

HYDRAULIC SYSTEMS

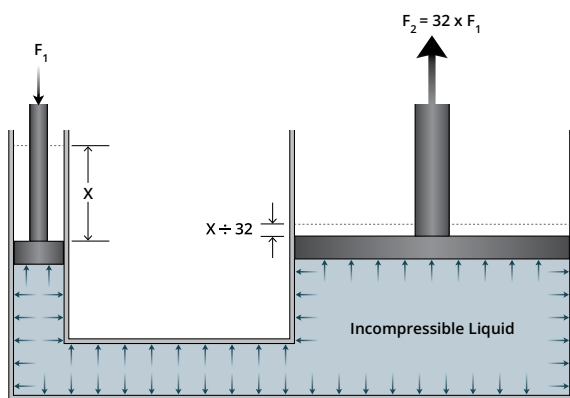
HYDRAULIC POWER

The use of hydraulics in modern machinery has been commonplace for centuries. Hydraulics are used in just about every application from cars, trucks, cranes, diggers, dumpers, excavators, bulldozers and of course sweepers. The main difference in the NiteHawk is how we harness hydraulics as our main sweeper power system.



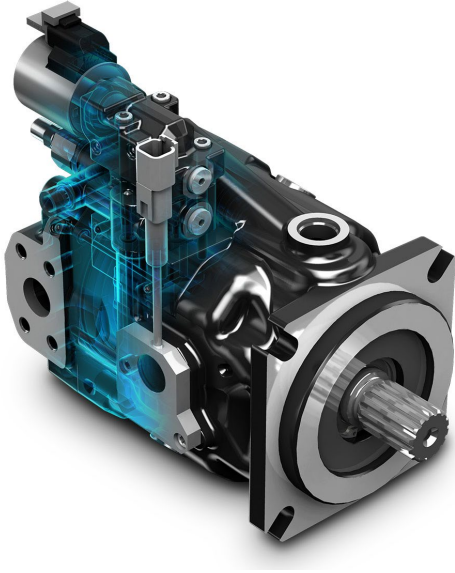
HYDRAULIC BASICS

Hydraulics use incompressible liquids (usually oil in modern machinery) to move around energy. The basis for all hydraulic systems is expressed by Pascal's law which states that the pressure exerted anywhere upon an enclosed liquid is transmitted undiminished, in all directions, to the interior of the container. This principle allows large forces to be generated with relatively little effort. For example, a 5-pound force exerted against a 1 inch square area creates an internal pressure of 5 psi. This pressure, acting against the 10-square inch area develops 50 pounds of force.



This is why hydraulic systems are so powerful and efficient. In mobile applications, the size of the pump or motor relative to the force and power generated gives hydraulics a significant advantage in the size to production ratio. And because they contain few moving parts and can operate for an extended periods of time with little maintenance, they are a popular means of controlling motion.

HOW A VARIABLE DISPLACEMENT PISTON PUMP WORKS



Casappa MVPD Pump

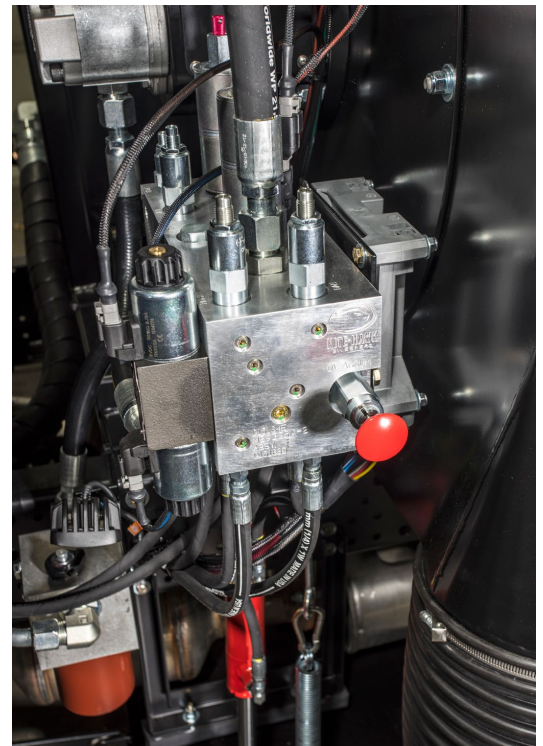
The pump has pistons in cylinders arranged parallel to each other and rotating around a central shaft. A swashplate at one end is connected to the pistons. As the pistons rotate, the angle of the plate causes them to move in and out of their cylinders. A rotary valve at the opposite end from the swashplate alternately connects each cylinder to the fluid supply and delivery lines. By changing the angle of the swashplate, the stroke of the pistons can be varied continuously. If the swashplate is perpendicular to the axis of rotation, no fluid will flow. If it is at a sharp angle, a large volume of fluid will be pumped. At NiteHawk we use an electrically actuated compensator to control the pump and thereby allowing the operator to adjust the sweeping performance based on application.

