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Romania – Republic of Serbia
IPA Cross-border Cooperation Programme

Research to achieve ecological rods for deep joint brazing

PhD. Eng. Binchiciu Horia
PhD Student. Eng. Binchiciu Emilia
www.sudotim.ro

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Introduction

- Deep brazing joint materials need to present technological proprieties that assure high moistening capacity, namely high lifting heights throw capillary's at the lowest possible temperatures.
- Above mentioned prescriptions can be obtained by optimizing the alloying levels of the brazing rods, namely of the chemical activity in the coat, on the criteria of maximizing the two proprieties.
- Research objective is to accomplish a general use coated rod, type AG105-FH10 EN1044/1999, EN1045/2002, that deposit alloys with high content of tin.

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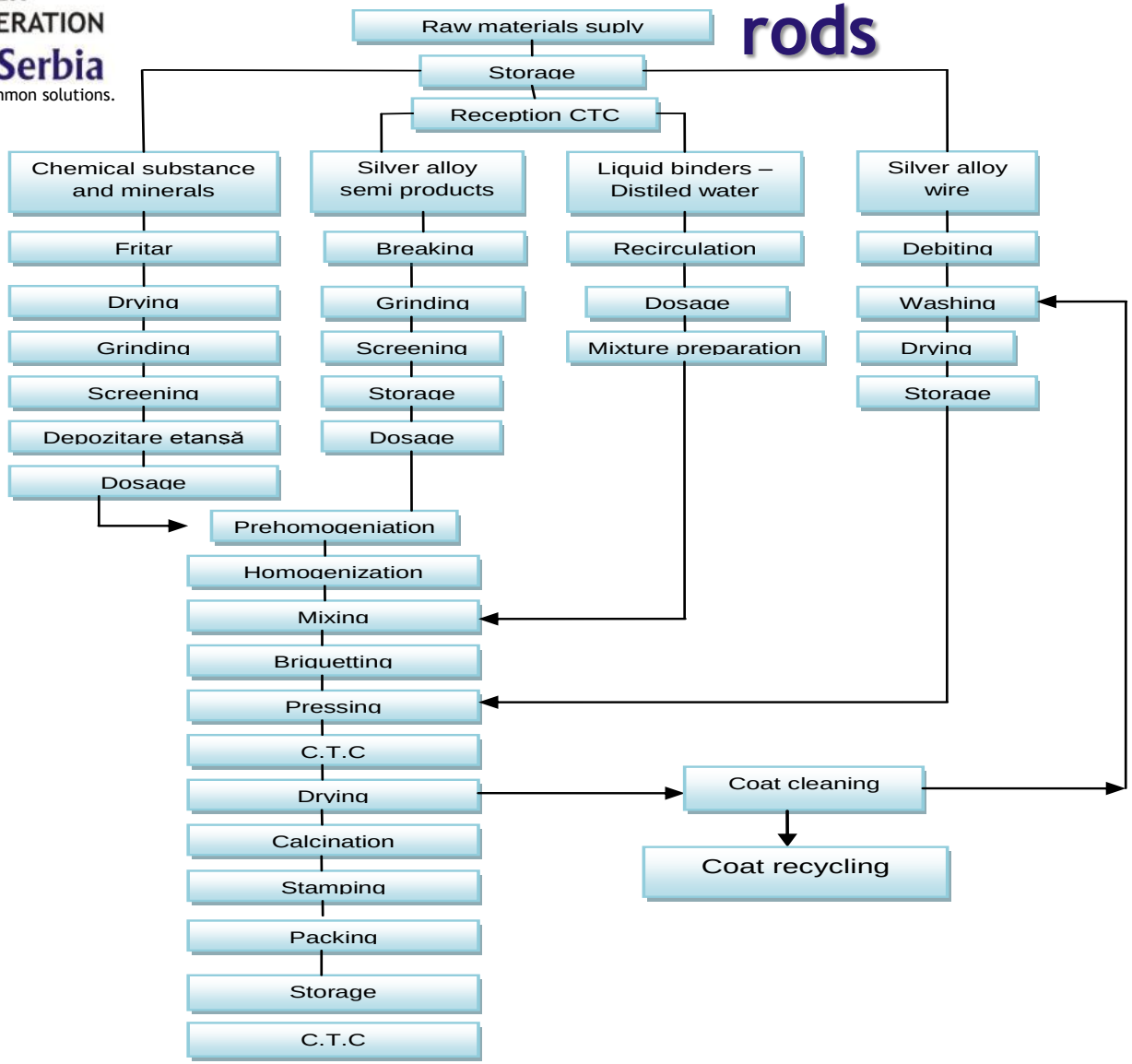
Manufacturing technology for coated rods



