

Courtesy of Vern Evans



A deep dive into the history of mine development

Vern Evans on the evolution and future of shaft sinking

By Tijana Mitrovic

Vern Evans began working at the potash shafts in Saskatchewan in the 1970s right when he was out of university. At the time, those mines were the most advanced in the world – and he has worked in shaft sinking ever since. Evans met Charles Graham on the job in the 1980s and later consulted for him when Graham was the managing director at CAMIRO Mining Division. Bemoaning the fact that innovation in lateral development had been stalled for the past 40 years, the two decided to look back further and see how shaft sinking had evolved.

The result was a six-part *CIM Magazine* series titled “The Evolution of Shaft Sinking,” which ran from 2007 to 2008 and proved itself a popular reference on the subject. The articles covered the history of shaft sinking from before 1600 to 2007, and now Evans has come back to the topic to write a seventh instalment, covering the years from 2007 to the present.

CIM Magazine spoke to Evans, a senior consultant at Stantec, about the original series, coming back to the topic after 13 years, and the future of shaft sinking.

CIM: How did you get interested in this history?

Evans: [Charles Graham and I] were mainly talking about lateral development at the time because he was trying to increase the rate of drill blast lateral development, so we got off topic a little bit and got into shaft sinking. I had more experience in shaft sinking than drill blast tunnelling, so we decided to [focus on the history of] shaft sinking. [We] started out writing one [article] and it evolved into a number of shorter ones.

CIM: How would you summarize the articles you’ve already published?

Evans: If you look at the series of articles, there was tremendous progress in advance rates up until the ’70s when the shaft-sinking advance rates seemed to hit a bit of a plateau. The tunnelling industry was just developing tunnel-boring machines at the time so they [were progressing], but [shaft sinking] seemed to have hit a plateau in advance rates... I think that’s changing right now, and hopefully in the next 20 years we’ll see something like [what] happened in the tunnelling industry back in the ’60s and ’70s when they went to mechanical excavation. But we’re not there yet.

CIM: What did you learn while writing the articles?

Evans: I learned [that] there were super advances right from the start of history. We went through the same [progress] as the [rest of the] mining industry of course: development of compressed air, steam, hoisting. All those things, as they improved

in mining, they also improved in shaft sinking. Things became easier, it wasn’t quite as hard to do things.

CIM: How do you feel about the current and future state of shaft sinking?

Evans: I’m more excited about the last ten years than I have been for a long time. I worked on the start of the Jansen project, where they excavated two complete shafts down over 1,100 metres, all with mechanical excavators. I then went over to Russia and was involved for five years over there with mechanical excavation of shafts. I’m really hoping that we can move in that direction... Besides the machines they used at Jansen and are now using in Belarus, there’s probably going to be some other shafts. Hopefully, we’ll end up with a machine that can actually excavate hard rock instead of the soft rock that we’ve used to date.

CIM: What are the biggest changes you can see?

Evans: Certainly, we’re doing things safer. We’ve developed man-riding buckets, so you don’t have to climb in out of a sinking bucket now. You’ve got a conveyance that opens the door and you can walk in, close the door, somewhat like an elevator – so that’s more of a convenience than anything else. The big thing is mechanical excavation. We’ve done five shafts in the last ten years or so and it looks like we’ll do at least four or five in the next ten and hopefully a lot more.

The problem with shaft sinking is we don’t sink enough shafts. It’s not a really important thing for a mining company to develop a mechanical shaft-sinking machine because they’re probably only going to sink a couple shafts in the history of the mine. The people who are sinking all the shafts now are in China. In the last 15 years, they’ve sunk a thousand shafts and it would be really interesting to know where they are. ... If they would get interested in mechanical excavation with the number of shafts they sink, [mechanical shaft sinking] could probably make some real headway. But trying to get into the Chinese shaft sinking business I suspect is somewhat difficult.

CIM: Do you think there’s a way that Canada can catch up to China in terms of shaft sinking in the coming years?

Evans: Not a chance. In the last ten years we’ve maybe sunk 20 shafts. That’s two a year. The Chinese sink 50 or 60 [per year]. So no, China is where the action is now. And listen, they’ll reach a plateau [in the number of shafts sunk] too. A lot of those shafts are for coal mines [and] coal is going out of fashion. But certainly, right now and in the near future, they’re going to sink a whole bunch more shafts than anyone else in the world.

CIM: Which developments do you think are the most critical?

Evans: The same things are critical in shaft sinking as are critical in mining: the improvement of hoisting, improvement in pumping water, the development of compressed air-powered machines, getting away from hand mucking into mechanical mucking, speeding up the improvement of all the equipment – those I suppose are the main ones.

CIM: Which developments are you most interested in and intrigued by, personally?

Evans: Personally I'm really interested in those Herrenknecht machines, if they can be developed for hard rock. It's been tried before. [Redpath Mining] developed a machine back in the '80s, and U.S. Bureau of Mines also developed one back in the '80s, but nobody really gave it a chance. They tried it for a while but it didn't work, whereas [BHP] should be credited. They took those mechanical shaft sinkers of Herrenknecht to Jansen and even though they didn't work very [well], they kept them in those shafts right [to] the bottom. That was great, because they were able to find out a lot of things and now the second generation machines will be better, and the third generation will be better after that.

CIM: Is there really anything new in shaft sinking or is it all just a continuous evolution of old techniques, given

methods like freezing were introduced in 1883 and cementation in 1896?

Evans: The new evolution will be in mechanical excavation. That would just change everything. There would be nobody on the shaft bottom [during operation], it would all be mechanical excavation, and that's a radical departure from anything we've ever done.

CIM: Do you think there is a new concern in shaft sinking that there wasn't, say 10 or 20 years ago?

Evans: I think the problem in shaft sinking, and maybe a little bit in mining too, is getting young people interested in it. It's not a job that appeals to a lot of young people. You're down there in a not very great environment, certainly most things are mechanized now, but [it's] probably not something that excites young people. So, I have a concern about getting people into the shaft-sinking business. There has to be something there that would entice them. Everything computerized [and] mechanical might be exciting for young people whereas the old way, what we've been doing for the last 50 years, probably doesn't excite too many young people.

CIM: If you were to come back to this topic 50 or 100 years from now, what do you think you would say about modern shaft sinking?

Evans: Well, I would hope they'd all be mechanized. **CIM**