

NO STRANGER TO THE CANADIAN MARKET, COILED tubing drilling long ago gained widespread acceptance as a legitimate technology. Cross the 49th parallel and the story is much different.

For several reasons — technological and geological among them — CT drilling simply hasn't penetrated the U.S. market with vigour. But much like an infant slowly learning to crawl before walking, it seems to gradually be gaining a foothold. Continued technological development has helped fuel optimism that it will grab a larger market share of U.S. drilling.

Kent Perry, director, exploration and production research with the Des Plaines, Illinois-based Gas Technology Institute (GTI), sees a bright long-term future for CT drilling in his country. Right now, it's mainly being used in Colorado and Kansas, he notes.

He points specifically to a particular project using a CT rig from Advanced Drilling Technologies of Yuma, Colorado, in the Niobrara Chalk in Kansas where estimated cost savings were pegged at 25% to 35% per well. "We've had a lot of inquiries about the rig and its applicability to various areas," Perry says.

"This particular rig ... moves very fast [and] the environmental footprint is almost zero in southwest Kansas. We get good hole quality, good cement jobs and straight holes." The rig is capable of drilling, running casing, tool handling and logging.

"One of the early drawbacks to coiled tubing drilling was that at first it was like hybrid



warming up to coil

INROADS SLOWLY
BEING MADE
IN THE U.S.
BY RICHARD MACEDO

systems," he says. "You'd take a rotary rig and then you'd bring in a coiled tubing system onto it, couple the two up and start drilling in that fashion. If you have to take the time to match the two up, well, then you're losing time.

"If your coiled tubing rig didn't have the ability to run casing, then you'd have to get a casing crew in and that was extra time and extra money. And so these rigs need to be designed kind of fit-for-purpose and have the capability to do the complete package to be efficient."

EnCana Corporation recently took some baby steps with the technology in Colorado's Piceance Basin, one of the Canadian gas giant's growing and highest potential resource plays in the U.S. Tim Baer, the lead for drilling in the south Piceance, says things have been going smoothly.

The company has been working with new rigs from Xtreme Coil Drilling Corp. Three XTC 400s, Xtreme's largest rig model, are working in the U.S. The first XTC 400 was delivered in May, the second in July and the third in September. Two XTC 400s are currently contracted to EnCana.

SOUTHERN EXPOSURE

Xtreme Coil Drilling has penetrated the U.S. market with its largest rig, the XTC 400.



“The rigs themselves are very beneficial because they can drill with both jointed pipe and coil applications. That’s very beneficial for us for different applications as needed,” Baer says. “We’ve started at just the infancy stages of using coil to drill out from surface pipe and drill the rest of the hole. It does give you some leverage in both cases.

“There’s obviously no connection times so you just continue drilling, so there’s no downtime as far as making connections and that sort of thing. It saves us quite a bit of time.”

According to the Petroleum Technology Transfer Council, in 2006, CT drilling represented less than one per cent of U.S. activity. An analysis showed that initial penetration in that market would involve vertical wells ranging from zero to 5,000 feet, followed by horizontals. After 2010, with additional technology development, CT will spread to the 5,000- to 10,000-foot range. By 2025, the application will represent 28% of wells in the zero- to 5,000-foot range and 19% of the wells in the 5,000- to 10,000-foot range.

Based on an average 25% reduction in costs compared to conventional drilling, annual savings are predicted to reach a level over \$6 billion by 2025. With the lower cost, gas resources that would not have been economic with conventional methods would be developed. Assuming current technology, GTI estimates that about 11 trillion cubic feet (tcf) of non-conventional gas at depths to 5,000 feet could be economically recovered from the U.S. natural gas base.

“There’s not a lot of availability of these types of rigs [in the U.S.] and ... a lot of the stuff in Canada is shallow,” Baer says. “Where we are, it is different. It is a little bit deeper but I think the biggest hindrance [was] the coil’s ability to meet a target [for] directional drilling. They had to find a package that would allow us to find a way that we could hit a spot — x, y, z space — downhole.”

The coil by its very nature has the inclination to bend, he adds, so apparatus such as motors and directional tools are needed to deliver success. “You come out vertical to say 2,000 feet and you start ... your directional part and you drill [a] 19 degree deviation and once you get just above your target

zone, then you go back to vertical through the pay interval, giving you an 's' curve."

Anadarko Petroleum Corporation is using coiled tubing drilling rigs supplied by Xtreme in the Wattenberg field of the Denver Julesburg Basin and plans to add two more coiled tubing rigs in Wattenberg in the coming months.

"One thing to remember is that each situation is different and each geographic location often has its own requirements and challenges," says Anadarko's John Christiansen. "Coiled tubing rigs work very well when drilling tight rock and relatively shallow depths like the 7,600 feet that we are drilling in Wattenberg. We've found the rigs also work well in more densely populated areas because they are quieter, safer and have faster penetration."

Cracking the market

Despite CT drilling having been traditionally more widely employed in the Canadian market, particularly because the geology favours it, Xtreme is trying to crack the American nut to a greater degree. Tom Wood, chairman and chief executive officer, is a believer that it's not pie in the sky.

