

MONDAY, AUGUST 22, 2005, P.M.

SESSION 5: INTERNATIONAL SYMPOSIUM ON LIGHT METALS

PRIMARY ALUMINIUM

Sponsor(s): Light Metals Section, The Metallurgical Society of CIM

Room: Neilson 2

Chair(s): A. BOLDUC, Alcan, Canada and
D. GALLIENNE, Aluminerie Alouette, Canada

PAPER 5.1—14:00

ANODE EFFECTS AND PFC EMISSION RATES.

A. TABEREAUX, ALCOA, U.S.A.

The reduction of perfluorocarbon (PFC) emissions from aluminum electrolytic cells is a key issue in reducing greenhouse gases at all aluminum smelters. The emission of tetrafluoromethane (CF₄) and hexafluoroethane (C₂F₆) gases during anode effects at smelters can be calculated using two different methods; anode effect-minutes slope and anode effect overvoltage. This work demonstrates that the optimum method depends to a large extent on the type of anode effect kill algorithm utilized at each smelter. CF₄ emissions vary widely from aluminum cells depending on the type of anode effect kill method utilized; fast, aggressive anode bridge movements vs. slower, moderate anode bridge movements.

PAPER 5.2—14:25

IMPACT OF USING SELECTIVE COLLECTOR BAR RODDING ON THE MHD STABILITY OF A 500 kA ALUMINIUM ELECTROLYSIS CELL.

M. DUPUIS, GeniSim Inc., Canada and
V. BAJAREVICS, University of Greenwich, United Kingdom

It has been previously demonstrated [1, 2] that using selective collector bar rodding have a big impact on the uniformity of the current density at the top surface of the cathode block and hence on the intensity of the horizontal current in the metal pad. The present study presents the impact of using selective collector bar rodding on the MHD stability of a 500 kA aluminium electrolysis cell. For this purpose the recently developed MHD package for the aluminium reduction cell time dependent behavior is used.

PAPER 5.3—14:50

STUDY OF THE THERMALLY-INDUCED SHELL DEFORMATION OF HIGH AMPERAGE HALL-HÉROULT CELLS.

M. DUPUIS, GeniSim Inc., Canada and
D. RICHARD, Hatch, Canada

It has been previously demonstrated [1] that there is no obvious thermal balance related issue limiting the size of a Hall-Héroult cell. Yet, it is well known that a forced air sidewall cooling system is part of the AP50 cell design [2]. In the present study, the authors analyze the impact of thermal loading on the mechanical deformation of high amperage cell potshells. The effect of adding cooling fins or a forced air sidewall cooling system is then assessed.

COFFEE BREAK—15:15–15:45

PAPER 5.4—15:45

OPTIMIZATION OF THE BUILDING VENTILATION OF A BATH TREATMENT PLANT OF AN ALUMINIUM SMELTER USING CFD MODELING.

E. DERNEDDE, Kroll International, Canada

Industrial plants located in the province of Quebec, Canada, are subjected to large variations of the ambient air temperature. Building ventilation systems of these plants must have some flexibility in order to meet industrial hygiene standards (TLV for chemical substances, heat stress and cold stress) at any time of the year. The building ventilation of a bath treatment plant of an aluminium smelter in Quebec was examined under summer and winter conditions. Part of the plant has periodic emissions of hydrogen fluoride gas and heat from hot anode butts. CFD modeling was used to optimise the building ventilation of the bath treatment plant. The present study proposes a modified building ventilation system, which improves the internal environment, complies with industrial hygiene standards and also reduces heating costs by 20 % during winter.