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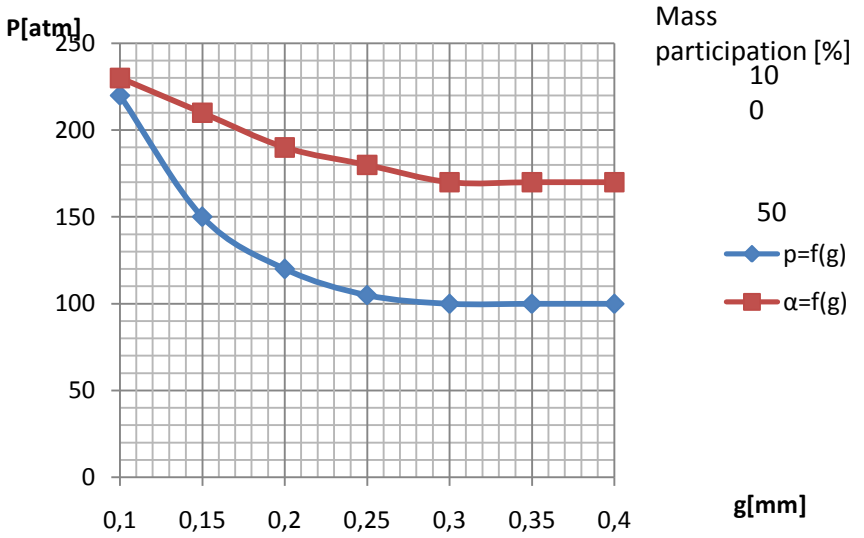
Optimization and developing the coated rods throw extrusion



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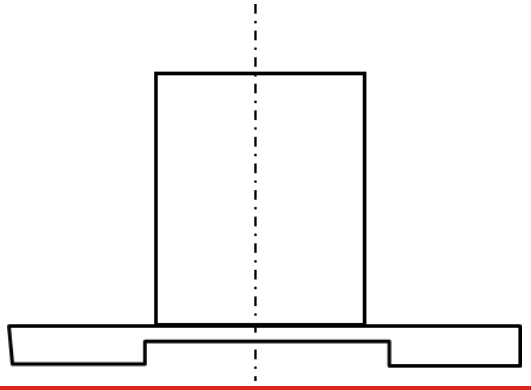
Product testing

- Chemical characteristics, spectral determined, on deposits.

Name	Chemical composition in mass %					
SR EN 1044:1999		Ag Min-max	Cu Min-max	Zn Min-max	Cd Min-max	Others Min-max
AG105	prescribed	39,0-41,0	29,0-31,0	26,0-30,0	--	Sn 1,5-2,5
	determined	39,5	29,2	28,2	--	Sn 2,45

- The temperature at the beginning of the melting process was registered throw thermal analysis.
- Specimen heating was done using a Letz microscope.



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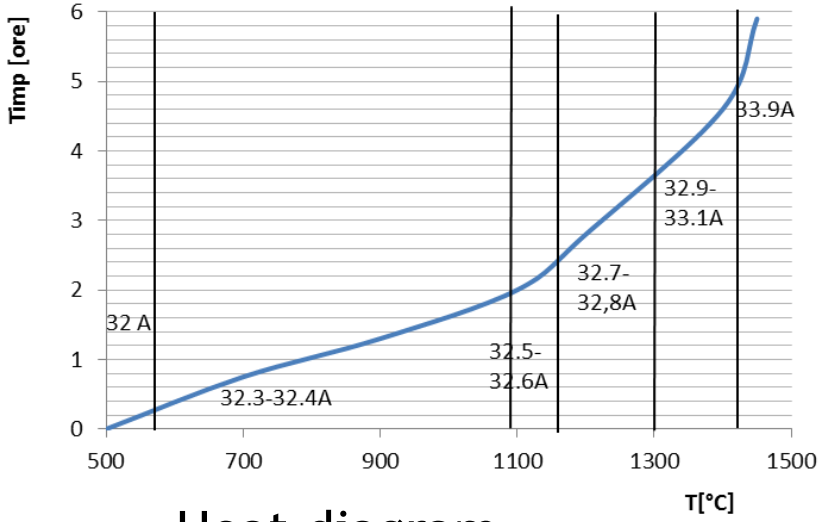
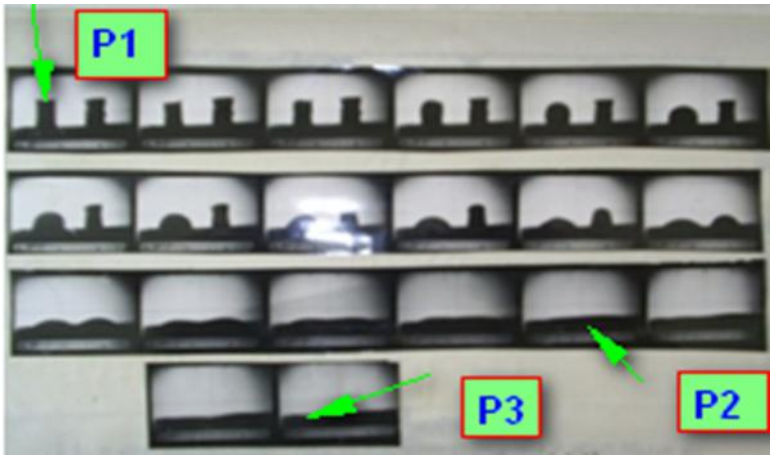


