Global use of Rotating Disc Contactors

About yesterday, today and tomorrow

In the 1940s, Shell developed an extraction column equipped with rotating disks, called the ‘Rotating Disc Contactor’ (RDC), for systematically separating certain contaminants and aromatic compounds in oil mixtures by adding solvents. The machine works according to a counter-flow principle and is used extensively in the chemical, petrochemical and oil industries.

From the start of this development, ESCHER Process Modules (ESCHER) has manufactured various RDC’s for Shell and thus acquired a very strong reputation, partly thanks to continuous enhancement of the mechanical design. On account of its experience with RDC’s, ESCHER purchased from Shell in the early 1960’s the worldwide rights to use the RDC in several separation processes involving the addition of solvent.

General description of RDC’s

An RDC consists of a vertical cylindrical container that is evenly subdivided into a number of compartments by a series of rings. In the middle of each compartment, there is a disc supported by an axle. The discs are designed for easy disassembly for maintenance.

The highest-density liquid enters the RDC at the top. The liquid with the lowest density enters at the bottom and flows upwards in the opposite direction to the liquid with the higher density that flows downwards. Rotation disperses one of the liquids in the other one. Varying the rotational speed allows simple adjustment of droplet size of the dispersed phase and thus the efficiency of the RDC.

The rotor axle is fastened to a ball-shaped swinging roller bearing at the top and is centred (and supported) by a slide bearing at the bottom. There are one or more intermediate slide bearings depending on the size of the RDC.

This set-up makes it possible for the RDC to continue working when the rotor is in a stationary position. Repairs can then be carried out on the mechanical seal while the RDC remains in operation. Obviously, appropriate precautions have to be taken when doing this.

ESCHER designed each delivered RDC specifically for the intended application, based on expertise and experience gained in earlier projects – an approach still followed to this day. Thanks to this flexibility in design and resulting efficient manufacturing, the RDC can be used for numerous different dimensions and throughput volumes. It makes the RDC an ideal solution for many extraction processes in the chemical, petrochemical and oil industries.

Numerous RDC’s operate round-the-clock worldwide, and a sizeable database of technological feedback allows constant enhancement of the mechanical design. It took ESCHER a long time to reach this stage of design and manufacture of RDC’s. The high standard of service and expertise that ESCHER maintains and applies in the manufacture of RDC’s will definitely be in evidence in equipment being developed for resolving problems surrounding separation processes with solvent injection.

ESCHER recently delivered new internal RDC components to China Petrochemical Development Corporation (CPDC) in Taiwan. CPDC is Taiwan’s only manufacturer of caprolactam, and ranks among the world’s five largest producers of nylon 6-raw materials. This makes the RDC a key success factor for making caprolactam, the principal raw material used in the production of nylon 6 fibres and nylon 6 resins.

RDC’s of ESCHER are currently operating in various countries worldwide. A full list of references, including factory locations, can be obtained on request.

Martijn van den Bijllaardt
Project Engineer, Escher Process Modules