


**MagnaDrive™**  
 CORPORATION


## Washington Mutual Tower

SEATTLE, WA • USA

### Success Snapshot

**31%**  
 ENERGY  
 SAVINGS

**\$15K**  
 SAVINGS ON  
 NON-ENERGY  
 OPERATING COSTS

**1.3 YRS**  
 BREAK-EVEN

### CHALLENGE

- High Levels of Vibration
- Excessive Maintenance
- Wasted Energy

The Washington Mutual Tower in Seattle was experiencing high levels of vibration in a chilled water pump that was part of the tower's HVAC system. The building's chilled water system consisted of a 125 hp / 1800 rpm 480 volt motor running a centrifugal HVAC chilled water pump.

Connected to the motor with an elastomeric coupling, the pump was initially designed to run at full speed against a pinch valve that was manually throttled, depending upon the cooling requirements in the building.

Due to the full head of the pump running against a pinched valve during normal operations, the increased vibration resulted in a need for increased maintenance on the pump and chilled water system. In addition, the building was wasting energy by controlling water pressure through the valve.

### SOLUTION

#### MagnaDrive ASD™

MagnaDrive Corporation replaced the control valve by installing a MagnaDrive 18.5 Adjustable Speed Drive (ASD).

The motor was moved up onto a raised base and the ASD's actuator was connected to the building's HVAC process control system.



Control is much greater than any VFD. The large footprint is not needed, and harmonics are not an issue. We don't have to replace couplings annually and deal with aligning the pumps and motors. The noise disappeared as soon as we started it. MagnaDrive... WOW!

- WASHINGTON MUTUAL ENGINEER

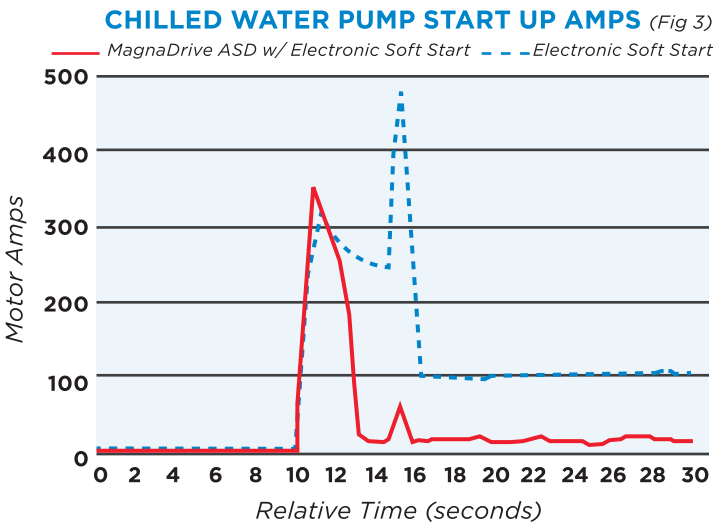


RESULTS

The MagnaDrive ASD eliminated the bypass valve, generating energy savings of 31%. The cavitation was eliminated and vibration was dramatically reduced, lowering long-term maintenance costs.

Although the MagnaDrive ASD was greater than 20 times more expensive than the elastomeric coupling it replaced, the customer was able to achieve a cash flow breakeven on its investment in slightly more than one year! After the MagnaDrive ASD was installed on the chilled water pump, and the speed of the pump was slowed to achieve a constant chilled water pressure for optimum building cooling. Eliminating the hand valve on the discharge of the pump reduced power demand from 65 kW to 45 kW, representing a constant energy savings of 20 kW, a reduction of 31%. Washington Mutual Tower operates their HVAC cooling system for eight hours per day, approximately one hundred days per year, for a savings of 16,000 kW-hr per year.

Additionally, the Tower’s building engineers discovered that there were significant non-energy operating savings because of the vibration reduction from use of the MagnaDrive ASD. For instance, they found that they no longer have to replace the elastomeric coupling between the pump and its motor on an annual basis. Also, the reduced vibration increased seal and bearing life in the system. Overall, the Tower is realizing more than \$15,000 in annual non-energy, operating savings.



Washington Mutual Tower had been using Variable Frequency Drives (VFDs) with electronic soft-starts. Comparing the locked rotor current draw of the VFD system vs. the MagnaDrive system showed a clear benefit from the MagnaDrive ASDs. The original purpose of the electronic soft start was to reduce the amplitude of locked rotor current when starting the motors. With the electronic soft starts, the Tower still experienced a 475 amp spike on the chilled water pump motor. Use of the MagnaDrive ASD and the electronic soft start, together, eliminated the excessive current spikes and reduced the duration of locked rotor current by 4 seconds. The high amperage levels that had been occurring during the start-up period caused heating in the motors, degrading motor insulation and shortening motor life. The high amperage draw previously experienced also caused voltage sags in the building. Voltage sags can disrupt sensitive equipment such as computer systems—a serious problem in a large office tower.

The average annual energy savings were similar to the MagnaDrive ASD. However, the VFD offered *none* of the non-energy operating savings available with the MagnaDrive ASD. MagnaDrive was clearly the best choice for this application.

SAVINGS

By the Numbers

Annual Energy Costs Before MagnaDrive (65 kW)(8 hr/day)(0.06 \$/kW-hr)(100 days)	\$3,120
Annual Energy Costs After MagnaDrive (45 kW)(8 hr/day)(0.06 \$/kW-hr)(100 days)	<u>\$2,160</u>
Average Annual Energy Savings	\$960
Average Annual Savings from Non-Energy Operating Costs	<u>\$15,000</u>
Total Average Annual Savings	\$15,960
Additional Expense Incurred	\$20,000
Breakeven Point (\$20,000) / (\$15,960/year)	1.3 Years


**MagnaDrive™**  
 CORPORATION


## Center-Point Irrigation System

NEVADA • USA

### Success Snapshot

**25%**  
 ENERGY  
 SAVINGS

**90%**  
 SAVINGS ON  
 NON-ENERGY  
 OPERATING COSTS

**1.3 YRS**  
 BREAKEVEN

### CHALLENGE

- Rugged & Remote Environment
- Competitive Industry
- Cost of Ownership

ANM Equipment and Miller Engineering were asked to design and build a Center-Point Irrigation system for a customer in Nevada. The irrigation pump provides 800 gallons per minute to three center pivots. Flow and head are variable so Miller Engineering needed to find a speed control solution capable of meeting the irrigation demand while also being robust enough to be located outdoors in a remote location.

### SOLUTION

#### MagnaDrive ASD™

A MagnaDrive 14.5 Adjustable Speed Drive (ASD) was installed with a split case pump driven by 75 hp 1800 rpm motor. Due to split case design, a floating shaft arrangement was used with the ASD. A Jordan electric actuator was installed with a 4-20ma input signal from a mag-flow meter. To operate the system, the user simply selects the number of center pivots to be operated on a control panel (1, 2, or 3). Three set points for operation were set at 800, 1600, and 2400 gpm. The system was installed in late 2004 and was started up during irrigation season in the spring of 2005.

### RESULTS

During the short growing season, reliability of irrigation equipment is critical to the success of the agricultural industry. Also, because of the competitive nature of this industry, cost of ownership is very important. ANM Equipment realized that the use of throttling and isolation valves would have given the lowest initial procurement cost for this project. However, when the total cost of ownership over the life of the system was considered, the MagnaDrive ASD option was the best choice for their pump control even without valuing the improved reliability achieved with the MagnaDrive ASD.

### SAVINGS

#### By the Numbers

<b>Annual Energy Costs Before MagnaDrive</b>	\$3,055
<b>Annual Energy Costs After MagnaDrive</b>	<u>\$2,290</u>
<b>Average Energy Savings Per Pump</b> (876 hrs / year)	\$765
<b>Annual Non-Energy Operating Costs Before MagnaDrive (control valves)</b>	\$4,160
<b>Annual Non-Energy Operating Costs After MagnaDrive (ASD)</b>	<u>\$1,148</u>
<b>Annual Non-Energy Operating Savings Per Pump</b>	\$3,012
<b>Total Annual Savings Per Pump</b>	<b>\$3,777</b>
<i>Additional Expense Incurred Per ASD</i>	\$5,000
<b>Breakeven Point (\$5,000) / (\$3,777/yr)</b>	<b>1.3 Years</b>




**MagnaDrive™**  
 CORPORATION

**FedEx**

SEATTLE, WA • USA

## Success Snapshot

**26%**  
 MAINTENANCE  
 TIME SAVINGS

**59%**  
 SAVINGS ON  
 NON-ENERGY  
 OPERATING COSTS

**0.48 YRS**  
 BREAK-EVEN

### CHALLENGE

- Global Network
- Transmission Fluid Spills
- Wasted Time = Lost \$\$\$

FedEx is in the business of moving packages..... Fast! FedEx is the world's largest express transportation company, providing fast and reliable delivery to every U.S. address and to more than 220 countries and territories. FedEx uses a global air-and-ground network to speed delivery of time-sensitive shipments, usually in one to two business days with the delivery time guaranteed. FedEx has ten Air Express Hubs worldwide handling over 670 aircraft and an average of 3.3 million packages daily.

