CT scanner revolutionizes process development in the oil sands

Helping find better ways of getting oil out of the ground

A NEW CT SCANNER at the Alberta Research Council is revolutionizing the way energy companies test and develop new extraction processes. This new way of working is helping the environment, too. The state-of-the art equipment, which produces results 40 times faster than ARC's industrial scanner, provides high-resolution 3D images that show the internal structure of geological core samples, sand packs and mechanical devices.

Simulates field situations

By creating a reservoir model—or "mini-reservoirs"—ARC is using the micro-imaging technology to simulate field situations and testing for results. Testing various methods and comparing the results will show oil sands and heavy oil companies which extraction process works best for their reservoir. This will reduce costs, enhance extraction and reduce water and energy use. For example, engineers and geologists can see what happens inside a sand pack when a new extraction process, such as solvent used to improve oil flow, is applied.

"It's a way of looking at what's happening inside the material—in a non-destructive way," says Shauna Cameron, Imaging Specialist in ARC's Heavy Oil and Oil Sands group. "Understanding the internal structure of material helps us develop new processes and find better ways of getting oil out of the ground."

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Scans in just 30 seconds

The industrial scanner that ARC has used for the past decade takes about 20 minutes to scan one millimetre of an object, so an item with a 50-millimetre core would take over 16 hours to scan. The new CT scanner typically requires less than 30 seconds to scan an entire object, which makes it perfect for dynamic experiments.

"An experimentalist can make real-time decisions and changes as they go along, controlling and fine tuning the process," says Cameron. The increased throughput also means ARC can do more work in less time.

Similar to hospital scanner

Just as a hospital scanner shows doctors the density of objects such as bones, ARC's CT scanner shows the internal structure and density of objects such as rock. Shauna Cameron and her team are designing different methods to maximize the use of the scanner for non-medical applications.

"A medical scanner is set up for the body, so we've had to learn new ways of using this equipment for the kind of work ARC is doing," she says.

ARC is also considering the purchase of its own calibration system to provide quantitative measures for rocks.

Other possible uses

The CT scanner has primarily been used in the oil sands, but its application goes beyond the energy sector. It features the best specifications on the market for low-contrast resolution, making it useful for a broad scope of research applications across many industries.

"We can look at fossils for museums or carbonate rocks from carbonate reservoirs in the north," says Cameron. "We even did some work with a valuable religious artifact that was made of wood to see if there was termite damage."

The micro-imaging technology offered by ARC's CT scanner is ideal anytime there's a need for cross-sectional study of the internal structure of objects.