

# REFRACTORY RESCUE

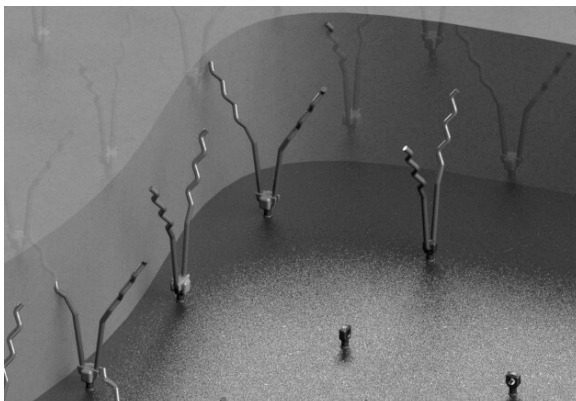
**Wouter Garot, SILICON, describes how moveable anchoring systems could benefit the refractory industry by reducing installation and repair work and offer improved corrosion resistance for refractory materials.**

**O**ver a billion tons of cement are made per year, and cement kilns are at the heart of this production process. Continual demands made in the cement industry for greater productivity and lower maintenance costs have pushed the industry to the limits of the conventional technologies existing on the market today. SILICON has recognised many of these limits and it has become the company's mission to transform the refractory industry through the use of superior anchoring systems.

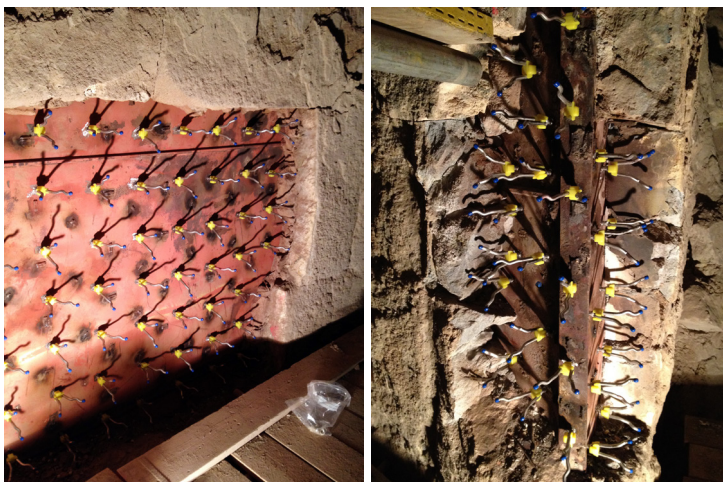


## Moveable anchors

One of the company's most popular types of anchors used in the cement industry are the 'moveable anchors' mainly used in rotary kilns where stress occurs due to



SpeedBolt examples.



Installed SpeedBolt system.

refractory movement. These conventional anchors are commonly fastened to an omega shaped bracket by manual electrode welding and are tack welded so that they break 'free' during operation and 'float' within the omega bracket. This allows the anchor to move with the refractory material as it undergoes variable loads, thereby greatly reducing stresses on the refractory material.

The SpeedBolt® was developed to facilitate the installation of moveable anchors for dynamic refractory linings in the cement industry and other applications where rigid anchoring systems are to be avoided. It also offers a solution to lessen the vast number of hours that usually go into the installation and repair work of anchoring systems in cyclones, rotary kilns, clinker coolers, calciners, ducting and more, whilst also offering corrosion resistance.

The design of the new SpeedBolt Heavy Bullhorn anchor is based on a standard SILICON Heavy Bullhorn anchor. It is adapted to easily place the anchor through the eye of the SpeedBolt and lock it in place using the SpeedClip. This adaptation enables a faster installation time. A solid holding power for heavy refractory is achieved with the anchor's corrugated legs. The strongly corrugated wave will hold the refractory through any movement it may make, allowing the refractory lining to be flexible and tough. The moveable anchors are available in many different metal alloys in  $\varnothing 8$ ,  $\varnothing 10$  and  $\varnothing 12$  mm.