In each hub a network of conveyors handles the transfer of packages between incoming and departing aircraft as well as between the air and land-based operations. When an aircraft arrives at the hub the package handling team has a set amount of time to unload, service, and reload that aircraft before it departs. **For every minute taken over the set limit, the hub is charged \$20,000 by the corporate office. Delays of any kind simply are not tolerated.**

FedEx had been using fluid couplings to drive the conveyors in each hub. Rapid starts and stops required cushioning in the motor/gearbox connection and, at the time of construction, fluid couplings seemed to be the best solution. Unfortunately, the fluid couplings also had their problems. Fully loaded conveyors require a lot

of torque to start which, and in the case of fluid couplings, can cause the coupling to release its transmission fluid. This is dangerous because of the heat of the fluid during operation and the potential to damage packages and their contents. In addition, in the event of a coupling failure, the time taken to replace a fluid coupling was, on average, 30 minutes.....time that is precious to the organization.

### SOLUTION

#### MagnaDrive FGC™

MagnaDrive Corporation approached FedEx with a proposal to replace the existing fluid couplings with MagnaDrive permanent magnet couplings. The benefits of reduced vibration, reduced maintenance, safety, and increased reliability were compelling enough to convince FedEx to install a MagnaDrive Fixed Gap Coupling (FGC) as a trial unit.

FedEx testing showed that in the unlikely event of a MagnaDrive coupling failure, the replacement time averaged 22 minutes – an eight minute / 26% time savings compared to the existing fluid couplings. Given the extreme overage charges for every minute taken over the set limit as described at right, this could equate to a massive cost savings as well.



## SAVINGS

## By the Numbers

<b>Annual Operational Costs Before MagnaDrive</b>	<b>\$4,529</b>
<b>Annual Operational Costs After MagnaDrive</b>	<b><u>\$1,840</u></b>
<b>Annual Savings Per Coupling</b>	<b>\$2,689</b>
<i>Additional Expense Incurred Per Coupling</i>	<i>\$1,300</i>
<b>Breakeven Point</b> (\$1,300) / (\$2,689/year)	<b>.48 Years</b>

## RESULTS

FedEx testing showed that MagnaDrive permanent magnet couplings on conveyor systems reduced vibration, lowered maintenance, and increased system reliability. The results proved real and quantifiable benefits to the FedEx organization.

Based on the success of the first unit, FedEx has not only continued to replace fluid couplings with MagnaDrive permanent magnet couplings, they have also worked with MagnaDrive management to develop a FedEx specific part number to simplify purchasing of MagnaDrive couplings!

Because of the quick return on investment, FedEx has made the decision to purchase MagnaDrive couplings in spite of the fact that they typically carry a price tag that is greater than the competing fluid couplings. Looking at the operational savings realized by FedEx in relationship to the additional cost, it is clear that a cash flow breakeven point of less than six months is realized.

In addition, FedEx recognizes that if a coupling failure were to occur, the eight minute replacement time savings would make it more likely that their sophisticated logistics system will remain on schedule.

**Because of the clear quantifiable benefit resulting from MagnaDrive technology, FedEx has purchased MagnaDrive permanent magnet couplings for use in all of its hubs worldwide.**

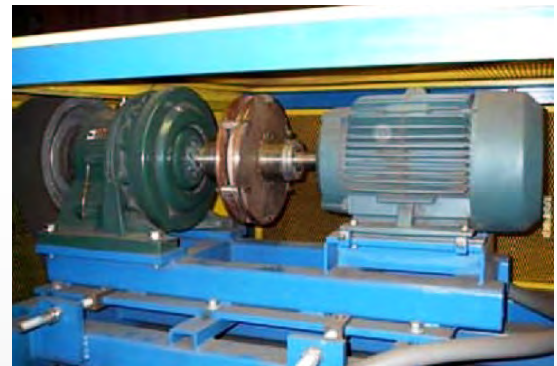
**FedEx Express Conveyor Applications:**

25 hp @ 1,800 rpm

30 hp @ 1,800 rpm

40 hp @ 1,800 rpm

50 hp @ 1,800 rpm



*Photos of FGC and FedEx Equipment*


**MagnaDrive™**  
CORPORATION


## Washington Mutual Tower

SEATTLE, WA • USA

### Success Snapshot

**66%**  
ENERGY  
SAVINGS

**\$12K**  
SAVINGS ON  
NON-ENERGY  
OPERATING COSTS

**0.9 YRS**  
BREAKEVEN

### CHALLENGE

- High Levels of Vibration
- Excessive Maintenance
- Wasted Energy

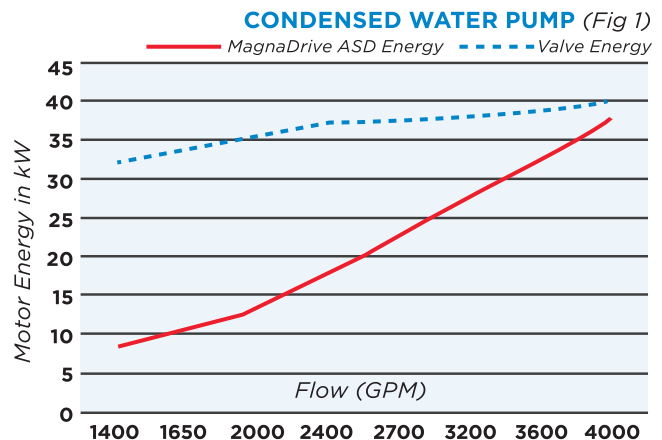
The 55-story Washington Mutual Tower is one of downtown Seattle's premier office buildings. In cooperation with the Northwest Energy Efficiency Alliance, the building's Chief Engineer installed MagnaDrive Adjustable Speed Drives (ASDs) on both of the HVAC Condenser pumps in the Tower.

In the original building design, a 75 hp, 1800 rpm motor was connected to a centrifugal HVAC condenser pump through an elastomeric coupling. The pump ran at a constant 100% speed during warm days and was manually throttled, using a pinch valve, depending upon the cooling requirements in the building. This method of operation resulted in system cavitation and vibration, increasing the maintenance requirements for the system. Also, energy was being wasted when water pressure was controlled through the pinch valve.

### SOLUTION

#### MagnaDrive ASD™

The 75 hp HVAC condenser pump moves cool water through the chiller compressor removing heat from the HVAC system refrigerant via a heat exchanger. The warm water is then circulated through the cooling tower heat exchanger and back to the chiller. MagnaDrive Corporation replaced the control valve by installing a MagnaDrive ASD. The motor was moved up onto a raised base and the ASD's actuator was connected to the building's HVAC process control system.



“We don’t have to replace couplings annually and deal with aligning the pumps and motors. The cavitation noise we lived with for ten years disappeared as soon as we started the MagnaDrive ASD.”

- WASHINGTON MUTUAL ENGINEER

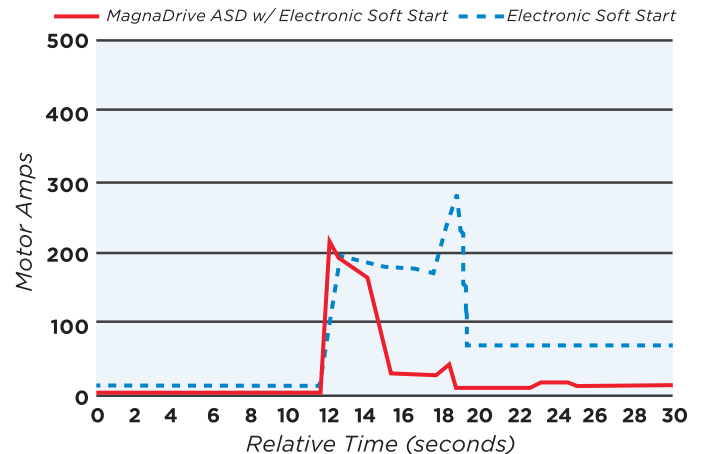
## RESULTS

After the MagnaDrive ASD installation, the HVAC condenser pump moves approximately 2000 gpm through the system with an energy demand of 13 kW, a reduction of 66% compared to the control valve system. Additionally, the system is no longer experiencing cavitation and the resulting vibration.

Although the MagnaDrive ASD was more expensive than the elastomeric coupling it replaced, the customer was able to achieve a cash flow breakeven on its investment in less than one year! Following installation of the MagnaDrive ASD on the HVAC condenser pump, control of flow through the condenser system was accomplished by slowing the motor speed, eliminating the pinch valve on the discharge of the pump reduced power demand from 40 kW to 13 kW, producing an energy savings of 66% (27 kW). Washington Mutual Tower operates their HVAC cooling system for eight hours per day approximately one hundred days per year for a savings of 21,600 kWh per year.

Additionally, the Tower's Building engineers discovered that there were significant non energy operating savings because of the vibration reduction from use of the MagnaDrive ASD. For instance, they found that they no longer have to replace the elastomeric coupling between the pump and its motor on an annual basis. Also, the reduced vibration increased seal and bearing life in the system. Overall, the Tower is realizing more than \$12,000 in annual non-energy, operating savings.

