A KEANE EYE: Simply brilliant Friday, December 17, 2004

IT IS not often that you can view a working scale model of something and be immediately convinced that the full-scale version will work just as effectively.

I recently visited semi-retired mining engineer and inventor Bob Beatty, and after viewing three working models of the CoAxial Pipe (CAP) conveyor, I was convinced there was a definite place for it in moving bulk materials efficiently.

The CAP conveyor is so different to a conventional conveyor in terms of behaviour that it should really be classified as a new class of bulk transport.

Apart from its obvious difference in being able to enclose the load (eliminating dust), and travel around corners and up steep gradients, the CAP conveyor has some technical differences from conventional conveyors. The belt material is a flexible, single-layer material that is cheaper than conventional belt materials, and does not require high tension to maintain drive. Rather than having drive from a single head roller, the CAP conveyor is driven throughout its length. The secret to this is the use of pairs of driven U-shaped spring idlers that support and drive the forward and return runs of the belt. The springs are the most innovative aspect of the CAP conveyor, but they work well in transferring torque to the belts and have been tested to meet the British standard for infinite spring life (10 million cycles).

The conveyor is housed in square-section modules joined with a universal joint-type connection that allows the belt to be moved readily, even when in use. The spindles of the springs are housed in robust bearings in the top of the frame. Drive is via a V-belt from readily available electric motors.

This provides redundancy should a motor fail, and the motor could be changed out while the belt is in operation.

As the belt runs under low tension, any breaks or tears can be readily repaired using a suitable adhesive.

The CAP conveyor can negotiate curves as little as 20 times the internal diameter of the "pipe". This provides unheard-of flexibility for a conveyor. The belt is self-cleaning as the contact of the return belt with the spring idlers tends to clean the belt.

Slurries can be handled, and abrasiveness is not a problem as the conveyed material travels with the belt, where it would abrade the inside of a fixed pipe. This application avoids the high energy costs of long pipe pumping applications and the cost of returning the decanted liquor from the sludge pond.

As there is no limit to the length of a CAP conveyor, it could be a viable alternative to a dedicated rail line in some bulk haulage applications, providing a low-cost continuous transport system that could be economic where rail is not.

The system can be used to support a trough belt as well as a pipe conveyor, and the pipe conveyor can be broken open in parts to accept side feed. It can be suspended from poles or from tunnel roofs, or the frame can be fitted with wheels to allow the conveyor to be placed on the ground (driven wheels would be an option in this situation). As the conveyor can be suspended from a crawl beam, it could be close coupled to allow it to follow the loading unit, avoiding the need to add belt sections as excavation advanced.

While the CAP conveyor was originally designed to work in conjunction with an in-pit sizer to replace trucks in conveying material from a mining pit, its potential uses are far broader. It has potential application in underground mining and civil tunnelling, in conveying spoil from the tunnel.

Smaller CAP conveyors could be used to remove spoil from confined excavation sites directly into tippers.

With the current lack of ship- loading capacity in the mining industry, the CAP conveyor could be laid across water on pontoons and directly load ships.

Like most good ideas, the CAP conveyor is brilliantly simple. Its development is held back by the unwillingness of people to be the first to trial a full-size conveyor, although working scale models amply demonstrate the workability of the concept.

It's too good an idea to die.

- Greg Keane

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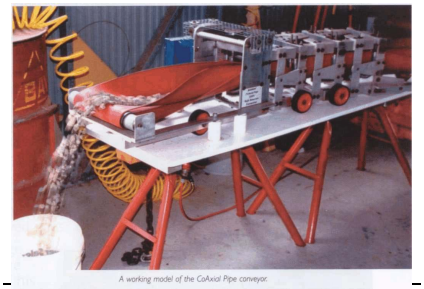
(More images of the CAP models can be viewed on http://www.bosmin.com/CAP/cap1.htm)	 A working model of the CoAxial Pipe conveyor.