MAKING A DIRTY JOB A LITTLE CLEANER

Kinder Morgan and Caterpillar work together to reduce diesel emissions at a Houston petcoke facility.

Managing huge stockpiles of coal-like petroleum coke is a dirty job. A by product of the oil refining process, "petcoke" is dusty and somewhat sticky, so it turns everything at the Kinder Morgan Petcoke facility in Houston, Texas, a grimy black. However, Kinder Morgan is working to keep one part of its operation cleaner—the exhaust coming from the facility's fleet of Cat® D9 Track-Type Tractors.

Kinder Morgan is an energy company that manages 45,000 miles of natural-gas pipeline throughout the United States and 150 bulk-shipping terminals worldwide. The Houston facility—technically known as the Port of Houston Bulk Materials Terminal—collects, stockpiles and ships 4 million tons of petcoke each year from three Texas refineries. The product is used as a fuel source internationally.

TERP Grant For D9 Repowers

As the facility's Manager of Heavy Equipment, Don Pleu oversees a fleet of mostly Caterpillar® equipment. It includes dozers, loaders, excavators, trackhoes, tool handlers, backhoes and more, but it's the D9 Track-Type Tractors that do the heavy work on the stockpile.

When Pleu came to the facility two years ago, the previous corporate owners had already started the application process for a TERP grant to upgrade the D9s' engines. TERP is the Texas Emission Reduction Program. The program awards grants to encourage owners of non-road diesel equipment to switch to engine technologies that produce lower emissions—either through a rebuild or a complete repower of their existing equipment.

It was great news for Pleu when the TERP grant was awarded, because the Kinder Morgan dozer fleet needed an upgrade. Pleu explains, "As long as the refineries are making fuel, they're making petcoke. Because we manage the petcoke from three different refineries, this is a 24/7 facility. Some of our machines will have 8,000 hours a year on them."

The grant originally called for 17 Cat D9s to be upgraded to Tier 2 emissions standards. That's a major technical challenge, so Kinder Morgan called on their local Houston Caterpillar dealer, Mustang Cat, for help.

"It's natural to repower a Cat machine with the same Cat engine," Pleu says, "and the way our grant is written, we can choose who does the repower. Because of our experience with Caterpillar—we get great support from those people—we chose to have them do the bulk of the repowers."

Interface Challenges

The challenge of going from an older engine to one with current technology is daunting. Even though the new engines have the same model number, it's not as easy as simply swapping old for new.

Pleu notes, "We're going from an analog, mechanical piece of machinery to a digital, electronically-controlled power plant. The unique challenge is the interface between that old technology and the new technology. For instance, we've got two temperature sensors—one that is capable of communicating with the engine's electronic control module, the other is the older technology that interfaces with the analog display on the instrument cluster."

A temperature sensor that interfaces with a computer-driven electronic control module (ECM) is one example of the emissions-reducing technology found on new Cat Engines. The older temperature sensor is still required, however, to keep the operator informed about machine conditions through the existing in-cab displays and fault indicator lights.

The challenges do not end there. During the repower process, Mustang Cat has to deal with differences in the engine platform itself.

Jeffery Dutton, product support sales representative for Mustang Cat, says, "Along with the interface concerns, there has to be some modification made to the mounting points as well. Even though it shares the 3408 model number, the new engine is substantially different. It's actually a little bit longer and a little bit taller."

Once the repower is finished, each Cat D9 essentially has two parallel electrical systems, which can make servicing complicated. "For example," Dutton explains, "when a field mechanic comes to troubleshoot an engine, he has to know that this machine is a repower so he'll know to carry both sets of diagnostic tools. He can't just diagnose one; he has to look at both setups. If a light's coming on in the dash saying it's overheating, he'll want to plug into the ECM and see the same reading."

Easing The Learning Curve

Mustang Cat is handling most of the repowers, with technical assistance from the Caterpillar Emissions Solutions group. Caterpillar Emissions Solutions specializes in providing emissions reduction technology for on-highway vehicle fleets, off-road machines and stationary equipment.

But because Kinder Morgan does much of its own service work, the Caterpillar team put together a Repowering Procedure document—along with the supporting parts manual and supporting schematics—to help ease the learning curve for the company's technicians. Pleu says, "We need that manual so we can troubleshoot this equipment in the future."

Following Mustang's lead, Pleu is having his own service techs do some of the repowers. "We will be doing at least two repowers ourselves at our own shop facilities," he says. "That's so my technicians and mechanics will experience what the Cat guys have done and know all the nuances of the repower."

Along with the new engine, the D9s receive what Pleu calls a "poor man's refurbishment." He explains, "Prior to the equipment going to Mustang Cat for repower, we go through a variety of services, updates, replacements and repairs at our shop. We'll do undercarriage repairs. We may replace the transmission with a remanufactured transmission. It would be foolish to put a brand new engine in front of a tired transmission and a worn-out undercarriage."

Creative Scheduling

To limit machine downtime, Mustang Cat came up with a plan to rebuild key components from one D9 as it is being repowered, then reinstall them on the next machine in line. Dutton says Mustang Cat ordered and installed fresh Cat Reman components on the first D9.

"From there," he continues, "we took the components that we pulled out of the first machines and had them remanufactured for the next unit. From the second machine on, Kinder Morgan took over the replacement of the transmission, torque converter and some of the pumps using freshly remanufactured parts that came from their own fleet."

This creative scheduling helps reduce time off the stockpile for each D9. That's important, Pleu says, because "we didn't have the luxury of spare dozers that we can readily take out of commission for a four-to-six week lay up."

Pleu worked around the downtime by shifting equipment between Kinder Morgan facilities. He explains, "One of the reasons we use the Cat D9 dozer is because we can move it between terminals. With anything bigger, we'd have to disassemble the undercarriage. With the D9, all we have to do is pull the blade and we can move the machine to another facility. So, based upon production demands, we moved equipment to cover the production needs while we had a unit in the shop."

Everybody Wins

Despite all of the efforts required, the Kinder Morgan team is pleased with the results of the repower program. Shop Foreman Howard Williams observes, "From a performance standpoint, I think the repowered machines have got a lot better pushing power. You can watch an older one and a newer one and it seems like the newer one will pick the blade up and go on up the pile where the other one is just easing up there."

As for air-quality improvements, Pleu adds, "you certainly don't see the smoke like you did with the older ones. The electronics in the new engines control everything more efficiently. You're not overfueling it, so you're not getting the black stacks."

The TERP repower grant has solid economic benefits for Kinder Morgan as well. "Basically, we're getting a free engine," Pleu says, "so it's too good to pass up. We win because we're getting a new engine, and the state wins because their emissions levels within the affected counties go down."

Williams echoes Pleu's sentiments about the environmental benefits of the programs, saying, "Really, everybody wins because the more emissions you can take out of the air, the better for your family if you live in the area. That's what it comes down to. Everybody wins overall."

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