Heat diagram



Thermal analysis of the coat

- The moistening capacity was determined throw experiments on three types of raw materials:
- Stainless steel X2CrNi19-11 - analysis throw optic microscope
- Heat resistant steel 16Mo3 - analysis throw optic microscope
- Al-Si alloy - analysis throw electro-sonic microscopy SEM

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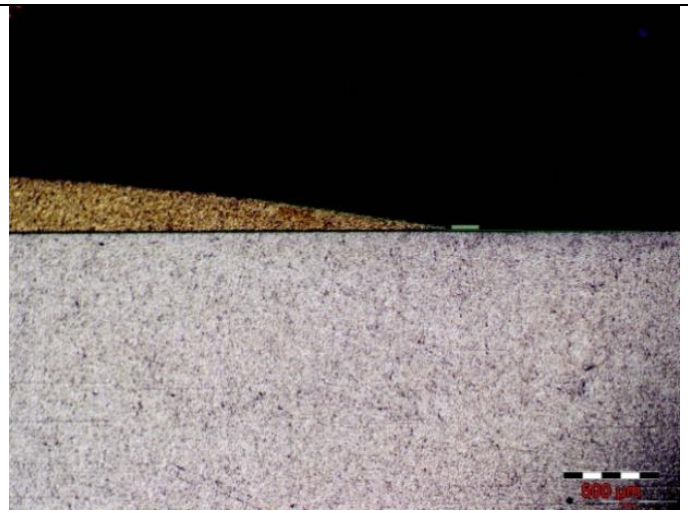	
Raw material: X2CrNi 19-11 Moistening angle: 9,986^{o}	**Raw material: 16Mo3** Moistening angle: 6,670^{o}

- In the pictures presented above we can observe a very good moistening angle for stainless steel as well as for alloyed tools steel.

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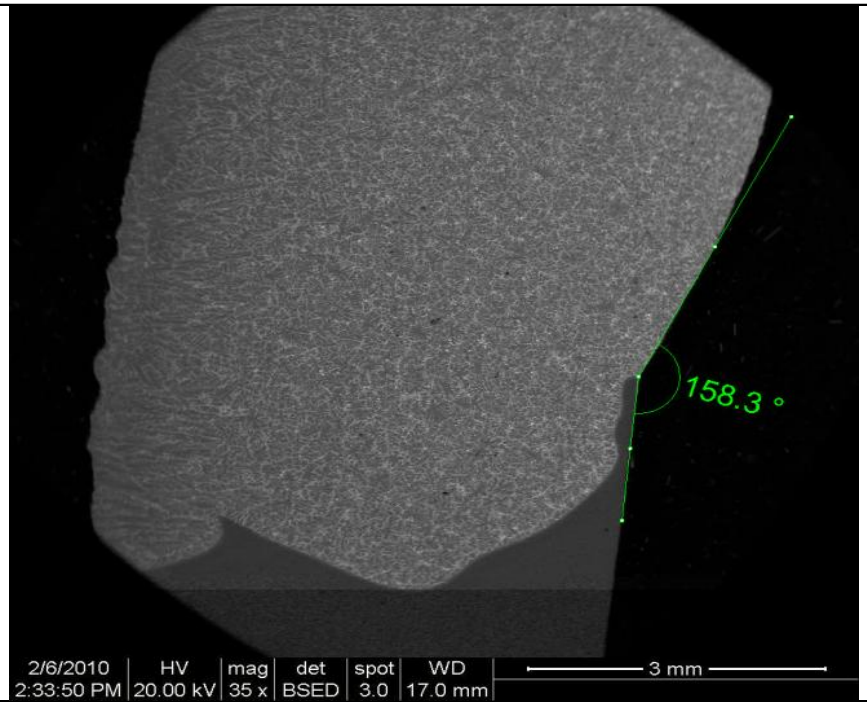
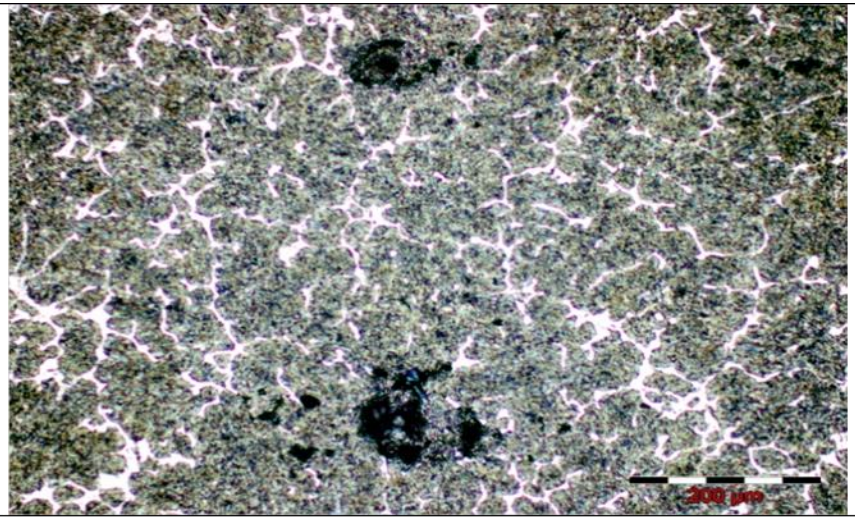


