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PAGE 2: COVER STORY

LOADING THE BOEING DREAMLIFTER

CAT® C9 ACERT® POWER THE KEY ELEMENT OF BOEING'S GLOBAL 787 DREAMLINER LOGISTICS SYSTEMS

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LOADING THE BOEING DREAMLIFTER

CAT® C9 ACERT® POWER THE DBL (DREAM BIG LOADER), A CARGO LOADER USED TO LOAD GARGANTUAN PARTS INTO BOEING'S DREAMLIFTER AIRPLANE.

No matter how you look at it, Boeing's new 787 Dreamliner is a very unusual aircraft. The airframe is built largely from sophisticated, high-strength composites rather than traditional aluminum. This makes it lighter and more fuel-efficient.

The wings and fuselage are assembled from large modules produced by Boeing suppliers in Italy, Japan and Kansas, and put together largely without any of the rivets that traditionally hold aircraft together.

Modules are delivered just-in-time to Boeing's Dreamliner assembly plant in Everett, Wash., by a fleet of three specially modified 747 freighters called Dreamlifters.

The Dreamlifter modifications include a large-diameter fuselage, and a hinged tail section to facilitate loading and unloading the huge, prefabricated Dreamliner components.

Without the Dreamlifter's 65,000 cu. ft. of cargo capacity, Boeing would have to wait several weeks for parts shipped by sea. That would not only complicate the assembly, scheduling and

logistics for the Dreamliner, but it would also significantly increase costs due the amount of in-transit inventory required. Moreover, some of the components carried by the Dreamlifter will not fit in standard shipping containers, which would mean Boeing would have to transport them in costly, dedicated ships.

THE DREAM BIG LOADER

The entire Dreamliner manufacturing process was created and developed to make the Dreamliner globally competitive both in terms of capital cost and operating efficiency — and it all hinges on the ability to load, unload and handle the huge wing and fuselage modules safely and efficiently.

The challenge of designing and building the gargantuan self-propelled loaders required to make that possible fell to TLD group, a world leader in aircraft ground support technologies.

The TLD factory in Sherbrooke, Quebec, was selected for the manufacturing and assembly of this special project. The result is the DBL-110 (Dream Big Loader) Cargo Loader — a 100-ton, 118-ft. long behemoth able to lift 68 tons more than 25 ft. in the air and position its load within the fuselage of a Dreamlifter with accuracies measured in fractions of an inch.

"This is the largest cargo handler we've ever built," says TLD's Canada OEM Product/Marketing manager, Gabriel Roy. "It has 32 tires, 16 steerable axles, and six different steering modes plus the ability to raise and lower up to 68 tons and yaw the fully loaded cargo deck up to 1 degree to align the load precisely with the interior of the Dreamlifter.

"The design team took full advantage of the proven technologies developed for TLD ground support equipment over the years, and seamlessly integrated them into this unique machine. It's both a testament to today's technologies and production capabilities, and a fully functional preview of what tomorrow's systems will look like.

"And, it took only 15 months from start to finish," Roy adds.

TLD will build a total of seven DBL-110 loaders for Boeing — one each for suppliers in Nagoya, Japan and Grottaglie, Italy, and five for U.S. manufacturing locations including the Everett assembly plant. In addition to unloading the Dreamliner components, the Everett-based unit will be used to move them inside the plant during the assembly process.

"The DBL-110 is a critical part of the supply chain supporting 787 Dreamliner production," says Matthieu Gerphagnon, DBL-110 project engineer, "and that makes reliability an extremely important aspect of the design. We did extensive reliability-related engineering studies during the design phase, and included a number of redundant systems in the final product — including two diesel power packages."

The DBL-110 (Dream Big Loader), shown at left, is used to load Boeing's Dreamlifter 747 aircraft, shown in center photo. The DBL is powered by a pair of Cat® C9 ACERT®. The Dreamlifter is a large, specially-designed aircraft that carries airplane parts back to the Boeing assembly plant. This plant assembles Boeing 787 Dreamliner aircraft, shown in right photo.

"The DBL-110 is a critical part of the supply chain supporting 787 Dreamliner production. This makes reliability an extremely important aspect of the design."

