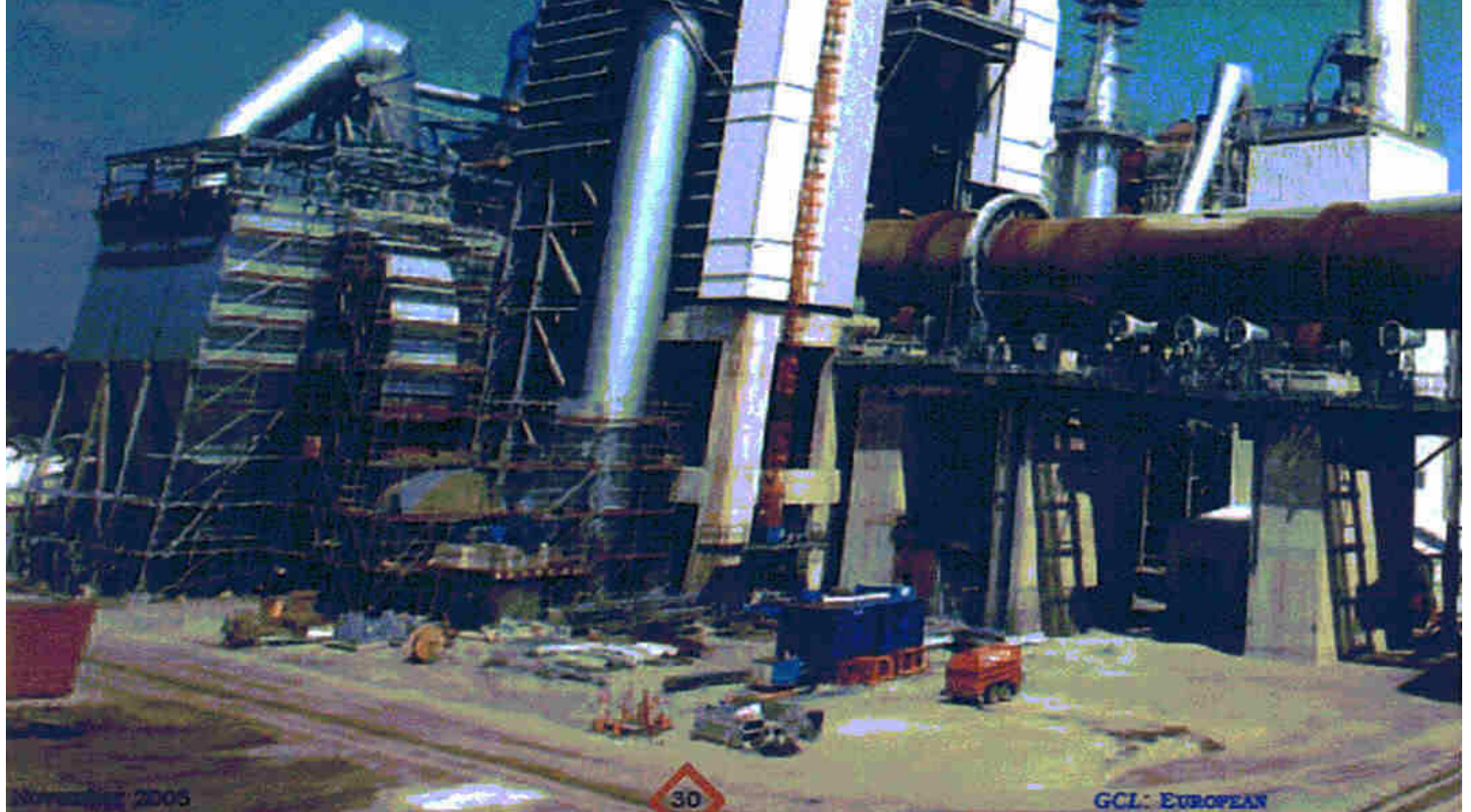


CASTLE CEMENT'S NEW PADESWOOD PLANT

BY ROBERT MCCAFFREY, GCL EDITOR

HeidelbergCement has just spent in the region of UK£64m (Euro100m) on the construction of the new Kiln 4 of the Castle Cement's Padeswood cement plant, in north Wales. The main contractor was FLS, and although there were two major incidents during construction, the plant has now been successfully commissioned.

The new kiln is now one of the most modern and least-polluting in Europe.



Castle Cement is one of the biggest cement producers in UK, and the recent installation of a new kiln at Padeswood will provide almost 30% of Castle's production capacity. Once fully operational, Kiln 4 will replace the three previous kilns at the site, as well as two wet kilns at Ribblesdale works. **GCL** spoke to Danny Coulston, the general manager at Castle Cement's Padeswood works in North Wales.


