

CUTTER PUMPS

SOLUTIONS TO PLUGGING PROBLEMS



CUTTER PUMPS



WASTEWATER RAGGING AND FOULING

More than six billion flushable toilet wipes, plus over one billion floor and counter cleaning wipes, mingle with countless paper towels, baby wipes, feminine hygiene products, grease, and other coagulants in sewers worldwide EVERY YEAR!

A problem that didn't exist fifteen ago has 'wiped out' many water utilities' maintenance and repair budgets. Instead of building infrastructure, wastewater engineers have been cleaning out pump stations up to three times a day, auguring out force mains, and picking away at so-called 'fatbergs' the size of buses just to keep systems running.

It's a problem—a big problem, and one that must be addressed to keep sanitation functioning around the world.

WHAT SETS CORNELL PUMPS APART

Since 1946, Cornell Pump has been a trusted manufacturer of durable and high-efficiency pumps for the industrial market, delivering unparalleled value to our customers. Our clear liquid, solids handling, and grit/slurry pumps are engineered to meet the demanding requirements of industrial applications, providing unparalleled reliability and interchangeability. With a broad range of pump models and configurations, we can easily integrate our pumps into your existing systems. Moreover, we offer custom system design to meet your specific needs. Our team of technical and engineering experts is among the best in the industry and can provide innovative pump solutions of the highest quality.

PUMPS DESIGNED FOR SPECIFIC JOBS

Our team of expert engineers design pumps to meet the varying demands of industry applications, such as solids handling, slurry, and head requirements.



OUTSTANDING EFFICIENCIES

We put our experience and knowledge to work to produce tested designs with some of the highest efficiencies of any pumps on the market.



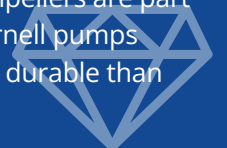
A WIDE VARIETY OF SIZES AND CONFIGURATIONS

Models range in size from 1" to 30" and a range of configuration options are available for each model – including frame and engine mount options and Cornell features like Run-Dry™ and Redi-Prime®.



ROBUST CONSTRUCTION

Cornell pumps are built using superior materials selected for their suitability to each pump's intended application. Heavier casting walls, thicker shafts, and fully-machined impellers are part of what make Cornell pumps more rugged and durable than other pumps.



WATCH A VIDEO

Use your smart phones QR reader to see a short video about the auger cutter solution for the SW Washington water district, or visit our website at <http://www.cornellpump.com/support/success-stories/>

CUTTER PUMPS

TWO CORNELL PUMP SOLUTIONS

In creating the cutter option to deal with wastewater ragging and fouling, a significant concern was to keep efficiency as high as possible. Two designs worked well—the blade cutter and the auger cutter. With a range of cutter solutions, users can choose the Cornell cutter which will suit their needs. Both provide Cornell quality and reliability.

MINIMAL INCREASE TO COST OF OPERATIONS

LABOR SAVINGS BY REDUCING CLEAN OUT EVENTS

TWO-YEAR WARRANTY

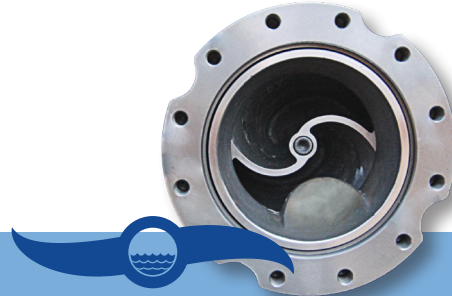
IMPROVE EFFICIENCY BY REDUCING DOWN-TIME AND PERIODS OF LOW FLOW



BLADE CUTTER

Consists of a rotating and stationary cutter utilizing a standard impeller.

- Minimal energy consumption (4% or less) for solution
- Designed to break up clogs/ragging
- Hardened cutter material
- Adjustable clearances
- Minimal flow restrictions
- Does not change external pump dimensions
- Retrofittable



WASTE WARRIOR

AUGER CUTTER

The more aggressive solution features scythe-like edges from the impeller eye, sweeping all the areas where the suction pipe meets the volute.