**CONDENSED WATER PUMP START UP AMPS** (Fig 3)



Washington Mutual Tower had been using Variable Frequency Drives (VFDs) with electronic soft starts. Comparing the locked rotor current draw of the VFD system vs. the MagnaDrive system showed a clear benefit from the MagnaDrive ASDs. The original purpose of the electronic soft start was to reduce the amplitude of locked rotor current when starting the motors. With the electronic soft starts, the Tower still experienced a 300 amp spike on the condenser pump motor. Use of the MagnaDrive ASD and the electronic soft start together eliminated the excessive current spikes and reduced the duration of locked rotor current by four seconds. The high amperage levels that had been occurring during the start up period caused heating in the motors, degrading motor insulation and shortening motor life. The high amperage draw previously experienced also caused voltage sags in the building. Voltage sags can disrupt sensitive equipment such as computer systems, a serious problem in a large office tower.

The average annual energy savings of the original VFD system were similar to the MagnaDrive ASD. However, the VFD offered none of the non-energy operating savings available with the MagnaDrive ASD. These additional savings clearly made MagnaDrive the best choice for this application.

## SAVINGS

### By the Numbers

<b>Annual Energy Costs Before MagnaDrive</b> (40 kW)(8 hr/day)(0.06 \$/kW-hr)(100 days)	\$1,920
<b>Annual Energy Costs After MagnaDrive</b> (13 kW)(8 hr/day)(0.06 \$/kW-hr)(100 days)	<u>\$624</u>
<b>Average Annual Energy Savings</b>	<b>\$1,296</b>
<b>Average Annual Savings from Non-Energy Operating Costs</b>	<u>\$12,000</u>
<b>Total Average Annual Savings</b>	<b>\$13,296</b>
<i>Additional Expense Incurred</i>	<i>\$12,500</i>
<b>Breakeven Point</b> (\$12,500) / (\$13,296/year)	<b>0.9 Years</b>




**MagnaDrive™**  
 CORPORATION

**University of Utah Hospital**  
 UTAH • USA

## Success Snapshot

**100%**  
 MAINTENANCE  
 SAVINGS

**\$13,907**  
 SAVINGS ON  
 NON-ENERGY  
 OPERATING COSTS

**0.14 YRS**  
 BREAKEVEN

### CHALLENGE

- Vibration Issues
- Excessive Maintenance
- Short Pump Seal Life

The University of Utah was experiencing vibration problems on their hot water pumps in the university's steam plant. The steam plant produces steam that is used throughout the university property, including the University Hospital. These vibration issues were causing premature pump seal wear. Technicians at the hospital had to replace the pump seals an average of twice yearly.

### SOLUTION

#### MagnaDrive MGE™

MagnaDrive Corporation's local distributor approached steam plant superintendent, Wyatt Peterson, at the University of Utah with a proposal to install MagnaDrive MGE 11 couplings in place of the existing conventional couplings on the system's 50 hp / 1800 rpm pumps. The University agreed and a total of eleven MGE couplings were installed.

### RESULTS

After installation of the MGE couplings, the University reports the following results:

- No maintenance has been needed after installation.

- No vibration transmitted between the system's components.
- Pump seal life has increased significantly.
- Timely response and support from MagnaDrive Corporation.

The maintenance staff at the hospital reports that prior to the installation of the MGE couplings they were required to change the pump seals in this system at least twice yearly at an average cost of \$2,000 per seal. The new system shows no indication of suffering from the same wear. The University now expects each seal to last at least one year due to the reduced vibration.

Even though the MagnaDrive coupling was more than four times as expensive as the traditional coupling, the University was able to achieve a payback on their investment in less than two months.

### SAVINGS

### By the Numbers

#### RESULTS AFTER MAGNADRIVE INSTALLATION

<b>Annual Savings From Reduced Seal Purchases Per Coupling</b>	<b>\$2,000</b>
<b>Annual Savings in Non-energy Operating Costs (other than seals)</b>	<b>\$11,907</b>
<b>Total Annual Savings Per Coupling</b>	<b>\$13,907</b>
<i>Additional Expense Incurred Per Coupling</i>	<i>\$2,000</i>
<b>Breakeven Point (\$2,000) / (\$13,907/yr)</b>	<b>.14 Years</b>

Photo Credit: UofUHealthCare at English Wikipedia, CC BY-SA 3.0 <<https://creativecommons.org/licenses/by-sa/3.0/>>, via Wikimedia Commons




**MagnaDrive™**  
 CORPORATION

**United States Army**  
 FORT WAINWRIGHT, AK • USA

## Success Snapshot

**20%**  
 ENERGY  
 SAVINGS

**20%**  
 SAVINGS ON  
 NON-ENERGY  
 OPERATING COSTS

**30%**  
 SOUND LEVEL  
 DROP

### CHALLENGE

- High Levels of Vibration
- Severe Misalignment
- Wasted Energy

Fort Wainwright Army base in Alaska was replacing flexible couplings 3 to 4 times per year on their Hot Glycol Return Pump systems. The U.S. Army was experiencing severe vibration and misalignment problems that were destroying the flexible couplings. Frequent replacement of the couplings was expensive and consumed both labor hours and operating hours while the equipment was down. Energy savings was also a goal on this system as a reason for installing MagnaDrive couplings.

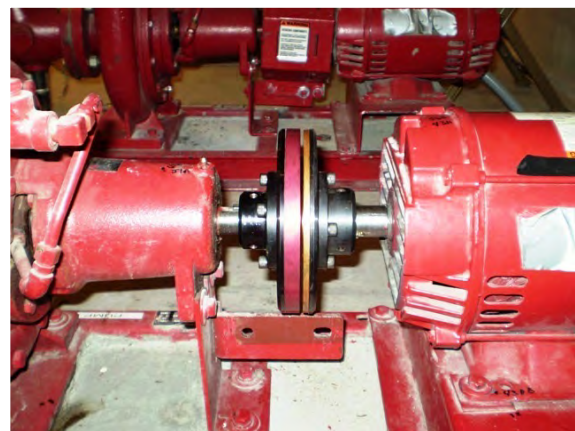
### SOLUTION

#### MagnaDrive MGE™

The U.S. Army's Contractor selected MagnaDrive MGE (MagnaGuard Economizer) couplings to address the thermal growth issues as well as save energy.

### RESULTS

Overall the MagnaDrive couplings significantly reduced vibration and misalignment issues. However, the U.S. Army was most impressed by a major reduction in energy consumption. MagnaDrive couplings have no physical connection between the motor and the load, which not only significantly decreased vibration, misalignment and maintenance in the system, but also contributed to energy reduction and cost savings. Total average power usage decreased by 20% on the pump system.



“At the end of the test we conclude that replacing the flexible couplings with MagnaDrive MGE not only resulted in significant savings in the avoided maintenance cost but also saved us energy.”

- U.S.ARMY ENGINEER

## RESULTS, cont

The before and after electrical system analysis showed immediate reduced motor amperage and temperature upon installation. Infrared scans showed the temperature dropped by approximately 2°C with the MagnaDrive coupling installed, dropping the temperature out of the critical range.

In addition, sound levels decreased by approximately 30% at four measurement points in the system.

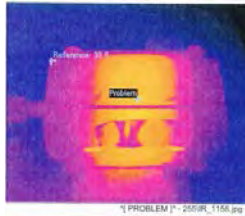
Even without taking into account the significant savings from reduced downtime and less maintenance due to lower vibration levels, the MagnaDrive couplings in this application pay for themselves in less than 9 months.

The U.S. Army has already installed multiple MagnaDrive units on its pump systems and plans to purchase several more to continue the cost saving trends demonstrated.

## SAVINGS

## By the Numbers

<b>Annual Energy Costs Before MagnaDrive</b>	\$4,255
<b>Annual Energy Costs After MagnaDrive</b>	<u>\$3,409</u>
<b>Average Annual Energy Savings Per Coupling</b>	<b>\$846</b>
<i>Additional Up-Front Expense Incurred Per Coupling</i>	\$600
<b>Breakeven Point (\$600) / (\$845/year)</b>	<b>0.71 Years</b>



*Before & After Infrared scans show temperature drop out of critical range*

kW Measured with Flexible Coupling			kW Measured with MagnaDrive MGE-03 Magnetic Coupling		
	APPLIED POWER (KVA)	REAL POWER (KVA)		APPLIED POWER (KVA)	REAL POWER (KVA)
PHASE 1	1.354	1.058	PHASE 1	1.208	0.836
PHASE 2	1.444	1.170	PHASE 2	1.311	0.948
PHASE 3	1.443	1.123	PHASE 3	1.310	0.900
AVG/TOTAL	4.241	3.350	AVG/TOTAL	3.829	2.684

db Readings on Pump & Motor Before & After MagnaDrive Coupling		
READING LOCATION	BEFORE	AFTER
Pump Side (readings taken on pump)	64 db	51 db
Motor Side (readings taken on motor)	56 db	32 db
Pump Side (readings taken on front bolt)	43 db	31 db
Motor Side (readings taken on front bolt)	43 db	30 db


**MagnaDrive™**  
 CORPORATION


## San Antonio Public Services

SAN ANTONIO, TX • USA

### Success Snapshot

**\$20,200**  
ANNUAL  
MAINTENANCE  
SAVINGS

**84%**  
SAVINGS ON  
NON-ENERGY  
OPERATING COSTS

**0.3 YRS**  
BREAKEVEN

### CHALLENGE

- Excessive Vibration
- Misalignment
- Accelerated Wear & Tear
- Contamination Concern

The City of San Antonio was experiencing excess vibration in their conveyor drive system. The system's original design used Falk Fluid Drive hydraulic couplings. The configuration with the Falk coupling was experiencing excessive vibration in the horizontal, vertical, and axial directions. The high levels of vibration were due to misalignment in the system because the hydraulic coupling was difficult to align and balance. These high levels of vibration caused accelerated wear and tear on the system requiring the City's personnel to perform maintenance on the conveyor drive system often. This need for extra maintenance added the additional concern of possibly contaminating the environment with hydraulic fluid every time maintenance was performed.