Danny Coulston has been in the cement industry all his working life and moved to Padeswood to become General Manager and to work with the construction team of the new Kiln 4. Experienced with precalciner kilns, Danny found moving from wet to dry kilns quite a shift in technology. Being a site manager at Padeswood could not have been an easy task for him, amidst serious objections to the building of the new kiln. The proposed structure was considered to be a 'blot on the landscape' by some of the locals, and genuine concerns were raised about the pollution that could emanate from the site.

GCL asked Danny Coulston for an account of the hoops and hurdles that had to be passed over, under and through, to finally get this

project off the ground. "When we first applied for planning permission in 2000 to build the new kiln," Danny said, "it was initially accepted, but then the council changed its mind and rejected the plan, and this was the reason why it went to a public enquiry, way back in 2000. It eventually got the go-ahead from the Welsh Assembly Government in 2002, after having to wait for a further two years, and we then finally started to build the new kiln." The actual construction phase took another three years to complete.

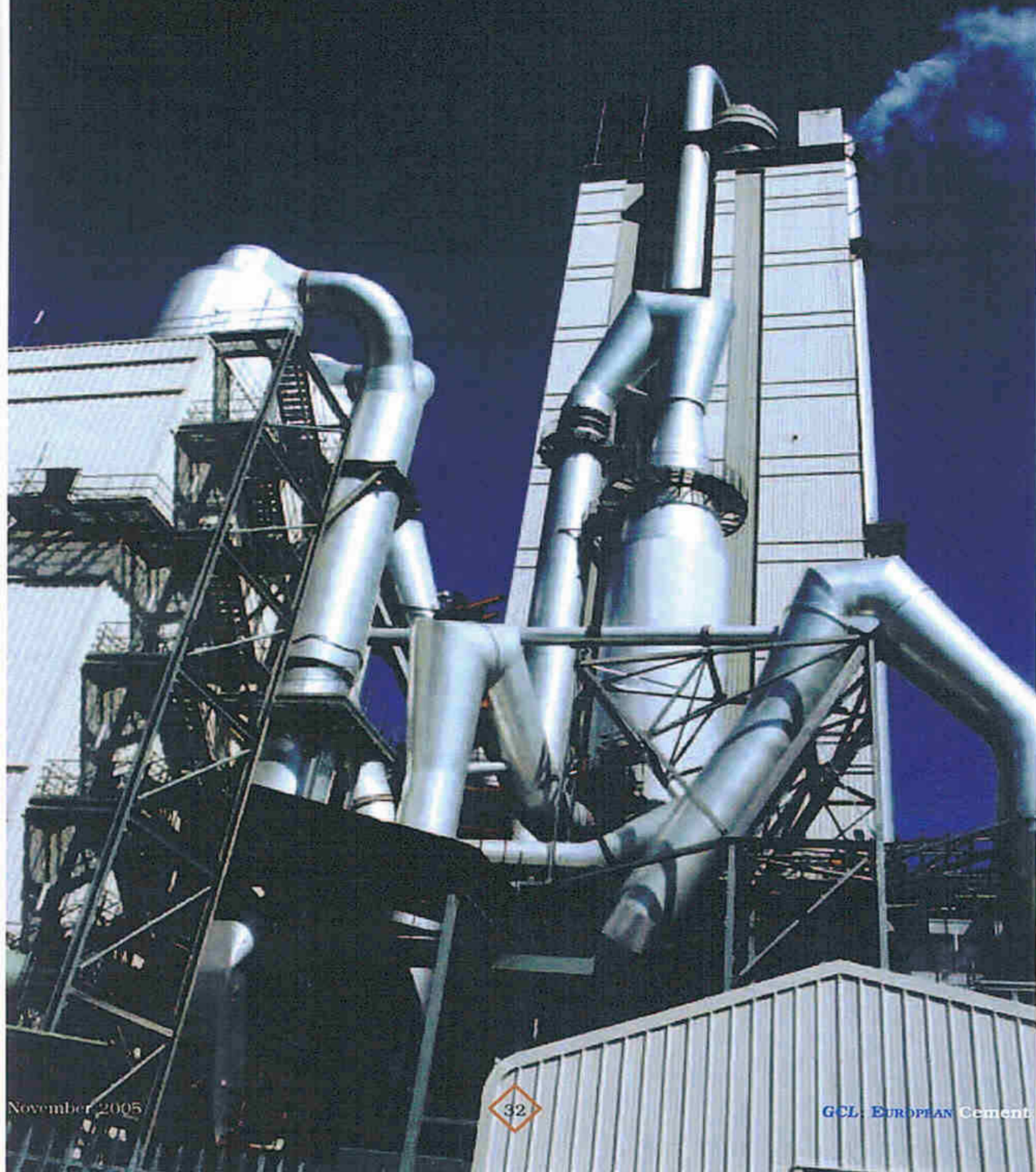
So what do the local council think about the project now? "I think they accept it," Danny continued. "We now have liaison meetings every month, inviting local councillors, members of the local public, protest groups, and of course the Environment Agency, with the main emphasis being on communication and critical success factors to achieve with the new kiln," he added. "We are confident we will achieve these critical success factors, on things like fugitive dust: no adverse impact to health in the area and in improving air quality compared to the old process."