Matthieu Gerphagnon, TLD Group

The Dream Big Loader (main story photo) is powered by two Cat® C9 ACERT®. In total, seven DBL-100s will be built for Boeing — one each for suppliers in Japan and Italy as well as five for U.S. manufacturing locations.

USING CAT ENGINES

TLD worked with local Caterpillar dealer Hewitt Equipment Ltd. of Montreal to develop the diesel power packages used in the DBL-110 loader. Each machine is equipped with a pair of Cat® C9 ACERT®, which drive a pair of hydraulic pumps as well as alternators to supply electric power. The C9 ACERT is an 8.8 liter, in-line 6-cylinder turbocharged and air-to-air aftercooled diesel engine rated at 375 peak hp (280 kW) and 325 intermittent hp (242 kW).

"Reliability was a key factor in selecting the engines," explains Hewitt Equipment sales engineer, Gilles Morin, "but they had to meet global emissions requirements as well. Fortunately, Caterpillar ACERT Technology meets both requirements very effectively."

The primary driving force behind ACERT Technology is the requirement to meet Tier 3/Stage IIIA emission standards that are being enforced around the world. The concept is based on precise control of the combustion cycle accomplished via a systems approach to air management, electronics, fuel systems and combustion systems.

All of the sub-systems included in ACERT Technology are based on field-proven components used on Cat engines over the years. ACERT Technology combines them into an integrated system that makes use of their mutually complementary individual capabilities to produce optimized engine performance.

Of particular importance to TLD was the Caterpillar internal mandate to achieve these goals with no sacrifice in engine reliability or durability while delivering improved operating economy and reduced life cycle cost. Thousands of Caterpillar engines equipped with ACERT Technology have been sold and are now in use in industrial applications and on off-road machines around the world.

"Global availability of spare parts and local maintenance were also major concerns in selecting the engines for the DBL-110," Roy adds. "We had to be sure both were as easily available in Nagoya and Grottaglie as they are in Wichita, Charleston and Everett. Cat's global footprint and comprehensive dealer network made that a nonissue for us." ▲

CAT® C4.4 ACERT® ENGINES POWER VERSATILE DEICERS TO KEEP COMMUTER AND

SAFE AND ON SCH

Aircraft deicing is serious business. Major airports and airlines spend millions of dollars every year on highly specialized equipment to apply deicing chemicals. But let's not forget about the hundreds of smaller airports around the country and the thousands of smaller aircraft used for commuter and cargo operations. These smaller facilities may not need huge machines capable of handling intercontinental 747- and A380-class aircraft, but they still require reliable, efficient deicing systems that can tackle narrow-body jets and commuter planes.

"This is our niche," explains Rudy Yates, president of Ground Support Specialist (GSS) in Horn Lake, Miss. "We build a pair of deicers aimed directly at regional airports, smaller airlines and air cargo operators. Our GS Series Deicers are self-contained systems with the capacity to deice virtually all aircraft up to the size of a Boeing 727, which covers just about anything one might find at a nonhub or regional airport."

THE MECHANICS OF DEICING

Deicing is typically a two-step process. In the first step, Type 1 fluids (a mixture of propylene glycol and water) are applied when hot to remove built-up ice and snow from the aircraft. Once the aircraft is ice-free, Type 4 fluids are applied to control further buildup between deicing and takeoff.

Type 4 fluids are viscous with a controlled shear point. They form a physical barrier between the ice and snow and the aircraft's skin. When the aircraft reaches approximately 80 knots during the takeoff roll, the Type 4 material shears off the skin, taking any accumulated ice and snow with it.

"A deicing system is essentially a set of tanks for the fluids, a pumping system, a boom to access the aircraft surfaces, and a chassis to move the whole thing around," Yates says. "That makes it sound very simple, but in practice it is anything but simple."

CARGO AIRCRAFT

EDULE

THE GSS DEICING PROCESS

GSS entered the deicing market with a compact, trailer-mounted unit tailored to meet the needs of smaller airports. This experience led them to develop a proprietary chassis in 2000, which is the foundation for the new GS 700 and GS 1400 deicing vehicles.

The GS 700 is a 15,800 GVW vehicle when loaded with 600 gal. (2,271 liters) of Type 1 and 200 gal. (757 liters) of Type 4 deicing fluids. It has an articulating boom with a 32-ft. (9.75 m) maximum reach.