### SOLUTION

#### MagnaDrive FGC™

The customer was presented with a proposal to replace the existing Falk Fluid Drive couplings with MGTL-18/300 Magnetic Couplings to connect the system's 300 hp / 1800 rpm motors to the conveyor gearbox.

### RESULTS

#### MagnaDrive MGTL™

After installation of the MagnaDrive coupling, system, vibration readings showed an 80% reduction in vibration horizontally and a 75% reduction vertically and axially. The MagnaDrive coupling eliminated the need for precision alignment, a process that was critical for the hydraulic coupling, and also eliminated the risk of environmental contamination from hydraulic fluid.

Despite having to pay more for the MagnaDrive coupling than the traditional fluid coupling, the City found the investment in the MagnaDrive coupling to be a wise choice. Even without taking into account the significant savings from reduced downtime due to lower vibration levels with the MagnaDrive coupling, the City of San Antonio was able to pay back its increased investment in less than six months.





## SAVINGS

## By the Numbers

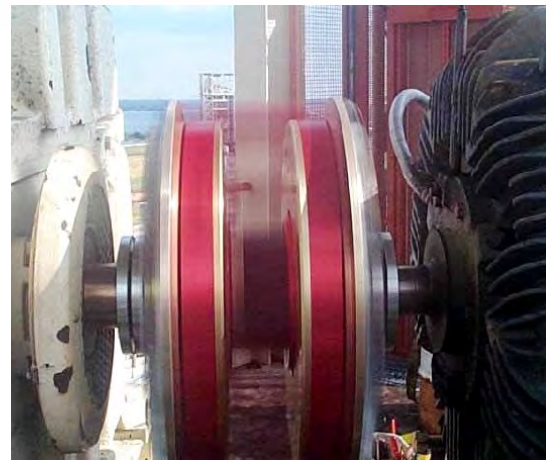
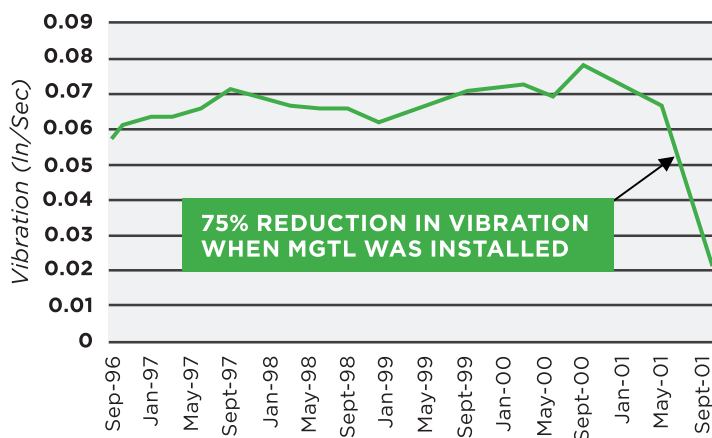
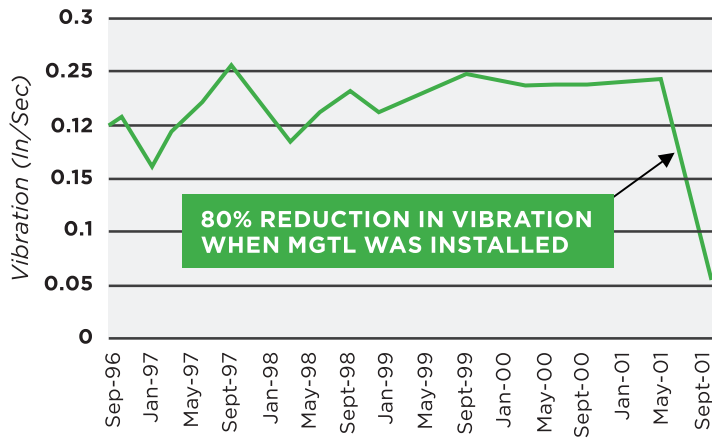
**Annual Non-Energy Maintenance & Operating Costs Before MagnaDrive (with Fluid Coupling)** \$24,000

**Annual Non-Energy Maintenance & Operating Costs After MagnaDrive (with MGTL Coupling)** \$3,800

**Annual Non-Energy Maintenance & Operating Savings Per Coupling** **\$20,200**

*Additional Expense Incurred Per Coupling* \$6,000

**Breakeven Point** (\$6,000) / (\$20,200/year) **.3 Years**



Photos of MGTL and City of San Antonio Public Services Conveyor Drive Equipment




**MagnaDrive™**  
C O R P O R A T I O N


## U.S. Navy Active Duty Fleet Maintenance Reduction Program

### Success Snapshot

**26%**  
LABOR SAVINGS  
PER COUPLING

**\$6.3 MIL/YR**  
MINIMUM SAVINGS ON  
MAINTENANCE COSTS

**0.47 YRS**  
BREAK-EVEN

### CHALLENGE

- Constant Misalignment
- Excessive Maintenance
- Hazardous Waste

When a U.S. Navy ship is at sea the structure of the ship flexes with the rolling sea. As a result, systems that were perfectly lined up while the ship was docked shift, causing misalignment and increased wear on rotating equipment. The U.S. Navy analyzed this problem and determined that sailors were spending an average of 29 days per year per pump repairing and replacing mechanical seals, couplings, and bearings because of coupling alignment difficulties. In addition, the greased couplings that were being used required quarterly maintenance that produced as much as three pounds of hazardous waste each year per pump.

Additionally, the U.S. Navy found that whenever a conventional coupling is disconnected for pump or motor work, a complete realignment of the pump and motor shafts is required. These alignments can take up to two additional days per pump and, depending on application, often also required both cold and hot checks.

A surprising finding was that the work done to realign the systems might have been creating its own problems! Realignments were introducing a shift in the load and wear patterns of the bearings and seals, significantly shortening their useable life.

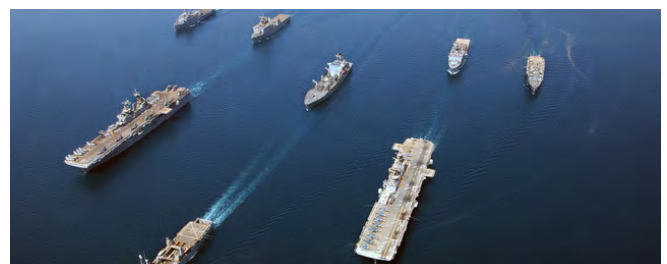
### SOLUTION

#### MagnaDrive FGC™

As part of the Fleet Maintenance Reduction Program, the U.S. Navy decided to test and install MagnaDrive permanent magnet couplings on critical applications on several active duty ships. First installations were on the USS Stennis and the USS Nimitz.

Testing by the U.S. Navy confirmed that the MagnaDrive couplings were a robust and reliable alternative to the currently used technology. In addition, the testing revealed that the MagnaDrive permanent magnet couplings were capable of accepting up to .25" of misalignment between the motor and load shafts.

MagnaDrive Fixed Gap Couplings (FGCs) were initially procured and installed on pumps on the USS NIMITZ (CVN-68). Additional FGCs were installed on the USS STENNIS on a JP5 service pump and an air conditioning chilled water pump.



## RESULTS

Following installation, the Navy confirms that the couplings:

- Provide a 75% reduction in required maintenance.
- Extend the life of connected equipment by eliminating the transfer of system vibrations or other harmful overload torque conditions.
- Eliminate hazardous waste.
- Eliminate downtime and expense caused by system lockup and destructive failure.
- Allow for soft start capability, reducing starting current significantly. This feature is particularly advantageous when ship is in a reduced electrical power configuration where limiting high current requirements is a concern.

The US Navy estimates that prior to implementation of the MagnaDrive FGCs, they were spending an average of 29 sailor days each year on pump repairs and maintenance caused by misalignment corresponding to a manpower cost of approximately \$5,637 annually.

