R&D OF AL-CU JOINING FOR THE SUBSTITUTION OF MONOLITHIC CU COMPONENTS FOR LIGHTER AND MORE EFFICIENT AL-CU BI-COMPONENTS



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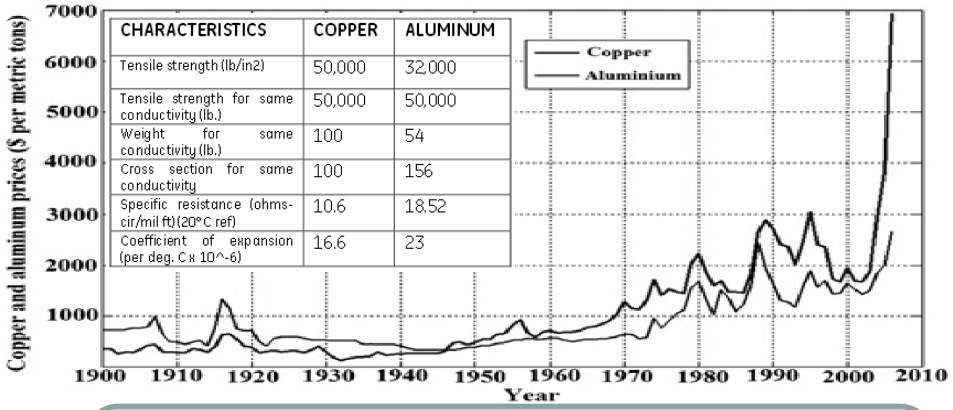
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MOTIVATION

PROBLEMS:

- High cost of Cu
- High weight of Cu components

CHARACTERISTICS	COPPER	ALUMINUM
Tensile strength (lb/in2)	50,000	32,000
Tensile strength for same conductivity (lb.)	50,000	50,000
Weight for same conductivity (lb.)	100	54
Cross section for same conductivity	100	156
Specific resistance (ohms-cir/mil ft) (20°C ref)	10.6	18.52
Coefficient of expansion (per deg. C x 10^-6)	16.6	23



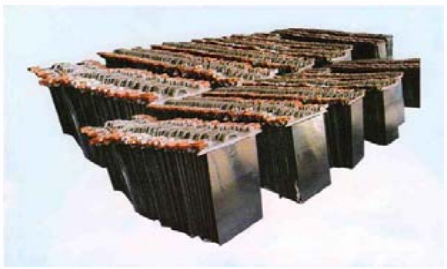
PROPOSED SOLUTION:

- Substituting monolithic Cu components for bimetalic Al-Cu

GOALS:

- A step towards sustainable and low emission EU community









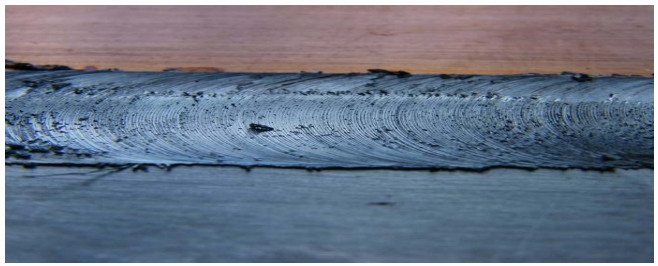




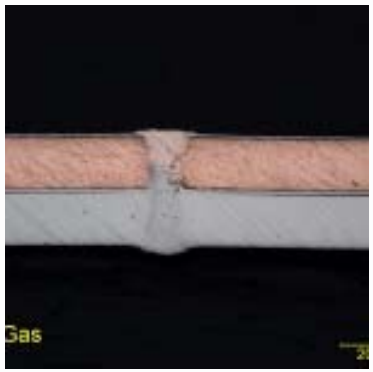


OBJECTIVES

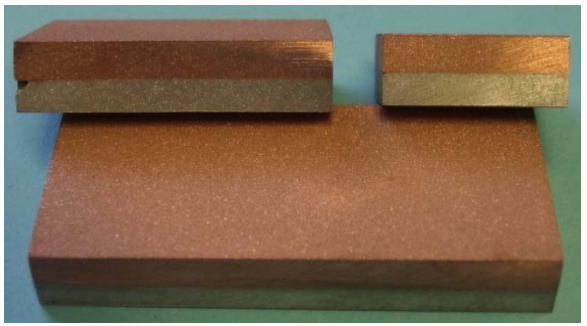
- Development of sound and reliable joining technologies for the pair Al-Cu with the goal of **substitution monolithic Cu components** for lighter and more economic Al-Cu bicomponents.
- The idea is to present different case studies **addressed by the industrial partners** .
- Each case study will take into account **its particular needs (production and properties).**
- In this sense, **different joining technologies** will be considered, depending on each particular case



Friction stir welding



Laser beam welding



Diffusion bonding

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EXPECTED RESULTS

- Substitution of expensive and heavy Cu components for **cheaper and lighter** Al-Cu components.

- Development of **sound and reliable** joining technologies for the pair Al-Cu.

- Keeping **at least the same properties** as for the monolithic part (electrical and or thermal conductivity, mechanical properties, corrosion resistance, etc.)

- Different welding technologies will be developed, depending on the **case study under consideration**. Some of the technologies that might be studied are: roll bonding, hybrid laser-roll bonding, friction stir welding, laser welding, electron beam welding, diffusion welding, exstrusion bonding, ultrasonic welding, EMPT, ...

