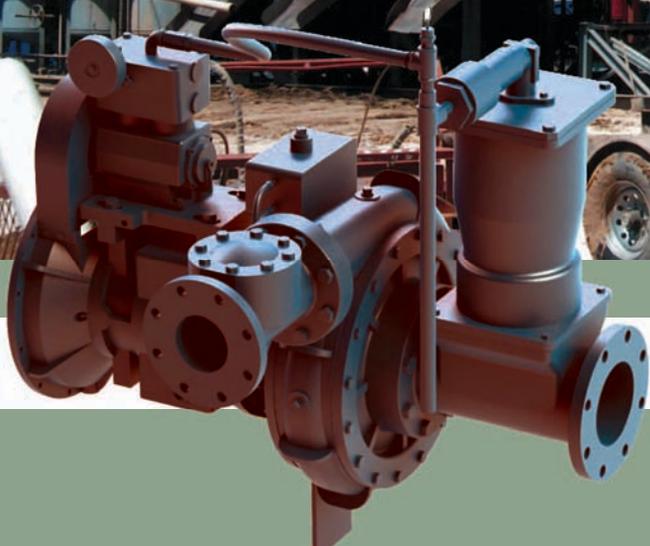




# CORNELL PUMP COMPANY OIL & GAS



EFFICIENT BY DESIGN



## OIL & GAS MARKET

Cornell pumps are designed and engineered for the most rugged and demanding installations. From the Antrim to Woodford Shales, Cornell pumps have exceeded operating expectations, and provided hydraulic fracturing companies unprecedented uptime, reliability, and efficiency.

Cornell pumps have been designed and manufactured to exacting standards since 1946 in Portland, Oregon. We supply pumps for not only Oil and Gas exploration/extraction, but also mining, municipal, agricultural, food processing, industrial, and rental applications.



## OIL & GAS PUMP QUALITIES

### HIGH EFFICIENCY

Cornell has produced highly efficient pumps since 1946; many of our configurations lead the industry with efficiencies above 87 percent. With fuel prices at record levels, Cornell pump's high energy efficiency stretch your money further on-site. Cornell manufactures more than 65 clear liquid and non-clog pumps that meet or exceed optimum efficiency standards for centrifugal pumps. Many Cornell installations save users significant costs through increased efficiency. That's money you can put back into your operation! The bottom line – Cornell Oil and Gas pumps cost less to operate.

### SOLIDS HANDLING

Cornell's two- and three-port enclosed impellers are designed to handle large solids and maintain exceptional hydraulic efficiencies. Cornell's Delta™ style impeller is specifically designed for handling stringy materials and heavy sludge for low- to medium-head applications. The three- or four-vane, semi-open impeller generates a cutting action designed to handle concentrated slurries for high head applications.

Cornell offers a wide range of Solids Handling pumps, from 1.25" through 30" discharge size, to handle the most difficult oil and gas applications. Cornell Solids Handling pumps can be found in a wide range of applications in the Municipal, Agricultural, and Industrial markets; and are available in a variety of mounting configurations including Close-Coupled, SAE Engine, Horizontal, and Vertical mounted.

### THICKER, SLEEVED SHAFTS

The Alloy steel shaft is more than 25% thicker than most other competitors. This allows the shaft to work under greater stress and still perform well. The sleeved shaft prevents materials from flowing back into the pump and prolongs the shaft and seal life. Sleeves are standard on Cornell Pumps—if available from a competitor, they are often expensive options. 420HT sleeve shafts are available for abrasive materials.

### SILICON-CARBIDE SEAL

Externally lubricated mechanical seal is standard. Seal can be run dry on high vacuum even when pumping highly abrasive materials.

# OIL & GAS APPLICATION STORY

## NEW PUMP MODELS MAXIMIZE PRODUCTION AND MINIMIZE COST

Richard Holton (CID), Southeast Regional Manager

A Gulf Coast based pump supplier of Cornell, one of the leading suppliers to the shale fracturing industry, had a customer that faced piping hydraulic fracturing water transfer with multiple pumps. New Cornell pumps helped pump more efficiently with lower fuel costs.

The company operated six miles of twin 8" pipeline with 100' of positive elevation change over the length of the pipeline. To supply the water, the company needed to pump 100 barrels of water per minute (4200 GPM) through the pipeline.