- Handles most aggressive and troublesome clogs and ragging
- Limited energy consumption (around 8%) for solution
- Hardened cutter material
- Insignificant flow restrictions
- Does not change external pump dimensions
- Retrofittable

HOW ARE CUTTERS AND CHOPPERS DIFFERENT?

Cornell also makes a chopper pump series in addition to the cutter pumps. While choppers can dice up even more aggressive clogs than cutters, they sacrifice flow, efficiency, and head to operate.

USE A CUTTER FOR:

- ✓ Clogs and ragging
- ✓ To save energy costs
- ✓ When you need a wide range of heads and flows
- ✓ If you want to retrofit
- ✓ If you are passing along to a main trunk or pipeline

USE A CHOPPER FOR:

- ✓ Severe plugging
- ✓ When energy efficiency is a minimal concern
- ✓ If the application will work with a narrow flow range
- ✓ If you don't need to work with existing equipment
- ✓ If you are unconcerned that material will plug further in process

SUCCESSFUL APPLICATIONS

Since its introduction in July 2011, Cornell cutter pumps have improved operations at treatment plants experiencing ragging and saved users thousands of dollars in maintenance costs.

CUTTER BLADES SAVE THOUSANDS IN SOUTHERN CALIFORNIA

The following is a testimonial from a Southern California water district's experience with Cornell's Cutter pumps.

"The water district replaced another manufacturer's pump with a Cornell 8NHTA cutter pump in February 2012. After installing this new pump, the Maintenance Superintendent went to the station to test it by cleaning the wet well. He indicated that this wet well was filthy, with a large blanket of rags and trash, which he intends to run through this pump for this test and to confirm that the pump can be used to clean the wet well on a routine basis. He had the Collections Crew stand by with wash water to wash down the wet well as he pumped this debris through the pump. According to his staff, even items, such as large plastic sports drink bottles, were running through the pump.

According to the superintendent, the pump never choked or indicated exertion. After thoroughly cleaning the wet well, his staff opened a volute inspection port to inspect the pump. It was clean and had no debris whatsoever in the impeller or volute.

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He was thrilled with this progress. They are considering installing or modifying existing pumps for at least one cutter pump per station."

-Cornell Distributor

CLOGGING PUMP STATION NEEDS INNOVATIVE APPROACH

A Southwest Washington water district started a wastewater management system to address the needs of 77,500 residents. The system has a pump station with an 18.4 mgd capacity at 200' TDH.

Shortly after being placed in service in December of 2008, the station experienced daily ragging that caused capacity to degrade from approximately 3,750 GPM to around 2,900 GPM. The decrease in flow reduced the daily output by 1.2 million gallons, effectively increasing the station's operating costs. The system operator tried fixes such as operating at different speeds and different operating levels. They changed the pump order and instituted a self-cleaning cycle. None of the fixes stopped the ragging. The station was taken offline in April 2009 and operated seasonally. In that capacity, it had to be de-ragged twice a day, seven days a week, at the cost of four hours of staff time per day.

Cornell's cutter was placed in the system in 2012. While the cutter reduced some of the issues and increased the flow rate, the eye of the impeller was still getting clogged more frequently than the system operator wanted.

Cornell got to work creating more than half a dozen prototype designs for new cutters to deal with the plugging of the impeller eye. The final solution used the stationary cutter from the original cutter system and added a cutter-auger that extended impeller vanes to the center to cut the ragging material.

The cutter-auger design reduced capacity somewhat but kept a consistent flow rate throughout the day.

Ragging events were reduced by more than ninety percent. The municipal water district is looking at retrofitting other pump stations where ragging is also a problem.

WHAT COULD YOU SAVE WITH CUTTERS?

The Southern California district estimated they saved about \$31,000 per year with the cutters, while the Southern Washington District figured between personnel and electric, they were saving more than \$41,000 per year. Most installations save thousands of dollars a year in staff time.