The GS 1400 is a 24,800 GVW vehicle when loaded with 1,200 gal. (4542 liters) of Type 1 and 200 gal. (757 liters) of Type 2 fluid. Its articulating boom has a 34.5-ft. (10.5 m) maximum reach.

Both vehicles utilize the same fluid delivery and heating systems as well as the same hydrostatic chassis drive system. Type 1 fluid is heated to 180 degrees F (82.2 degrees C) and applied at 20 to 30 gpm (76 to 113.6 lpm) at 150 psi (1,034 kPa). Type 4 fluid is applied at ambient temperature at 20 gpm (76 lpm) and 40 psi (276 kPa).

The GS 700 (shown at left) and the GS 1400 (above) can deice virtually all craft smaller than a Boeing 727.

The heating system is a 12-volt, diesel-fired unit designed by GSS specifically for this application. It can raise a 700-gal. (2,650 liter) tank of Type 1 fluid from ambient temperature to 180 degrees F (82.2 degrees C) in 12 minutes, or a 1,200- gal. 4,542 liter) tank in 20 minutes.

The standard engine for both vehicles is a Cat® C4.4 ACERT®, a 4-cylinder, in-line direct-injection diesel rated at 83 bhp (62 kW). The C4.4 ACERT is a Tier 3/Stage IIIA emissions-rated unit with a nominal displacement of 239 cu in. (4.4 liters). The engine is also equipped with glow plugs to aid in cold weather starting, an important feature for this application.

EASE OF USE MESHES WITH CAT OFFERINGS

"Simplicity of use and ease of maintenance were our key design goals for these vehicles," Yates explains. "The swing-out tray is a popular feature with our customers because of the ease of access it provides. The only other deicer on the market with this feature is larger and more expensive and built by another company.

"It's not likely that the regional and small city airports these units are intended for will have a dedicated diesel mechanic or a hydraulic specialist on duty," he adds. "So everything on the machine has to be as simple as possible, because if a deicer is required, an aircraft is not going to fly until one is available. Unscheduled downtime is not an option," he says.

"An airplane in need of deicing isn't going to fly. Unscheduled downtime is not an option."

Rudy Yates, Ground Support Specialist

"Customers like the extended, 500-hour maintenance interval that is standard with Cat engines, but the biggest selling point has to be the Cat dealer network," he stresses. "It really doesn't matter where a customer is located; there is a Cat dealer with parts and service nearby to take care of any maintenance or repair requirements.

The prototype GS 700 was not equipped with a Cat diesel engine, but was supplied by request from a large package freight customer for trial and evaluation. During the discussions regarding the unit, the customer expressed a preference for Cat power, and GSS investigated the various engines available before selecting the C4.4 ACERT® as the standard for subsequent vehicles in the GS Series.

GSS purchases a complete package, including radiator, air cleaners and additional accessories. Yates explains that all GSS has to do once they receive the engine package is bolt on an adapter plate for the two hydraulic pumps the engine drives and install an oil pressure sending unit that matches the gauge cluster in the cab. "On a few we also install a customer-specified demand throttle, but most of the engines simply run at constant rpm while powering the pumps."

The Cat® C4.4 ACERT® is the standard power source for both the GS 700 and the GS 1400 deicing systems.

"In fact," Yates says, "we are looking into having these vehicles classified as hybrids because the engine does not directly power the chassis. It's connected to the hydraulic pumps that power the hydrostatic drive as well as the fluid handling and boom systems. The advantage is that the engine can run at essentially constant speed, which minimizes emissions. Hybrid classification would generate some tax incentives we could then pass on to our customers."

Sales of the GS Series Deicing systems is about evenly divided between the GS 700 and GS 1400 models. The package freight company that tested the original prototype has become a regular customer, as well as a regional airline serving the Southwest and Midwest markets and the commuter arm of a major Canadian airline.

PROOF POSITIVE

One of the first production GS 700 Deicing systems was delivered to an airport in northern Wisconsin just in time for a full winter of use. It serviced an average of 11 flights per day and clocked over 500 hours of use in its first season.

"We had a few issues at minus 20 degrees F (minus 28.9 degrees C)," Yates says. "We had to replace the standard drivetrain oil with automotive automatic transmission fluid to keep it from jelling, and we had to make some airflow and nozzle adjustments on the heater. What we didn't have to do, though, is make any changes to the Cat engine. It started and ran just fine.