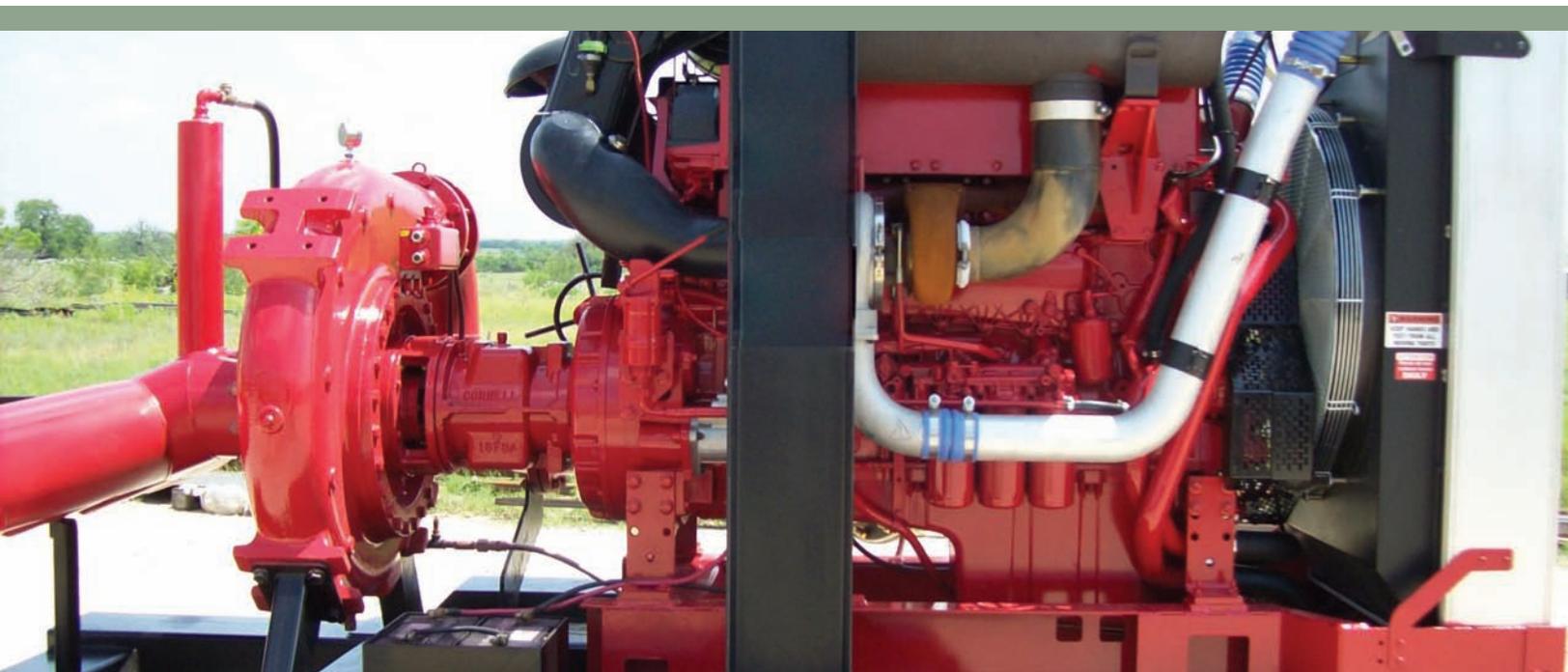
The water transfer company had nine 6NHTB's on site to do the job. Three of the 6NHTB's were sitting at the water source as the supply pumps. Spaced long the twin 8" pipelines were six more 6NHTB's at various intervals to boost the pressure. This required significantly more labor to initially set, maintain and monitor nine pumps than the solution pumps.

After Cornell and the dealer analyzed the specifications for the system, an option was recommend that cut the number of pumps needed to three. The solution was to place an 8NHTH at the water as a supply pump and to place one 6822MX on each 8" pipeline as booster pumps. Not only did this cut the number of pumps by two thirds, but it also drastically reduced diesel fuel consumption on the project.

The 6822MX is part of Cornell's high head "MX" line of mining pumps that has been released since 2010. The "MX" line of pumps boasts industry-leading performance with flows up to 8,000 GPM and heads up to 800' TDH. They are available in 2"-8" discharge sizes and include ductile iron casings with CA6NM impellers.

While the 8NHTH may not be a new pump for Cornell, it is relatively new to the oilfields. It is a 10X8 pump that boasts a maximum 20.50" impeller with a max flow of 8400 GPM and a shutoff head of 460'. This impressively solid pump has wide flow range with excellent efficiencies.

Since being introduced into the oilfields by the supplier in 2011, the "MX" pumps and the 8NHTH have substantially changed the way many of these difficult projects are approached. It is no longer necessary to stack large numbers of pumps to do long pipe runs or drastic elevation changes. These pumps have become staples of many oilfield companies' product offerings.





