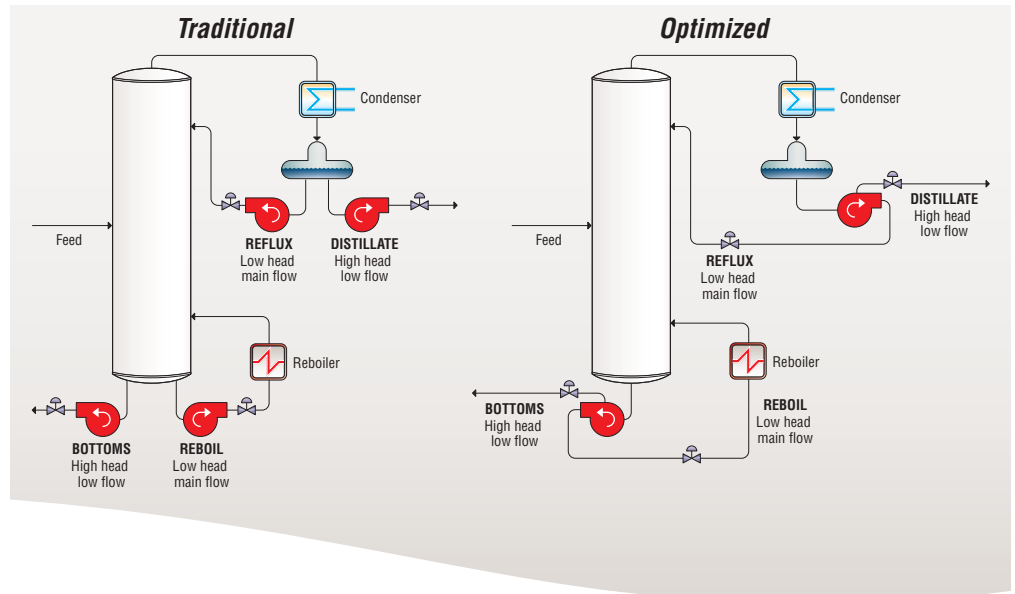


*Split Flow pumps are ideal for applications in which a single suction line transfers to two separate downstream destinations. The total number of pumps can be reduced by half without any loss in system performance.*



## Cost-saving, Dual-service Design

The latest Flowserve innovation for optimizing oil and gas pumping is the new Split Flow, dual-service process pumps: horizontal overhung (OH2), vertical in-line (OH3) and two-stage between bearings (BB2). Compliant with the critical design parameters of ISO 13709/API 610, Split Flow pumps are designed for applications in which a single suction line transfers discharge liquid to two downstream destinations. The total number of operating and back-up pumps can be reduced by half without any loss in system performance. The Split Flow also provides:

- Significant reduction of equipment and carbon footprint
- A decrease in the number of costly mechanical seals, flush plans and support systems
- Reduced maintenance expense
- Potential energy savings

## A Good Choice for Refinery Service

Distillation tower reflux and reboil services are ideal applications for Flowserve Split Flow pumps. In both of these services, there is a dual need for the process fluid. Reflux requires high flow/low head liquid recirculating back into the tower, while a slipstream of low flow/high head distillate liquid needs to be sent downstream. Similarly in reboil bottoms, most of the process stream is recirculated back into the column, while a smaller volume at higher pressure is transferred to a charge furnace.

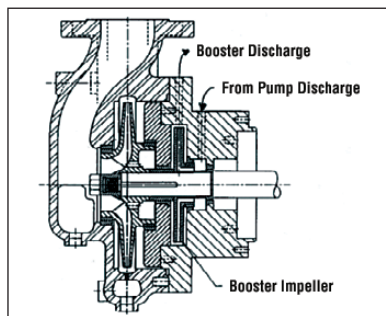
Typically, each of these services requires individual pumps to handle the four separate discharge streams (“traditional” system in the above diagram). These four pumps are frequently supported with installed spares, for a total of eight pumps for a single distillation tower. By using the Flowserve Split Flow pumps, however, refinery operators can support the system requirements with only two pumps (or four pumps if installed spares are used) per the above diagram.