## How it works

The SpeedBolt anchor is welded onto a casing; the shank is  $\varnothing 16$  mm which ensures a solid weld base for the heavy refractory load – the Bullhorn anchor is placed through the SpeedBolt eye.

Finally, the plastic SpeedClip is put in place by hand or with a hammer to securely position the anchor. The clip melts at temperatures above  $220^{\circ}\text{C}$  ( $428^{\circ}\text{F}$ ) giving the Bullhorn anchor freedom to move. The SpeedBolt can be installed on flat and curved surfaces, side-hand, overhead and downwards.

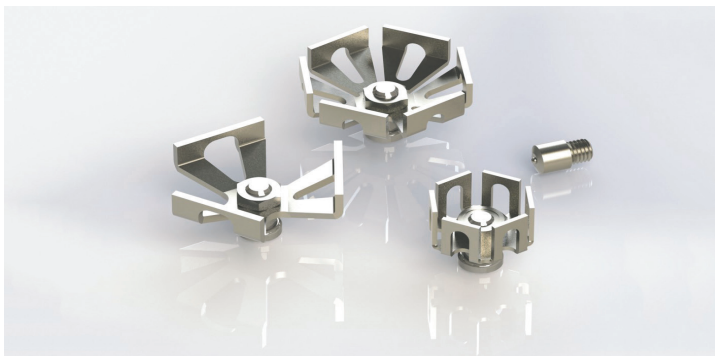
The SpeedBolt anchor does not need replacement when the Bullhorn anchor needs to be replaced in the next turnaround. It is made of stainless steel and will resist corrosion at the shell side for several turnarounds. This eliminates the need to weld a new SpeedBolt each time, thereby saving extra time in the installation of the new anchors, which then only need to be clipped in the SpeedBolt eye again as before.

### Dual lining

A dual lining version has also been developed where improved insulation is required. In the case of a dual lining system, a threaded stud or shoulder stud is first welded onto the casing. The SpeedBolt is screwed on top after the back-up layer is installed.

### Problem solving

The single point fastening method, using a stud, allows for a safe and damage-free repetitive expansion and contraction of the refractory material. Through examination of samples exposed to repeated thermal cycling, it was observed that using this system, small



The single point fastening method, using a stud, allows for a safe and damage-free repetitive expansion and contraction of the refractory material.



The burner lasts 2 – 3 times longer with SILICON's system.



SILICON headquarters.

cracks formed and created small 'islands' where expansion and contraction could take place quite freely.

The SpeedCell® 2G and 3G is SILICON's solution for the cement industry, burner tubes and heavier concrete applications. It maintains all the benefits of earlier models but adds extra strength and holding power to installations due to its increased thickness.

The company's anchors are always screwed onto a shoulder stud, of which the length is precalculated so that the top of the anchor is aligned with the lining height. The lowest lining height it can be used with is 19 mm and the maximum height is 150 mm. M8 shoulder studs

of various dimensions can be ordered to allow the application of the anchor models with different refractory lining thicknesses. The stud's shoulder ensures that the SpeedCell stays intact and at the appropriate height. Small-medium grain refractory material is generally best suited for the system.

### Applications

In cement plants, SpeedCell can be used in the regions where severe abrasion tends to make the refractory wear extremely quickly. Multi-layer refractory solutions can also be offered, using the SpeedCell systems. It is also possible to install the systems as a refractory anchoring solution on internal walls of small diameter pipes. In these cases, the length of application is limited to what is reachable by the studwelder.

### In-house engineering

SILICON engineers can provide advice and support regarding refractory anchoring needs. The company's research and experience has given it the tools to advise customers on the best solutions for them. CEMEX, HeidelbergCement, Holcim and others are some of the company's customers. ■

### About the author

Wouter Garot, CEO of SILICON used his expertise in Materials Science and his experience in applying special high temperature alloys to develop anchoring systems that were custom-made to suit specific evolving industrial process requirements. He established SILICON to bring his products to European and ultimately international markets.