The separation of crude oil into its various fractions, through the process of crude distillation, cannot be completely accomplished by a single pass through the distillation column. Some heavy hydrocarbons will escape to the top of the column, just as some light hydrocarbons are entrained in liquid low in the column. In order to facilitate the proper distribution of the hydrocarbon, fractions refiners use two processes: reflux and reboil.

Reflux is the process of introducing vapor from the top of the column into a chiller. Fluid that condenses is returned to a lower point in the distribution column, which is at a higher temperature. Fluid that remains in the vapor phase is drawn off as product. Refluxing is effective at the top and middle of the distillation column. Typical service conditions will be hydrocarbon liquid and vapor at 70 psi and 220°F (overhead reflux) to 450°F (middle of column reflux).
The opposite situation to reflux could also exist. Here, light hydrocarbon is entrained in a heavy fraction at a point too low in the distillation column. This is corrected by directing a liquid side stream to a heat exchanger to increase its temperature, driving off lighter hydrocarbons as a vapor. This process is called reboiling.

Reboiling is effective in the middle and bottom of the column. It is an attractive process to the refiner because only a small portion of the total crude volume needs to be reboiled to achieve the additional recovery, saving time and money. Typical service conditions will be hydrocarbon liquid and vapor at 70 psi and 450°F (middle of column reboil) to 650°F (column bottom reboil).

**Valve Requirements**

There are multiple aspects to consider in the selection of products for reflux and reboil control valve applications. First, the fluid is almost always withdrawn from the column at or near its boiling point. Because of this, flashing or cavitation is a real possibility. Second, the reflux, reboil rate from one column to the next may differ greatly, based on total crude capacity. The decision of Finetrol® and whether to utilize Q-Trim® are made by examining the application with Metso Automation's Nelprof control valve sizing program.

The Finetrol control valve is ideally suited for reflux and reboil control valve service. The basic choice of a rotary design, with its inherently superior shaft seal, is desirable to achieve compliance with stringent environmental requirements.

**Model Number and Description**

The Finetrol® FC_DWTAJ1KBSGGF- Quadra-Powr II positioner performs well in reflux control. The ANSI Class 300, carbon steel, fire tested construction with raised face flanges provides a basic construction to meet the codes and standards specified by refineries.

**Valve Design Features**

Abrasion resistant satellite internals are standard. Unique eccentric plug design and an installed linear flow characteristic provide for constant gain and precise control over a full 90° of rotation. Ease of repair is a key feature of the Finetrol. The seat retention mechanism, with its wide spiral groove joint between the body and seat retainer, assures perfect alignment without feeler gauges or lapping. The Finetrol, coupled with the Quadra-Powr II spring and diaphragm control actuator, and Metso Automation positioner allow for highly accurate, repeatable control when installed in the customers flow loop.

There are several options to further tailor the valve to the customers specific flow parameters. Q-Trim anti-cavitations and noise attenuation trim is available to address any flashing or cavitation predicted by Nelprof. The Finetrol is also available in the ISA S75.03 globe valve length. This is important because many of the valves currently installed in these applications are globe valves. Stringent environmental standards are causing refiners to purchase valves that are equipped with high integrity stem seals. All Metso Automation valves meet the requirements of the U.S. Clean Air Act.

Metso offers the most up to date, cost effective designs to meet all of today's demanding application requirements. Higher Cv, cavitation noise reduction, enhanced shaft seals and highly accurate controls are just a few of the features that benefit the end user.