Article 03

How to pay back the cost of an AquaSense in a few months

Abstract

Reducing CO_2 emissions and energy costs can result in the pay back of the purchase and installation cost of AquaSense in a matter of months.

The understanding of personal and business responsibilities for reducing CO_2 emissions is greater than it has ever been before. With the further consideration of ever increasing energy costs, any actions that can reduce energy usage need to be investigated, and if appropriate, instigated.

One such action is the installation of the AquaSense from Pi into any swimming pool's recirculating pump system. The AquaSense can be used, not only to control the pH and chlorine dosing in a pool, but also to control the main re-circulating pump speed. By controlling the pump speed appropriately to the chlorine demand in the pool (which in turn is closely related to the bather load), electricity usage can be minimized resulting in significant CO_2 and energy cost reductions. These reduced costs often produce a pay back in the order of months, rather than years.

Theory

The main recirculating pumps provide the motive force for circulating the water in the pool through filters and past chemical dosing points. These pumps are normally specified to provide sufficient flow rate to maintain the minimum recommended number of turns per hour (pool volume pumped per hour) plus an additional capacity. Often these pumps are run at a single speed providing far greater flow than is actually required in order to maintain water quality.

By turning the pumps down when they are not being required to operate on 'full', significant savings can be made both in monetary and CO_2 emission terms. For most installations, this will require the purchase and installation of inverters to be able to turn down fixed speed pumps from their maximum.

Not only can this reduce energy costs and reduce CO_2 emissions, but it can improve the clarity of the pool water by reducing the flow rate through the filters.

Implementation

The CRONOS® and CRIUS® AquaSense pool controllers (fig.1) provide two control mechanisms for the pumps. The first is an overnight setting; most pools have 'downtime' overnight when it isn't necessary to run the pumps above the 'minimum'.* When doing this, pool operators may be advised to install an accurate flow meter, whose output can be fed directly into the AquaSense pool controller. Alternatively the AquaSense allows the operator to input the overnight minimum flow as a percentage power reduction, and also times at which this reduced pump rate applies.

The second control mechanism is based on the control output from the controller to the chlorine dosing pump. During normal pool usage there will be times when the pool is almost empty and during these times we want to turn the pump down, and during times of heaviest pool use we want to turn the pumps up again.

Fig.1 - An example of a CRIUS® AquaSense pool controller

The times of heaviest pool usage is effectively measured by the chlorine demand in the pool. The controller provides the operator with three bands 'A', 'B' and 'C' with user settable boundaries (Fig.2).

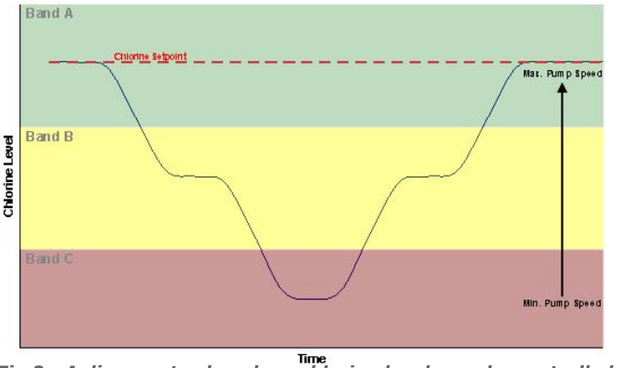

Fig.2 - A diagram to show how chlorine levels can be controlled by varying pump speeds.

**It is important to determine the minimum pump speed that results in the minimum acceptable flow rate for the pool, this is done by taking various factors into consideration such as pool volume and the filter type.*

When the chlorine residual is at its set point (within band A) the pump is set to run at the minimum flow rate. When the residual drops into Band B (indicating greater use of the pool), not only does this increase the chlorine dose but also the circulating pump rate. As the chlorine dips into Band C (indicating even greater pool use) the pump is turned up again to its maximum setting. By optimizing these bands, the pool operator can ensure that the circulating pumps are always operating at the minimum flow rate required to maintain pool water quality, thereby minimizing energy costs and CO_2 emissions.