Strangely enough, when **GCL** last visited the plant in 1999 there were large demonstrations actually in favour of the new kiln. "Yes" explained Danny, "the workers were concerned that if the investment did not take place there was a distinct possibility that the plant would be shut down." How real was this 'Sword of Damocles?' asked **GCL**. "Well, it was very real. We had relatively old technology here, since we opened in 1949, and there had been very little investment over the years. Kiln 4 had to be built and if the plan had finally been rejected, then the place could well have been closed. So you can see how vital it was to eventually get the planning permission."



Kiln 4 shortly after commissioning, just prior to the completion of cladding work on the preheater tower.

Beautiful





Above: Cardox Sockets in evidence on cyclone. Below: Danny Coulston by the 37.5 raw meal VRM. Which uses an 1835kW drive from ABB, running at 993rpm, and a MAAG gear,
Bottom Right: The main 33kV to 11kV transformer on the site, supplied by On Load Gears, Chennai and Marson's Ltd, Kolkata.



"With the waste incineration directive, we have got to hit 500mg/Nm³ with alternative fuels. The FLS guarantee for coal is 650mg/Nm³. So the limits are very tight and we're at around the 650/700 mark now. Once we've got below 650mg/Nm³, we'll go to the Environment Agency and say, 'Right, we want to start burning alternative fuels now.' We are quite confident we can hit the 500mg/Nm³ limit with alternative fuel. It is just in the range between 650 and 500mg/Nm³ that we are concerned about burning coal alone."

"We're authorised to burn Cemfuel, which is liquid waste, Profuel derived from paper and plastics, and chipped tyres. The Cemfuel is prepared by one of our subsidiaries and then trucked-in using tankers. We're still in the design phase of the Profuel system, but we plan to start using the mate-





rial in 2006. We have a manufacturing site down at the Ketton works, and we will possibly go into contract with one of the local authorities around here, to supply Profuel. We'd like to manufacture it locally, to maintain a good working relationship with the authorities. We'd like to believe it might be neutral, zero cost, because we are taking waste off their hands. So it's a win/win situation for both organisations."

Permits

"We are authorised to burn all three alternative fuels, as part of the actual permitting process. The IPPC (integrated pollution control permits) took three years to obtain. We have to

do a test on coal, and then we have to do further tests to burn alternative fuels. Obviously we have a testing regime, but we are authorised to burn the alternative fuels. We know from our experience with both the Environment Agency and the cement industry in general that alternative fuels reduce the environmental emissions and that they are comparable, if not better, than with coal. Once Padeswood has completed the commissioning, we can start using any of those three alternatives."

"We already have air-monitoring systems up and running, for the continuous monitoring of the stacks. We have a permanent monitoring station at Pennyffordd, just about 2 miles away in one of the local villages to the east of the plant. It's situated there because the prevailing winds are south-westerly, so it's likely to pick up the highest concentration of any potential pollutants that come through." Danny Coulston explained.

Other emissions

"We've met all our conditions with all the other emissions, it's purely the NOx that we're trying to concentrate on now. We measure NO, dust, sulphur dioxide, hydrochlorides, carbon monoxide continually and Metals, Dioxin and Furans bi-annually. Burning the alternative fuels should not effect these other parameters: our previous experience within both Castle and the industry is that there would be the minimum impact on the other emissions."

