EUROPEAN UNION

GOVERNMENT OF ROMANIA

SERBIAN GOVERNMENT

Structural Funds
2007-2013

Romania-Republic of Serbia
IPA Cross-border Cooperation Programme

Workshop

Ecologic Alloys for Soldering and Brazing. Brazing and Soldering Procedures

26.09.2014, Hotel Central, Timisoara

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Title: Promoting new ecologic filler alloys for soldering, based on the non-ferrous ore of the Romanian-Serbian cross-border area

ACRONIM: ECOSOLDER

Project Reference: MIS ETC Code 1409

Lead Partner: ISIM Timisoara, Romania

Partner: **Mining and Metallurgy Institute** Bor - **MMI Bor, Serbia**

Total value : 221.123,30 Euro

Lead partner: 121.771,30 Euro

Partner: 99.352,00 Euro

Project implementation: June 2013-December 2014 (18 months)

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Project objectives

- **Creation of a R&D cooperation network between ISIM of Timisoara and MMI of Bor, for soldering filler alloys.**
- **Innovative and ecological soldering and brazing processes**
- **Ecological filler alloys for soldering and brazing**
- **Workshops for promoting the new ecologic filler alloys for soldering**

- dissemination of the results related to the non-ferrous alloys, their mining extraction,technology of the elaboration of the filler alloys for soldering and brazing, as well as the industrial implementation of this technology and the industrial applications of these materials, by the ***target groups****: companies of the electronic industry, refrigerator producers, manufacturers and shops for repairs of water, gas and heating installations, shops and individual skilled workers for jewelry and decorating technique.*

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Project activities

Activity		Description	
A1, A 5 100 %		Meeting for the preparation of the project, at the Lead Partner, ISIM of Timisoara and at the Partner 2, MMI of Bor	
A2 90 %	A6 100 %	Meetings for current issues of the project, at ISIM.	Meetings for current issues of the project, at MMI.
A3, A7 100 %		Realizing a data base for soldering filler alloys ISIM Timisoara - *information about filler alloys for soldering and brazing, lead-free and without any emissions of toxic substances, technologies for soldering and brazing by various processes, based on electric, flame, ultrasonic and laser heating, etc.* MMI Bor - *information about the non-ferrous ore in the cross-border area, mining technologies for their exploitation in locations on both sides of the border, metallurgy technologies of producing non-ferrous metals and alloys, technologies for producing ecologic alloys, lead-free and without any emissions of toxic substances, intended for soldering and brazing by processes based on flame, electric, ultrasonic and laser heating, etc.*	

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Project activities

Activity	Description
A3, A7	*The joint data bases include:* • *selected documentations about detecting and measuring hazardous substances of gas and fumes, by utilizing filler alloys for soldering and brazing;* • *selected papers for friction stir technique and laser technique, that are useful in the project development.* • *documentation about furnace soldering and brazing technologies* • *selection of non-ferrous materials suitable for soldering;* • *technical data for base materials, for filler alloys and fluxes used in the project* • *chemical control of metal materials needed for soldering;* • *preparing of equipment for melting and casting.*

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Project activities

Activity No.	Description
A4 75 %	Purchasing of equipment and materials : ISIM Timisoara - IT equipments - Mobile systems for measurement of gas and fumes concentration with system for data acquisition - Materials and filler alloys for soldering and brazing tests - Standards and documentations
A8 100 %	Purchasing of equipment and materials : MMI Bor - Dilatometer - Device for hardness measurements - Device for micro-hardness measurements
A9 97,5 %	Creation of a direct IT connection, **website** of the project and a R&D cooperation network between ISIM of Timisoara and MMI of Bor, for soldering filler alloys. *On the website, the economical agents will have access to informations regarding ecological filler alloys and innovative soldering and brazing processes.* ***www.ecosolder.eu***

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Project activities

Activity No.	Description
A9	***Website content / sitemap and main structure:*** ***1. HOME / about*** ***2. Project Objectives*** ***3. Activites and results*** ***4. News & Events*** ***5. Communication & Science*** ***5.1 Ecosolder Forum*** ***5.2 Scientific Database*** *5.2.1 Scientifical papers* *5.2.2 Technical data for base materials* *5.2.3 Technical data for filler alloys* *5.2.4 Technical data for fluxes* *5.2.5 Soldering and brazing technology* *5.2.6 Others technical documents* ***5.3 Weblinks*** ***5.4 Live-Chat*** ***6. Contact***

