



# AutoShift™ Slim Combination Decoking Cutting Tool

*Flowserve has pioneered many significant advancements in hydraulic decoking and has transformed it into an increasingly safe, efficient and automated process.*



## Revolutionizing Hydraulic Decoking

*With more than 100 years of decoking experience through its Worthington®, Pacific® and IDP® heritage brands, Flowserve is the undisputed global leader in hydraulic decoking systems. It has pioneered many significant advancements in hydraulic decoking and has transformed it into an increasingly safe, efficient and automated process. Now, with its new AutoShift Slim combination decoking tool, Flowserve is poised to revolutionize the industry.*

The AutoShift Slim combination decoking tool makes remote operation feasible by removing the operator from the cutting deck. Mode shifting is accomplished automatically and remotely by water pressurization and depressurization, not manually as with other tools. As such, there is no personnel exposure to the following dangers:

- High-pressure water
- Hot spots or steam eruptions
- Hydrogen sulfide (H<sub>2</sub>S) vapors
- Mechanical hazards

### AutoShift Slim Tool Benefits

The AutoShift Slim combination decoking cutting tool provides numerous benefits to hydraulic decoking operations, including:

- Improved operator safety
- Greater system automation
- Easier maintenance with field-replaceable nozzles
- Increased robustness to prevent tool damage
- Slimmer profile to reduce “stuck” tools
- Shifting flexibility to free “stuck” tools
- Manual shift feature



*Proprietary AutoShift Decoking Tool*

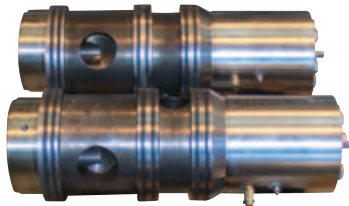
## Hydraulic Decoking Made Safer

With the proprietary AutoShift Slim combination decoking cutting tool, hydraulic decoking is automated, simplified, and most importantly, safe.

Traditional combination cutting tools require extensive handling to shift cutting modes manually. First, a pilot hole must be bored downward from the top of the drum through the coke bed using downward-oriented nozzles of the decoking tool. Then, the tool must be raised to the top of the drum where either the entire tool or the operating mode of the combination decoking tool is changed to use side-oriented cutting nozzles. Finally, the tool must be rotated and moved vertically downward in the pilot hole, where the side-oriented nozzles cut the balance of the coke and flush it out the open bottom of the drum.

Removal of the cutting tool from the drum, to either change it out or change its cutting mode, is a cumbersome and hazardous operation. Raising the tool out of the vessel can be very dangerous if the proper control system is not in place to terminate the fluid cutting pressure to the cutting tool.

The AutoShift Slim combination decoking cutting tool eliminates these dangers and reduces cycle times by shifting modes automatically and remotely in the drum. Moreover, its ability to remotely shift operating modes means that operating personnel do not need to be on the cutting deck, risking exposure to hot gases and mechanical hazards. The time savings positively impact the production capacity of the refinery by returning the decoked vessel to service quicker.



## Available Retrofit Cartridge Assembly

*Today's AutoShift cartridge assembly for new and retrofit cutting tools*

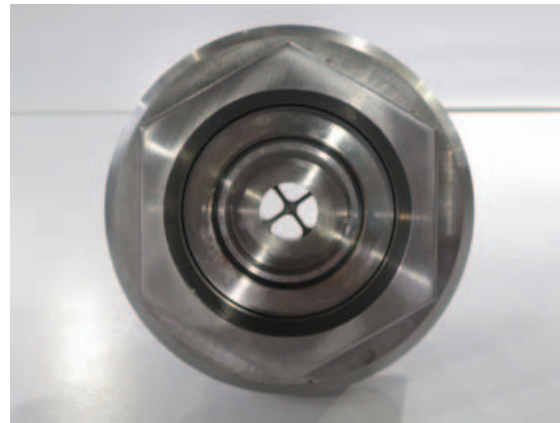
## Available Upgrade Kit

AutoShift Slim is not just available as new equipment. Existing Flowserve combination cutting tools, like the AutoShift, Rotaryshift and Flowserve Pacific tools can be upgraded to AutoShift Slim technology. The AutoShift Slim retrofit kit includes redesigned nozzles and a mounting plate that fit existing Flowserve combination tool bodies.

The conversion requires the following assemblies:

- AutoShift cartridge (for conversion of older combination tools)
- A set of cutting and boring nozzles
- The reduced profile mounting plate

The conversion comes as a complete kit that can be retrofitted quickly at an authorized Flowserve Service Center. The retrofit includes a documentation package containing updates to the original operating manual.



*AutoShift Slim Nozzle*

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