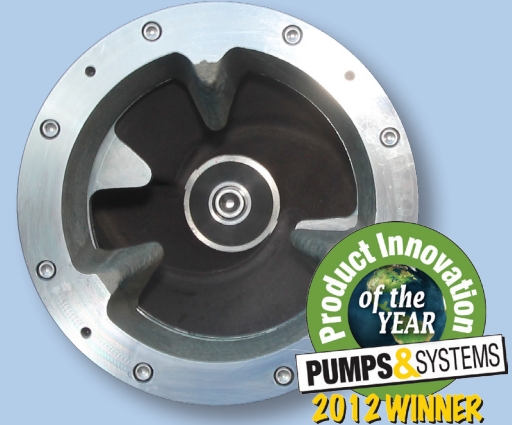
Cost Savings Example:

Average time per event (two workers for three hours)	6 hours
Cost per man hour	\$50
Total direct cost per event	\$300
Events per week:	2
Total annual direct expense	\$31,200
Total man hours saved that can be used maintaining other items	624 annually

CUTTER PUMP APPLICATIONS

SINGLE TOOTH WEAR PLATE

Useful with very high hay, water foilage and other stringy material content. Tooth holds the material without plugging eye of impeller. Sweeping motion of the cutter blade cuts up the material to pass through the pump.

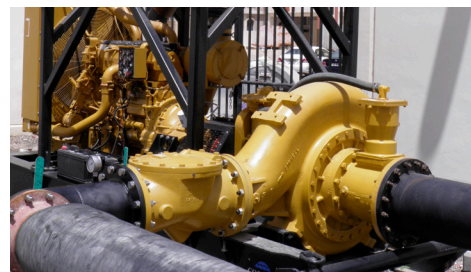


CUTTER BLADES FOR MANURE

USED ON MANURE BOATS AND FOR STATIONARY LAGOON PUMPING

The trusted source for reliable pumps to the manure pump industry, Cornell has been a leader in transferring, removing, and pumping for injection for more than 30 years. The cutter allows us to:

- Break up clogs and rough cut
- Work from a boat or stationary location
- Works well with a priming system
- Reduce maintenance, labor, and downtime costs



RENTAL CUTTER APPLICATIONS

Cutters are useful in Rental applications where a temporary installation best meets the end user's needs.

SEWER BY-PASS: in cases where reconstruction, emergency, or growth call for a system that can handle ragging and plugging.

DEWATERING: If debris in the dewatering stream could foul an impeller or sheet up and plug a pump, a cutter blade or auger could address the issue.

HYDRAULIC TRANSFER: pulling from less than-clean water sources necessitates cutting debris such as leaves before pumping out of a pond.

INDUSTRIAL CUTTER APPLICATIONS

FOOD PROCESSING: Dealing with items like chicken feathers or potato peels that can plug standard pumps is within the cutter's capabilities.

PLANT WASTE WATER: if scum or wash-down material could plug a standard pump, the cutter is an excellent option to keep the plant running.

- Poultry/meat processing
- Wood chip clogging in Pulp & Paper
- Stringy material
- Laundry service