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Project activities

Activity No.	Description
A10 90 %	Updating and exchange of data bases between the partners. -*ISIM - know-how about the soldering and brazing technologies, for the applications of the new ecologic filler alloys for soldering and brazing, compared with other kinds of filler alloys, available on the market.* -https://www.dropbox.com/home#!/home/a.ecosolder.d-base-share/ISIM-data -*MMI - update with information concerning geology, mining and metallurgy of elaboration of the ecologic, lead-free filler alloys for soldering and brazing.* -https://www.dropbox.com/home#!/home/a.ecosolder.d-base-share/MMI-data **https://www.ecosolder.eu**

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Project activities

Activity No.	Description
A11 90 %	Elaboration of joint innovation related studies, regarding filler alloys for soldering and brazing, in the cooperation network ***ISIM Timisoara - technical reports:*** • Studies and experiments regarding behavior of filler alloys and the base materials at soldering and weld-brazing using conventional techniques, as well as ecological new techniques, with innovative character, for soldering of materials: laser and friction stir soldering techniques • Materials for Al/Al, Al/Al-Si and Al/Steel brazing • Weld- brazing of titanium to aluminium, using various filler alloys • Innovative and environmentally friendly bonding techniques using FSW principle, for Al alloys (EN AW 1200, EN AW 5754), Cu99, brass (CuZn39Pb2), steel S235, Ti Gr2, magnesium AZ31B; as similar and disimilar materials); filler alloy S-Sn97Cu3; soldering flux ALUTIN(for Al alloys) and ROSOL 3 (for copper) • Laser soldering of an electronic board • Electric copper bit soldering of electric contact pieces

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Project activities

Activity No.	Description
A11	• Soldering and brazing experiments using new ecological filler alloys, elaborated in the project • 4 Scientifical papers and articles ○ **"Noi abordări în domeniul sudării prin frecare cu element activ rotitor (FSW). Tehnici noi de placare și lipire dezvoltate pe baza principiului FSW"** Conference SUDURA 2014, 9-11.04.2014, Sibiu ○ **"New Ecological Technique for Soldering of Metallic Materials"** 7th International Conference TIMA 14 "Innovative Technologies for Joining Advanced Materials", ISI Proceedings, 19-20.06.2014, Timisoara, http://www.isim.ro/tima/tima14/doc_pdf/tima14_abstracts.pdf and published in Advanced Materials Research Volume 1029, doi: 10.4028/www.scientific.net/AMR.1029.218 ○ **"Aspects regarding friction stir welding of copper Cu 99",** published in Journal Welding & Materials Testing No. 2/2014 http://www.bid-isim.ro/bid-rom.htm ○ **Innovative and ecological joining techniques,** approved for presentation to the "46th IOC" Conference, 01-04.10.2014, Bor, Serbia • 1 Patent request (A 00254) regarding friction stir soldering was filed at OSIM Bucharest (no. 1830 / 11.04.2014)

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Project activities

Activity No.	Description
A11	MMI Bor - technical reports: • calculation and preparation of non-ferrous materials suitable for soldering. • preparing of equipment for melting and casting. • melting and casting of solders. • elaboration of some experimental results and comparing experimental results with literature. • elaboration of studies regarding different types of soldering • studies regarding ecomaterials for soldering. • It was made the low melting ecological solder alloys based on tin and indium. • delivery to ISIM of a small quantities of ecological filler alloys for soldering and brazing experiments, prepared in the MMI Bor laboratories (solder alloys with indium and special brass) • preparing materials for experimental performance on the obtaining equipment. • recording calibration curve of heating and cooling on the DTA. • selection and preparing of experiments for obtaining some soldering alloys, new series of the experiments.

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Project activities

Activity No.	Description
A11	•Scientifical papers and articles ○ "Ecological lead-free solder Ag-In-Sn" is published in national scientific journal titled "Copper", Vol. 39, No.1, 2014, pp. 9-16 (http://www.irmbor.co.rs/images/izdavastvo/casopisi/arhbakar/bakar1_14.pdf) ○ The monograph titled "Ecological lead-free solders Sn-In-X (X=Ag,Cu)" is written and published. ○ 1 scientifical paper approved for presentation to the "46th IOC" Conference, 01-04.10.2014, Bor, Serbia

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Project activities

Activity No.	Description
A 12 92,5 %	Editing of information and publicity materials *Promotional materials (flyer, leaflet, newsletter, brochure, posters, banners, etc.) - produced and distributed, on occasional contacts and at the organized workshops and conferences.*
A 13 47,5 %	Organizing media presentations • Two informative materials regarding ECOSOLDER project published in SUDURA Journal No.2/2014 (http://www.asr.ro/html_ro/reviste/2014/ISIM%202_2014.jpg) and in Welding & Material Testing Journal No. 2/2014. • press release on 21.05.2014 and published at http://www.mc.kcbor.net/2014/05/21/irm-bor-pocinje-projekat-prekogranicne-saradnje-ecosolder/ • announcement and invitation to the Workshop organized by MMI Bor on 1st July 2014 at hotel Albo in Bor, published on 27.06.2014 at http://www.mc.kcbor.net/2014/06/27/irm-bor-promocija-novih-ekoloskih-legura-za-lemeljenje-na-bazi-obojenih-metala-iz-ruda-rumunsko-srpske-prekogranicne-oblasti/

