

WORLD CEMENT®

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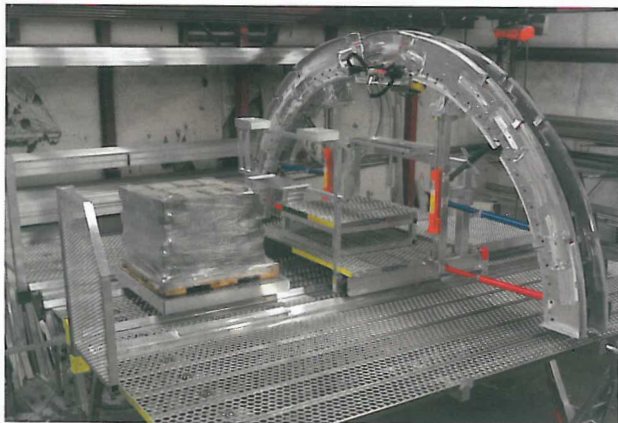
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The Mechanical Elephant in the Plant

Andrew Smith and Stacey Rice, Brokk and Bricking Solutions, USA, discuss bricking machine safety and maintenance.

With the economic downturn, the question cement plants are asking is: "How can costs be cut whilst still maintaining or improving efficiency?" The number one factor in achieving these goals is what can be done with current equipment. When internal kiln maintenance equipment is under the microscope, sometimes it is just as easy as having a machine inspected or audited.

In recent years, Bricking Solutions has begun to receive calls from production managers, maintenance managers and contractors in the cement industry asking a lot of specific questions related to equipment safety, such as platform load ratings, fall protection and US safety standards. This really is a time when manufacturing companies need to take a look at what can be done to help get the most out of their current equipment and to educate plants about what is within their reach as far as maintenance is concerned.



15 000 lb capacity work platform allows for three full pallets of bricks plus men and tools.



Dye penetration testing.

How many plant managers, kiln engineers, production managers and contractors have been stopped during an outage and/or fined for not having the proper safety features on a bricking machine? How much capital did this cost and how much time did this set them back? Sometimes it is the elephant in the room that costs the most. It is there and everyone sees it, but no one wants to say anything. If someone brings the topic up then they receive the same reply: "it is not in the budget for this year".

Some of the most important questions to ask are:

- What is the age of the machine? Metals were not meant to last a lifetime, especially in such a harsh environment.
- How many times a year is the machine used?
- When was the last time it was dye penetration tested?
- How is it stored?
- Does it have fall guards? Up and down kiln.
- How is it being maintained? Who is responsible for the maintenance?
- What is the load rating?
- Does it conform to both US and the plant's safety standards?

All these things have a great bearing on how long a machine will last and what can be done to help it to last a few more years (if possible), until funds can be secured to upgrade to a newer bricking machine.

About 78% of the cement plants in North America are currently using equipment that is 5 – 30 years old. As a point of comparison, how many people are still using computers that

are 5 years old? This article will now look at the expected load rating of bricking machines that operate in one of the plants within this 78% bracket.

A typical pre-2004 Bricking Solutions bricking machine only has a 6000 lb load rating. What happens when the following items are subtracted from a 6000 lb load rating?

- 3250 lb: one pallet of MAGKOR B322.
- 1080 – 1320 lb: Masons 6 at 180 – 220 lb.
- 750 lb: bricking arch.
- 100 – 300 lb: tools.

This means that only 380 – 820 lb reserve deck capacity remains. This was fine before the industry moved to two shape bricks. However, now half a pallet of MAGKOR B622 has to be added, as well as two or three different sized key bricks.

- 1625 lb: MAGKOR B622.
- 400 lb: key brick.
- Overloaded: approximately 1600 lb.

As can be seen, the weight has significantly exceeded the designed capacity.

It is very important to understand a machine and its limits, as well as what a little maintenance can do to extend the life of current machines.

- When looking at the frames it is important to know the age of the material. Are there large gouges in the parent metal or welds; when were they last dye penetration tested? This can easily be checked by the manufacturer of the machine or by a certified third party.
- Most machines are stored on the burn floor, uncovered, in a high heat area. This is partially due to convenience, the logistics of getting the equipment to the burn floor during an outage, and a lack of places to store it. Extended periods of extreme heat or cold tend to break down the o-rings in the top of the cylinders and in the master valves at a faster rate than normal. The master valves are repairable but the o-rings in the top of the cylinders are not. Most people unhook the cylinder hoses and leave the ports open, which leaves the system susceptible to dirt infiltration. It is important to close any open ports on the arch or the long jack to keep the dirt out of the system.
- Lubrication is a big part of maintenance. Be sure both before and during a shift that the lubricator filter is full and cycling oil properly and that the system is not full of dirt or water. It is also important to check that the lubricant contains the correct air tool oil. If temperatures are below 40 °F this oil should be a winter grade. It is necessary to bleed out the system with the ports on the bottom of each side of the arch.
- If any type of mortar is used then cleanliness is key. Cleaning the cylinder shafts reduces the risk of damage to the o-rings in the top of the cylinders. Any kind of silicone spray will also help keep the shafts clean.
- Cleaning and storage are very important factors that are simple to do and a big part of machine maintenance. Often, mortar is used for brick installation, leading to build-up on the arch and decking. Build-up on the decking not only makes it heavier to carry but can also cause a trip hazard. Build-up also hides any damage on parts of the machine



Example of poor weld repair.



