

WORLD TUNNELLING

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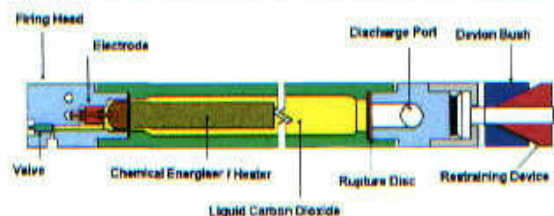
Extracts of **"Production Consumables"** by David Hindle Page 386
Rock excavation methods:

"Cardox provides a system of non-explosive rock breaking that operates on the principle of the rapid conversion of liquid carbon dioxide to an inert CO₂ gas that expands instantaneously to be released at high pressure causing a powerful yet gentle heaving action that breaks the rock. No permits are required for its transportation, storage or use and the System is fully approved by the UK's Health & Safety Executive.

As part of the recent WHITBY WATER SEWAGE EXCAVATIONS for shafts and tunnels directly in the centre of this busy Northern England town posed several environmental concerns. The use of explosives and noisy excavation methods were of course prohibited so Morrison-Amec were charged with the task of finding an effective method of breaking rock that produced little if no vibration, noise and dust. They turned to The New Improved Cardox System which had previously been used successfully on several of their sites for tunnelling and shaft sinking projects in sensitive areas.

Six Cardox tubes were activated down the main shaft just meters away from busy roads and shops and according to the firm the vibration and noise monitoring equipment in place for the initial six tubes did not even register on the instruments and the audience of engineers, consultants and other officials just a few meters away on the surface did not even know the tubes had been activated. The action of the Cardox tubes produced the required degree of rock fragmentation to enable the excavation of the shaft to proceed economically and efficiently."

Whitby shaft before and after Cardox rock fragmentation.



The CARDOX Tube



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