CUTTER BLADE DESIGN AWARD 2012 PRODUCT INNOVATION OF THE YEAR, BY PUMPS & SYSTEMS MAGAZINE

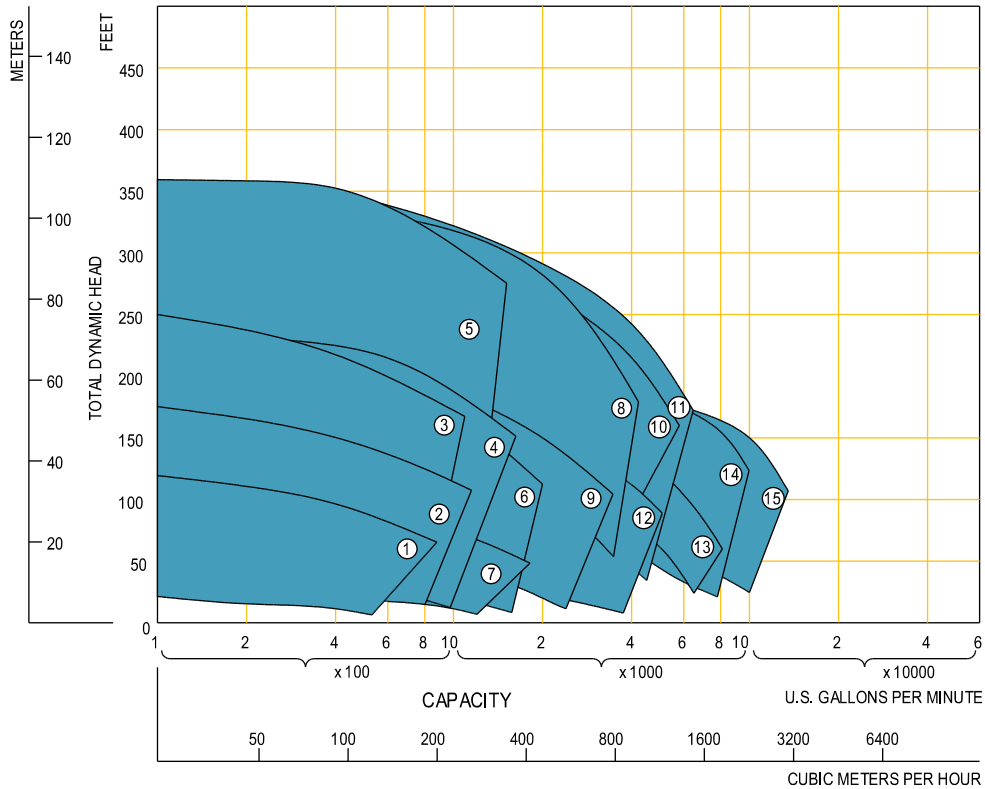
The fourth annual Product Innovation of the Year was judged by Pumps & Systems magazine. Dozens of innovative products vied for the distinction of Product Innovation of the Year. Clackamas-based Cornell Pump Company's Cutter Pump was judged to be the best of the worldwide entries—the previous three contests were won by companies based in Denmark, Ohio, and Germany. The magazine's editorial board chose the winners, finalists, and honorable mentions.

Cornell's Cutter Pump was awarded the prize because of the innovative design that took minimal energy consumption. The review group was also impressed at how effectively the cutters worked at breaking up the clogs. The system's flexibility was also a key element in the award selection; cutter rings can be added to existing installations, allowing municipalities the benefit of cutters without having to buy all new pumps.

You can read the article on our website under the application sheet tab: <http://www.cornellpump.com/applications.html>