### Engineered for System Simplification

Based on the HPX and HWX pumps respectively, the OH2 and OH3 Split Flow models feature a dual chamber configuration with an impeller in the primary chamber and a rotating disc in the secondary chamber. Impeller and disc are arranged to balance the axial thrust and are fitted with wear rings. Depending upon hydraulic requirements, a multiple-blade Barske or a low specific speed impeller may replace the rotating disc to provide low flow/high head BEP performance for the slipstream.

BB2 Split Flow is also applied to the two-stage HED pump. In this case, the secondary or “Slipstream” discharge is accomplished by a take-off line off the second stage.

|              | OH2                                  | OH3                                  | BB2                                 |
|--------------|--------------------------------------|--------------------------------------|-------------------------------------|
| Flows to     | 275 m <sup>3</sup> /h<br>(1200 gpm)  | 275 m <sup>3</sup> /h<br>(1200 gpm)  | 680 m <sup>3</sup> /h<br>(3000 gpm) |
| Heads to     | 185 m<br>(600 ft)                    | 185 m<br>(600 ft)                    | 455 m<br>(1500 ft)                  |
| Pressures to | 42 bar<br>(600 psi)                  | 42 bar<br>(600 psi)                  | 80 bar<br>(1160 psi)                |
| Temperatures | -160°C to 450°C<br>(-250°F to 840°F) | -185°C to 400°C<br>(-300°F to 750°F) | Up to 450°C<br>(840°F)              |



### Refinery Scores Impressive CAPEX and OPEX Savings With Split Flow Pumps

A California (USA) refinery was expanding capacity to include a new fractionation unit. Refinery operators elected to install a Split Flow pump on the reflux service, rather than the typical two-pump arrangement. It was an OH2 pump with top/top nozzles with an installed spare unit.

This Split Flow pump was fitted with a conventional OH2 impeller in the primary chamber and a rotating disc with drilled holes in the secondary chamber. These elements were arranged back-to-back. Most of the pump discharge went back into the tower as reflux. A low-flow fluid stream off the pump discharge nozzle fed the secondary chamber with full discharge pressure, which was further increased by the rotating disc. This slipstream liquid was expelled into a secondary distillate line. This design resulted in a marginal increase in shaft length and shaft flexibility index ( $L^3/D^4$ ), with very little impact on shaft deflection and well within ISO 13709/API 610 requirements.

It is important to note that in many cases, the slipstream distillate is handled by a conventional centrifugal pump operating far back on its performance curve. Such an arrangement needlessly wastes energy. The secondary chamber disc used in the Split Flow pump was specially designed to deliver BEP hydraulics and reduce energy use.

The Split Flow process pump at this refinery delivered 15 years of reliable service, requiring only routine mean time between planned maintenance. The refinery owner realized savings of US\$240 000 in installed capital cost and an annual energy savings of US\$25 000 due to improved hydraulic fits.

Bulletin PSS-10-5.6 (E) Printed in USA. May 2012.  
 © 2012 Flowserve Corporation

#### To find your local Flowserve representative:

For more information about Flowserve Corporation, visit [www.flowserve.com](http://www.flowserve.com) or call +1 937 890 5839.

#### USA and Canada

Flowserve Corporation  
 5215 North O'Connor Blvd.  
 Suite 2300  
 Irving, Texas 75039-5421 USA  
 Telephone: +1 937 890 5839

#### Europe, Middle East, Africa

Flowserve Corporation  
 Parallelweg 13  
 4878 AH Etten-Leur  
 The Netherlands  
 Telephone: +31 76 502 8100

#### Latin America

Flowserve Corporation  
 Martín Rodríguez 4460  
 B1644CGN-Victoria-San Fernando  
 Buenos Aires, Argentina  
 Telephone: +54 11 4006 8700  
 Telefax: +54 11 4714 1610

#### Asia Pacific

Flowserve Pte. Ltd.  
 10 Tuas Loop  
 Singapore 637345  
 Telephone: +65 6771 0600  
 Telefax: +65 6862 2329