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INNOVATIVE RESEARCH IN THE FIELD OF BRAZED JOINTS FOR DRILL BIT

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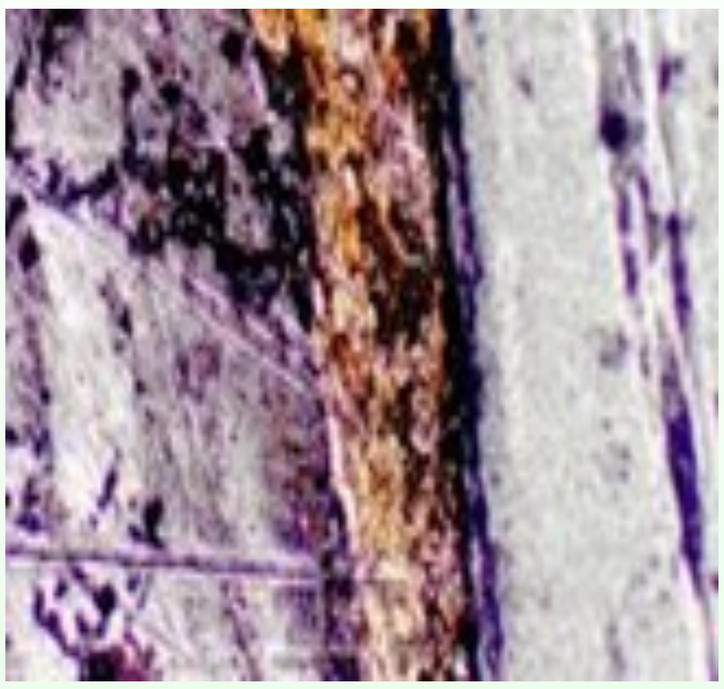
Developing brazed joints between simmered wolfram carbide reinforcement (BM1) and low alloyed steel with chromium support (BM2), in burnt and recovered stage, from the drill bit in basaltic rocks, are made, in an economic way, by using the oxy-acetylene process, with mark VIAg40SnR (AM1) rods, that deposit with a single melt two layers, a buffer layer, rich in silver, and a filling layer, that contains 40% silver.
The bonding is type deep joint with restraint, of 0,2-0,3 mm, systemic distributed by prepositioning so we will obtain a moistening process and capillary brazing.
Component and addition material (AM) deposit chemical composition assure a good diffusion process and a high resistance to shear, at the brazed joint level with Ac156, according to SR EN ISO 17672:2010.
In section we can see extended areas of diffusion of the addition material into the base material 1, due to high silver content in the buffer layer, of approx. 56% and of the intense deoxidation and decontamination activity of the pickling flux, type FH10 according to SR EN 1045:1999.
The heat affected zone is practically unchanged from a structural point of view. This observation combined with the lack of defects, like empty



The micrograpfic analysis of the joining zone in cross section [200X]

Chemical composition of the manufacturing components for VIAg40SnR.

Code	Composition [mass %]				
	Ag	Cu	Zn	Sn	Si
Ag140 prescribed	39,0-41,0	29,0-31,0	26,0-30,0	1,5-2,5	Max.0,05
Ag140 determined	39,5	29,8	27,2	1,9	0,02
Ag156 prescribed	55,0-57,0	21,0-23,0	15,0-19,0	4,5-5,5	-/0,05
Ag156 determined	56,2	22,4	16,3	4,8	0,03
Cu50-Sn48-Si2	---	51,3	---	45,3	1,8
DMVIAg40SnR	40,3	30,2	26,1	2,4	0,05

The deposited materials structure is fine grain, biphasic with associated hardness of approx. 210 HB, which offers medium joint resistance to shear of 240 MPa, they are according to exploitation requests.
Hardness and resistance to shear characteristics, relative high, are explained by the point like metallographic structure and by the purity of the deposits.
Protection to oxidation, when heating the components, is accomplished by the chemical activity of the deoxidation flux, assured by the covering coefficient of the rod, of 1,9.
The coating mixture is made out of powder precursor Ag156 and FH10 flux, with a participating ration of 10/90.

DM [attack E1, 100X]

Exploitation tests in basaltic rocks of the bit drill using the new technology confirmed predicted results and a cost reduction of approx. 25% due to the cost of the new material.

Selective references:
1. M. Schwartz, Brazing, Second Edition, The Materials Information Society, ASM International, Materials Park, Ohio 44073-0002, ISBN 0-87170-784-5, 2003.
2. E. F. Binchiciu, Integrated brazing technologies with advance precursors, PHD thesis, University Politehnica Timisoara, 2016.