



EARLY DETECTION OF DECREASING PERFORMANCE OF ELECTROLYTIC CELLS

In an electrochemical plant it is very important to detect any decrease of the performance of electrolytic cells as early as possible to minimize the economic consequences, because in most cases the performance loss is irreversible, which means either significantly increased production costs or high maintenance costs and high production loss to replace the damaged components.

An irreversible increase of the voltage of all cells by just 30 mV, caused for example by impurities in the feed brine, increases the power costs in a world scale plant in Europe by more than 500 T€/a.

Even a problem with a single cell, for example an insufficient electrolyte flow, causes severe consequences, if the problem is detected too late and an irreversible damaged cell has to be replaced, because the complete electrolyzer has to be idled for maintenance.

Several events can decrease the performance of electrolytic cells, but most of them are directly affecting the voltage of the cells. EMOS measures the voltage of electrolytic cells with a worldwide unique precision, but the voltage is also affected by other operating parameters in a wide range. In addition all industrial electrolytic cells are showing from startup high differences in performance and are aging different. Therefore the detection of decreasing performance of cells has to be based on the modeling of the individual behavior of the cells.

R2 has developed an **Early Detection Engine (EDE)**, as an extension of EMOS Monitoring, which compares online the actual voltage of the cells with a predicted voltage, which is calculated by EDE based on the individual “normal” performance of the cells and the actual operating parameters. Inside EMOS Monitoring deviations can be alarmed or can be used to trip the corresponding electrolyzer. In membrane cells after shutdown and during startup EDE also identifies pinholes and classifies their severity.

The models describing the “normal” behavior of the individual cells are delivered by R2. R2 is developing the models with its propriety IMU2 software, a neural network modeling tool. The required historical data from the plant are extracted from the R2 database, where EMOS Monitoring is continuously storing all required information.

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