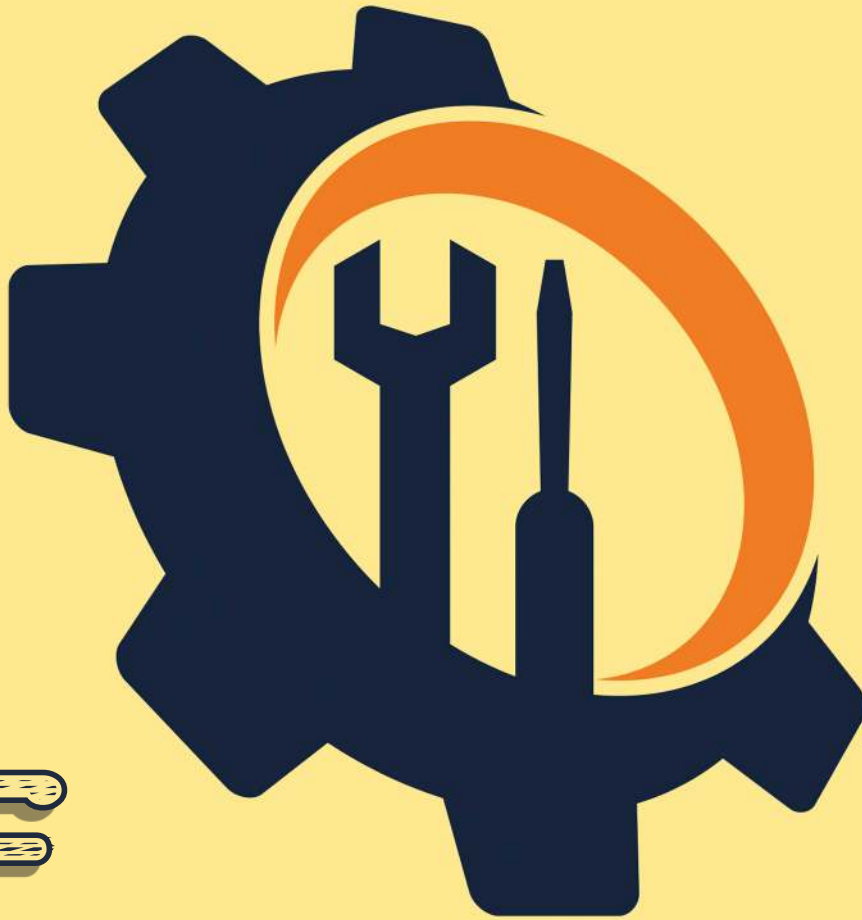


THE BENEFIT



OF

RETROFIT

IGS discusses the advantages of retrofitting air cannons over replacing the equipment entirely.

Roanoke Cement, like many cement plants, was faced with an unexpected operational problem. The manufacturer of the air cannons that they depended upon for many years to help prevent process blockage and improve efficiency, stopped the supply of replacement spare parts. Instead of purchasing inexpensive replacement parts, the new recommendation was to completely replace the plant's air cannons.

Air cannon life cycle

The lifetime of an air cannon varies greatly and is mainly determined by the location and environment where it is mounted. Air cannons installed close to the extreme heat and possible contamination from the cement process will not fare as well as those mounted in ambient temperatures with a low firing frequency. Yet even air cannons installed in the worst locations in most cases do not require complete replacement, but just a replacement of the internals. Instead of spending money to replace the air cannon, the plant would receive a greater return on investment by investing a small

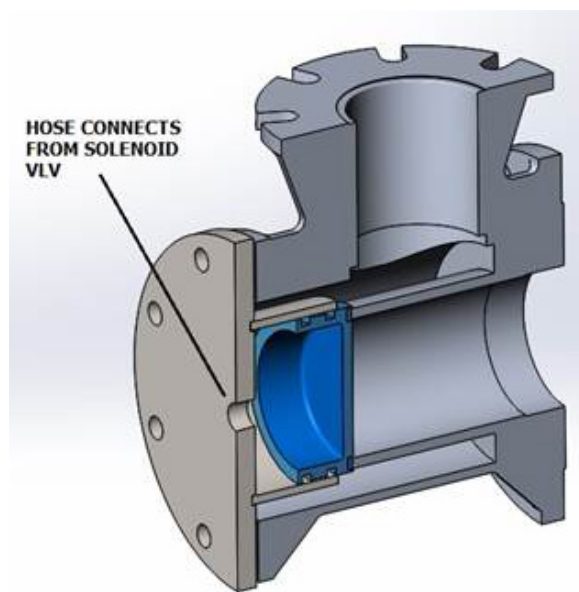


Figure 1. IGS air cannon retrofit solution.

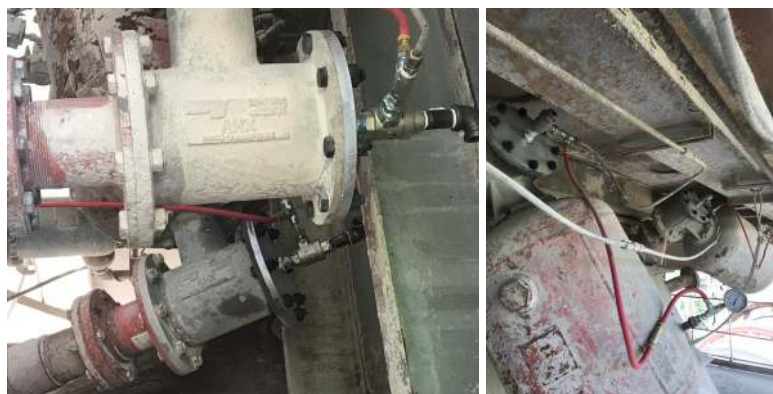


Figure 2. Retrofit installation at Roanoke.