Raw material:Al-Si alloy. Messuring the moistening angle

- The macrostructure does not present fusion defects



Deposition: 1000x, 500x Dendritic structure in the basal area of the alloy resulted at binding with the covered rod VIAg40Sn

- In the metallographic structure we can observe the dual phase structure, uniform distributed, specific for the solid solutions of the brazing materials

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Technical chart for VIAG40Sn

SILVER ALLOY RODS
FOR BRAZING
MARK: **VI Ag40Sn**

SIMBOLS
FROM EN 1044 : AG 105
FROM 8513 : L - Ag 40Sn
ISO 3677 : B-Ag40CuZnSn 650 - 710
MANUFACTURER: **SUDOTIM TIMISOARA**

PURPOSE/DESTINATION : Used alongside deoxidation flux, adequated to achive welded joints of similar or diverse materials (steel and steel, copper and copper, copper and steel, etc.)

FEATURES

Dimensions and limit deviations[mm] :
$3{,}25^{+0}_{-0{,}08}$; $3{,}00^{+0}_{-0{,}08}$; $2{,}50^{+0}_{-0{,}08}$; $2{,}00^{+0}_{-0{,}08}$; $1{,}50^{+0}_{-0{,}08}$.

Chemical composition, average on the rod, in mass %:
40% Ag; 30% Cu; 28% Zn; 2% Sn .
Approximate Density: 9,1 g/cm^3
The chemical composition of the deposited metal, micro-alloyed through its coat is in accordance with EN 1044 prescriptions, type Ag 105.

Deviation from prescribed spacing limits are permited if the physical and technological limits of safety are guaranteed.
The coat of the rods is type EH10, in accordance with EN 1045, with micro-alloy additives and deoxidation catalyst reactors.

INDICATIONS OF USE: Used for brazing through the oxi-fuel process with neutral flame, to temperatures between the melting interval of the alloy, wich is approx.: 690 °C

DELIVERY CONDITIONS : According to negociated conditions.

WARRANTY : 1 year

AVAILABILITY : 15 years

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Conclusions

- Research conducted resulted in defining the product recipe for the covered brazing rods with alloys such as AG105, with high yield, type VIAg40Sn;
- Patent OSIM nr. RO125836/2013;
- Defining a manufacturing technology for coated rods type VIAg40Sn Φ2 mm;
- Manufacturing and testing the prototype lot and the new product;
- Results presented are taken from **CONTRACT PCCA type 2 no. 188/2012: MATERIALS and TECHNOLOGIES DESIGNED TO ACCOMPLISH CUTTER KNIFES for ASPHALT-MATFREZ,** ongoing, consortium consists of SC SUDOTIM AS SRL TIMISOARA, TRANSILVANIA UNIVERSITY BRASOV, UPB – CEMS BUCHAREST, SC ECONET PROD SRL BUCHAREST, INTEC BUCHAREST.

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Thank you for your attention!

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