University of New Orleans Press Release (December 16, 2005)

Innovative Pump Could Solve Floodwater Problems in New Orleans

NEW ORLEANS, LA The University of New Orleans in partnership with Power Engineering, Inc. announces the development of an innovative new pump that could be the final solution to resolving emergency floodwater problems in the Greater New Orleans area.

The disaster caused by Hurricane Katrina has brought the New Orleans hurricane protection problem to national and international attention. While most of the discussion has focused on building stronger and higher levees, University of New Orleans (UNO) engineers are working on resolving water pumping problems and increasing flood protection by implementing an innovative new pump.

It has been more than 90 years since A. Baldwin Wood invented the revolutionary 12-foot screw pump in 1913. The Wood Screw Pump has resolved New Orleans's drainage problems and uniquely contributed to the health and wealth of New Orleans' environmental and commercial foundations. The Wood pumps were, however, designed for drainage but not for saving the city from fast and massive flooding. The Wood Screw Pump is characterized by high volume and low pressure for lifting a large amount of water 20 or 30 feet over the levee and dumping it into canals connected to Lake Pontchartrain.

The existing centrifugal pumps can offer a bit more pressure but not much more than 300 feet before their efficiencies drop significantly to below 50%. The disadvantage of the Wood pumps and the centrifugal pumps is that they must be located near the dump sites and therefore, canals become necessary to be stretched into the inner city from Lake Pontchartrain. The breaches of the 17th Street and London Avenue canal levees have led to an avoidable tragedy if those canals were not there. Another type of traditional pump, the piston pump, can deliver very high pressure; unfortunately, its volume flow rate is unacceptably low (less than 5% of the centrifugal pump at an equivalent size). Hence, the only solution to the limitations of the current pumps is to invent a high pressure and high volume pump that can pump water several miles directly into the Mississippi River or to Lake Pontchartrain without going through the canals.

The Energy Conversion and Conservation Center (ECCC) of University of New Orleans is currently collaborating with the New Orleans based Power Engineering, Inc. to make this happen.

A revolutionary new pump "TurboPiston Pump" (TPP) has been invented by Patrick Rousset, PE, the President of the Power Engineering, Inc. and a mechanical engineer who graduated from UNO in 1982. This new pump combines the merits of each existing type of pumps (ie. centrifugal pump, reciprocating piston pump, and rotary screw pump) while discarding the problems relating to each.

The TPP consists of two opposing rotating disks (see Figure 1) with the suction side disk being mounted with a slightly inclined angle, so these two disks are separated with a wedge of volume. Eight pistons are built on the inclined suction disk and eight corresponding cylinders are built on the vertical discharging disk. Each chamber has both a suction and a discharge valve associated with it and rotating as an integral part of each rotor. The rotating motion will drive a continuous piston motion of compressing and expanding as the pistons and cylinders combine on the circumference of a circle and glide in and out of each other. The rotating motion harnesses the feature of a high volume flow rate of the centrifugal pump (Turbo-motion), the piston motion achieves the positive displacement feature of high compression ratio of a piston pump, and the wedge volume simulates the energy saving feature of the extended surface of a rotary screw pump. Therefore the TPP and economic to maintain because it has only two moving parts, whereas a traditional reciprocating pump has 50 to 100 moving parts. In addition, a normal reciprocating pump requires a charge pump upstream to assure proper chamber filling to avoid cavitation, which can damage the pump or render the pump useless. The TPP requires no upstream charge pump since the rotary motion acts as its own charge pump. Due to its high rotating speed, the common problem of a pulsating discharge from a piston pump is minimized, and the discharge of TPP is comparable to the centrifugal pump. TPP displaces a fixed quantity of fluid per revolution thereby fine control of the flow rate is as simple as controlling the speed of the unit at a linearly proportional rate.

Present New Orleans pumps can move average 335,650 gallons of water per minute and discharge at 30 pounds of pressure per square inch (30 psi). With a similar 12 ft diameter cross-sectional area running at 900 rpm, the TPP can pump 722,860 gallons of water per minute and discharge at 1000 psi pressure, which can lift a water column **2,300 feet high** or transport water horizontally for **sixty miles**. This allows the flood waters to be moved away in closed piping systems protected from overflow or breaching. A single TPP pump, can pump flood water from anywhere in the Greater New Orleans directly into the Mississippi River or into the Lake Pontchartrain or into the Gulf of Mexico 40 miles away. Although hundreds of TPP pumps are needed to keep up with the flood water volume, the cost will be significantly cheaper than building hundreds of miles of category-five levees with the subsequent maintenance costs after each major storm. Even with the possibility of building the category-five levees, a reliable pumping system is definitely required to keep Greater New Orleans dry under any conditions. The TurboPiston Pump system is one of the best solutions to this need.

A smaller TPP has been built and tested at 900 rpm. The TPP is ready for implementation and be expanded to higher pressure and rpm. While the Power Engineering, Inc. is engaged in marketing and implementing the TPP technology, the engineers at Energy Conversion and Conservation Center at UNO is working on improving the current design to make TPP more reliable, more efficient, and produce more pressure and flow. ECCC engineers will support Power Engineering to resolve installation and operation problems as well as any new product test. ECCC engineers are expanding the applications of TPP to other areas such as gas/oil industries, municipal waster water treatments, slurry transport for high pressure biomass and coal feeding, and for high flow rate metering. ECCC is also developing a sister version of the TPP to apply the same working principle to a "TurboPiston Compressor" (TPC). UNO and Power Engineering are jointly developing and implementing this new pump technology that could be the ultimate solution to resolving emergency flood water problems in the Greater New Orleans areas.

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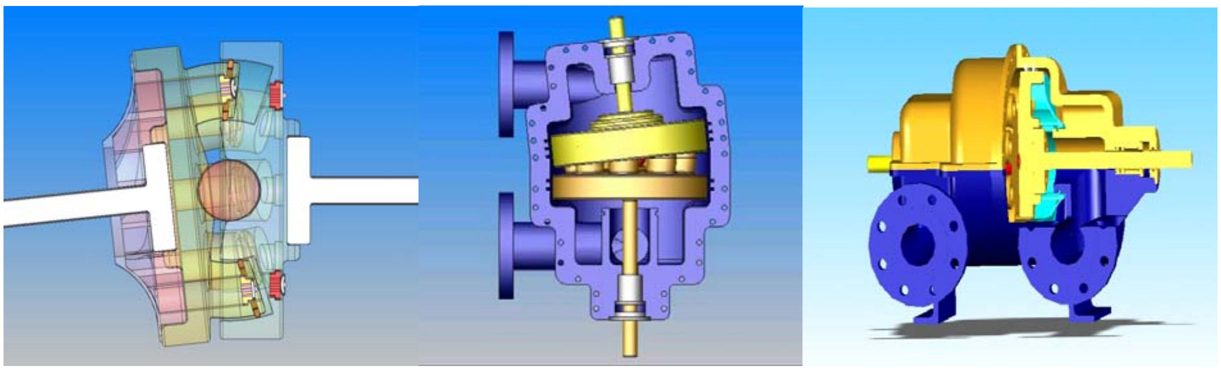

Figure 1: The innovative TurboPiston Pump

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