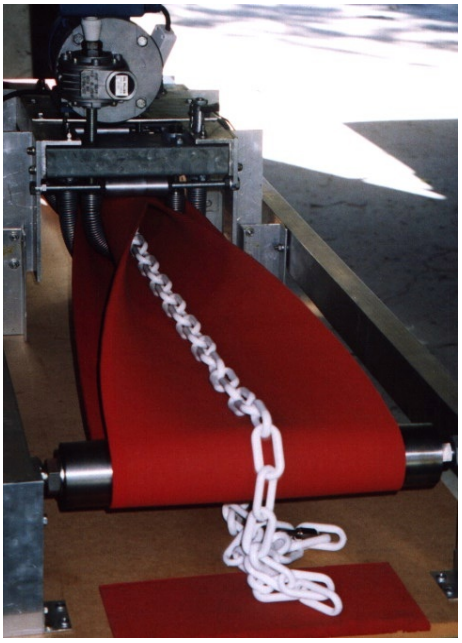
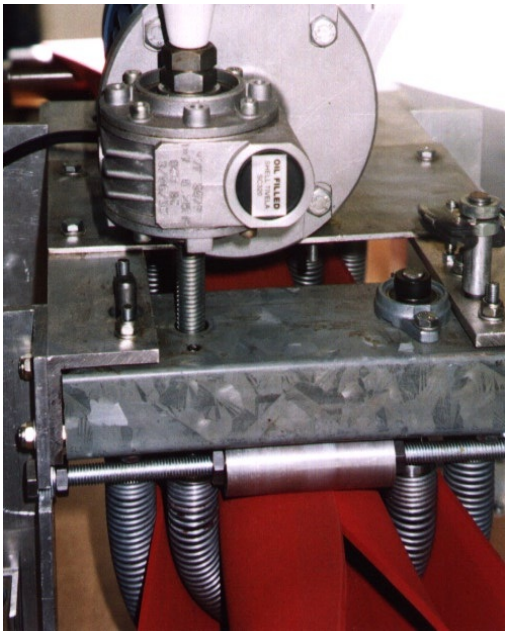
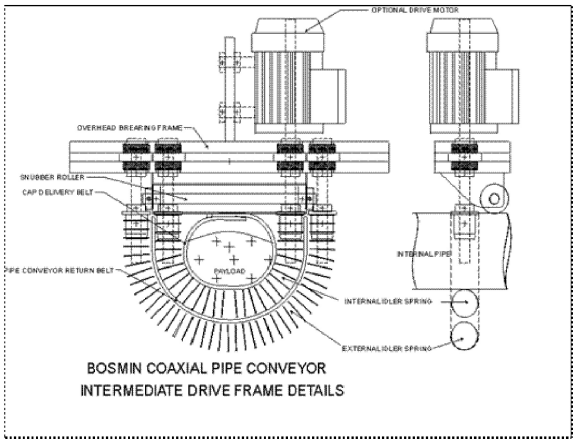
BOSMIN CoAxial Pipe Design Detail



These photographs show some detail of our driven idler arrangement. After much bench testing and confirmation mechanical stress calculating, we have designed the driven idler spring shown above. This drive spring completed over ten million cycles, which surpasses the British standard for an infinite spring life, and we are therefore very confident that the idler drive system is a reliable, cheap, and an effective way to power a coaxial pipe conveyor belt.



Our bench tests show the spring idler grips the belt very effectively when transferring spring torque to the conveyor. The action of the rotating spring simultaneously provides motive power to both the forward and return runs of the conveyor belt. This also allows a large single conveyor drive system to be replaced by a series of small units spread along the conveyor route, and linked in parallel.



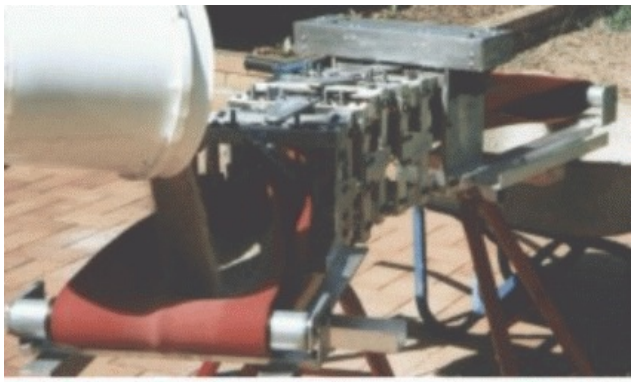
The BOSMIN belt drive arrangement may provide drive torque to several idler axles using a single drive shaft as shown in INTERMEDIATE DRIVE FRAME DETAILS. The system allows for driven idlers to be interspersed with non-driven idlers along the entire conveyor length. This reduces the tensile load requirements for the conveyor belt and permits the use of a non-laminated, low cost, elastic belt.