"The difference between success and failure, if you look over in the Piceance, when we drilled that first 's' curve, if we would have had that smaller injector on there, we probably would have stuck everything in the hole and that's probably all you would have heard about it," he says. "Had we had our smaller injector, you would have planted it probably and that would have been it and then everybody would have said you can't do this."

And therein rests the key to making this work — taking the equipment from the Canadian market as it is and transferring it to the U.S. is a recipe for failure. Ingredients Wood says should help breed success in the largely untapped American market include trial and error and plenty of patience.

"Just in the last month or so here, we've kind of had some fairly large breakthroughs once we got our 400 series rig in the U.S., which is our big one," he says. "We're starting to drill ... with [EnCana] down in the Piceance. Some of the tools are starting to work in our favour now, that's always been an issue."

"When you get into this more complex drilling ... there's only probably been a handful of those done successfully in the world with coil and we've done them."

The XTC 400 design has the largest coiled tubing injection system in the world, according to Xtreme. Rig No. 8 drilled its first well in the Denver Julesburg Basin in Colorado, nabbing a record 51.25 rotating hours drilling with coil from below the surface casing to total depth of around 8,375 feet.

"Actually in one day we drilled 5,600 feet of hole with that rig which is kind of mind-boggling," Wood says.

Part of the technology's unsuccessful attempts to gain widespread acceptance in the U.S. rests with the previous inability to go deep, a point not lost on Wood. "In the U.S. you need to be able to drill that 10,000-foot stuff," he says. "If you don't have a tool to do that, you're probably going to miss out. [With] the drilling in Canada, the coil rigs have been successful because it's an extremely fast hole."

"When you drill in formations that are deeper, they get harder, they change a lot. The process you have in Canada does not work in the United States. It doesn't fit. We've tried it and we know why and if you listen to the other coiled tubing companies as they get deeper in Canada, they'll tell you that it doesn't work right."

In early August, Xtreme completed commissioning of its third XTC 400 rig in the Piceance Basin. The company expected to exit the third quarter of the year with 10 coil over top drive (COTD) drilling rigs completed and operational. In addition to the two patents issued during the first quarter for its new drilling technology, Xtreme has a further 34 patent applications under review in the U.S., Canada and other jurisdictions.

Some of the pending patents restrict Wood from getting into the details of what new methods are being employed to overcome some of the challenges in the U.S., but he expects the market will continue to progress.

"It's very big but you have to have the right sized rigs for that market," he says. "We're trying it in different areas right now. We're in the Rockies, primarily southwest Wyoming. It's really proven itself up there. We've gone from wells that were taking 10 days down to four."

"The dynamics are really different," Wood adds. "We actually have a rig over in Kansas right now ... and it's taken us about three months to figure out how to do it there because this is very technical drilling, but it's a very large market for us. We can make a lot of fields in Kansas that are maybe not so economic anymore, economic again. And we're working with an operator in there that really believes in this."

Part of Xtreme's decision to move its rigs stateside was driven not by an urge to set records but a response to a slowing western Canadian drilling climate, precipitated by slipping natural gas prices. With Canadian drilling remaining persistently sluggish and no clear signs that a turnaround is imminent, other markets such as the U.S. become more attractive. U.S. drilling has remained relatively robust by comparison and companies such as Xtreme will continue aggressively pursuing business south of the border.

"We're not giving up on Canada by a long shot," notes Wood. "Once we develop these deeper products in the U.S. we'll probably move them back into Canada as well."

Pinpointing why CT drilling hasn't yet caught on like wildfire in the American market can be explained several ways, according to the GTI's Perry. In previous attempts, the method was used in environments where it wasn't technically ready, producing mixed results. This, he speculates, might have inhibited growth.

"There was a lack of familiarity with it — there was some complex geology and so forth," Perry says. "[Previous obstacles include] if you get into real hard rock or if you get into greater depths or into difficult drilling environments where you have stuck pipe and things of that nature, where the coiled tubing has some drawbacks."

"It's important to take the rig, put it in the right environment and then keep moving to the more challenging environments as you gain experience, as the technology improves, as the capabilities overall improve. I think with that approach it's really going to take off in the future."

Perry has heard varying degrees of success in terms of the 10,000-foot watermark — one company was "really happy" with CT drilling, which saved it time and money descending to 6,000-8,000 feet in the Denver Julesburg Basin, while another company said "it was mostly a wash with their rotary systems."

"I'm convinced that coiled tubing, as the problems are identified, it will be able to overcome those obstacles and be able to expand," he adds. "I think there's enough overall benefits from the coiled tubing systems to do that."

Peering into his crystal ball, Perry tentatively predicts the future of CT drilling in the U.S. is bright as the technology continues its slow and steady growth trajectory. "It's always hard to make that call," he says. "Why it should take so long, I'm not sure, but things do take time. I personally think by 2025 it's going to be drilling much more than 25% of the shallow market and have reached up into the deeper depths as well. It's certainly on track." **ntm**

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