

# SILO CLEANING

- EC** The cleaning of silos used to be a dirty, dangerous job. Now the use of remote cleaning devices has transformed this potentially fatal activity
- EC** Die Reinigung von Silos war früher eine unangenehme und gefährliche Angelegenheit. Der Einsatz von ferngesteuerten Reinigungsmaschinen hat diese potentiell gefährliche Tätigkeit nun grundlegend verändert.
- EC** Auparavant, le nettoyage des silos était un travail sale et dangereux. À présent, l'utilisation d'outils de nettoyage à distance a révolutionné cette tâche qui pouvait s'avérer mortelle.

Clearing silos can be a dangerous, time consuming job. Several methods exist to unblock and then clear silos, but the Cardox System is claimed by its maker as the most efficient method of clearing build-ups and blockages. Its maker claims the method is safe, powerful, and cost effective. Cardox generates a guaranteed maximum pressure each and every time it is used - up to 2800 bar (40,000 PSI) - through the use of carbon dioxide. Liquid carbon dioxide is heated by an electrically-initiated chemical charge. The CO<sub>2</sub> then instantaneously expands to 600 times its original volume, aerating and clearing "even the most problematic of build-ups."

Recently used at Castle Cement's Ketton Works in the UK, Cardox was employed to clear around 7000t of raw meal from the main silo - most of which had been at the bottom of the silo for several years. Castle Cement's project engineer John Kenny was in charge of the operation.

"In order to carry out repairs to the raw meal silo, it first had to be emptied," said Kenny. "The silo is self-emptying until 6000 to 7000t remain, which then have to be assisted into the airslides. The profile of the meal within the silo at this stage is some 8m high at the silo walls and the repose angle is up to 70°."

"To speed up the emptying of the silo," he continued, "we employed the Cardox System, which is designed to heave and aerate the meal by discharging carbon dioxide (CO<sub>2</sub>) at high pressure into the material. Gaining access via the top of the silo is both costly and time consuming with little gain in the emptying rate, whereas using Cardox from the base of the silo, we managed to clear 750t per shift."

"The operation was carried out using Cardox Tubes about 1m in length, which are pre-charged with liquid CO<sub>2</sub> just like a slender fire extinguisher. At the discharge end of the re-usable Tubes a rupture disc is fitted and at the opposite end (the activating end) a chemical Heater is fitted."

"When an electric current is applied to the Tube via

a cable, the heater instantly converts the liquid CO<sub>2</sub> to a gas that expands and builds up pressure inside the Tube until it bursts through the rupture disc at the end of the Tube. This releases the CO<sub>2</sub> as a cold heaving mass now 600 times the original volume, through a special discharge nozzle into the material."

"In future we will be considering installing fixtures around the silo wall so as to discharge the Cardox Tubes even quicker," concluded Mr Kenny.

Carbon dioxide gas is an inert gas which is commonly used in fire extinguishers, so it is safe to use without the fear of reaction with any gas-air mixtures inside silos, kilns or other vessels.

**EC**