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Project activities

Activity No.	Description
A 13	• The media presentation of the workshop realized in Bor at hotel Albo on 1st July is done and the published in media on: http://www.mc.kcbor.net/2014/07/02/radionica-promovisanje-novih-ekoloskih-lemova-u-rumunsko-srpskoj-prekogranicnoj-oblasti/ , as well as http://www.ekapija.com/website/sr/page/934958/Stručnjaci-iz-Bora-i-Temišvara-usavršili-dve-nove-lemne-legure. • The workshop is media presented (2 interviews) on 2 TV station on the 1st July: Regional Television RTV Bor http://rtvbor.rs/dnevnik/14442-dnevnik-01-jul-2014.html and Sezam TV www.dailymotion.com/video/x20m88u_vesti-rtv-sezam-01-07-2014_news • Media presentation in newspaper titled “Nove Knjazevacke Novine” on 16.07.2014. • The media presentation for the monograph presentation is done on 05.09.2014 at http://www.mc.kcbor.net/2014/09/05/monografija-o-ekoloskim-bezolovnim-lemovima/.

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Project activities

Activity No.	Description
A 14 75 %	Workshops with the participation of the partners, specialists of the industry and ONGs at ISIM Timisoara Workshop no.1 ISIM Timisoara **"Innovative soldering techniques using ecological filler alloys"**, 21.02.2014, Hotel Central, Timisoara • Low melting ecological solder alloys based on tin and indium (MMI) • Achievement of deep groove brazed-joints of sintered tungsten carbides to mild steel support (2% Cr) (SUDOTIM) • Experiments for dissimilar joining by weld-brazing of aluminum and titanium parts (ISIM) • Experiments for the innovative friction stir soldering process FSS (ISIM) • Experiments for laser soldering of an electronic board (ISIM) Workshop no.2 ISIM Timisoara "**Ecologic Alloys for Soldering and Brazing. Brazing and Soldering Procedures**", 26.09.2014, Hotel Central, Timisoara • 5 presentations

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Project activities

Activity No.	Description
A15 100%	Workshop with the participation of the partners, specialists of the industry and ONGs at MMI Bor Workshop MMI Bor **"Promoting New Ecological Solders in Romanian-Serbian Cross-Border Area"**, 01.07.2014, Hotel Albo, Bor • Experiments for the innovative processes: friction stir soldering (FSS), laser soldering, electric soldering, as well as weld-brazing (ISIM) • Properties of some low melting ecological solder alloys (MMI) • Brazing, joint steel-hard metal (Martenzit doo Bor) • Research to achieve ecological rods for deep joint brazing (SUDOTIM) • Quality assurance in welding and non-destructive testing of a Francis Turbine spiral casing Stay Vane Ring in ATB FOD (ATB FOD Bor) • Ventilation of production facilities in foundries and labaratories "ADMETAL"BOR (ADMETAL Bor)
A16 83,17 %	Elaboration of the succeeding reimbursement claims and progress reports. Elaboration of the final reimbursement claim and report.

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Expected results

Promoting the results of the project

- to the Closing Conference of the project, organized by ISIM Timisoara in November 2014
- in the scientifical papers that will be presented in October to the International Conference 46 IOC, held at Bor, Republic of Serbia, where the MMI Bor is co-organizer
- In international journals or international conferences, in order to promote the filler alloys for soldering and brazing
- in industrial companies; meetings with specialists from industrial companies from eligible area and distribution of promotional materials with these occasions, will continue (activities included in strategy for promoting the filler alloys and technologies for soldering and brazing).

Exchange of databases

- the exchange of information from the database between partners will continue
- dabase that is be available on the website will be updated, contribute in this way to promote the project, the ecological filler alloys and innovative processes for joining of metallic materials.

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Expected results

Joint innovation related studies, regarding filler alloys for soldering and brazing, in the cooperation network

- Complex experiments regarding behaviour of filler alloys and the base materials at soldering, weld-brazing and brazing will continue at ISIM Timisoara
- Selection and preparing of experiments for obtaining some soldering alloys, at MMI Bor

Promotional materials and publications

- Editing a brochure that will be distributed to the Closing Conference of the project, organized by ISIM Timisoara in November 2014

Cooperation network

- continuation for development of the relations and communications between the partners, SMEs, companies and specialists from academic field, regarding to identify and solve technical problems

90 % of the project activities – done until 14.09.2014

100 % of the project activities – done until 14.12.2014

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Thank you for attention