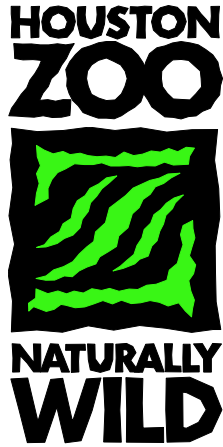


CASE STUDY



Houston Zoo Installs a Flux Drive ASD and Cuts Energy Usage By 40%

The Houston Zoo has over 4,500 permanent residents for whom they provide housing, meals and medical care. The Zoo strives everyday to become more eco-friendly and sustainable and has recently made design changes to the Sea Lion exhibit that allowed them to save thousands of gallons of water every day! The next step for the Sea Lion exhibit was to reduce the energy consumption of the Sea Lion water filter application.

Situation: Houston Zoo's Sea Lion Exhibit was built in 1968. In a later renovation, to improve the Sea Lion's health, one of the exhibits water wells was drained and turned into housing for a filtration system. The filtration room consisted of two 15hp AC motors with a pressure system that pumped the water from the Sea Lion exhibit

through two filters using a control valve to manage the rate of the water flowing into the filter system.

The challenge with the filtration room is that it is the lowest point in the zoo and as a result, has been flooded by both Hurricane's Rita and Ike. While Hurricane Rita flooded the room with 3ft of water, Hurricane Ike submerged the room and all the equipment in 12ft of water. So any energy savings device installed in this location must withstand the possibility of being under water for a few days.

Benefits:

- *Reduced energy usage by 40%
- *Reduced hardware cost
- *Reduced vibration and noise,
- *Can withstand harsh conditions

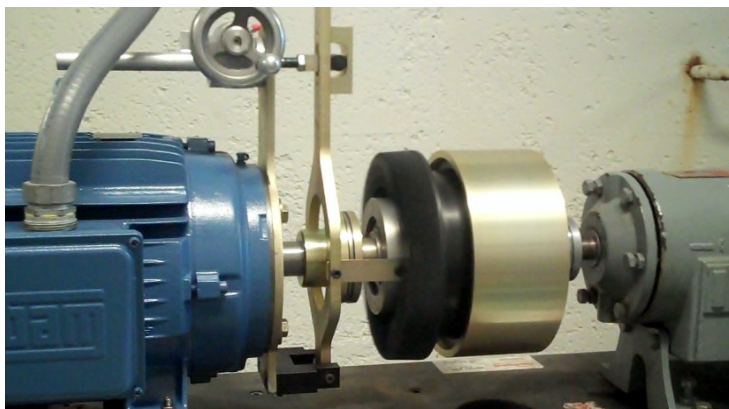
"The Flux Drive has cut the power use for that pump in half. "

*- Beth Schaefer
Curator of
Natural
Encounters and
Sea Lions,
Houston Zoo*

Solution: A Flux Drive 08-60 Adjustable Speed Drive was installed between the motor and pump shafts of the filtration system. The facility staff required manual control for this installation and a Joyce hand operated actuator was supplied with the ASD to allow the operator to engage and disengage the ASD to control the pumps discharge pressure and resulting flow through the sand filters. Power usage was dropped from 8.96kW, using a throttling valve, to 5.5 kW using the Flux Drive . In addition to the power savings, pump cavitation was eliminated significantly reducing noise levels and pump bearing temperature was reduced from 143 deg f. to 104 deg f.

"The installation of the Flux Drive here at the Houston Zoo has resulted in a much quieter work area and we can now adjust the speed of the motor with

ease. The Flux Drive has cut the power use for that pump in half. Installed across the board, this could result in a significant savings to an institution both in dollars and energy use as we all try to be more aware of our impact on the earth's resources. We also believe that the wear and tear on our pumps will be significantly reduced as we no longer have to valve back the flow of water leaving the pump. We will definitely be tracking those savings as time goes on."



CASE STUDY



Technical Discussion of Situation:

The filtration application had a 15 hp 1760 rpm US motor running a Flow Serve GRP 4x3x10 salt water pump coupled with a Dodge 7E Flex coupling and two identical pumps running in parallel pumping salt water through sand filters for the Sea Lion Exhibit. Pressure and flow rates were controlled manually using a hand operated discharge valve.

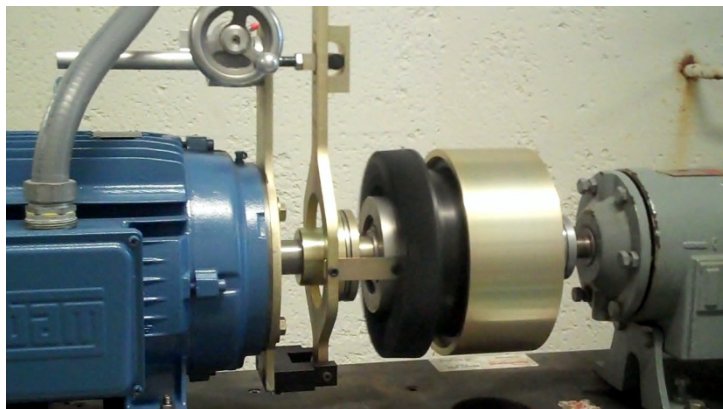


Initial vibration levels on the motor and pump as found were very low but the motor bearings had high ultrasonic levels (55 DB) due to bearings needing grease. The facility staff stated that the pump is rebuilt often and in fact had new bearings and seals installed in the last month. As found, alignment showed to be 8.3 mils vertically and 5.6 mils horizontally. Cavitation and noise levels on the pump were noticeably high due to the discharge valve being partially closed. The Energy levels were measured on the motor at operating pressure. Measured operating wattage with the valve throttled was 8.68 kW, 29.8 amps and 1% THD (Total Harmonic Distortion). Output pump pressure was measured at 22 psi and the pump bearings had elevated temperatures 143 deg f.