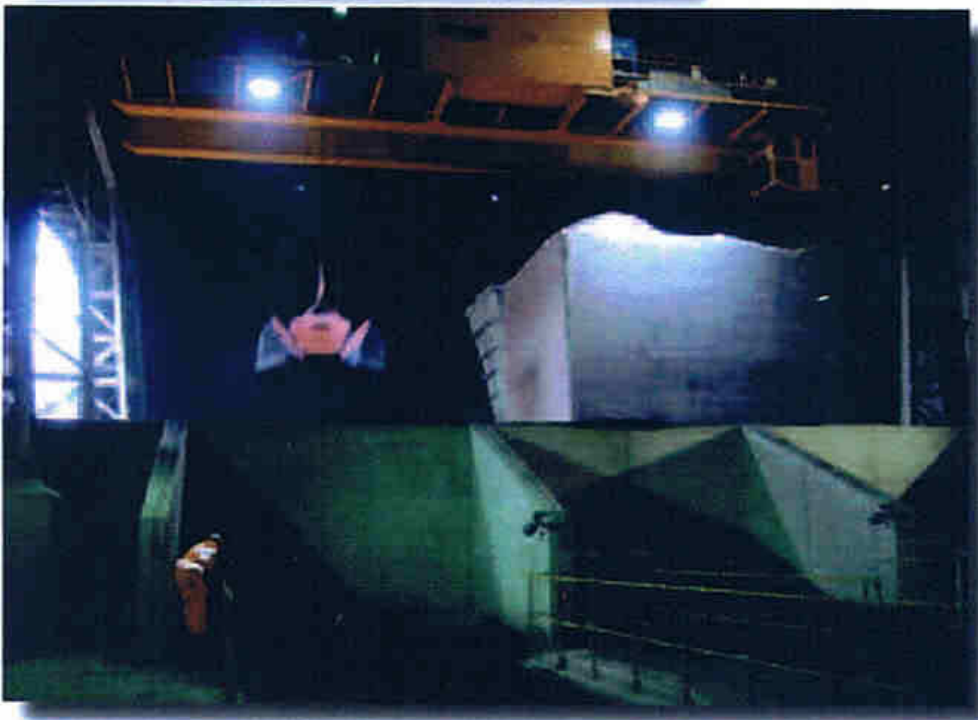
"We don't see any adverse impact on trace metals, from using alternative." So, would it be correct to say that none of those trace metals will increase when alternative fuels are being used? "Our previous experience if I am correct, is that the trace metals as a group, remain approximately the same or lower," said Danny Coulston. What about dioxins and furans? **GCL** asked. "Well, certainly compared to our previous kilns, they'll come down significantly, but again, the actual authorisation is 0.1ng/Nm2.



Top: The undergrate compartment of the SF 3x3F Crossbar cooler looks like a laboratory clean-room: no riddlings present.

Left: Two Pfister coal weigh feeders, for the main burner and the calciner burner. The feeders use a GEFA slide gate valve (far left).

Bottom: the Demag automated crane system in the raw material hall: 'Working very well.'





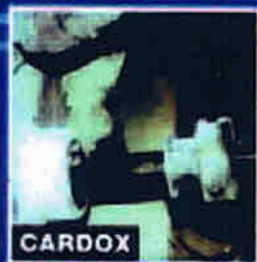
Above: The Cardox Recharging Unit can be located anywhere on the pre-heater and can even be portable.

The Cardox Unit can fill Cardox Tubes in less than 1 minute and requires virtually NO maintenance.



Above: Commissioning underway in a temporary control room. The plant uses a Raytek kiln scanner

one cardox system can service the cement production line



CYCLONES



FEED PIPES



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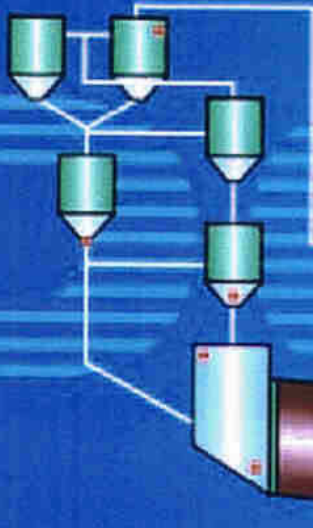


Above: A new Mercedes tractor unit pulling a Feldbinder tanker arrives for a new delivery. The plant's rotary packer and palletiser are from Ventomatic. Right: A Lachenmeier stretch-hooding unit at the plant. Bags are sprinkled with 'Lock&Pop' a high shear-resistant, zero lift-resistant glue from Keytech Europe, to promote stack stability. Far right: Bags are supplied by Korsnäs and Abertay.

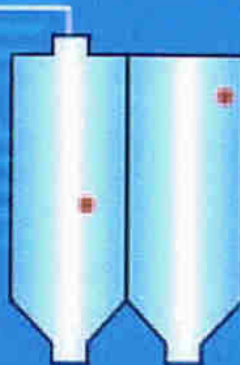


RAW FEED MILL

SILOS



ROTARY KILN



COOLER



RISER DUCT



Chipped tyres

By burning waste tyres, Danny Coulston explained that the new kiln at Padeswood would be able to help the local tyre-fitting companies and also help the environment. "We have a dry kiln so the tyres have to be chipped and the chipped tyres will go into the calciner. The calciner for Kiln 4 has been specially designed for alternative fuels, so we do have a separate combustion chamber. The design of the calciner was carried out by both FLSmidth and Castle Cement. "We would chip the tyres off site, and then truck them in". Danny Coulston explained. "The alternative fuel market is changing quite markedly. For example, at Ribblesdale, we are burning meat and bone meal. We may actually apply for meat and bone here, rather than tyres in future".

