Obtaining Total Site Heat Integration Profiles in a real refinery plant

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Abstract

Sines refinery’s processing configuration is oriented towards increased gasoline production through its catalytic conversion unit (Fluid Catalytic Cracking – FCC) and oriented towards maximising diesel production through its recent hydrocracker unit (HC), which initiated operations in January 2013, with the goal to convert vacuum gasoil (VGO), which comes from two different vacuum distillation units, from Matosinhos refinery and from imports, into value added final products. These comprise mainly diesel and jet, but also naphtha and LPG. Covering an area of 320 ha, the Sines refinery comprises 34 process units. This study addresses the hydrocracking unit (HC) and its supporting facilities - a steam reforming unit (HR), an amine treatment unit (AK) and a sulphur recovery unit (SC). The HC is a two stages unit which was designed to contain operational flexibility while maintaining a high conversion into middle distillate products (Kerosene/Jet and Diesel). The hydrocracking was analyse using a bottom-up approach to obtain the Total Site Heat Integration Profiles, i.e. piecing together units to obtain a global picture of the section. This will enable to explore scenarios of integration between units.

Process stream properties were obtained through Aspen HYSYS v8.8 simulations and a pinched-based analysis was performed with Aspen Energy Analyzer v8.8.