Poor maintenance of the machine – master valve failure.



Build-up of dust and mortar.



Example of poor weld where the incorrect weld material has been used.

such as cracks on the frames, large gouges and damaged aluminium bolts for the spacer assemblies. When choosing a storage place, be sure it is somewhat clean and covered and avoid extreme temperatures if possible.

- For 2 t bottle jacks or 3 t hydraulic jacks, be sure they are well oiled and operating properly before there is an outage to ensure that there is enough time to get them replaced if there are any leaks or damage.
- Safety features are almost non-existent on older machines. There are several retrofit items available to keep machines up to code: heavy duty fall guards; new style castors with built in kick brakes; beam and rung style ladders and locking mechanisms for the arch trolley.
- Carrying out an evaluation of the machine 2 – 3 months prior to an outage is the best way to check a machine is in good working order. Conducting this in a timely manner will also ensure that replacement parts are on hand. If there is nobody to do this, or if it is unclear what to look for, then ask the manufacturer if it has an evaluation or yearly maintenance programme. If it does, this is an easy way of always keeping a machine in a good condition without the headaches.
- Records keeping is a helpful way of keeping track of the maintenance costs on an annual basis and justifying the cost of a new machine with all the latest safety features. This will also raise awareness of the items needing consistent replacement; these items can then also be put in the budget for the following year.

Proper equipment maintenance will not only save money, it will also keep machinery safe and efficient.

Brokk and Bricking Solutions have set forth a new division named BBS Technical Services. This focuses on a set guideline that a plant should look at when evaluating its installation equipment before use, in order to eliminate any potential hazards that may diminish safety and efficiency in the installation and raise overall costs. In addition to the above maintenance procedures, a certificated technician will complete

a safety inspection/audit of all the installation equipment and components. They will conduct an evaluation of set-up procedures, in-kiln movement and/or adjustment of the machine, procedures for bricking through tapers, including reviewing in-kiln policies and procedures as well as the plant's bricking rig safety standards. The technicians will train and certify a 'competent person' capable of the inspection and review of overall machine assembly, disassembly, operation and safety procedures, consistent with the plant's Bricking Rig Safety Standards.

Bricking Solutions specialises in manufactured goods using the highest quality aluminium T6-6061. The aluminium is as strong as steel but a third of the weight, which allows the equipment to be easily set up and to support the greatest amount of weight with good safety ratings. Equipment is designed to international standards using certified aluminium welders before being thoroughly tested. It is important to understand that procedures in welding position, wire and gas have changed over the years. T6-6061 aluminium alloy used in the company's high strength/lightweight fabrications must be designed and fabricated to conform to ridged requirements to preserve the high strength characteristics of this heat treated alloy. Welding in the wrong place or applying too much weld can reduce the tensile strength in this material from more than 40 000 PSI to as low as 11 000 PSI.

In 2011, a US cement plant was put in a compromising situation when a refractory contractor happened to notice an enormous crack in the load bearing area of the bricking machine while it was out of the kiln. Should the platform have been used, there could have been a massive failure resulting in lost time, injuries and financial fines. The plant contacted the manufacturer, Bricking Solutions, and a technician from BBS Technical Services visited the plant. The machine was manufactured in 1975 and had undergone many repairs on the frames carried out by someone who was not certified to weld T6-6061 aluminium alloy and not under the guidance of a structural engineer. Upon completion of a two day evaluation, it was determined after receipt of the official report that the machine could no longer be used and a replacement was necessary. Thirty-seven years of refractory installation for a bricking machine in a rotary kiln is phenomenal but everything has its shelf life. Since then, the plant has invested in a 2011 model bricking machine built to all safety standards and incorporating the latest advances in platform optimisation. All Premium Ez Flexx bricking machines are built with the largest work platform to date. The specified capacity is 17 ft. long with a 15 000 lb live load engineered with a 3:1 safety factor. The plant now has one machine that can install refractory in all three kilns, ranging from 14.6 – 19 ft. One of the aspects that increases the efficiency of the new Ez Flexx, and perhaps the most important, is the quick and effortless adjustability that allows the machine to brick through both tapers in K1 and K2.

When discussing solutions to reduce costs and increase efficiency, do not let the mechanical elephant in the room become safety. Maintenance is the ideal way of getting the most out of a machine whilst raising awareness of items that need to be addressed or repaired. A good maintenance plan increases the life span and efficiency of equipment and also reduces the risk of safety hazards with no malfunctioning items. As mentioned, if maintenance or the limits of a machine are unclear, training is all that is required, so simply call the equipment manufacturer and ask. 📞