Figure 3. Original damaged parts: clinker filled air cannons.

amount of money to replace the internals with a new design, and addressing the installation issues which cause the maintenance problems.

Is replacement necessary?

Many air cannons that have been successful at solving buildup problems only ever require the replacement of a few spare parts. However, recently, several cannon suppliers made the decision to no longer supply spare parts for their high-performance air cannons. This has led to the only (expensive) alternative left for the plant – to replace their old cannons with new models.

This move has not been particularly well received by many cement plants, as many of the originally installed cannons are still performing well. The need to completely replace air cannons has caused plants to spend money, perhaps unnecessarily, in order to ensure they continue to have air cannons operating in their plant.

Retrofit solution

One supplier of air cannons and their components has chosen to supply the necessary retrofit solutions, which do not require a full replacement. Integrated Global Services (IGS) has developed a retrofit kit that replaces the internal components, allowing plants to keep their existing air cannons operating. The cost of a retrofit is also significantly lower than the cost of installing a new air cannon.

Improvements to the internals

IGS has also made improvements to the internals of traditional air cannons. First, the manufacture of construction was upgraded from aluminium to coated carbon steel.

Air cannon experts found that aluminium in this application is too soft to withstand the pounding (requires a spring cushion) and does not resist corrosion well and that the elimination of the spring should be set to reduce air cannon failures.

Traditional air cannons have an aluminium piston, a spring, and aluminium casting with a press in bearing. The bearing frequently becomes scarred or dirty, causing malfunctions. The new solution uses standard hard chrome tubing, which is part of the back plate. The back plate can be unbolted and removed. This chrome tubing is used in a number of air cylinders each year and provides a smooth surface, which facilitates a more reliable operation.

IGS also offers air cannons that include the addition of an air cylinder, which provides better



Figure 4. IGS Retrofit 6 months in operation.

control of the pounding action of the air cannon, and can extend maintenance-free periods. In addition, the air cylinder does not necessitate the storage of air in the air tank between firing, and can reduce air consumption by around 50%.

Retrofit installation procedure

Installation of a retrofit kit can be performed quickly and inexpensively while the plant is on-line. This is accomplished by utilising the existing air cannon essentials, assuming they are in proper working condition. The solenoid valve, air lines, air receiver tank, air pressure gauges and relief valves, valve body, and firing programming currently in place for the air cannons is utilised with the retrofit. The installation procedure is as follows:

- ▶ Remove the bolts and back plate from the existing air cannon valve body.
- ▶ Remove the internal components from the valve body consisting of the aluminium piston and spring.
- ▶ Insert the retrofit kit. All of the components are pre-assembled to the back plate and are installed as one piece.
- ▶ Replace the bolts to fasten the plate to the valve body.
- ▶ The air cannon is ready to be placed in normal operation mode.

Roanoke Cement

Case study: Roanoke cement

In 2018, Roanoke Cement was searching for an answer to replacing all of its air cannons with new cannons. The plant became interested in IGS cannons when it learned that all of the components, except the piston, are off-the-shelf parts. Spare parts that are needed can be purchased from any supplier on-line. This prevents the plant from being at the mercy of the supplier for spare parts.

The plant installed 1 IGS air cannon on top of an existing cannon's valve body for a trial period to determine that the design and components were as effective and robust as promised. After one and half years in service, Roanoke Cement decided to purchase 12 IGS retrofit kits and 14 new air cannons in 2019. The kits were installed on existing air cannons within the plant. Some of the cannons were still firing while others had not been operational for quite some time.

Installation of new components

The original components were removed from the air cannon valve bodies while the cannons were still mounted in place, and the IGS components were installed. Existing solenoid valves, air lines, and programming were used, making installation simple.

An air cannon expert found that the plant was in full production and not in an outage at the time of the changeover. On average it took 20 minutes per air cannon if the removal of the old internals was straightforward. In cases where old cannons were not operational and cement became lodged within, the time required to remove the old internals was closer to an hour per cannon.

Some of the cannons were not operational because of broken components, predominantly the springs. These cannons had become full of clinker dust with the internal components virtually cemented in place. A special tool had to be designed to remove the spring and piston. In addition, the bearing surface inside the valve body was in such poor condition that original spare parts, even if they were available, would not have been able to make the cannons operational again.

The IGS retrofit kit does not utilise the old air cannon's bearing surface, therefore even in cases of buildup and damage to the original internals, once the new kit is put in place, the cannon operates as if it is new.

Repair not replace

After 6 months, Roanoke Cement reported that the retrofitted cannons were still firing the same as when originally installed, and that there has been no required maintenance or problems. The 14 new IGS cannons were installed during the February outage.

Conclusions

The industry is continuing to move in the direction of efficiency and preservation, cutting out unnecessary costs and time associated with maintenance. Vendors who recognise the need to help plant operators meet their environmental and efficiency targets will continue performing well in this climate. ■