
100 kW DC ARC GENERATOR WITH A DIVERGENT CHANNEL OF INTER-ELECTRIC INSERTER AND ANODE

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Normally, current density of the arc root attached on anode surface of a non-transferred direct current (dc) arc generator is exceedingly high. This has always caused quickly deep erosion of anode, and has been the main bottleneck by which the effective utilization and long-duration operation are limited. Our previous work had designed and ran the generator with special anode structure to disperse the arc column and to make sufficiently diffused attachment of the arc root on the anode surface [1-2].

In the present work, a dc arc plasma generator, with nitrogen or air as the working gas, was designed for around 100kW input power and very low erosion rate of its anode. Main difference with the previous design is that an inter-electric inserter is added and set between the cathode and anode. Working gases were fed by two passes separately into cathode cavity (main gas) and between the inserter and anode (auxiliary gas). The inter-electric inserter has a flow-restrictor of 5mm diameter and downstream expansion angle, to disperse the arc column by gasdynamic expansion and to reduce the current density attaching on the anode surface at downstream of the inserter. The arc current was set at 100A-370A, and the arc voltage changed up to 330V as the gas feeding rate up to 400 slm in total.

Results show a sufficiently diffused arc root attachment on the anode surface. Increasing the flow rate of auxiliary gas, arc voltage increased apparently, when the arc current was fixed. No deep local erosion could be observed on the anode surface.

Keywords: dc arc plasma generator, Nitrogen arc, Air arc, Diffused arc root attachment, Light anode erosion.

Reference

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This work is supported by National Natural Science Foundation of China (No.11575273, 11735004).