

APPLICATION REPORT



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Schenck Process alternative fuel PSP handling and feeding system provides a reliable and trusted processing solution for a UK cement plant

Hope Cement Works is located in an area of natural beauty and with one of the most stringent planning authorities in the UK. The company is committed to working with the local planning authority and local community to deliver low impact, environmentally friendly construction solutions whilst driving down manufacturing costs and improving product quality. The recent move to use Processed Sewage Pellets (PSP) as a waste-derived fuel, as a partial replacement for the traditional coal, is part of this commitment.

Cement manufacture is an energy intensive process due to the high temperatures required in the cement kilns for clinkerization. The use of waste-derived fuels to replace conventional fuels, in particular fossil fuels such as coal, is a widespread industry practice and can contribute to reducing the global warming impact and the total environmental footprint of the cement industry.

Cement is manufactured by combining clinker, a mixture of limestone and other raw materials that have been pyro-processed in the cement kiln, along with Gypsum and other cementitious additives. Clinker production typically occurs in kilns heated about 1450 degrees C.



PSP material receiving station, conveyor and storage silo

Hope Cement Works decided in 2011 to introduce additional waste-derived fuels to their existing list of fuels already being used to supplement the use of fossil fuels in their kiln and pre-heater tower. PSP (Processed Sewage Pellets), which is processed waste from water treatment, is a material high in calorific value similar to coal.

The use of PSP material as a fuel has meant that the Hope Cement Works could use over 50% of waste-derived fuels, which is slightly above the industry standard and also have plans to increase this percentage in the future with the potential use of other similar waste materials. The use of PSP material required a modification to the existing handling systems that have been used for other fuels.

Hope Cement Work's initial assessment was to utilize their existing MBM (Meat and Bone Meal) Plant and convert it to handle the new fuel. Hope Cement Works approached Schenck Process for their advice and expertise in weighing, feeding, dosing and material handling.

Schenck Process reviewed the user requirement specification and decided that the exercise to convert the existing MBM plant to handle PSP reliably and accurately was possibly but not the best solution as it could lead to inflexibility in operation and would be a costly exercise to reclassify the current areas to the higher ATEX requirements for the additional equipment that would be required.

Taking these considerations into account Schenck Process approached Hope Cement Works with an alternative solution. The new solution combined the use of the existing Schenck Process Multicor coal feed system, currently feeding the kilns and the use of additional PSP Multicor feeding systems, working in-line with the existing coal feeders. The new system allowed the same conveying lines to the kilns to be used, whilst also utilizing proven equipment technology in the form of the Schenck Process Multicor system. The proposal is a proven best practice approach which was already used on site and one that was respected by the Hope Cement Works engineers for its reliability and high performance capability.

Trevor Harrison, Project Manager at Hope Cement Works, Derbyshire commented that one of the reasons for choosing Schenck Process equipment for the transport of the PSP fuel was "that we trusted the Schenck Process products and system that had been used for over 10 years for the coal feeding operation so when we needed a parallel system for handling PSP material, they were the natural choice. The solution that Schenck Process proposed showed that they understood the problems of handling PSP material and as the system used the same computer control system as the existing installation and being located next to the coal bunkers meant that the same delivery pipes to the kiln could be used."

The material handling starts with the intake of the PSP onto site, which required a system reception point to receive the material discharged from walking floor vehicles and transfer the material reliably and effectively to bulk storage silos, ready for discharge into the Multicor units that would dose the material into the existing coal feed line to the Kiln. Schenck Process proposed the use of their Bulk Reception Docking station complete with variable speed multi screw feeder discharge system. The Docking station allows the vehicle walking floor trailer to dock with the unit and discharge its load in a controlled and safe manner, without dust egress and spillage. The docking station is fitted with dust extraction and a roller shutter door to the front to protect against adverse weather conditions when not in use.



Multicor Feeder for PSP material feeding into the same pipeline as the existing coal feeders

The base of the receiving unit is fitted with four screw feeders, that feed the material directly into a Schenck Process' Redler chain conveyor and elevator, that delivers the material to two bulk storage silos, allowing material to be discharged via a screw feeder and isolation arrangement located to the top of the silo top. Explosion vents fitted to the docking station and along the elevator, provide explosion venting protection, designed to relieve the pressure rise within the system by means of bursting discs should an explosion occur within the docking station or chain conveyor during unloading and transfer of material to the two silos. A slam shut valve is also used within the system to prevent against flame propagation should an explosion occur and trigger secondary explosions within the system.

The outlet of each silo, is fitted with a silo discharge aid to aid effective and reliable silo discharge of material. Material is discharged into a feed hopper located above the Schenck Process Multicor units, which also acts as a calibration hopper for online calibration of the feed accuracy of the Multicor units.

The facility to control the discharge of material from the Multicor unit is controlled via a variable speed motor. An analogue signal from the main Kiln control system sets the PSP Multicor discharge rate, allowing the feed to be controlled independently in conjunction with the coal feed system. The Multicor mass flow meter uses the Coriolis force measurement principle to determine the mass flow within the device which monitors the weight of material that passes through the unit.

Schenck Process Disocont Controllers integrated within the client's main PLC control system is used for the control, monitoring and operation of the Multicor mass flow meters and measurement of the Coriolis force to obtain the amount of material that is being delivered to the kiln.

This combination of Schenck Process products and technology provides a totally flexible, reliable and cost effective method of feeding alternative fuel into the main burner of the Kiln. Trevor Harrison confirmed that "the commissioning was effective with only minor issues to resolve and has run very well since the project was finished in the summer of 2012. The relationship we have had with Schenck Process for the design and commissioning of the project has been excellent and has created a system that has more than fulfilled our expectations."



Schenck Process Multicor feeder for PSP material



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