Case Study

Crow Wood Leisure in Burnley, UK is a high quality, private leisure facility running a number of pools and spas. In a drive to increase bathing water quality and to reduce CO_2 emissions, Crow Wood installed two CRIUS® pool controllers (fig.3) in 2008.

Fig.3 - A picture of one of the CRIUS® controllers installed at Crow Wood Leisure.

After 8 months of exemplary pump control, Crow Wood then implemented the inverter control option to reduce circulation pump power usage. Data from October 2015 has shown that the conservative settings within the control algorithms have produced an average power saving of 38%. This equates to an average saving of 94 kWh/day or approximately £2550 (€3625, $3315) per year*.

During the initial installation period, Chlorine and pH control was monitored closely (fig.4). Peak pool usage occurs during Friday mornings with an aqua-aerobics class, and on Saturday mornings when the pool is heavily used by families. The graph below shows that even in these high demand situations Chlorine and pH control have been easily maintained.

"We are extremely pleased with both the Pool and Spa control provided by the pool controller. Now with the inverter control function, not only are we maintaining the highest quality bathing water but we are saving money and the planet at the same time!"

Ron Sykes, Crow Wood Leisure, UK

Conclusion

Implementation of an AquaSense pump control package can greatly reduce the power consumption of the pumps (10%-50%) providing a pay back of anything from 3 months to 2 years. This calculation does not include the savings that can be made by reduced wear and tear, reduced maintenance, and the resulting longer pump life.

**Figures derived from a 1 month trial on a 25m pool at Crow Wood Leisure. Anecdotal evidence on many other installations suggests that pay back would be considerably quicker for a bigger pool.*

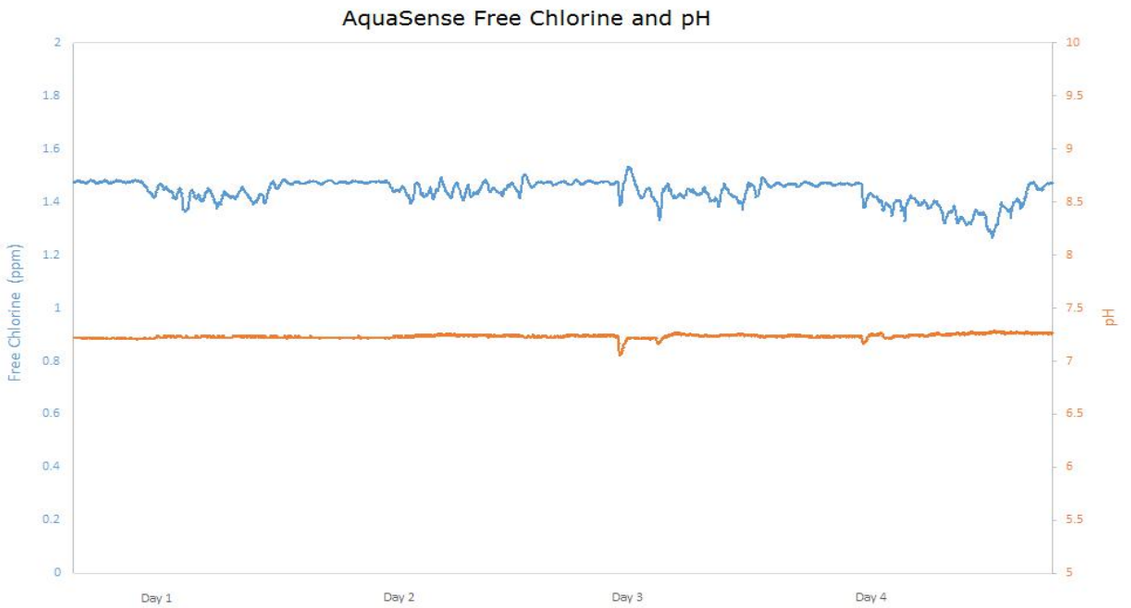

Fig.4 - pH and Chlorine level data recorded by the AquaSense installed at Crow Wood Leisure