

Tripling the lifetime of lining

A Vietnamese cement plant has more than tripled the lifetime of the refractory lining in its cooler bull nose by using a precast modular lining from HASLE Refractories. Abrasion and alkali attacks have been reduced significantly, while the solution is also extremely resistant to coating.

■ by **HASLE Refractories A/S**, Denmark

A 5000tpd cement plant in Vietnam, running on 70 per cent coal and 30 per cent AFR, was having problems with short refractory life in its cooler bull nose. With a lifetime of no more than 8-12 months, the cement plant had to reline its cooler bull nose after each campaign. Relineing the area not only required many manhours and materials but also took up valuable production time. To minimise downtime, the cement factory was looking for a longer-lasting refractory solution for its cooler bull nose.

"The first kiln stoppage took place 10 months after the installation. An inspection showed that the Hasle precast Modular Lining looked almost new."

Figure 1: completed installation of HASLE precast Modular Lining in the cooler bull nose at a cement plant in Vietnam



In 2013 the cement plant decided to try HASLE Refractories' precast Modular Lining. Provided with a 1m² installation in the front wall of the cooler, the cement producer was able to test the Modular

Lining's performance in its cooler against the existing lining. After six months, the lining was inspected and appeared practically new with no signs of abrasion or coating. Therefore, the cement plant decided to install the lining solution in the entire cooler bull nose.

Design and installation of custom-made solution

As the cooler bull nose has a curved area, HASLE's team of experienced engineers started designing a custom-made solution for the curved section. In March 2014 the design was approved by the cement plant and a full 20m² of HASLE precast Modular Lining was installed. Whenever a precast Modular Lining installation takes place, a team of HASLE supervisors are on-site coordinating with the relevant local installation company to ensure all parts of the installation are carried in accordance with best practice.

Standing the test of time

The first kiln stoppage took place 10 months after the installation. An inspection showed that the HASLE

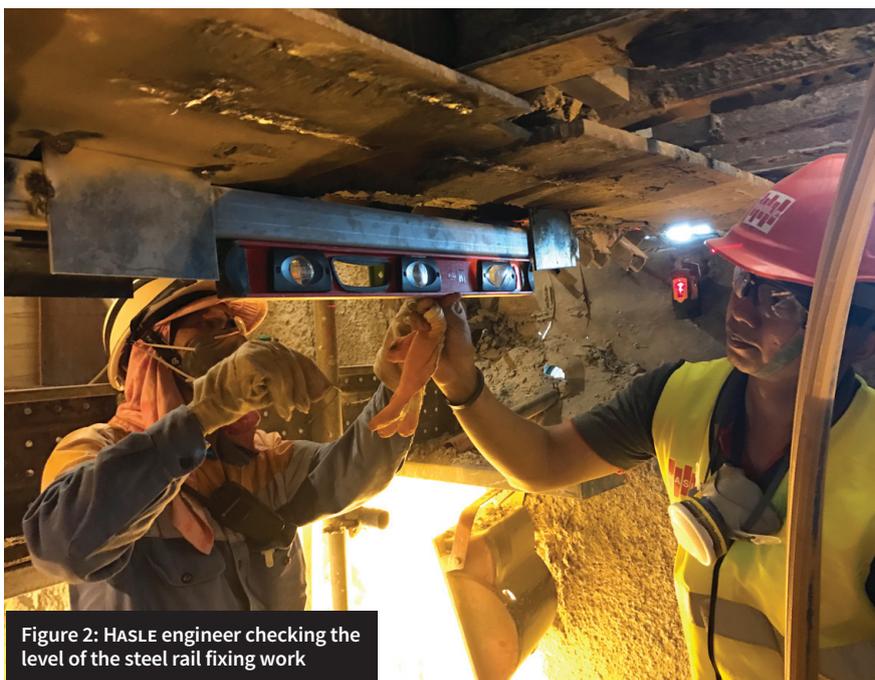


Figure 2: HASLE engineer checking the level of the steel rail fixing work



Figure 3: steel rails and steel plates welded in place to hold the elements



Figure 4: square precast modular elements are installed on console elements

precast Modular Lining looked almost new. However, the castable from a different supplier installed on both sides of the precast Modular Lining was found

to be in disappointing condition and was already worn by more than 30mm after only 10 months of operation (see Figure 5).

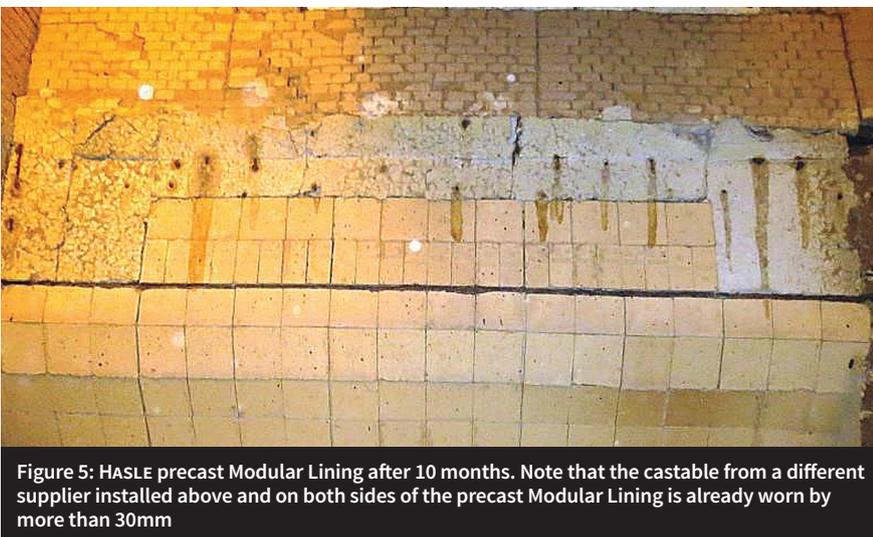


Figure 5: HASLE precast Modular Lining after 10 months. Note that the castable from a different supplier installed above and on both sides of the precast Modular Lining is already worn by more than 30mm

“After more than three years, the precast Modular Lining in the cooler bull nose was dismantled. A new Modular Lining was installed and is again providing the cement plant with hassle-free operation of the cooler bull nose area.”

