

# Carrying on

An innovative conveying system is starting to get some attention from the mining sector.

By Noel Dyson

## CARRY THAT LOAD

- A conveying system that can meet most of a mine manager's needs such as handling tight turns, carrying material up slopes of 80 degrees, and enclosing the load is available.
- ICSI's system is soon to be installed in a fertiliser plant and two major miners are showing interest.
- The company has also developed a suspension system for its conveyors that minimises the system's footprint.

The enclosed conveyor system, designed by Innovative Conveying Systems International, has been picked up by a fertiliser manufacturer and is on the radar of a couple of major miners.

ICSI managing director Michael Pietsch said the company was in discussions with one miner but that it was early days.

"We have one other major earthmover talking along similar lines," he said. "We're developing a concept for them as well."

The fertiliser plant installation will be in place in the next few weeks. Pietsch explained the fertiliser plant would need to be closed to allow ICSI to install its system.

The ICSI conveyor system has the ability to meet most mine managers' wishes. Want a conveyor that can negotiate tight turns and rough terrain, while keeping its contents enclosed? Want one that can carry material up grades approaching 80 degrees? Want a conveyor flexible enough to "slew" at its offloading point and act as its own stacker?

What about one that allows maintenance people to change the idlers while the conveyor is running at full speed and does not require specialised skills to maintain the belting?

The ICSI system offers to meet all of these needs. However, the conveyor system has taken a decade of Pietsch and his son Dror's life. Dror Pietsch is also ICSI's business development manager.

Pietsch said there were other conveying systems that could do some of what ICSI's system could do but he was yet to come across one that had all of the benefits the ICSI system was offering.

The ICSI system has been patented in most of the industrial world, including Australia, South Africa, China and the United States.

Pietsch said ICSI was not interested in taking on the conventional conveyor market but was instead pursuing the niche market of conveying jobs that had proved too difficult for existing technology.

One of the secrets to the ICSI system's success comes from wrapping the conveyor belt into a loop. The conveyor "hangs" from specially made "j" sections that pull the belt into a tear-drop shape for much of its travel. This brings the benefit of enclosing whatever is being transported, removing the need for external structures to be built around the belt to stop dust escaping.

It also helps to reach the 80-degree elevation. Bringing the contents of the belt together helps generate bridging, which stops the material being transported falling back down the belt.

Pietsch said the system could handle up to 80 degrees for aggregate and larger material, and had managed to move finer materials such as wheat on slopes of up to 45 degrees. He said building baffles onto the inside of the belt would allow the system to move finer substances, such as wheat, up elevations approaching 80 degrees.



*ICSI managing director Michael Pietsch with a working version of the conveyor system.*

The corrugated belt design is another factor behind the system. The corrugations allow the belt to “flex”, which in turn allows it to handle tight turns as well as holding the material more securely than a smooth belt. Pietsch said flex in the belt was geometric, rather than elastomeric. In simple terms it relies on the fact that the belt is longer when it is straightened out than when it is corrugated. It also means the belt does not stretch.

This flexibility allows the conveyor system to slew at its end and, essentially, act as its own stacker. It also gives it the ability to handle curves with a radius of about 5m, much tighter than conventional conveyors.

The belt only takes the weight of the load but not the tensile load. Instead of running over rollers as a traditional conveyor system would, the ICS system is suspended from a number of idlers on “j” sections. These “j” sections take tensile load.

This “hanging” arrangement also means the conveyor can be tucked into unobtrusive positions. For example, in an underground environment it could be suspended from the roof of a drive or along one of the drive walls.

The company has since taken the “hanging” approach a little further with its recently-patented airborne conveying development.

“It’s an enabling structure for suspending our system above ground,” Pietsch said. “It’s a couple of cables which carry a sub frame.”

That sub frame supports the ICSI system.

“It will also allow for a service trolley to run under it,” Pietsch said.

It removes the need to have a big footprint to support a conveyor system.

“It can also run along the roof of a tunnel.”

He said the closest thing to the ICSI suspended conveyor system was a rope conveyor system – a conventional conveyor system that travelled on four cables or frames.

“It has wheels that use the cable as a track. The technology comes out of the ski-lift companies.”



*The conveyor system is capable of handling turns with a 5m radius thanks to a corrugated belt design that allows the belt to “flex”.*

Maintenance of the conveyor system has also been simplified. ICSI has designed its belting in modules that can be easily changed, removing the need for skilled workers such as belt splicers. ICSI is also finalising the design of a system that allows idlers to be changed while the conveyor is operating.

The conveyor system is moved by a series of drives that ICSI has developed. Instead of big motors at the end of the conveyor belt, ICSI plumps for a series of drives along the conveyor system.

Pietsch said the multiple drive system helped reduce stress on the belt. “Because of the multiple drives, a 10-kilometre belt does not need to be any stronger than a 100-metre belt,” he said. “There are no cumulative forces building up.”

The robust design also means the conveyor could be mobile. In a tunnelling application, for example, a 100m length of ICSI conveyor could be used to follow a road header, taking the spoil from it and discharging it further back down the tunnel, removing the need for trucks to be brought up behind the road header.

The Pietsch family started on its conveyor quest to try and find an alternative to haul trucks in openpits. One problem with using conveyors in an openpit is that the angle the system would have to negotiate would be too steep for existing conveyor systems. An alternative is to step the conveyor up the haul road, which involves various transfer points and lots of belt.

Alas, the openpit application may be some way off yet. The main problem lies in trying to get rocks of up to 1 cubic metre in size (and mine rocks rarely present as cubes) properly aligned with the conveying system.

Such a rock, Pietsch said, would weigh up to 3 tonnes but that would not be a problem for the belt, providing it could be properly aligned with the conveyor.

The systems ICSI has at the moment can handle particles up to about 300mm in size.

“We see our system being used mostly in the post crushing stage,” Pietsch said.

One of the fascinating things about the ICSI development is that the Pietschs are not conveyor folk. Pietsch was a contract miner running companies such as Hardrill and also mined some small deposits his family owned.

He said the development of the conveyor system had grown from that understanding of what miners want.

That breakthrough was developed by a proof of concept conveyor that Dror Pietsch made by hand.

Since those early days, the company has built up a strong team of research and development people who are tackling some real conceptual development problems referred to them by large companies. 