SUPERMAX® Units Excel As Solvent Condensers In Pharmaceutical Manufacturing

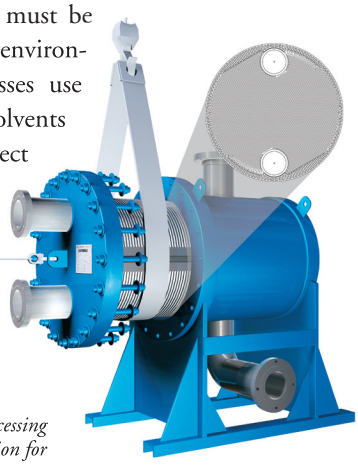
SUPERMAX® units are earning preference over shell & tube exchangers for their lower cost, rapid delivery, smaller footprint and easier maintenance.

In processes involving batch reactors with one or more organic solvents, the SUPERMAX® all-welded shell & plate unit offers potential for improved performance and efficiency. The opportunity for a significant solution can be quite substantial, since multiple condensers are often used on each batch reactor as primary and secondary condensers and vent condensers.

Tranter recently received a significant contract for SUPERMAX condensers from a leading bulk pharmaceutical producer in Hyderabad, India. The contract consisted of many SM-22 units, each with a surface area less than 120 ft^2 (12 m^2), and several SM-07 units, each with less than 60 ft^2 (6 m^2) of surface area. All units were supplied with the removable core option.

The Application

Batch reactor capacity ranges from 265 to 1585 gal (1000 to 6000 litres). Solvents used include methanol, toluene, dichloromethane, xylene, tetrahydrofuran, chloroform and others. Used only to dissolve the reactants, products and byproducts, the solvents must be recycled for efficiency and environmental reasons. Some processes use the condensers to cycle the solvents back to the reactor; some collect the condensate in tanks for reuse. In some processes, condensible reaction by-products are entrained with the solvent vapor.



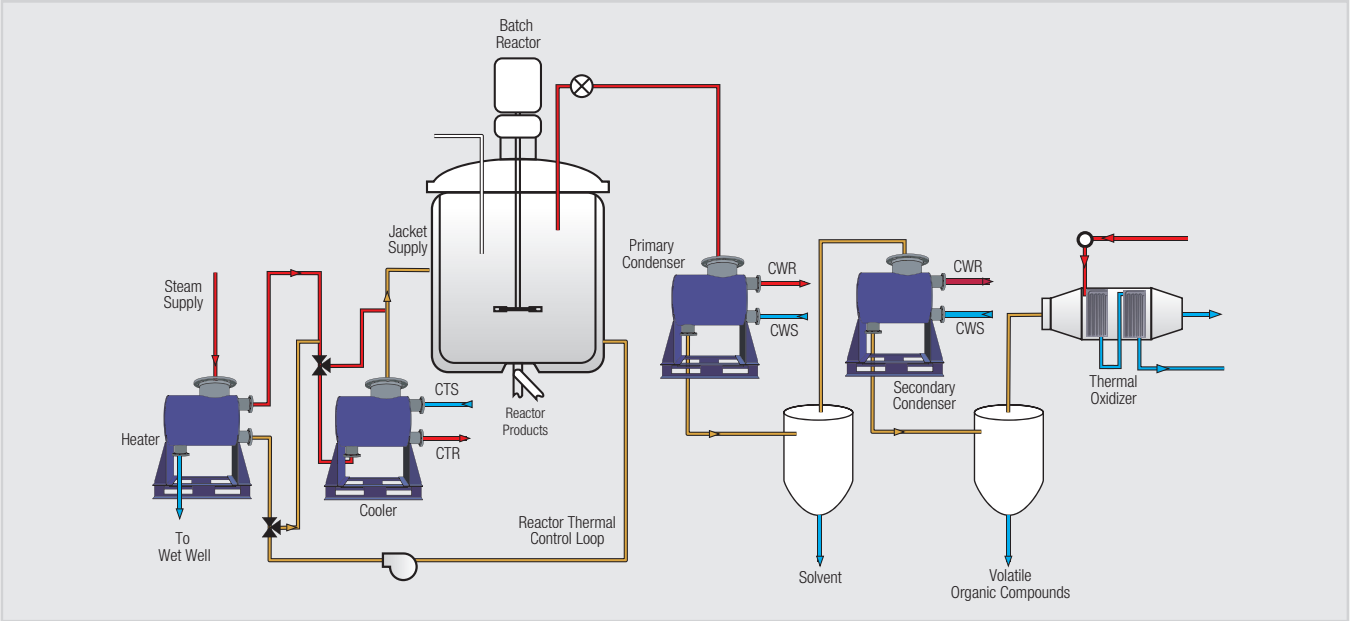
Pharmaceutical plants and chemical processing facilities prefer the removable cover option for solvent condensing duties because of its easy access and cleanability.

Upon completion of the various reactions in the steam-heated, jacketed reactors, the solvents are vaporized and condensed by a two-stage, primary and secondary condenser arrangement. A SUPERMAX secondary condenser, or subcooler, is often used with chiller water media to condense these volatile organic compounds (VOCs). Noncondensibles or refrigerants are sometimes removed by a thermal oxidizer.

The Opportunity

Conventionally, each reactor has S&T units as primary and secondary condensers, sized in accordance with reactor capacity. These units are relatively slow to respond; reactors with SUPERMAX units in many cases have a shorter vaporization/condensation cycle time, which can raise plant capacity. Additionally, the much larger S&T units require more steel, which raises their purchase price and makes necessary more elaborate and expensive support structures. Maintenance of S&T units is more difficult, considering that the tube bundle-pulling process requires more labor and space than removing the SUPERMAX cover/plate pack assembly for descaling.

These SUPERMAX advantages make reactor solvent condenser applications an attractive optimization strategy for pharmaceuticals and chemical process industries. In some cases, there may be an opportunity to replace slow-responding S&T units in the reactor thermal control loop with SUPERCHANGER® plate & frame or SUPERMAX all-welded units. Tranter plate HEs, with their smaller hold-up volume, can heat the jacketed reactor to the setpoint faster, conserve costly heat transfer fluids, and control reaction temperature more precisely. The benefit is better yield, lower energy consumption and less off-grade production.



Optimization strategies encompass not only solvent condensers but also the reactor thermal control heating/cooling loop with SUPERMAX or SUPERCHANGER units.

TRANTER®
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