

عنوان مقاله:

Technical and Economic Analysis of U-Bundle Heat Exchangers for MRS Station of Shirvan Power Plant

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خلاصه مقاله:

This study proposes a compact and cost-effective U-bundle heat exchanger as a replacement for the existing bath-type heater at the MRS station of the Shirvan combined cycle power plant. This heat exchanger supplies gas at the appropriate temperature to the power plant inlet and prevents temperature drops due to pressure reduction at the MRS station. The TEMA CFU configuration was chosen for its ease of maintenance and optimal heat transfer performance. The effects of inlet hot water temperature and mass flow rate on outlet gas temperature and the total cost of the heat exchanger were evaluated. Optimization revealed that adjusting hot water inlet temperature is more cost-effective than varying mass flow rate. Additionally, a smaller shell diameter and larger tube length and number yielded the most economical design. The newly designed heat exchanger, compared to the existing one, has significantly smaller dimensions due to the implementation of forced convection and a larger heat transfer surface area, hence it occupies significantly less space. The economic analysis showed that the initial cost is recovered within ۳۹ months through substantial gas savings and eliminated heater-related expenses. The significantly shorter payback period, when considering the export value of the consumed gas, combined with reduced environmental impact, makes the design an interesting alternative to conventional heaters.

کلمات کلیدی:

Heat exchanger, U-bundle, Natural gas, Optimal design, Shirvan MRS

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