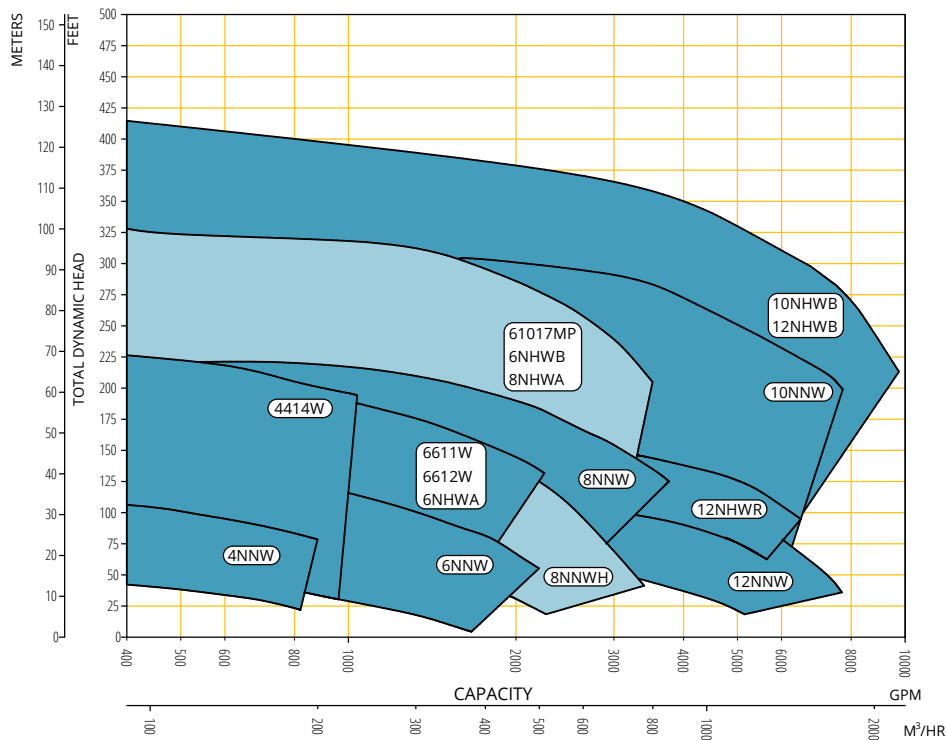
CUTTER PUMPS

CUTTER PUMP CURVES

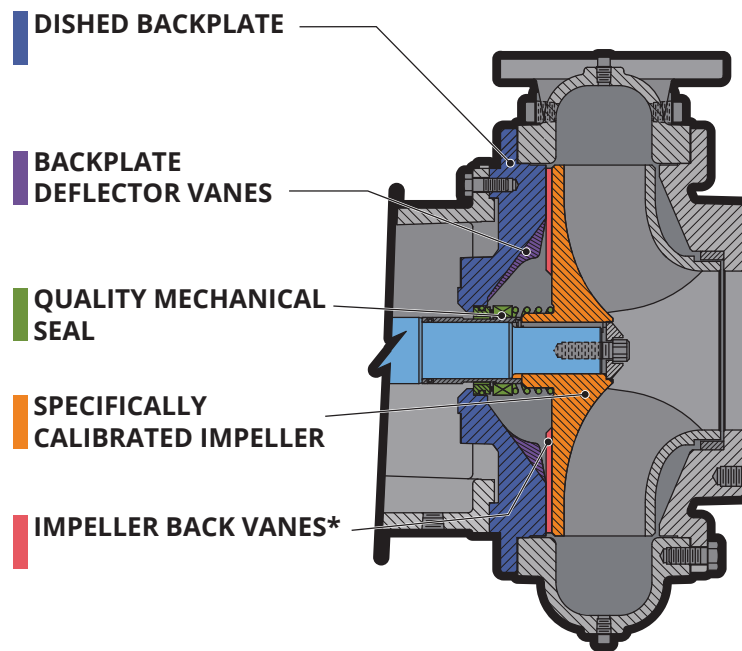


1. 4NNT
2. 4NHTA
3. 4414T
4. 4514T
5. 4NHTB
6. 6NHTA
7. 6NNT
8. 6NHTB/ 8NHTA
9. 8NNT
10. 8NHTR
11. 10NNT
12. 12NNT
13. 12NHTR
14. 14NHG
15. 16NHG22

WASTE WARRIOR CUTTER PUMP CURVES



CUTTER PUMPS



CYCLOSEAL® — THE SEALING SYSTEM INTEGRAL TO CORNELL PUMPS

Cornell's manure pumps come equipped with the patented Cycloseal sealing system, which leverages cyclonic action to extract solids and abrasive substances from the seal area while simultaneously purging air and gas pockets. This groundbreaking technology extends the lifespan of the seal and eliminates the requirement for venting or flushing water.

No Flush Water or Packing: Cycloseal technology eradicates the need for packing or flushing water with its backplate and wide vanes, leading to cost savings, less service time, and no messy drips.

Extended Seal Life: Cornell's Cycloseal is highly durable in harsh conditions such as manure slurry, starch recovery, clear water, food processing, and self-priming applications, with the potential to triple the expected seal lifespan.

