

The bottomless barrel

China to see first hydrogen-addition upgrader

Oil isn't just getting heavier in western Canada, with the growth of the oil-sands industry—it is a global trend. However, for facilities around the world that process crude oil into refined products, accommodating different feedstock slates is not a simple flick of a switch, and increasingly, it is likely these installations will have to adapt. In China, the Hebei Zhongjie Petrochemical Company is taking steps to add 20,000 barrels per day of new heavy oil throughput capacity at its 150,000-barrel-per-day petrochemical facility, in order to manage increasingly heavy imported oil—mainly from off-shore Russia. The technology it plans to use—a Genoil Hydroconversion Upgrader (GHU)—will be the first of its kind in the country.

“China now has to accept heavier sour crude from exporting countries,”



The GHU will be installed at an existing processing facility in China.

explains Guo Chen Yu, vice-president of the Hebei Zhongjie Petrochemical Company. Last September, Yu led a delegation from the company to Calgary-based Genoil's pilot facility near Two Hills, Alberta, where they were introduced to the GHU, which is now set to

be operational at the China installation by 2010. “We view the GHU as a method of being able to refine the heavier sour crude into motor fuels to meet growing demand in China.”

At the 10-barrel-per-day pilot facility near Two Hills, Genoil has processed a

A model of the China facility.

Pilot test results

In a trial for a major international oil producer, Genoil reports it increased the specific gravity of a heavy oil feed by 17 degrees API, with a 93 pitch conversion (538 degrees Celsius plus) at only 124 bar and 402 degrees Celsius. The test was designed for a one-year catalyst life cycle. The company calls these results “unprecedented.”



variety of crudes, says chief operating officer James Runyan, including in situ oilsands production, as well as feedstock brought in from prospective clients in eastern Europe and the United States. In testing, Genoil reports the GHU has increased the specific gravity of heavy oil by as much as 17 degrees API, with 93 per cent pitch conversion (535 degrees Celsius plus) at only 124 bar and 402 degrees Celsius. The technology incorporates gasification, using heavy residue left over after upgrading to generate synthesis gas and hydrogen to fuel the process. No coke is produced as a byproduct, which Runyan explains is an improvement over oilsands operations that use coking to break the hydrocarbon value chain.

“Coke is basically a hazardous waste,” he says. “Companies have to find some way to bury it.”

Runyan explains that using a GHU also provides for less wasted product. He says that by using coking, a 100,000-barrel-per-day operation loses about 20 per cent of its oil. Using hydroconversion, an operation of the same size—sourcing its hydrogen from outside—would actually produce about 103,000 barrels per day. He says using gasification, where the “bottom of the barrel” is burned to generate synthesis gas, the operation would produce 90,000 barrels per day.

“Heavy oil and bitumen producers are also examining the benefits of stand-alone GHU installations to eliminate the need for shipping with costly diluents, reduce exposure to heavy oil differentials, and increase product marketability by improving quality,” Genoil says. “By using a GHU to upgrade residue through hydroconversion, refiners can change their product slate, generating higher margins and eliminating exposure to high sulphur fuel markets.”

Whether it is through a GHU, or other technologies that upgrade heavy crudes into lighter, more valuable products, Runyan says the need for expanded capacity is evident.

“The refineries in North America and most all over the world are running a percentage of heavy sour crude as high as they can stand, and it’s getting heavier.”