Technical Discussion of Solution:

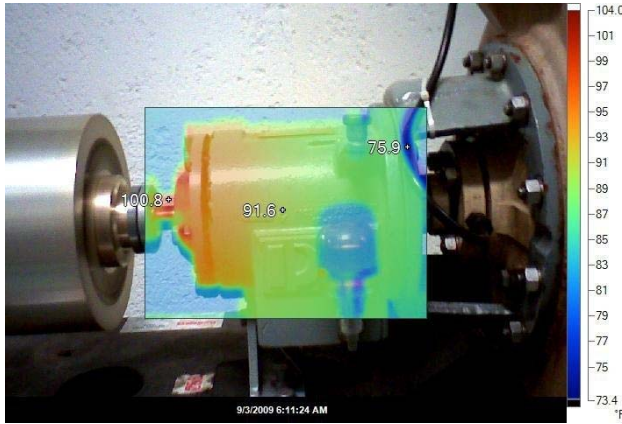
A Flux Drive 08-60 Adjustable Speed Drive was installed between the motor and pump shafts of the filter application. The original shaft to shaft distance with the Dodge coupling was 4 inches. The motor had to be moved back another 6" to accommodate the Flux Drive ASD. Four new holes were drilled and tapped into the base plate and helicoil inserts epoxied into the holes to attach the motor. Flux Drive supplied a new WEG 15 hp 1770 RPM C-face motor to complete the installation. The facility



staff required manual control for this installation and a Joyce hand operated actuator was supplied with the ASD to allow the operator to engage and disengage the ASD to control the pumps discharge pressure and resulting flow through the sand filters. The time needed to install the ASD was approximately 2.5 hours.

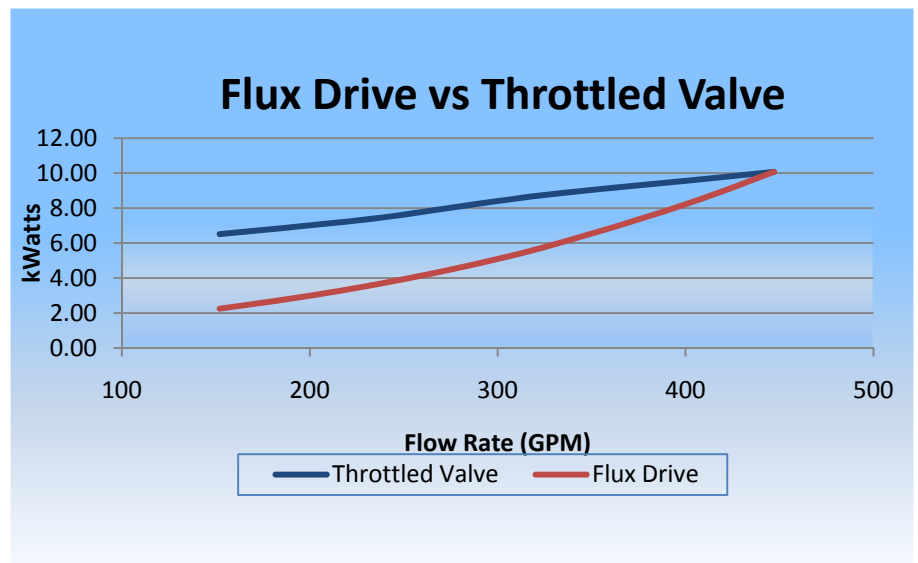
Alignment of the Flux Drive was done using the supplied .060" shim spacers to verify adequate air gap between the induction Rotor and magnet assembly. A visual inspection of the flex hub showed the alignment to be acceptable. Actual alignment was recorded using a laser to be 12.7 mils vertically and -11.8 mils horizontally.

CASE STUDY



Vibration levels were also recorded on the motor and pump with the results being less than 0.04in/sec horizontally, 0.02in/sec in the vertical and axial directions on the motor and less than 0.06 in/sec horizontally, 0.01 in/sec vertically and 0.03in/sec axially on the pump. The discharge valve was opened fully and the pressure set point of 22 psi was achieved by engaging the Flux Drive ASD using the hand actuator and speeding up the pump up to 1428 RPM. Cavitation on the pump was eliminated and noise levels fell significantly. Pump bearing temperature was reduced from 143 deg f. to 104 deg f.

Power measurements were recorded using a Fluke 345 power quality meter and found to have reduced from 8.96kW using a throttling valve to 5.5 kW using the Flux Drive ASD, resulting in an approximate 37% of the motors energy savings. There was no measurable change in the THD of 1%.



40% Energy Savings with the Flux Drive ASD

Founded in 2004, Flux Drive, Inc. is dedicated to building high quality adjustable speed drives and flexible soft-start couplings for the purpose of saving energy and improving the performance of AC motor applications.