

New Busbar Network Concepts Taking Advantage of Copper Collector Bars to Reduce Busbar Weight and Increase Cell Power Efficiency

Marc Dupuis

Consultant

GeniSim Inc., Jonquière, Québec, Canada

Corresponding author: marc.dupuis@genisim.com

Abstract

At the 2015 ICSOBA conference a reversed compensation current (RCC) busbar network concept was presented. There is no return potline as the full return current passes under the cells back to the rectifiers. The concept preferably uses upstream and downstream anode risers to produce a symmetric upstream/downstream steady-state bath-metal interface deformation. This busbar arrangement gives a very stable cell operation but requires more busbar weight.

In order to reduce the busbar weight, the concept has been improved by the use of copper collector bars, which allows extracting 100 % of the cell current on the downstream side of the cell and then feeding 50 % of the current to the standard upstream risers and 50 % to busbars passing under the next cell to the downstream risers. The improved concept has alternated upstream and downstream risers. It decreases busbar voltage drop and increases cell power efficiency.

This concept can also be used for the external compensation current (ECC) busbar design, which does not require downstream anode risers and reduces the busbar weight and cell voltage further. This paper presents detailed results for B_x , B_z , metal pad flow, cell voltage and power efficiency, for improved RCC and ECC concepts.

Keywords: MHD cell stability; busbar design; mathematical modeling; power efficiency; copper collector bars.