- Defining industrial **procedures** for joining Al/Cu

OUTLINE

REPLACING MONOLITHIC CU COMPONENTES BY BI-COMPONENTS MADE OF AL-CU

CASE STUDY	CASE 1: AUTOMOTIVE COMPANY 1	CASE 2:METAL PRODUCTION COMPANY 2	CASE 3: ELECTRIC POWER INDUSTRY COMPANY 3	CASE N COMPANY N
PROPOSED TECHNOLOGIES	-Roll bonding - Hybrid laser-roll bonding - Laser - EBW -…	-FSW - Explosive welding - EMPT - …	-Rotary friction welding - Explosive - Magnetic pulse welding	¿?







A step towards sustainable production and low emission EU community

INTENDED CALL: FOF 12-2015 Industrial technologies for advanced and assembly processes of multi-material

- TYPE OF ACTION: Innovation Action (not basic research)
- MINIMUM CONSORTIUM: At least 3 companies or entities from 3 different countries
- ESTIMATED BUDGET: 6-9M€ (depending on final number of participants)
- FUNDING RATE: 70% of total eligible budget (including total direct costs and total indirect costs).
- DEADLINE: 09.12.2014?

CONSORTIUM (SO FAR)

INDUSTRIAL PARTNERS:

- 1 automotive supplier (electrical components) – confirmed
- 1 automotive supplier (heat exchangers for electronics) – confirmed
- …

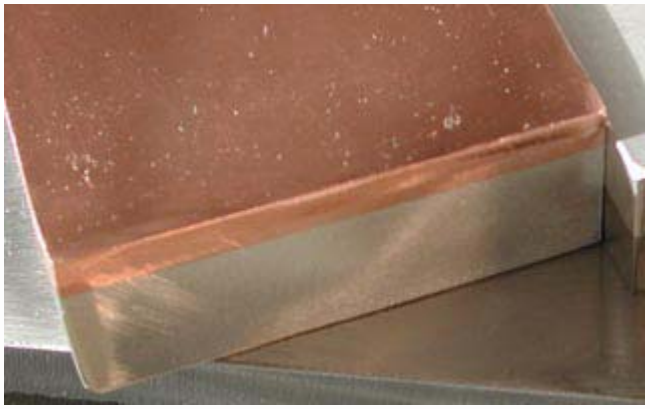
RTDs:

- AIMEN (Spain) (FSW and laser)
- UNIVERSITY OF COIMBRA (Spain) (Mechanical and microstructural characterization)
- UNIVERSITY OF LJUBLJANA (Slovenia) (Roll bonding and others, characterisation of electrical properties, …)
- THE OPEN UNIVERSITY (UK) (diffusion bonding)
- TU Graz (Austria) (Electron Beam welding, …)

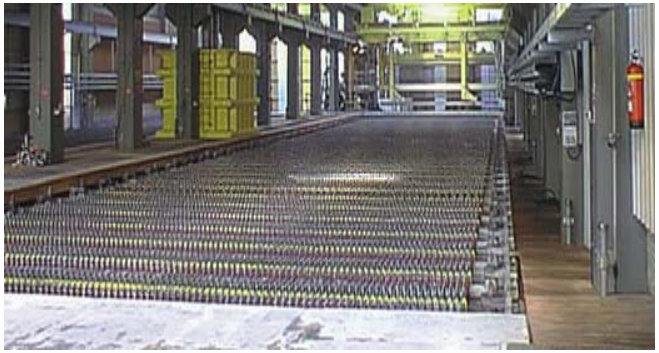
NOT CLOSED – NEED TO BE UPDATED

INTERESTED INDUSTRIES

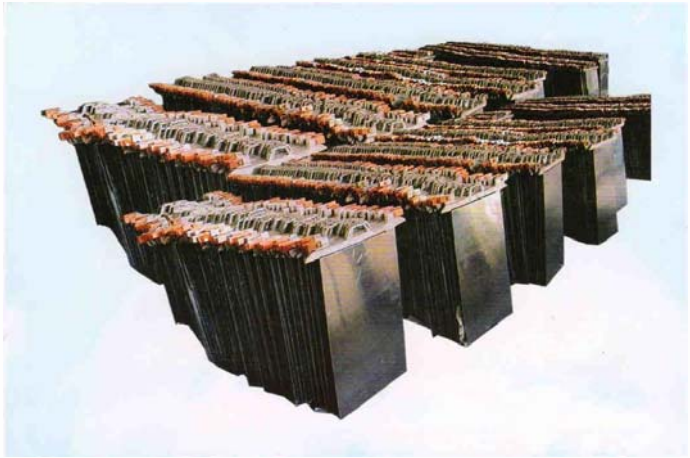
Possible interested industries:
- Metal production
- Power generation and transportation
- Electrical components
- Automotive
- …











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TENTATIVE WORKING PLAN:

1) Definition of Al-Cu components to be developed during the project

2) Design of new/optimized technical solutions

3) Development of joining procedures

4) Characterisation

5) Technical and cost benefit analysis

6) Exploitation and dissemination

TO BE DEFINED DEPENDING ON FINAL INDUSTRIAL PARTNERS:

- END USERS REQUIREMENTS
-PROJECT TASKS
- DETAILED WORKING PLAN
-PARTICIPANTS CONTRIBUTIONS

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Thanks for your attention



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