

Drive & Control profile

A Spotless Reputation:

Car Wash Manufacturer Shines with Hydraulic Design for “Touchless” System



The D&S 5000™, a high-pressure touchless, brushless automatic car wash, ushered in the next generation of car wash system designs. As the gantry rounds a vehicle curve to proceed down the front or back, it reduces speed in its descent, while a hydraulic counterbalance valve prevents runaway. The gantry passes over the vehicle, applying high-pressure wash, spot-free rinse, and optional chemicals.

In the early 1990s, before maturing into the competitive, high profile businesses we know today, car washes were considered eyesores and were often tucked away behind large department stores. With little emphasis placed on marketability, the car wash equipment industry of the time was largely influenced by price—a deciding factor that would quickly change with equipment technology. Capitalizing on new innovations in “touchless”

technology, D&S Manufacturing, Inc., a stainless steel carwash manufacturer headquartered in St. Louis, introduced the D&S 5000™ high-pressure touchless, brushless automatic car wash—ushering in the next generation of car wash system designs.

When the D&S 5000™ was first introduced in 1991, component selection, like any equipment purchase, was driven by price. As

Challenge

Improve speed, performance, and operability of next generation of automatic car wash systems

Bosch Rexroth Solution

- Industrial Hydraulics
- Gear pump
- D03 manifold
- Proportional throttle valve
- Fixed gear pump

Benefits

- Variable speeds and cycle times improves car wash and increases number of cars serviced
- Elimination of previous third manifold station dedicated to slow speed actuation
- Proportional throttle valve allows for higher speeds without abrupt starts and stops
- Wide range of speeds supported for various car wash stages

business owners began to realize the potential profitability of the car wash, they also began to clamor for faster wash cycles and a better quality wash. In response, D&S embarked on a redesign of the D&S 5000™ and contacted its fluid power partner John Henry Foster Company (JHF), a leading hydraulic and pneumatic distributor in St. Louis.

JHF reviewed the criteria and proposed a complete system solution using hydraulic components from Bosch Rexroth Corporation's Industrial Hydraulics division.

“The D&S goal has always been to help each car wash owner build a successful operation and achieve the maximum potential return on their investment,” said Dave Benedict, D&S CEO. “Our cooperative efforts with John Henry

Foster meshed our individual competencies and produced incredible results in the second generation D&S 5000™. Their design input allowed us to incorporate higher quality Rexroth components, resulting in better overall system performance—all while staying within our cost parameters.”

Two-Station Manifold Cleans Up Design

Ted Cassimatis, Phil Green, and Ken Strain, members of the JHF sales and engineering team and contributors to the D&S 5000™ re-design, described the early hydraulic system as a 7-1/2 HP motor and a double pump mounted on a vertical tank. A tree-station D03 manifold with standard directional valves and sandwiches controlled the main U-shaped gantry speed, the side spinner motor, and the oscillator motor. When a vehicle entered the



To solve the challenges of the previous D&S 5000™ design, the John Henry Foster team proposed a 7-1/2 HP electric motor powering a 6.5 GPM Rexroth gear pump and a two-station series D03 manifold.

car wash, it actuated a switch on the tire treadle prompting the gantry to pass over the vehicle. The gantry applied presoak as it moved over the top of the vehicle and a hydraulic motor operated the oscillators during the entire cycle. When the gantry rounded a vehicle curve to proceed down the front or back, it would reduce speed in its descent, while a hydraulic counterbalance valve prevented runaway. At the bottom of the descent, an electronic eye signaled the gantry back up. The gantry passed over the vehicle, applying high-pressure wash, spot free rinse, and optional chemicals depending on the desired wash package.

“When we reviewed the original system design we quickly uncovered several issues that we knew we could remedy,” recalled Cassimatis, who cited several examples. The team noted the unit ran hot and the hydraulic motor on the gantry would sometimes stall in extreme heat conditions. The oscillators only needed 0.6 GPM, but were fed by a dedicated 1.1 GPM gear pump. In addition,



Introduced at the Car Care World Expo 2002 in Chicago, the patent-pending D&S Super 5000™ car wash touts even faster cycle times and higher quality washes.

the customer wanted more speed on the main gantry without increasing the motor horsepower.

To solve these challenges, the JHF team proposed a 7-1/2HP electric motor powering a 6.5 GPM Rexroth gear pump and a two-station series D03 manifold. A small custom block on the first manifold station housed a priority flow control valve (0.6 GPM with +/- 25 percent tuning adjustment) for the oscillators and the balance of the flow went to the main gantry. A relief for both circuit legs was also incorporated. The second station provided oil to the main gantry via a Rexroth DO3 standard directional valve, and a kick down relief valve reduced pressure as the gantry went to the bottom of its stroke. JHF observed that the unit actually slowed to an ideal speed with the kick down relief, eliminating the previous third station that had solely been for slow speed actuation.

“The redesign of the D&S 5000™ was faster, simpler, higher quality and more reliable,” summarized Benedict. He also noted that D&S labor to assemble the system placed it soundly within the required price range.

Cutting Cycle Time, Improving Clean

As demand in the privately owned market grew, D&S decided to design a new touchless system specifically for the convenience store and oil company service station market. This D&S Super 5000™ car wash received rave reviews from industry experts. Touting even faster cycle times and higher quality washes, the Super 5000 is also capable of sizing a vehicle and only traveling the distance required. This gives a better wash on the rear of shorter cars and shortens the entire cycle time, which in turn increases the number of cars washed per day. D&S also included remotely adjustable variable speeds for each individual pass of the car, giving the system the ability to adjust its speed depending on the chemical that is being applied to the car—an adjustment that provides a better overall wash.

When the JHF team first looked at D&S’s wish list of variable speeds and cycle times for the new Super 5000, it was apparent that ramping capabilities were needed to give smooth acceleration and deceleration for the carriage and gantry movements. Given a high inertial non-overrunning load and only one function operating at a time, JHF chose a Rexroth fixed

gear pump system and proportional throttle valve for bleed-off speed control of the carriage and gantry. The proportional valve allows the Super 5000 to attain higher speeds without abrupt starts and stops and with an infinite number of speeds for presoak, high-pressure wash, spot free rinse and optional chemicals.

“The Rexroth proportional throttle valve was really the key to the Super 5000 project,” said Cassimatis. “It made the infinite number of speeds possible, while keeping the system simple with only one proportional valve to control both the carriage and the gantry functions. Car wash owners can adjust each pass to their own preference with the ultimate in speed and flexibility.”

Other fixed-speed functions—side spinners, oscillators, and optional side blasters—are fed by a priority flow control valve and each function has manual independent speed control. These features, as well as other new engineering changes, reduced the cycle time by up to 30 percent depending on the size of the vehicle. JHF also designed a custom manifold to incorporate all valving and organize the system piping with fewer connections, fewer leak points and easier access, all in a smaller, lightweight package.

Rexroth
Bosch Group