## CORNELL PUMPS FOR THE OIL & GAS INDUSTRIES

Cornell Pump Company produces pumps with extra heavy wall thickness, featuring industry leading efficiency. We produce water distribution pumps in most popular sizes from 3" to 8", with up to 28 feet of suction, 475 feet of head and 7000 GPM flow. Cornell's series of pump lines for oil and gas exploration, application dewatering, and hydraulic fracturing follows:

### MP SERIES

MP Series Mining Pumps are designed for coarse abrasives. Cornell Pump Company's MP Mining Pump Series brings patented Cycloseal® technology to the oil and gas industry. Adding to Cornell's, diverse range of dewatering pumps, MP series mining pumps offer high operating pressures, and are specifically designed for coarse abrasive slurry applications such as sand, gravel, coal, manure, and mine dewatering.



### MX SERIES

New high pumps featuring a four vane enclosed impeller design, handles solids up to 2". A slurry pump with efficiencies up to 75 percent, the MX series is designed for high operating pressures and high flow requirements. Dependable, high quality construction set it apart from other slurry pumps—CA6NM impellers are standard on the pumps. Available in horizontal frame and SAE mount configurations.

### HYDRAULIC SUBMERSIBLES

A premium pump with hydraulic efficiencies of 76 to 80 percent BEP, the pumps handle 3" or larger solids, with total dynamic head of up to 360 feet, and up to 7,000 GPM. Designed for mining, oil/gas, industrial, flood control, and agricultural applications, standard construction is a class 30 cast iron, with optional construction in 316SS, CD4MCu, and ductile iron.





## CUTTER PUMPS

Winner of the 2012 Innovative Product of the Year award from Pumps & Systems magazine, the cutter is designed to break up clogs and reduce ragging. Used in oil and gas operations to remove wastewater from the site. In applications, its ability to pass through solids saves up to \$31,000 per installation per year on maintenance costs.



## SP SERIES

Cornell Pump Company's SP Series Slurry pump brings patented Cycloseal technology to the oil and gas industry. Adding to the diverse range of O&G dewatering pumps, The SP Series Slurry pump offers a Cornell solution to abrasive applications throughout the mill process. The SP Series incorporates double-casing design, with replaceable liners and impellers available in both chrome iron and rubber. The patented Cornell Cycloseal® incorporates a unique deflector vane back plate and expeller to offer a reliable, single mechanical seal design, even in the most severe operating conditions. The optional Run-Dry™ reservoir offers protection without the need for flush water.

## WET PRIMING

Cornell's line of horizontal self-priming centrifugal pumps is equipped with semi-open impellers for handling liquids containing solids in suspension. These pumps can operate satisfactorily with liquids containing air or dissolved gases. Various Materials of Construction are available for the Self-Priming Pumps: All Iron, All Stainless Steel, All Bronze, Stainless Steel Fitted and Bronze Fitted. Pumps have removable rotating assemblies, replaceable front and rear wear plates, bearing oil monitors, separate oil fill ports, and double lip seals for bearing protection.



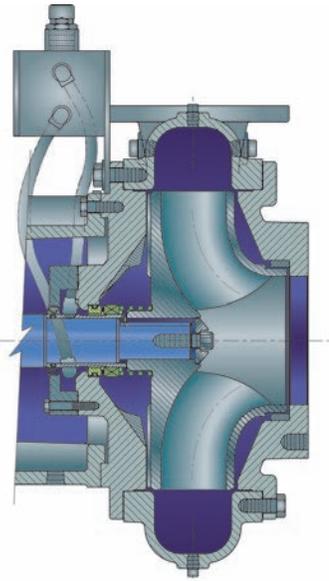
## SUBMERSIBLE

At Cornell we understand the need for reliability, durability and efficiency. This is why we have coupled our pumps with the most reliable and durable submersible motors on the market. Cornell motors are FM approved and suitable for Class I, Division I, Group C & D, explosion proof service and are inverter duty. Non-wicking, permanently numbered leads are potted into a separate cable cap assembly, preventing leakage to the stator.

Cornell motors are protected by thermostats and utilize class F insulation. Dual moisture probes are installed for the early detection of seal failure. Capacities from 80 GPM to 15,000 GPM and heads from 10 feet to 400 feet give Cornell a clear performance advantage.



