Water Technologies & Solutions
Case Study

Shandong Power Plant retrofits with E-Cell* EDI stacks to treat boiler feedwater

MK-3 electrodeionization (EDI) stacks reduce operating costs and improve reliability

Project Summary

End-User ..... Shandong Power Plant A
Location ..... Shandong Province, China
Commissioned 2010
Application ..... boiler feed water
Technologies ..... electrodeionization (EDI)
Capacity ..... 220 m^3/hour total, with 55 m^3/hour per system

Factors Impacting Technology Selection – previously installed EDI system from Competitor A had high power consumption and frequent maintenance; Competitor A was excluded from replacement consideration

Operational Results –two new suppliers were tested side-by-side with E-Cell demonstrating nearly 75% less energy required versus Competitor B; choosing E-Cell resulted in approximately $50,000 (USD) in energy savings annually; product water resistivity for E-Cell was 17 MOhm-cm versus 14 MOhm-cm for Competitor B

Winning Value Proposition – operational stability; energy savings; minimized maintenance; safety

Keywords – electrodeionization (EDI); E-Cell MK-3; competitor replacement; retrofit; boiler feedwater; power; energy savings; reduced operating cost; reliability

Figure 1: SUEZ's E-Cell system used at Shandong Power Plant

Challenge

Before 2010, the end-user installed and operated a competitor's (Competitor A) EDI stacks to generate boiler feedwater at the end of an integrated membrane solution of UF+RO+EDI. Due to high power consumption and frequent maintenance, the end-user decided to replace Competitor A's EDI systems. Operational stability, energy-savings, minimized maintenance, and safety were all important criteria in the evaluation of the replacement stacks and systems.

Solution

In 2010, the end-user decided to run side-by-side testing of two EDI suppliers not previously used at the plant – SUEZ's E-Cell and another multi-national competitor, Competitor B. The previous performance of Competitor A disqualified them from being included in the replacement evaluation. The side-by-side tests

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of the new suppliers were to compare the performance of the respective EDI stacks from the different brands in standard operations at the plant. SUEZ and Competitor B were installed on parallel systems, each with 55 m^3/h of product flow, for this evaluation. After testing the end-user planned to select the one with better performance to replace the other two sets of existing EDI systems. These two sets were an additional 110 m^3/h of product flow capacity.

The testing was completed with 16 stacks of E-Cell MK-3 EDI product. Competitor B's EDI product was installed at the same capacity and same quantity of stacks.

Results

After a period of operation, SUEZ's E-Cell MK-3 proved to provide better product water performance and lower power consumption as shown in Table 1.

Table 1: Operation data

Parameter	SUEZ's E-Cell MK-3	Competitor B
Product resistivity	17 MOhm-cm	14 MOhm-cm
Product flow	55m^3/h	53m^3/h
Voltage	100V	250V
Current	2A	3A

With side-by-side operational data versus Competitor B and a history of poor performance at this plant from Competitor A, SUEZ's EDI was shown to provide superior boiler feedwater for this power plant at lower operating energy costs. SUEZ's EDI also showed the ability to maintain stable and reliable performance while requiring minimum labor and maintenance. The E-Cell MK-3 DC power consumption is only 0.06 kWh/m^3, much lower than Competitor B's EDI DC power consumption of 0.23kWh/m^3. For this case, compared with Competitor B's EDI stacks, choosing SUEZ resulted in nearly 75% less energy required and saved the end-user around $50,000 (USD) in energy every year.

In 2013, the end-user then installed SUEZ's E-Cell MK-3 stacks to replace the stacks from Competitor B used in the side-by-side testing and began operating the plant with only SUEZ's E-Cell stacks installed.

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