In September 2015 HASLE’s precast Modular Lining had been in operation for more than 1.5 years. An inspection showed that the elements were still in perfect condition – even the HASLE logo was still clearly visible on the surface of the elements. As time went on, the cement factory tripled the lining lifetime in its cooler bull nose and eventually the lining achieved a total lifetime of more than three years.

By choosing this lining solution, the Vietnamese cement plant ended up saving both manhours and materials. No relinings or repairs were needed to keep the cooler bull nose operating for more than three years, resulting in increased production stability at a lower operational cost.

After more than three years, the precast Modular Lining in the cooler bull nose was dismantled. A new Modular Lining was installed and is again providing the cement plant with hassle-

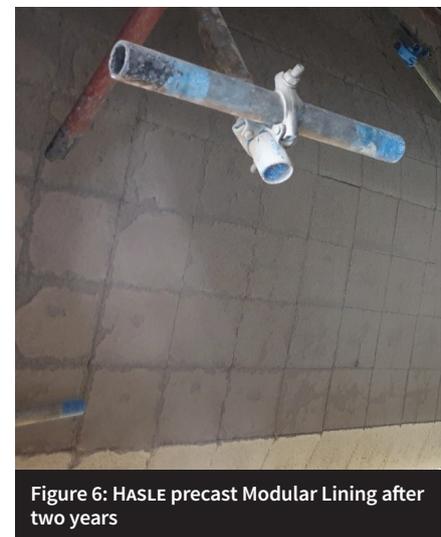


Figure 6: HASLE precast Modular Lining after two years

free operation of the cooler bull nose area.

Strong, thin and abrasion- and alkali-resistant

HASLE's precast Modular Lining was originally designed almost 30 years ago as a hot-face refractory lining for the critical areas of high-temperature industries. It has since been optimised and today is durable and extremely resistant to abrasion, chemical attack and coating, resulting in significantly longer lifetime.

A HASLE precast Modular Lining will typically last twice, three times or even longer than a traditional cast lining – even in extremely hostile environments. Key to its longevity is the precast Modular Lining's extraordinarily low open porosity of only 10 per cent, whereas a traditional in-situ cast solution typically has an open porosity of 18-20 per cent or more.

Another major advantage is that a lining thickness of down to 185mm can be achieved. This is very often less than the thickness of a traditional cast lining. With a reduced lining thickness, cement plants can opt to reduce heat loss by applying more back-up lining or increase the cross-sectional volume, which will provide additional space and consequently increase production capacity. With HASLE's precast Modular

“A Hasle precast Modular Lining will typically last twice, three times or even longer than a traditional cast lining – even in extremely hostile environments. Key to its longevity is the precast Modular Lining's extraordinarily low open porosity of only 10 per cent, whereas a traditional in-situ cast solution typically has an open porosity of 18-20 per cent or more.”



Figure 7: HASLE precast Modular Lining after three years

Lining, a 10-15 per cent volume increase is not unusual.

Meticulous manufacturing

All the lining elements are cast under strictly-controlled conditions in HASLE's manufacturing plant in Denmark. The elements are cast by skilled workers using the best vibration tables, special moulds and high-quality dry-out ovens.

A strong focus on each step of the casting process is necessary to ensure a consistent, optimal quality. After being cast into the moulds, the elements are left to cure for 24h and are subsequently pre-fired for five days up to a peak temperature of 500 °C. This means that no dry-out of the lining is required after installation, which allows for a faster restart of production.

All precast elements are visually inspected and subjected to a strict quality control procedure prior to leaving the production facility.

Fast and easy installation

An intelligent design, combining steel anchors with a tongue-and-groove system, makes installing HASLE's precast Modular Lining both fast and easy. Installation time is often about 50 per cent quicker than the installation of a traditional in-situ cast solution.

Once preparations are completed, the manhours required for a typical precast Modular Lining is 80min/m², depending on the condition of the area to be lined, ie number of air blasters, inspection holes, manholes, etc.

The precast elements weigh only about 15-16kg each, so no special lifting equipment is required.

A step towards a more sustainable production

As more and more cement plants around the world work towards becoming more sustainable, the exceptional durability and longevity of HASLE's precast Modular Lining is proving its worth. Along with the reduced lining thickness, which enables plants to either reduce heat loss or increase the cross-sectional volume to increase capacity, HASLE's lining solution also helps cement plants get closer to achieving sustainability goals in other ways. Not only does it require less material per installation to create than an in-situ castable solution, it also lasts much longer. In fact, cement plants can lower their overall use of natural resources per produced unit, simply because the Modular Lining greatly reduces the number of relinings and repairs needed over time.

Also, whereas a stocked monolithic castable can become unfit for use over time, HASLE's Modular Lining has unlimited shelf-life, reducing material waste.

The lining has been installed in more than 100 plants worldwide. Aside from installations in cooler bull noses, it has shown excellent performance when installed in a variety of applications, ie feed pipes, coolers, smoke chambers, cyclone roofs as well as cyclone bull noses. ■