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Pinch Analysis in a Hydrocracking Unit using FI2EPI

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Abstract

Process Integration may strongly decrease the minimum energy requirements, and therefore the energy costs, that are a significant parcel of the operating costs in a refining process. Pinch analysis methodology allows calculating the required minimum energy in terms of utilities, therefore maximizing process heat recovery.

This paper presents a case study of a heat exchanger network (HEN) retrofit with the aim to reduce the utility consumption in a reaction section of a refinery Hydrocracking Unit, using FI²EPI, a heat-based pinch analysis freeware tool.

With FI²EPI, one can analyse process streams, cooling and heating requirements to further proceed to establish the process energy targets. By identifying the pinch point location, FI²EPI automatically plots the composite curves and grand composite curve of the process. The tool also enables the user to insert data about the already installed HEN, allowing a grid representation that can be used on future comparisons between the actual process and other alternatives that accomplish the minimum energy requirements or minimum total cost. It also allows to discuss the use of different utilities to decrease the global energy cost. FI²EPI’s features are presented through an application in a real section of a refining process with an existing HEN. The retrofit case, which suggest the existence of a heat exchanger network already installed, has to be analysed in a different way from a grassroot, since there are a lot of technological, investment and strategic restrictions. Preserving the main structure of the existing HEN, a set of scenarios based on economic and technical criteria are discussed, to lead to the best integration option.