

A Novel Slinger for Efficient Reflux Condensate Distribution in the Boiling Reactor

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Abstract

In a multiphase continuous boiling reactor, often condensate from the overhead reflux condenser is fed back to the reactor through either a dedicated condensate return or the feed line. Despite some advantages to adding all the condensate into the feed line, a significant portion is purposely returned directly to the reactor, where a slinger distributes it over the free liquid surface. Commercial slingers consist of multiple straight, radial vanes atop a horizontal disc that rotates with the mixing shaft. Ideally, slinger rotation in the reactor headspace spreads liquid over the entire annular gap between the disc and the reactor wall. This creates a full liquid curtain, or “umbrella,” that removes condenser-plugging particles from the upward-migrating vapor and rind-forming particles from the vessel wall. Unfortunately, the liquid from a standard slinger typically covers only a portion of the reactor cross-section. Therefore, it cannot prevent such plugging and rind formation. A novel slinger (KS-8) comprising eight curved radial vanes was developed and implemented in a Dow plant to overcome this liquid distribution limitation, and thus, improved asset reliability and utilization. This presentation addresses the key phases of the KS-8 development program: Ideation, Experimental, CFD Validation, and Implementation in the plant.

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