This critical design element allows for tight cornering with the CoAxial Pipe Conveyor (CAP), and is a distinct advantage over the very stiff specialised belts used with existing tube conveyors. The CAP belt can be butt-joined using rubber adhesive compounds, making belt extension or belt repairs a relatively simple task.

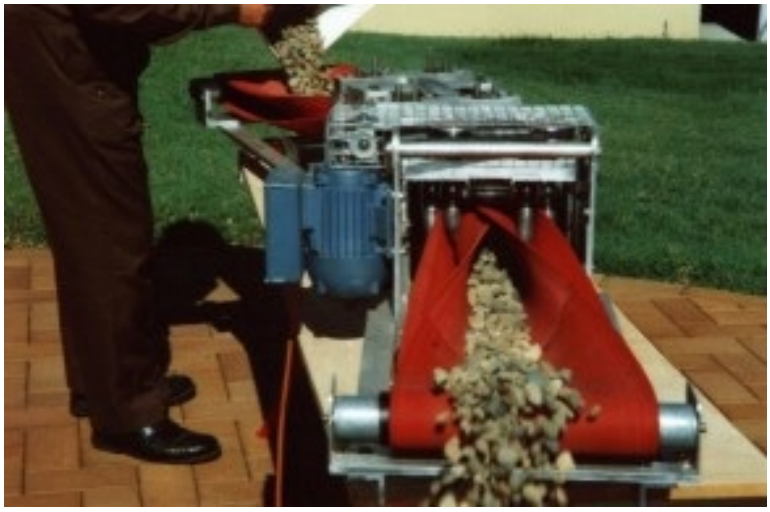
The driven idler concept also has some interesting application for conventional trough conveyors in adding drive power along the belt. In this application, the belt only needs to form into a "U" shape rather than a complete pipe. It provides an alternative on long conveyors to a high tensile conveyor belt powered by a single large drive-head, or an alternative to extending an existing conveyor installation without having to re-engineer the belt and drive system.

The CAP could be competitive with an overland conveyor installation where reducing earthworks is a consideration. The CAP idler frame holds all four of the required support bearings, which means the idler frame can be supported on one or two posts, and is easily manufactured using a CNC borer. The alignment between

posts needs only to have a curvature radius greater than 20 times the CAP internal diameter, which provides considerable design flexibility. The maximum particle size is another design consideration and ranges between 33-66% of the pipe internal diameter, depending on the pipe fill factor.



The CoAxial Pipe Conveyor is operating on a 26° turn at a 20:1 pipe diameter to curve radius..
The articulated frames permit tight vertical and horizontal curves. Fixed CAP installations do not require the articulated frame structure, only support for the bearing mounts.



The CAP was initially designed for mining use where the idler bearing frame can be bolted to the side or the drive roof. Alternatively it may be supported by a trolley running on an overhead "I" beam, as is now commonly installed in coal mine development drives. The latter option means the CAP can be retracted and advanced from the tunnel face as soon as an I-beam extension is installed.

In an open cut arrangement the idler frames are supported within an articulated structure placed between the idler frames and hung from a crane, or carried on driven wheels. In the latter application, the conveyor can be driven to follow a loading unit, and may replace truck haulage in several applications.

The photos show a bench test of fine phosphate sand material being conveyed at 70 degrees through two tight vertical curves. CAP equipment has the capacity to replace some bucket elevator applications.

The CAP may reduce handling costs and simplify the design at some installations. It can operate dynamically, and can convey the payload up steep slopes or around tight curves, as might be required for ship unloading. The CAP idler frames can be fixed, or move while operating. One mechanical engineer who inspected the unit described it as "a pipe without the water". This suggests another application where abrasive slurry material is problematically pumped through a pipe. The CAP can accomplish this task by moving the "pipe" rather than the slurry, thereby eliminating abrasive contact with the pipe.

Apart from these mining applications, the CAP could find industrial use wherever there is a need to handle quantities of dry, sized materials such as coal, sand or gravel, drill cuttings or sample splits, grain seeds or sugar, pills, powders or confectionaries, screws, washers, nuts, bolts, etc.

When placed on floating pontoons, the CAP may be used to transport bulk materials offshore, thereby reducing the need for expensive harbour deepening at some locations.

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