On the systems where MagnaDrive FGCs have been installed, revised estimates indicate that the same pumps now only require an average of seven sailor days of labor each year. Using the same calculations as above, this corresponds to a manpower cost of approximately \$1,360 annually.

Because of the long-term savings potential, the U.S. Navy decided to purchase MagnaDrive Couplings in spite of the fact that those couplings had a price tag more than double the competing, traditional couplings they had been using in the past. Looking at the labor savings realized by the Navy in relationship to the additional cost, it is clear that a cash flow breakeven point of less than six months is realized.

**Because of the clear economic benefit from MagnaDrive technology, the U.S. Navy has purchased over 1500 of these couplings for use on 10 different ship classes across its fleet. The U.S. Navy estimates its minimum savings from the use of MagnaDrive couplings to be nearly \$6.3 Million per year!**

## SAVINGS

### By the Numbers

<b>Annual Labor Costs Before MagnaDrive</b>	<b>\$5,637</b>
<b>Annual Labor Costs After MagnaDrive</b>	<b><u>\$1,360</u></b>
<b>Annual Savings Per Coupling</b>	<b>\$4,277</b>
<i>Additional Expense Incurred Per Coupling</i>	<i>\$2,000</i>
<b>Breakeven Point (\$2,000) / (\$4,277/year)</b>	<b>.47 Years</b>

### Fleet Maintenance Reduction Program

[Close Window](#)

#### Magnetic Couplings

 Status: **Ongoing**

##### Estimated Navy Cost Avoidance:

Minimum annual:	\$ 6,260 K
Minimum 15 Year:	\$ 93,900 K

##### Problem:

Alignment between motors and their associated pumps are critical. Current couplings require extensive maintenance and precise alignment. Misalignment causes premature failure of motor/pump bearings and seals.



##### Solution:

Commercially available magnetic couplings, which isolate the pump and motor, eliminates the need for precise alignment, significantly increases system reliability and reduces maintenance time and materials.

##### Fleet Impact:

Use of magnetic couplings will significantly reduce the required maintenance on associated pump/motor bearings and seals. On those occasions when coupling is required, alignment will be quick, easy and will use no hazardous materials.

*Excerpt from the US Navy's website*




**MagnaDrive™**  
 CORPORATION


## Chevron Oil Tanker Fleet GLOBAL

### Success Snapshot

**75%**  
VIBRATION  
REDUCTION

**\$15K+ /YR**  
MINIMUM SAVINGS ON  
MAINTENANCE COSTS

**0.13 YRS**  
BREAK-EVEN

### CHALLENGE

- Vibration Problems
- Misalignment
- Shortened Equipment Life

Chevron Corporation is one of the world's largest oil producers. Chevron has interests in seven refineries and eight chemical plants in the Asia Pacific region, and has produced more than ten billion barrels of oil over the past 50 years. To transport their products around the globe, Chevron has a fleet of over 20 oil tankers. Chevron contacted MagnaDrive Corporation with a request to help them reduce vibration caused problems in the oil transfer pumps on one of their Australian based tankers, the Chevron Vega Voyager. Because the tanker structure flexes while at sea, misalignment between the pump and its motor were causing accelerated mechanical seal wear, resulting in shortened seal life.

### SOLUTION

#### MagnaDrive MGE™

MagnaDrive Application Engineers determined that the best solution for the 20 hp / 3600 rpm oil transfer pumps would be a MagnaDrive MGE 07 coupling. This solution was presented to Chevron and the decision was made to fly a MagnaDrive employee and a Chevron vibration expert to the Vega Voyager's Australian port of call for an immediate installation.



### RESULTS

The MagnaDrive MGE-07 coupling was installed while the Vega Voyager was in port. The Chevron vibration expert measured a 75% reduction in vibration during pump operation. Also, the Vega Voyager crew noticed a significant reduction in noise while the pump was running.

Chevron estimates that prior to the installation of the MagnaDrive MGE Couplings, they were replacing the system's mechanical seals at least twice each year due to the vibration caused by misalignment. Now that the MGE Coupling has been installed, the mechanical seal life is expected to greatly increase, saving Chevron not only the cost of two seals each year per pump, but also the expense associated with the replacement labor and the downtime associated with each seal failure.

Because of the long term savings potential, Chevron has made the decision to install MagnaDrive MGE Couplings on all oil transfer pump applications in their single hull tanker fleet. Additionally, Chevron is also looking at other tanker and land based applications where MagnaDrive disconnected technology can have the same economic benefit to their organization.

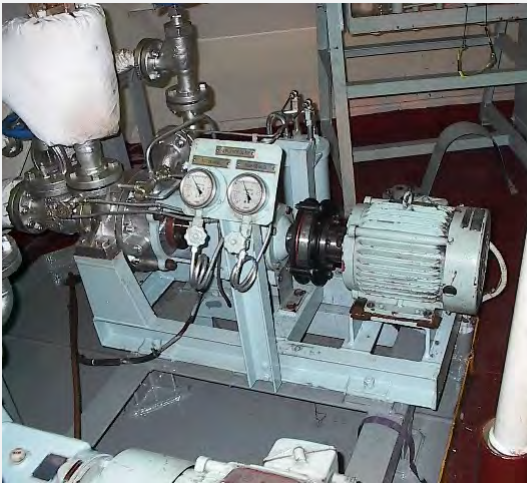


## SAVINGS

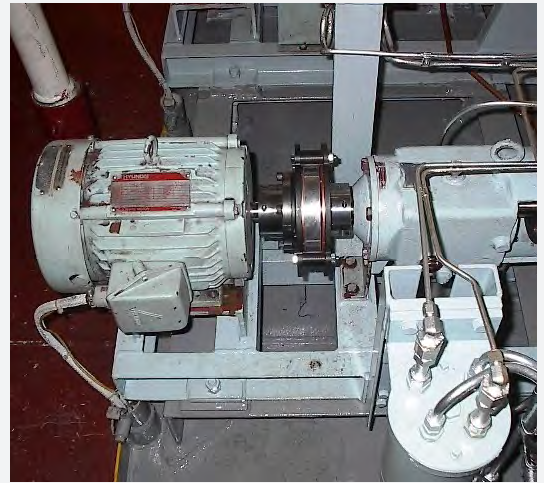
## By the Numbers

<b>Annual Maintenance &amp; Operating Costs Before MagnaDrive</b>	<b>\$16,946</b>
<b>Annual Maintenance &amp; Operating Costs After MagnaDrive</b>	<b><u>\$1,523</u></b>
<b>Annual Savings Per Installation</b>	<b>\$15,423</b>
<i>Additional Expense Incurred Per Coupling</i>	<i>\$2,000</i>
<b>Breakeven Point</b> (\$2,000) / (\$15,423/year)	<b>.13 Years</b>

Originally, Chevron had been using semi rigid disc couplings on the oil transfer pumps. Because of the long term savings potential, the decision to purchase MagnaDrive MGE Couplings was made in spite of the fact that the MagnaDrive couplings had a price tag more than triple the cost of the couplings they had been using in the past. Looking at the maintenance and operating savings realized by the Vega Voyager in relationship to the additional cost, it is clear that a Cash Flow Breakeven Point of less than two months is realized.



*Photos of Chevron Oil Transfer Pumps and MagnaDrive Couplings*






**MagnaDrive™**  
 CORPORATION

**Beijing Yanshan Petrochemical  
 Co. Ltd.**  
 BEIJING, CHINA

## Success Snapshot

**41%**  
**ENERGY  
SAVINGS**
**¥311K**  
**AVERAGE ENERGY  
SAVINGS PER FAN**
**1.3 YRS**  
**BREAKEVEN**

### CHALLENGE

- Vibration & Noise
- Excessive Wasted Energy
- Rugged Conditions

Beijing Yanshan Petrochemical Company located in Beijing, China is one of the main divisions of the China Petrochemical Group. Several of their cooling towers have fans which are designed to run at full speed with a 160 kW (215 hp) motor at 1480 rpm. The fan is rated for critical conditions, e.g., summer time, highest humidity, etc. and is always running at full speed which causes a tremendous amount of wasted energy. Because of the competitive nature of this industry, the total cost of ownership is very important, and energy savings also is national policy in China.

### SOLUTION

#### MagnaDrive ASD™

Yanshan Petrochemical Company compared MagnaDrive technology with other options available in the market such as VFDs, Eddy Current Drives, and Fluid Drives and opted to purchase a MagnaDrive Adjustable Speed Drive (ASD). MagnaDrive's distributor in China replaced the existing coupling between the motor and the fan with a MagnaDrive 20.5 ASD. The motor was moved backward onto an extended base, and the actuator was connected to the cooling tower process control system.

### RESULTS

The primary benefit expected by Yanshan Petrochemical Company from the installation of the MagnaDrive ASD was energy savings. As an additional benefit, vibration and noise were reduced significantly, and this is reducing the downtime needed for maintenance on their motor, fan, and other equipment in the cooling tower.

Besides energy savings, water is also conserved because by reducing the fan speed, unnecessary evaporation is also avoided.