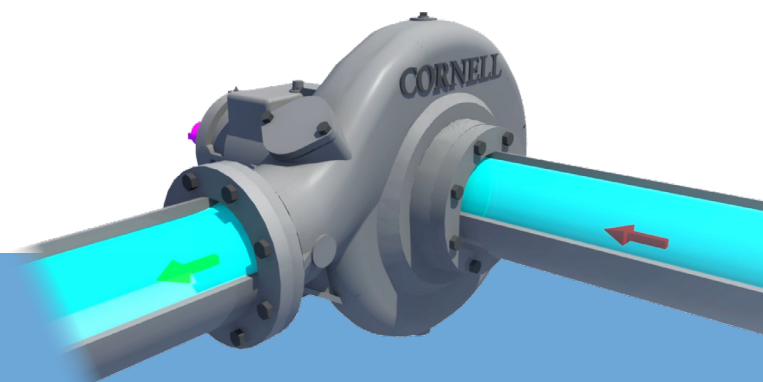
Run-Dry™ Option: Cornell's Cycloseal system-equipped pumps have an optional Run-Dry feature that lubricates the seal faces even without liquid in the pump casing. The Run-Dry feature is indispensable in scenarios where the pump must operate dry for an extended duration or may lose prime unexpectedly without being turned off.

System Savings: Cycloseal system eliminates the need for external water flush, filters, grease cups, or piping typically found in pumps with packing or mechanical seals.

Better for Abrasive Applications: Cycloseal is more durable than packing and regular mechanical seals that come into contact with grit and other substances, as it prevents solids from entering the seal area, resulting in less seal wear.

Greater Reliability: With positive seating, end users can easily detect when the Cycloseal is correctly installed, leading to longer service intervals due to its increased ability to withstand grit.

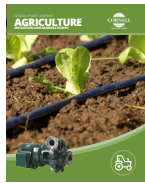
Maintenance Savings: A more durable seal results in less pump downtime and lower maintenance expenses throughout the pump's lifespan.



Watch the Cycloseal video online to see it in action:

<http://www.cornellpump.com/support/videos.html>

CORNELL PUMP COMPANY MARKET & PRODUCT LINE



AGRICULTURE



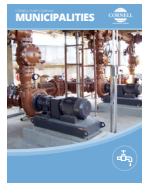
FOOD PROCESS



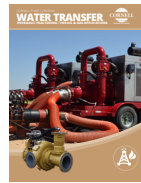
INDUSTRIAL



MINING



MUNICIPAL



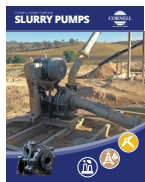
WATER
TRANSFER



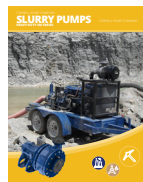
REFRIGERATION



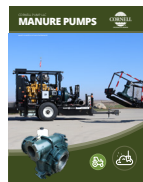
CONSTRUCTION



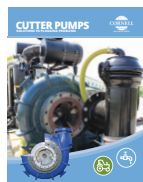
SLURRY



SLURRY SM



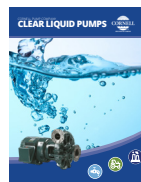
MANURE



CUTTERS



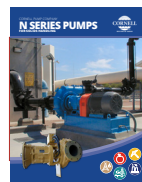
SELF PRIMING



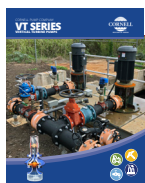
CLEAR LIQUIDS



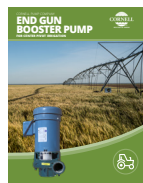
MX SERIES



N SERIES



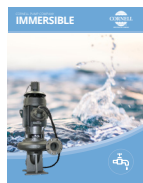
CYCLONE™



EDGE™



HYDRAULIC
SUBS



IMMERSIBLE



CD4MCU



RUN-DRY™



PRIMING
SYSTEMS



CYCLOSEAL®

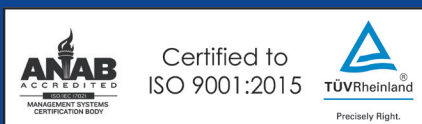
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Cornell pumps and products are the subject of one or more of the following U.S. and foreign patents:

6,074,554; 6,036,434; 6,079,958; 6,309,169; 6,104,949.

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