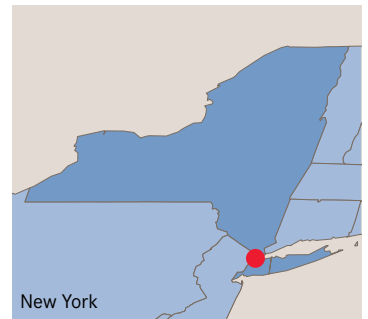
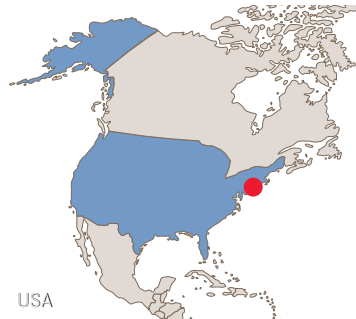


New MTU Series 60 engines give lift to Cornell & Company cranes at the World Trade Center



- Who:** Cornell & Company, owner of the largest fleet of tower gantry cranes in the United States
- What:** Repowering of tower gantry cranes used on the new World Trade Center Tower 3 with MTU Series 60 engines
- Why:** To improve fleet fuel efficiency and meet tough emissions laws for New York construction projects
- Where:** New York, N.Y., USA



Three large tower gantry cranes from Cornell & Company—repowered with new MTU Series 60 diesel engines for reduced emissions and fuel consumption—are helping to construct the new World Trade Center Tower 3 in Manhattan's financial district. The repowering project is part of a major effort that also included 15 other cranes in the company's fleet, one of the largest tower gantry crane fleets in the country. The switch to fuel-efficient and cleaner-burning engines enabled Cornell & Company to bid for and win the World Trade Center tower crane work by complying with New York's tough local emissions standards. The new engines are also delivering up to \$100,000 a year in fuel savings compared to the engines they replaced.

Prior to the crane fleet repower project, Cornell & Company was facing a deadline regarding the use of old diesel engines in their crane fleet on projects in New York; emissions from the approximately 25-year-old diesel engines that powered its crane fleet were too high. As one of the most densely populated cities in the country, New York passed Local Law 77 to reduce the impact of exhaust emissions on human health. The city regulation requires operators of diesel equipment to use ultra low sulfur diesel (ULSD), install diesel particulate filters (DPF) on the exhaust and to comply with EPA diesel emissions regulations for Tier 3.

New engines more efficient

The old 2-cycle diesel engines in the crane fleet were simple and dependable, but they were not as clean burning or as fuel efficient as today's modern 4-cycle diesels. Due to their design, the 2-cycle engines used a lot of fuel, and their exhaust emissions were too high to comply with any of the EPA Tier levels or Local Law 77. Cornell & Company had to do something about updating the engines in its fleet of cranes if it wanted to win construction jobs in New York.

"As an initial test, we bought an MTU Series 60 engine and put it in one of our TG1900 tower gantry cranes," said Don Garrahan of Cornell & Company. "We looked at other manufacturers' engines too, but the people who offered the best service and who helped us the most were Johnson & Towers, the local MTU distributor."

Don Garrahan, Cornell & Company

"Our performance is better, and we're burning about half the fuel we were burning before."



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The MTU Series 60 Tier 3 engine features 525 hp and 17 percent more torque in the normal operating range than the engine it replaced.

The company's TG1900 and TG2300-B tower gantry cranes are used in constructing multistory buildings and can climb themselves as the building height increases. Each TG2300-B crane has a minimum 230-ton lifting capacity and a maximum boom length of 240 feet. The cranes employ a modular design so they can be modified for individual project needs. The engine module houses the engine, the hydraulic components, gear box, hydraulic oil supply and cooling system. Garrahan said the cranes are hydraulically operated, meaning that the engine is throttled up and down to drive hydraulic pumps through a gear box and then the pumps run hydraulic motors that actually turn the cable drums.

Substantial improvements

After the first test engine was installed, Garrahan said there were immediate improvements in performance, noise, exhaust emissions and fuel efficiency. "With the old 2-cycle engines we were burning approximately 10 gallons of fuel per hour, and now we're burning five gallons per hour. On this job with three cranes, that's a fuel savings of approximately \$500 per day or upwards of \$90,000 to \$100,000 dollars annually," he said. Engine noise was also a concern — especially when these cranes operate for eight or more hours a day in densely populated Manhattan. However, the Series 60 Tier 3 engine is significantly quieter than the old 2-cycle engines to begin with. On top of that, the new engines have been outfitted with residential/critical exhaust silencers to make sure their noise is unobtrusive.

The new engines are EPA certified to Tier 3 emissions standards, which were the prevailing standards when the engines were manufactured and shipped in 2011. To comply with Local Law 77, the engines are also fitted with diesel particulate filters to further reduce particulate matter in the exhaust.

"The new MTU Series 60 engine is an inline six configuration, rated at 525 horsepower at 2,100 RPM with 1,313 foot-pounds of torque — approximately the same as the 2-cycle engines they replaced," said Robert Shomo, senior vice president for sales at Johnson & Towers. "However, the new engines have 17 percent more torque in the lower and middle speeds where the engines normally operate, giving them better performance and response," he said.

While the old and new engines are comparable in size, weight and displacement (14 liters), the Series 60 Tier 3 engine has greater heat rejection, necessitating a specially designed radiator that required some modifications to the crane's chassis. "We had to make some serious modifications to the cooling system in order to accommodate the hydraulic coolers and the charge-air coolers, which the 2-cycle engine didn't have," said Shomo. "The rest of the installation was straightforward."

Federal subsidy eased the way

Repowering three cranes was one thing, but repowering a whole fleet of 18 cranes was quite another in terms of investment by Cornell & Company. Because the repowering project would have a significant positive impact on air quality at construction sites in New York and around the Northeast, Johnson & Towers decided to help Cornell & Company apply for a federal grant as part of the Diesel Emissions Reduction Act (DERA). This federal program set aside \$150 million to help subsidize the replacement of older diesel engines in marine, rail and industrial equipment throughout the United States. Of 251 proposals submitted to DERA in 2010, Cornell & Company's application was one of only seven in the country that were approved. The grant covered 75 percent of the cost of the new engines and paved the way for repowering Cornell & Company's total fleet of 18 gantry tower cranes.

The three cranes will be on the World Trade Center Tower 3 job site for about the next year and a half, and so far the results are very favorable. "The new engines have really worked out well," said Garrahan. "Our performance is better, and we're burning about half the fuel we were burning before. It's unbelievable. We are really tickled pink, we really are."

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