### SAVINGS

#### By the Numbers

<b>Annual Energy Costs Before MagnaDrive</b>	¥759K
<b>Annual Energy Costs After MagnaDrive</b>	<u>¥448K</u>
<b>Average Energy Savings Per Fan</b> (8000 hrs / year)	¥311K
<i>Additional Expense Incurred Per ASD</i>	¥398k
<b>Breakeven Point (¥398k) / (¥311K/yr)</b>	<b>1.3 Years*</b>

*\*The Breakeven Point of 1.3 years is considering energy savings alone. If maintenance reduction and operation uptime are considered, the Breakeven Point is much lower.*

**"The energy savings rate is very satisfactory.  
 Installation is easy, and compact. Noise and  
 vibration are reduced dramatically.  
 MagnaDrive is fantastic!!!"**

**YANSHAN PETROCHEMICAL CO. LTD. ENGINEER**


**MagnaDrive™**  
 CORPORATION

**Minnesota Power**

DELUTH, MN • USA

## Success Snapshot

**80%**  
 REDUCTION IN  
 VIBRATION

**84%**  
 SAVINGS ON  
 NON-ENERGY  
 OPERATING COSTS

**0.3 YRS**  
 BREAKEVEN

## CHALLENGE

- Ongoing Vibration Issues
- Excessive Maintenance

Minnesota Power was experiencing vibration problems on their air pre heaters. In an effort to correct this problem, a preventive maintenance procedure was implemented, requiring all couplings to be re-greased during *every outage*. Each re-greasing would tie up three maintenance technicians for three days. Worse yet, the reduction in vibration levels that was accomplished by the re-greasing would only last a few weeks before the vibration would return again.

## SOLUTION

MagnaDrive MGTL™

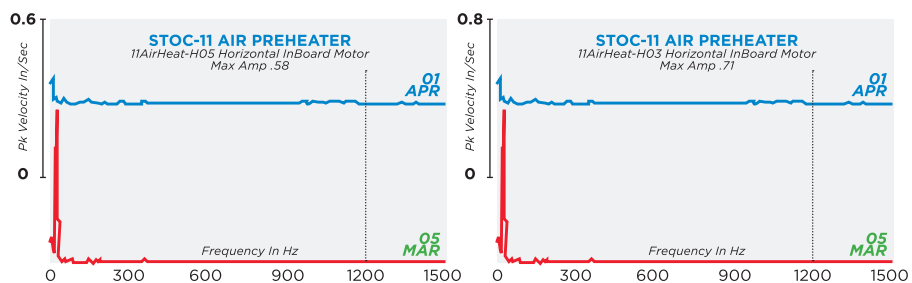
MagnaDrive Sales approached Minnesota Power with a proposal to replace the existing couplings with MagnaDrive MGTL Couplings. Because the MagnaDrive Couplings have no physical connection between motor and load, vibration transferred between the two components is significantly reduced.

## RESULTS

Minnesota Power's vibration problems on their Air Pre-Heaters have been completely eliminated, with readings indicating more than an 80% vibration reduction. Prior to implementation of the MagnaDrive MGTL Couplings, Minnesota Power was spending

an average of nine days each year per Air Pre-Heater on repairs and maintenance caused by misalignment, corresponding to a non energy operating cost of approximately \$21,600 annually.

Despite having to pay more for MagnaDrive Couplings than for traditional couplings, Minnesota Power found the investment in the MagnaDrive Couplings to be the best choice. Even without taking into account the significant savings from reduced downtime due to lower vibration levels, **Minnesota Power was able to pay back its increased investment in less than 6 months, and they now save 84% annually on non-energy operating costs.**



## SAVINGS

## By the Numbers

<b>Annual Non-Energy Operating Costs Before MagnaDrive</b>	<b>\$21,600</b>
<b>Annual Labor Costs After MagnaDrive</b>	<b>\$3,360</b>
<b>Annual Savings Per Coupling</b>	<b>\$18,240</b>
<i>Additional Expense Incurred Per Coupling</i>	<i>\$5,000</i>
<b>Breakeven Point (\$5,000) / (\$18,240/yr)</b>	<b>.3 Years</b>


**MagnaDrive™**  
C O R P O R A T I O N


## Northwestern U.S. Forest Products Company

PACIFIC NORTHWEST • USA

### Success Snapshot

**70%**  
VIBRATION  
REDUCTION

**92%**  
ANNUAL LABOR &  
EQUIPMENT COST  
SAVINGS

**0.09 YRS**  
BREAK-EVEN

### CHALLENGE

- Vibration Problems
- Equipment Failure
- Excessive Maintenance

A forest products company located in the Pacific Northwest was experiencing repeated failures in their clean condensate pumps due to extremely high levels of vibration in the system that were the result of thermal expansion in the system piping and the pump shaft. Vibration amplitude levels of over 0.4 in/sec (RMS velocity) were literally shaking the pump apart. According to the maintenance crew, the condensate pump was being replaced between three and four times every year as a result of the vibration.

### SOLUTION

#### MagnaDrive MGE™

MagnaDrive Corporation proposed the installation of a MagnaGuard Economizer (MGE) coupling as a replacement for the existing rigid coupling. Because this was a 100 hp motor running at 3600 rpm, an MGE 11 coupling was selected. Removal of the original coupling and installation of the MGE 11 coupling was done without moving either the pump or the motor and only took less than an hour to complete.

### RESULTS

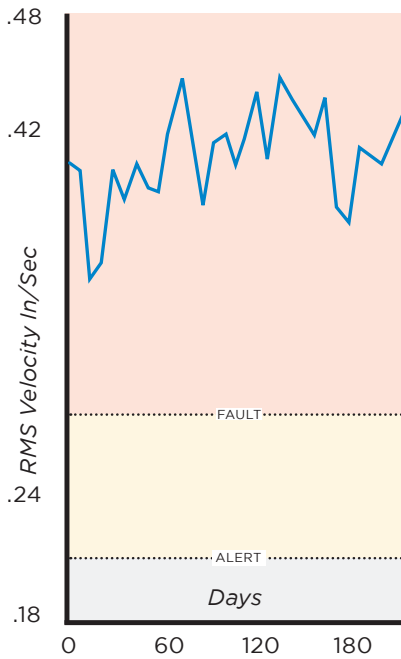
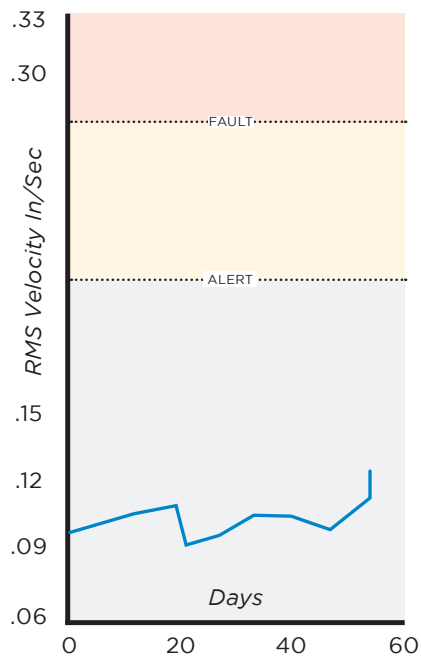
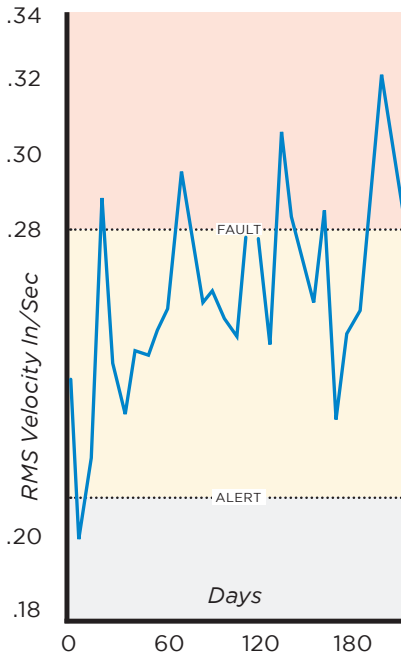
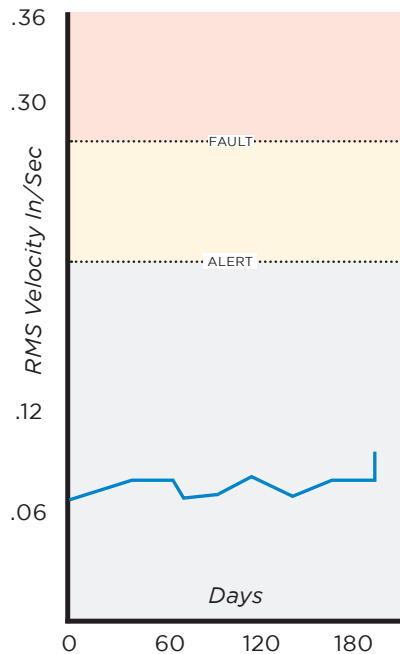
After successful installation of the MGE-11 coupling the customer reports the following results:

- Vibration levels dropped from 0.431 in/sec to 0.116 in/sec RMS velocity on the inboard side of the pump (down 73%) and from 0.286 in/sec to 0.087 in/sec RMS velocity on the outboard side (down 70%).
- Reduced maintenance due to decreased vibration.
- The pump is lasting longer. Instead of replacing the pump 3 – 4 times each year at a cost of \$5,000, the plant has operated over one year with no signs of pump damage!