Cardox and Air Cannons

Various plants around the world using alternative fuels have had to invest in Cardox to prevent build-ups: what about Padeswood? "Oh yes, we've already started installing additional Cardox points on the tower. It's working well and I've got experience with water lances at both Ribblesdale and Ketton. One of the things that I wanted was to try and remove the health and safety risk associated with burns. We looked at a number of suppliers and we thought that Cardox was the best route and at the moment we are very pleased with the Cardox route", said Danny. "We have them installed on the lower three cyclones, the riser and the calciner. We've had a couple of blockages but we've put some more Cardox points on and the run factors are improving regularly".



Above: Small Cardox Sockets are welded onto the cyclone and below the feed pipes.



Build-up



Cardox Tube Inserted



Build-up cleared

Dust levels

"One of the biggest issues we've got politically, particularly with people in our local village, is the dust levels that we've emitted in the past. It's just not acceptable to cover people's cars in dust," said Danny. "This is one of the things that we're trying to focus on. Our chimneys have changed. We've obviously got the old stacks for the wet kilns and kiln 3 and we've got the new tower for kiln 4, but the new stack is 110 metres tall and the previous ones were about 70 metres. We have a five-stage pre-heater and the stack just needs to go slightly higher than the actual tower itself. The added height is beneficial in terms of particle dispersion and we also have 'spiral' on the top of the stack that causes turbulence at the top of the tip, and it spreads out the plume. You can't see anything coming from the stack, even on a clear or a cold day at the moment, it's very rarely you see any plume anyway. The only time you do see it is when the raw mill stops, then it goes straight to the conditioning tower, to the bag filter and out, and then you may see a slight plume, and even then it is very slight. HeidelbergCement did not want any pits anywhere on the site, so the lowest point is the actual clinker transport system and anything else is built on top of that. That's why the kiln itself is relatively high".

Sweet Clinker

GCL asked Danny Coulston to describe the high points of the build: "The first high point was when we ran the first drive; getting the power supply and getting one of the motors to turn the kiln in July, that was quite a momentous day and it was a relief for the project team. Then, obviously the first bit of clinker to come out the kiln was quite an emotional moment too. If you are involved in a project such as this, seeing the first clinker drop from the end of the kiln is a wonderful sight".

Clinker Production

"We have been increasing our run factors on a week-by-week basis, since July 2005. The biggest issue that we had was the product from the sand mill. We found that because it is an open circuit mill, we get the occasional coarse fraction coming through the mill. It goes into a silo using an FK pump and the extraction uses a Pfister unit. We found that because some coarse fractions were going through into the silo, it kept blocking the Pfister unit. It does not need to be very coarse to cause blockages but the sand that does end up in the silo can be as coarse as 1mm".

"We've got a project engineer from our head office looking into the problem. Certainly that has been the biggest issue that we have had and recent trials shows we are achieving the desired fineness and reliability".

"At the moment we can produce more clinker than we can mill. So, we have an investment application to transport an old mill down from Clyde, the old slag works and install it here. We've already got ball mills here on site, which give better quality than vertical mills and we want to be consistent. The reliability of the ball mill is proven and I think the general feeling is that the ball mill is very much lower than a vertical raw mill, so that if it was going to be a brand new plant, with a new product, we would probably have gone for a vertical mill".

The impact of Kiln 4 is that we have closed the three kilns down here at Padeswood and two wet kilns at Ribblesdale. So the capacity for the organisation is marginally lower. Previously, the capacity of the site with the old kilns was 500,000t/year of clinker and in future with Kiln 4; it will be as much as 820,000t/year. So it's quite a big increase".

"What we'll do is shift the customer base from the north to the Midlands. Ketton will remain the same; they will continue to supply the south east region. Our Market is North Wales, Manchester, Liverpool, North West England and Birmingham. We'll just transfer some of the volume from Ribblesdale down to ourselves because Ribblesdale and Padeswood are an hour and a half between each other, so it is a very small change".

All of the refractory material at the plant was supplied by Vesuvius of the UK. AES Analytical and Environmental Services is providing on-going emissions monitoring services to the plant. The plant's main bag-house was supplied by FLS Airtech, and is a six compartment bag filter.

