WEAR PROTECTION OF COMPONENTS OUT OF COPPER IN HOT RUNNER TECHNOLOGY

Task

In hot runner technology, copper working materials are first choice due to their high heat conductivity. A disadvantage, however, is their low service life as a consequence of high abrasive wear, which results from high current speeds and pressures of up to 2500 bar. The state-of-the-art technique to increase the lifetime of gate tips is the soldering or pressing of steel into the copper-based component. As a consequence of thermal loads, cracks can form or the tips can come loose during industrial operation.

Method

During Laser Metal Deposition (LMD), metal powder is applied in the interaction zone between laser beam and substrate and melted in the laser beam. Here, the coating is fused to the base material in a metallurgic connection. With this process, it is possible to apply layers up to a thickness of several millimeters. For the company Schmelzmetall, Fraunhofer ILT has developed an LMD process by applying a cobalt-based alloy on the copper alloy K265. In a second step, gate tips were made at Schmelzmetall out of coated preforms, which are currently being tested in industrial operation, compared to conventionally manufactured gate tips in terms of service life.

Result

The cobalt-based alloy (JetKote 7206) can be applied free of cracks and pores on the copper alloy K256. The coating fuses metallurgically to the base material and has a hardness of 600 HVO.3. Field tests are currently being conducted. Parallel to this, the LMD strategy is being adapted in order to attain short processing times so that the process fulfills industrial requirements.

Applications

The main field of application is found in the plastic processing industry and its suppliers. Further applications are wherever the high heat conductivity of copper is needed, but also where high wear protection is required, thus, for example, in the die cast industry.

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1 LMD-coated gate tip from the company Corvaglia.