#### CUSTOMER SATISFACTION

When asked to summarize their experience with MagnaDrive, our Forest Products client expressed complete satisfaction with both the MGE Coupling and the service they received from our Applications and Sales personnel. The customer has since placed additional orders for the MGE Coupling, and they are currently reviewing additional applications for potential MagnaDrive ASD installations.



**PUMP INBOARD BEFORE**MTC5-3184 CLEAN COND to DAs NORTH  
Trend Display of Overall Value**PUMP INBOARD AFTER**MTC5-3183 CLEAN COND to DAs SOUTH  
Trend Display of Overall Value**PUMP OUTBOARD BEFORE**MTC5-3184 CLEAN COND to DAs NORTH  
Trend Display of Overall Value**PUMP OUTBOARD AFTER**MTC5-3183 CLEAN COND to DAs SOUTH  
Trend Display of Overall Value**SAVINGS****By the Numbers**

**Annual Labor & Equipment Costs Before MagnaDrive** \$24,800

**Annual Labor & Equipment Costs After MagnaDrive** \$2,029

**Annual Savings Per Coupling** **\$22,771**

*Additional Expense Incurred Per Coupling* \$2,000

**Breakeven Point**  
(\$2,000) / (\$22,771/year) **.09 Years**





**MagnaDrive™**  
 CORPORATION

**Nippon Paper**  
 PORT ANGELES, WA • USA


## Success Snapshot

**13%**  
 ENERGY  
 SAVINGS

**44.5%**  
 SAVINGS ON  
 NON-ENERGY  
 OPERATING COSTS

**0.95 YRS**  
 BREAKEVEN

### CHALLENGE

- Excessive Vibration
- Rugged Environment
- Wasted Energy

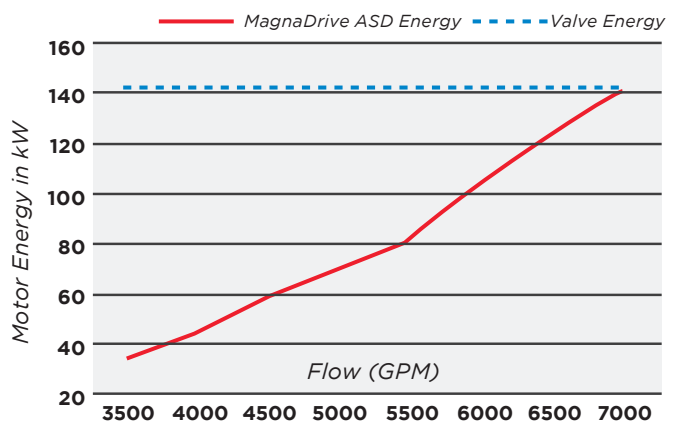
The effluent pumping system at the Nippon Paper - Port Angeles, WA mill treats the wastewater created by the paper manufacturing process. The system had three 100 hp centrifugal pumps, with two of the pumps operating in parallel to pump raw effluent from the main pump station sump to a clarifier. The third pump was used as a backup or during extreme process upsets. Although the minimum flow rate required by the treatment process was 4,800 gpm, a system review showed that when both pumps were operating at full load, their combined capacity was 7,000 gpm.

The primary system control was a clarifier sump level control operating a throttling valve and a bypass valve in tandem to maintain a minimum level in the sump. As the level in the sump rose, the throttling valve opened and the bypass valve closed. Conversely, as the level in the sump fell, the discharge valve closed and the bypass valve opened re circulating the excess 2,200 gpm back to the main pump station sump.

An additional issue with the existing system was that the pumps could only be started at full load from a dead start. Starting the pumps in this manner created flow surges and pipe hammer that led to stress in the system's piping, as well as causing a long duration of locked rotor currents that overheated the pump motors.

The mill also found that, because the pumps were oversized for the process, cavitation and excessive vibration were present in the piping because the total volume of effluent being pumped was nowhere near the pumps' capacity – the pumps were being starved for flow.

### MAGNADRIIVE ASD vs VALVE ENERGY DEMAND



“We are extremely pleased with the energy savings we are getting with the MagnaDrive Adjustable Speed Drives. With the stability, reliability and reduced maintenance cost requirements of the system; we are excited about moving forward with other applications in the mill.”

- NIPPON PAPER ENGINEER

## SOLUTION

### MagnaDrive ASD™

Nippon Paper decided to compare Variable Speed Control options against their existing valve system. The MagnaDrive Adjustable Speed Drive (ASD) was more suitable for the mill than electronic Variable Frequency Drives (VFDs) because of their ruggedness and lack of delicate electronic components. Also, the MagnaDrive ASDs were less costly than comparable VFDs.

Nippon Paper chose to install MagnaDrive ASDs on the effluent pumps. Use of the ASDs would allow the mill to replace the throttle and bypass valve operations instead controlling the speed of the pumps to match the system's output to the mill's requirements.

## RESULTS

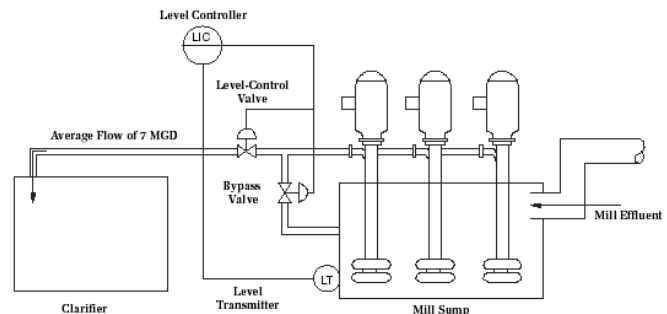
The implementation of the project has improved the operation of the effluent pumping system and resulted in significant energy savings for the Port Angeles mill. With the newly configured pumping system, the mill no longer depends on bypass and throttling valves to control the pumping system. The ASDs can vary the pump speed to match the pump output capacity with the mill's required process flow rate. The new configuration allows the mill to operate one of the pumps at full capacity while operating the other one at partial load. By not operating both pumps at full capacity, cavitation and vibration have been drastically reduced. Also, because they are uncoupled from the pump motors, the ASDs allow the pumps to start gradually, which eliminates water surges and pipe hammer. This, in turn, lessens stress on the system's piping and internal components, reduces maintenance needs, and prolongs equipment life.

The graph on Page 1 shows motor energy demand in kW vs. flow rate to the clarifier in gpm. The blue line represents two pumps running, using a level control and bypass valve to maintain level in the mill sump. The green line represents the energy savings potential using the MagnaDrive ASDs to control level and flow with variable speed. Using the drives to maintain an average flow rate of 7 mgd (4800 gpm) to the clarifier, the customer experiences

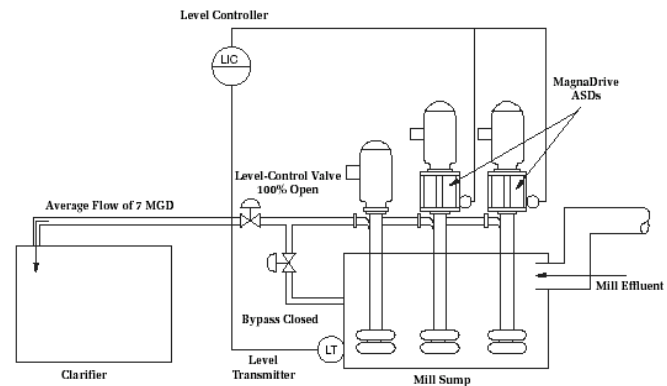
an average of 80 kW demand savings over the original system configuration.

By controlling the system's flow rate using pump speed instead of throttling valves, the mill's power demand has declined from 142 kW to 62 kW. **The mill is saving \$32,000 and 700,000 kWh in annual energy costs, and \$15,000 per year in maintenance costs giving a breakeven point of slightly less than one year!**

### ORIGINAL SYSTEM: TRADITIONAL VFDs



### NEW SYSTEM: MAGNADrive ASDs



## SAVINGS

### By the Numbers

Annual Energy Costs Before MagnaDrive	\$250,369
Annual Energy Costs After MagnaDrive	<u>\$214,378</u>
Annual Energy Savings from ASDs	\$31,991
Annual Non-Energy Operating Costs Before MagnaDrive	\$34,601
Annual Non-Energy Operating Costs After MagnaDrive	\$19,178
Annual Non-Energy Operating Savings Using MagnaDrive ASDs	\$15,423
Additional Expense Incurred (\$22,500 Per ASD)	\$45,000
Breakeven Point (\$45k) / (\$47,414/yr)	<b>.95 Years</b>


**MagnaDrive™**  
 CORPORATION


## City of Eugene, Oregon Wastewater Division

EUGENE, OR • USA

### Success Snapshot

**35%**  
 ENERGY  
 SAVINGS

**\$10,560**  
 SAVINGS ON  
 NON-ENERGY  
 OPERATING COSTS

**0.29 YRS**  
 BREAK-EVEN

### CHALLENGE

- Premature Wear & Tear
- Increased Maintenance
- Wasted Energy

The City of Eugene, Oregon wastewater treatment facility was experiencing premature wear in the bearings of the gearbox connecting their motor to their double flight, Archimedean screw pump. Because they were using a belt drive to transfer torque between a 200 hp motor and the gearbox turning a 90 inch (2.29 m) diameter, 63' (19.2 m) long screw, they were experiencing premature wear in the system's bearings. The lateral forces of the belt drive on the gearbox shaft created an unbalanced load leading to the need for increased maintenance activities.

