugs etc.).

- On one hand the know-how defines the technology to prepare copper-aluminium and other bimetal sheets.
- On the other hand the know-how defines the technological principle on how to connect twisted aluminium wires to copper blade terminals: with quick disconnect terminal made by aluminium-copper bimetal. This allows to replace the current copper wiring with aluminium wires.

Targeted customers: electrical appliance manufacturers and suppliers, vehicle manufacturers and their suppliers, research institutes, R&D centers of multinational companies.

If you are interested, please respond to:

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