WHY NITEHAWK AND WHY HYDRAULIC?

At the heart of every NiteHawk Sweeper is our revolutionary hydraulic system that keeps us as the domestic leader in the medium-size sweeper market.

Performance

Whether your challenge is routine trash pickup or light sand, rock, or gravel our units are versatile and powerful. Purpose built curved fan blades modeled after the turbofan in a jet engine achieve unmatched capability with a fraction of the input horsepower. Our partnership with organizations like Casappa have facilitated an impressive size to output power ratio to achieve best in class performance.



Reliability

Our advanced series pumps and motors are rated for far higher pressures than our typical operating range. These components are specifically designed to handle the harsh environments in which we operate. Millions of actual sweeping hours logged each year demonstrate our system can withstand the rigors of everyday sweeping and give us the confidence to offer the longest warranty in the industry.



Simplicity

The sweeper incorporates a sleek electronic controller to operate all sweeping functions. The interface allows the operator the ability to adjust sweeper settings to match the operating environment with minimal training.

CAN bus allows for microprocessor control of pressure and rpm input, leading to precision tuning of the hydraulic system with the chassis engine. Intuitive hydraulic component gauges give immediate feedback for easy inspection and maintenance. A non-CDL chassis platform gives the flexibility to train operators quickly and thoroughly.

Longevity

NiteHawk Sweepers has produced hydraulic sweepers for close to four decades. Our warranty is the longest in the industry because we have the confidence derived from those decades of experience and real world testing.

The natural lubricating ability of our hydraulic pumps and motors allows for a longer life cycle. The open design hydraulic system coupled with the large capacity baffled reservoir keeps oil temperatures well within specified operating range. Filters on both the pressure and return side offer additional protection against potential contamination. Our three-stage filter system cleans the oil thoroughly for long component life. The hopper unit is stainless steel and powder coated to further protect against the harshest environments. NiteHawk Sweepers are designed to operate 7 days a week and 365 days a year.



Eco-Friendly

No auxiliary engine, no emissions! With NiteHawk you won't sacrifice performance for the environment. Eliminating the complicated and everchanging maintenance pit of an auxiliary engine reduces your carbon footprint. We don't exhaust any air while sweeping, which reduces particulate matter and fugitive dust expelled into the air. Sweeping is also a best management practice and integral part of a sustainable storm water runoff plan. We also offer biodegradable hydraulic fluid as an option.



Reduced Maintenance

Routine system inspections, with yearly fluid and filter changes, are all that's needed to keep the hydraulics running optimally. Assuming normal operation and routine service, your major hydraulic components will provide years of high output service at minimal cost. Fluid and filter conditions are shown by simple indicators available for visual inspection. Flaps, skids, and other wear parts are easy to inspect, repair, or replace. Controller USB ports allow for quick diagnostic feedback for troubleshooting. Training mechanics and service personnel can be done onsite in less than a day by our training staff.

Quiet

Simply put, no other sweeper is as quiet as a NiteHawk. The sweeper unit may operate in the most discerning environments like hospitals or HOA's. Decibel levels outside the truck are in the low 70's enabling the unit to stealthily sweep where others can't. Sound levels inside the cab are even lower, increasing operator comfort and reducing fatigue. Driver safety and comfort is paramount, and NiteHawk stands alone in the reduction of sound pollution.





Operational Efficiency

Total cost of operation is the lowest in its class. By eliminating the auxiliary engine, we have reduced fuel usage by as much as 50% in comparison to our competitors. Our maintenance to run time ratio exceeds any other sweeping unit. The ability to drive at freeway speeds makes the unit suited for any environment.

The piston pump is considered the most efficient of all the hydraulic pumps. The hydraulic variable displacement piston pump converts the mechanical energy of the truck motor into hydraulic energy for use in the fan motor and the other hydraulic components of the sweeper system. The efficiency of this energy transference allows the sweeper to operate with lower input energy (horsepower and torque) than an auxiliary engine. Eliminating the complexity and reduced reliability of an auxiliary engine is key in maximizing operational efficiency.

Warranty

Simply put, we have the longest warranty in the business. We can offer the comprehensive coverage because we have the confidence to back it up. The thousands of NiteHawk sweepers in operation are a testament to our product quality and longevity. Our 5-year unlimited hydraulic warranty and our commercial chassis supplied coverage create the strongest warranty in the industry.

Customer Service

Our knowledgeable customer service representatives have years of experience and our fully stocked parts department has overnight service. Our online parts store is open 24 hours a day. Equipment schematics, factory training, and real time troubleshooting are also available to keep you up and running.

Innovation

NiteHawk continues to push forward with advanced fuel solutions like liquid propane gas (LPG) and compressed natural gas (CNG). We design and test to rigorous standards. Our engineering team can customize options to meet individual RFP standards and our marketing team can create customized wraps for promotional use.