### SOLUTION

#### MagnaDrive MGD™

Gregory Watkins, Project Manager for the City of Eugene Wastewater Division, was given a proposal to replace the belt driven system with a MagnaGuard Delay Coupling (Model MGD 18/250). Watkins agreed and purchased four MGD units for his pumps.

### RESULTS

The City of Eugene successfully installed their MagnaDrive MGD Couplings and reports the following results:

- A 35% reduction in energy required to operate the pump.
- No wear on bearings resulting from lateral tension of belts.
- Virtually no maintenance after installation.
- Longer bearing life.
- No vibration transmitted between the systems components.
- High tolerance for system component misalignment.
- Complete system protection from screw jams due to the MGD's disconnected technology.
- Timely response and support from MagnaDrive Corporation.



**“The initial price of the MGD was a little higher than other coupling technologies, but when we looked at the total cost of ownership over the life of our system it was definitely the right decision.”**

***Gregory Watkins, Project Manager for the  
City of Eugene Wastewater Division***



The original drive system was designed to prevent pump and motor damage in the event of an obstruction entering the screw pump. By using an offset motor and a belt drive, the system depended on belt slip to allow the motor to continue turning even if the screw was jammed. While this set up did help to protect the motor and pump, it also cost the city in terms of wasted energy. The combination of belt friction, belt slippage, and off center loading of the motor and pump bearings added up to a significant amount of energy being used just to overcome system losses (35%).

The MagnaDrive MGD Coupling is mounted in line with the motor and pump shafts, removing the side loads. Also, the MGD is able to manage system misalignment and pump jams while still operating at a high level of efficiency, all while saving energy, maintenance time, and finances.



## SAVINGS

## By the Numbers

<b>Annual Energy Costs Before MagnaDrive</b>	\$99,516
<b>Annual Energy Costs After MagnaDrive</b>	<u>\$64,685</u>
<b>Annual Energy Savings from MagnaDrive</b>	\$34,831
<b>Annual Non-Energy Savings from MagnaDrive</b>	<u>\$10,560</u>
<b>Annual Savings Per MagnaDrive MGD Installation</b>	\$45,391
<i>Additional Expense Incurred Per MGD Coupling</i>	\$13,000
<b>Breakeven Point (\$13k) / (\$45,391/yr)</b>	<b>.29 Years</b>



Photos of MGD and City of Eugene Wastewater Facility






**MagnaDrive™**  
 CORPORATION


## Grand Hyatt Hotel

SEATTLE, WA • USA

### Success Snapshot

**10%**  
 ENERGY  
 SAVINGS

**52%**  
 SAVINGS ON  
 NON-ENERGY  
 OPERATING COSTS

**0.5 YRS**  
 BREAK-EVEN

### CHALLENGE

- Water Pressure Reliability
- Excessive Vibration
- System Misalignment

The Grand Hyatt Hotel in Seattle had a problem. They had just received an award for achieving the second highest overall customer satisfaction ranking for all Hyatt properties. They wanted to be #1! To reach this goal, hotel management analyzed customer surveys and found that, during high occupancy levels, there were some complaints regarding water pressure on the upper floors. The Grand Hyatt Hotel contacted MagnaDrive Corporation for help.

### SOLUTION

#### MagnaDrive ASD™

The hotel's water supply is provided by three 60 hp / 3600 rpm pumps that operate sequentially in response to demand from guest rooms. Because hotel occupancy can vary dramatically day to day, variable water flow was a crucial component for any solution. The flow required could also be impacted by meetings or conventions on site or seasonal weather patterns. Concerned with energy use, the hotel made the decision to use pump speed control to adjust the water pressure instead of throttling valves. The hotel had experienced problems with Variable Frequency Drives (VFDs) in the past and wanted to explore alternative adjustable speed technology. MagnaDrive Corporation proposed using three 10.5 Air Cooled Adjustable Speed Drives (ASDs)

on the water supply system. Hotel Management chose MagnaDrive Corporation because the reliability of the water supply is so critical to a hotel's operation.

### RESULTS

**Following installation of the MagnaDrive ASDs on the water supply system, the Grand Hyatt Hotel has seen the number of water pressure complaints drop almost to zero!**

The ASDs provide all rooms with the target water pressure whether the hotel is at partial capacity or completely full. Also, because of the precise control offered by the MagnaDrive ASDs, the hotel's water pressure is maintained in a smooth and consistent manner without the stepped response that is often seen in a multiple valve system. Energy savings compared to a control valve solution are significant and, in addition to providing the energy savings desired by the hotel, the MagnaDrive ASDs are also eliminating issues that had been experienced in the past due to system misalignment.



The Hotel Management found that despite the higher costs of a MagnaDrive ASD compared to a VFD, overall non energy operating costs could be lowered due to reduced vibration in the system. **Their analysis confirmed vibration reductions greater than 70% were achieved.**

**The lower vibration reduced seal replacements and increased bearing life in the motor and the pump. Not including benefits related to improved reliability and higher customer satisfaction, the Grand Hyatt estimates payback on their increased investment was 6 months.**



SAVINGS

By the Numbers

Annual Non-Energy Operating Costs Before MagnaDrive (Using a VFD)	\$18,300
Annual Non-Energy Operating Costs After MagnaDrive (Using an ASD)	<u>\$8,800</u>
Annual Non-Energy Operating Savings from MagnaDrive ASD	\$9,500
Annual Energy Costs Before MagnaDrive (VFD)	\$16,000
Annual Energy Costs After MagnaDrive (ASD)	<u>\$14,500</u>
Annual Energy Savings from MagnaDrive ASD	<u>\$1,500</u>
Total Annual Savings from MagnaDrive ASD	<u>\$11,000</u>
Additional Expense Incurred Per ASD	\$5,500
Breakeven Point (\$5,500) / (\$11,000/yr)	.5 Years




**MagnaDrive™**  
 CORPORATION


## Poplar Point Pumping Station

WASHINGTON, D.C. • USA

### Success Snapshot

**\$40K**  
SAVINGS  
PER PUMP

**\$80K**  
SAVINGS ON  
NON-ENERGY  
OPERATING COSTS

**2 Months**  
BREAKEVEN

### CHALLENGE

- Vibration & Noise
- Excessive Wasted Energy
- Rugged Conditions

The Poplar Point Pumping Station is located in South East (S.E.) Washington, DC. This D.C. Water pump station has three 22.5 mgd (approx.) vertical drive line pumps. The Motors are 100 hp at 495 rpm, 3 phase, 60 hz, 208 volts.

The capacity of the pump station is 45 mgd. There are 2 variable pumps and one that is fixed speed. The two variable pumps (pictured above) start and stop continuously - 24/7 at 30 minute intervals.

When one of the variable pumps stops and the corresponding check valve fails, this condition would result in reverse flow back to the pump so fast that the pump shaft would break.

This happens frequently and causes a headache to Blue Plains Pumping Station maintenance and operations. Although there is a check valve, the costs to repair the system along with the cost of down time was very expensive. DC Water rented a pumping system for a year before they tried to resolve the problem. The rental pumps were suggested by a consulting engineer to the cost of over US\$80,000 per month.

### SOLUTION

#### MagnaDrive ASD™

DC Water Blue Plains decided to install MagnaDrive to solve their problem. Since level control was required, a MagnaDrive Adjustable Speed Drive was proposed. Our partner in the D.C Metro Area - Das Solutions supplied 2 vertical 26.5 Adjustable Speed Drives (ASDV) with non-reversing clutches to prevent reverse operation and prevent the pump shaft from turning in reverse when one of the pumps stops.

### RESULTS

The two vertical MagnaDrive 26.5 ASDV's have been installed since 2011. **During a meeting at D.C Water's main office two years after continuous operation, MagnaDrive was informed that the DC Water-Blue Plains Pumping Station saved almost 2 million dollars since the drives were installed.**

### SAVINGS

#### By the Numbers

#### RESULTS AFTER MAGNADRIE INSTALLATION

Total Monthly Savings Per Pump in Non-Energy Operating Costs	≥ \$40,000
Total Monthly Savings from 2 Total Pumps with MagnaDrive 26.5 ASDV's installed	≥ \$80,000
Additional Expense Incurred	\$160,000
Breakeven Point (\$160k) / (\$80k/mo savings)	<b>2 Months</b>