## OPTIONS AND CHARACTERISTICS

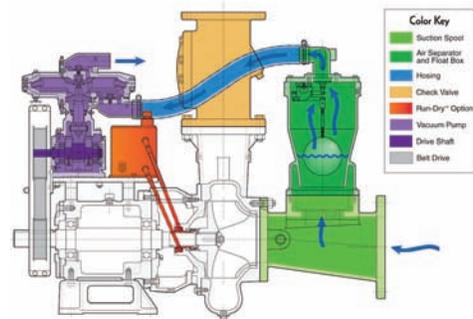


### CYCLOSEAL®

Cornell's Cycloseal® design, with its unique deflector vanes, works with the impeller backvanes to create a cyclonic-action. This action removes solids and abrasive material from the seal area while purging air and gas pockets – extending seal life and eliminating any need for venting or water flush. The Cycloseal® design extends seal life up to three times that of a conventional mechanical seal. Longer seal life translates into less down time and lower maintenance costs.

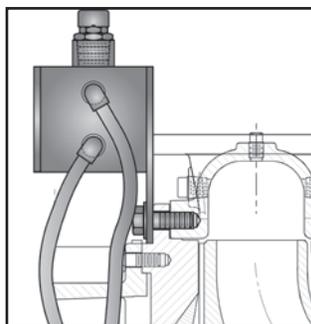
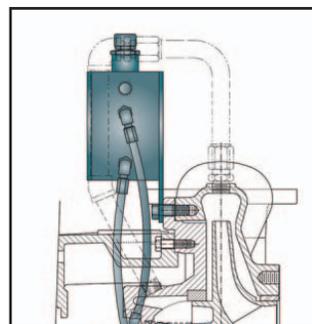
### REDI-PRIME®

Cornell's patented priming and repriming system allows your pumps to work properly, unattended. Redi-Prime® pumps are designed with oversized suction to provide more flow, reduce suction friction losses, and make air liquid mixtures with ease. The widest range of dry repriming pumps in the industry, Redi-Prime® is available on virtually all of Cornell's Solids Handling and Clear Liquids pumps, from 1.25" to 30" discharge. Valued by rental and OEM's around the world, Redi-Prime® provides a distinct advantage to your application.



### RUN-DRY™ OPTION

Run your pump dry without the use of expensive water systems and without mechanical seal damage. Cornell's Run-Dry™ system consists of an auxiliary gland which provides containment for an application-specific lubricant present at the inside diameter of the mechanical seal faces. This lubricant prevents dry running of the seal faces while priming, re-priming, and on standby. The Run-Dry™ gland is connected to a lubricant reservoir via inlet and outlet lines which are oriented tangentially to the pump shaft so that shaft rotation provides circulation and subsequent cooling of the lubricant.



## FEATURES

- Heads up to 800 feet possible
- Valve eliminates any liquid carry-over
- Suction lifts up to 28 feet
- Industry leading two-year warranty

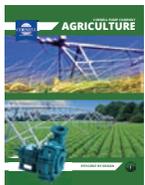
## BENEFITS

- Fully automated priming and self-priming, dry-run pumps
- Handles air/liquid mixtures with ease
- Patented Cycloseal®, Redi-Prime®, and Run-Dry™ options
- Handles large sized solids
- High suction-lift capabilities up to 28 feet
- Up to 7000 GPM flow
- Cornell competitive advantage: patented engineering features





# MARKET AND PRODUCT LINE



AGRICULTURAL



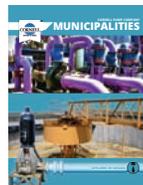
FOOD PROCESS



INDUSTRIAL



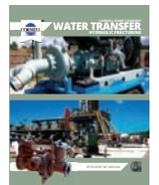
MINE DEWATERING



MUNICIPAL



REFRIGERATION



WATER TRANSFER



CHOPPER



CUTTER



EDGE™



HYDRAULIC SUBS



HYDRO TURBINE



IMMERSIBLE



MANURE



MP SERIES



MX SERIES



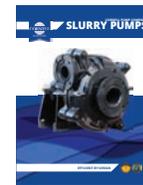
OIL & GAS



REDI-PRIME®



STX SERIES



SLURRY



SUBMERSIBLE

Cycloseal®, and Redi-Prime® are Registered Trademarks of Cornell Pump Company.

Cornell pumps and products are the subject of one or more of the following U.S. and Foreign patents: 3,207,485; 3,282,226; 3,295,456; 3,301,191; 3,630,637; 3,663,117; 3,743,437; 4,335,886; 4,523,900; 5,489,187; 5,591,001; 6,074,554; 6,036,434; 6,079,958; 6,309,169; 2,320,742; 96/8140; 319,837; 918,534; 1,224,969; 2,232,735; 701,979 and are the subject of pending U.S. and Foreign Patent Applications.



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