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Producing of aluminium matrix composite wire

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Continuous fibre reinforced aluminium matrix composite wires were perspective materials as reinforcing core wire whether in electrical conductors or preferentially reinforced castings. Since the last years of the 2nd millennium composite cores were developed as reinforcement instead of a steel core in the high-tension electrical conductors. The much lower thermal expansion and the much higher specific strength were their advantages. Actually the leading type between these special products is the aluminium conductor composite core (ACCC) cable, in which the reinforcing is made of polymer composite tube that is filled with carbon fibre. Another type of low sag electric conductors is the ACCR cable (aluminium conductor composite reinforced), in case of that high strength steel or invar alloy core wires are replaced by aluminium matrix, alumina fibre reinforced composite wires. In the long-term practice, only two solutions were successfully applied for producing aluminium matrix composite wires. The first one is the 3M's ultrasonic-assisted infiltration and the second one is the Blucher's process. This last one applies continuous infiltration with gas pressure, but only the first infiltration is used on an industrial scale. The most critical step of the Blücher's process is that, the reinforcing fibre roving is pulled across the molten aluminium containing gas-pressure system. The Blucher's process was developed at the Metal Matrix Composite Laboratory of the Northeastern University (Boston MA, USA), but in 2005 the laboratory was transferred to Budapest University of Technology and Economics. The article describes those results, which were achieved in the new working period of the Metal Matrix Composite Laboratory.

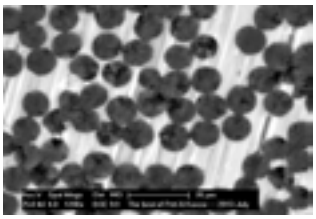

Figure: Cross section of a carbon fibre reinforced aluminium matrix composite wire

Recent Publications:

1. Blucher J T, Narusawa U, Katsumata M and Nemeth A (2001) Continuous manufacturing of fiber-reinforced metal matrix composite wires – technology and product characteristics. Composites Part A: Applied Science and Manufacturing 32:1759–1766.
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3. Kientzl I and Dobránszky J (2008) Production and Behaviour of Aluminium Matrix Double Composite Structures. Materials Science Forum 589:105-110.
4. Leal A A, Deitzel J M and Gillespie J W (2009) Compressive strength analysis for high performance fibres with different modulus in tension and compression. Journal of Composite Materials 43(6):661–674.
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Biography

Janos Dobranszky is working as a Scientific Advisor in the common research group for composite science and technology at the Hungarian Academy of Sciences and Budapest University of Technology and Economics. He is a Mechanical Engineer and International Welding Engineer. Since 2015, he is a Habilitated Doctor of the Faculty of Mechanical Engineering of BME and Doctor of the Hungarian Academy of Sciences. His main research field interests are Metal Matrix Composites, Biomaterials and Biocomposites, Weldability of Stainless Steels, Failure Analysis of Wood cutting Band Saw Blades. He is the Hungarian Delegate in the Commission VI of the International Institute of Welding.

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