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DYNAMIC SIMULATION OF HEAT EXCHANGERS USING LINDE'S IN-HOUSE PROCESS SIMULATOR OPTISIM®

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ABSTRACT A heat exchanger model for transient and steady state simulation has been developed using Linde's process simulator OPTISIM® together with Linde's physical property system. The heat exchanger model is set up in a modular manner which allows the simulation of different heat exchanger types (e.g. Plate Fin Heat Exchangers / PFHE, Shell and Tube Heat Exchangers / STHE, Coil Wound Heat Exchangers / CWHE and much more). Furthermore, specific pressure drop and heat transfer correlations may be applied or predefined correlations may be used. The heat exchanger model accounts for mass, momentum and energy balance. A common-wall approach for the energetic coupling of streams and metal is used. Heat capacity and conduction of the metal parts are taken into account. The material flow is assumed to be homogeneous. For dynamic simulations, the initial temperature profiles may either be obtained by a stationary energy balance (for the analysis of load changes) or they may be set arbitrarily (start-ups and other scenarios). A comparison of steady-state solutions with well-known heat exchanger design tools and transient simulations are presented, e.g. effects of a closing valve at a STHE and PFHE or reduction of the warm flow of a CWHE.

KEY WORDS: Heat exchanger, Computational methods, Numerical simulation, Process simulation, Lifetime estimation, OPTISIM®