

FOCS – Fiber-Optic Current Sensors

Success Story: FOCS Installation in Aluminium Smelter



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BACKGROUND

In aluminium smelters, current measurement is needed to control the potline current as a mean to control the process as well as an indication of the production efficiency.

Our customer is an aluminium producer in Europe. The potline is equipped with 5 rectifiers feeding 160 pots with a total of 189 kA at 680 Vdc. The ABB FOCS-225 is replacing an existing Hall effect sensor, which will become obsolete once the current increase for higher production is completed.

SUCCESS FACTORS

The ease of installation as well as flexibility of placement, due to the sensor's lightweight design as well as inherent immunity against stray magnetic fields, were some of the factors for success of the ABB FOCS.

Our large know how in optical sensors, our continuous development since 1987 and our ten years operational experience, were other points in our favour.

WORK PERFORMED

During one day only, the ABB FOCS has been unpacked and completely mounted around a life busbar. No production stop was needed.



During the erection of the sensor, it was appreciated that the sensor head weight is very light. Only one person was needed to mount the sensor head and to move the pre-assembled U-shape forming the top half over the busbar.

The sensor, able to measure 225 kA with an accuracy of 0.1%, has been energised the same day and the first measurements were taken.

MEASUREMENTS AND RESULTS

As the production increase was to be started at a later date, we had the opportunity to run the Hall effect sensor and FOCS in parallel for direct comparison.

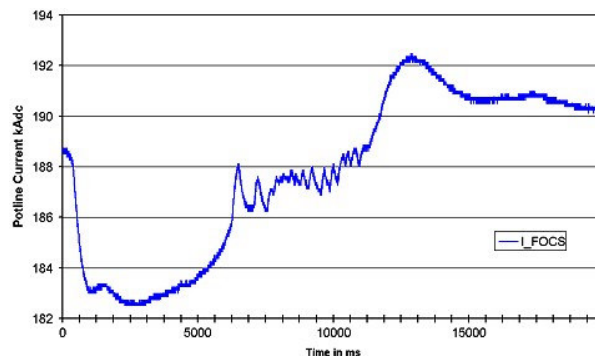
A difference of 400 to 500A was found between both sensors. Based on the alumina consumption, the customer was expecting a difference in this range.



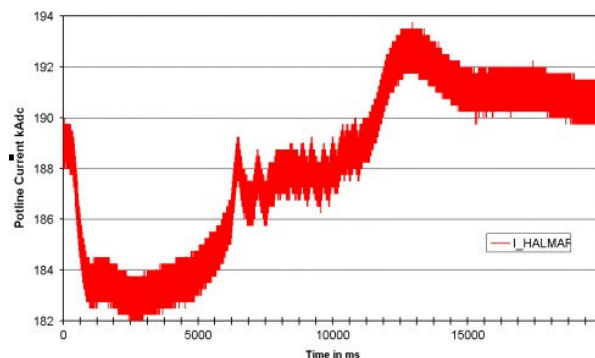
Power Electronics
High Power Rectifiers

MEASUREMENT OF ANODE EFFECT

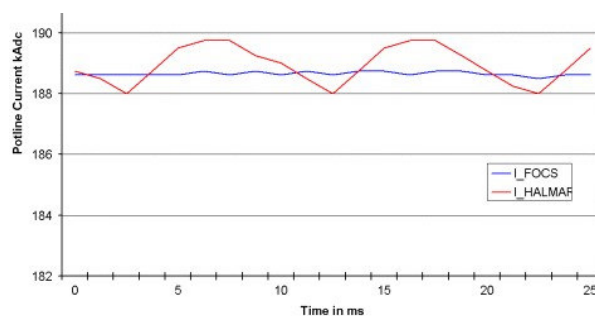
The below graphs - based on a 1.25ms sample time - show some details of measurements and are thus a direct indication of the performance of both sensors.



Response of ABB FOCS during Anode Effect



Response of Hall sensor during Anode Effect



The above graph shows a 100 Hz noise in the Hall effect sensor. The origin of this noise is a result of the Hall effect sensors auxiliary supply generated from a 50 Hz AC voltage converted to DC.

ABB Switzerland Ltd.

Baden/Turgi
Switzerland

Tel: +41 58 589 38 09

Fax: +41 58 589 20 90

E-Mail: focs@ch.abb.com

Internet: <http://www.abb.com/powerelectronics>