"That was a great test bed," Yates says. "We ran deliberate tests that weren't anywhere near as severe as the conditions the unit will operate in. The GS 700 came through with flying colors, with only minor maintenance issues and NO significant downtime." ▲

MASTER CRAFT C-SERIES OFF-ROAD FORKLIFTS ARE BUILT WITH

70% CATERPILLAR CONTENT

INCLUDING THE CAT® 416E BACKHOE LOADER POWERTRAIN AND CAT® C4.4 ACERT®

Master Craft forklifts are also being used in Iraq. This C-08-7116 is shown here working in the dusty Baghdad terrain.

If it's off-road material handling you're looking for, Master Craft Industrial Equipment Corp. has a solution. The Tifton, Ga., rough terrain forklift manufacturer prides itself on having 11% market share in the United States. The family-owned company has also been able to penetrate previously unattainable overseas markets by incorporating Caterpillar industrial engines and OEM Solutions systems in its most recent line of forklifts.

Master Craft forklifts are used in more than 50 different industry segments (logging, turf, mining and energy to name a few) and have now been sold for use in many different countries outside the United States (Russia, Central and South America, Canada and Australia to name a few).

"Our forklifts are different than traditional industrial models because our rough terrain forklifts can maneuver off-road through sand and mud, which is exactly what our customers require," explains Bill Meadows, Master Craft general manager.

ROUGH TERRAIN NEEDS

To match the tough environments in which its customers work an average of 1,200 hours a year, Master Craft turned to Cat dealer, Yancey Brothers, and Cat OEM Solutions when developing its newest line of forklifts, the C-Series.

Master Craft C-Series forklifts are constructed with approximately 70% Caterpillar content and are distributed mostly through Cat dealers and the Cat Rental Stores. Master Craft is also an Allied Vendor with the Cat Rental Stores.

"In lean times such as these, partnering with Caterpillar and utilizing integrated Cat technologies in our forklifts has allowed us to expand

The C-Series rough terrain forklifts are powered by Cat® C4.4 ACERT®. The engines are paired with fully synchromech Caterpillar power shuttle transmissions with a torque converter and Cat drive axle.

into new markets," explains Jason Haswell [Jason's grandfather, John, started the company in 1952. His father, Jack (current president) and brothers, Jackie and Jarrett, all continue to work within the family-owned company.]

"The Cat dealer network provides worldwide warranty and service, which is primarily what has allowed us to expand into areas where we previously had no presence," confirms Jack Haswell.

PRIMARILY CAT CONTENT

The C-Series is available in eight models with 2- and 4-wheel-drive configurations and lift capacities from 5,000 to 10,000 lbs.

Each model is powered by a Cat® C4.4 ACERT® and incorporates the Cat 416E backhoe loader powertrain and axles (engine, transmission, cooling system, fully synchromesh power shuttle transmission with torque converter, column-mounted electrical forward/reverse control, and Caterpillar inboard planetary drive axle with hydraulic actuated differential lock).

The engines typically operate at 93 hp (69 kW) at 2,200 to 2,500 rpm.

"We buy from the fan through the flywheel and beyond for our C-Series models," says Darrell Lynch, Master Craft engineer.

DIVERSIFY, DIVERSIFY

"Price is always an important issue with our customers," explains Elton Pearman, sales manager.

"Our customers want quality, reliability, durability and resale value. Partnering with Caterpillar allows us to stand behind our machines for the long haul."

"We've been partnering with Cat OEM Solutions and our Cat dealer for more than 10 years," recalls Jason. "They have always been there for us and have always been very patient."

Production has slowed down somewhat for Master Craft within certain industries, like construction. However, the energy, mining and salvage markets are in full swing.

The company is currently working on an order for a company in the Middle East. Here the C-Series forklifts will be used in the energy market.

"Our current strategy is achieving balance with our product line," says Meadows. "We plan to address additional markets as well as continuing in the more traditional markets. We're working on new models as well."

New offerings include both a smaller- and larger-horsepower machine within the C-Series lineup. "We are planning for a smaller 40-hp (30 kW) model and a larger 120-hp (90 kW) model," explains Blakely Watson, Master Craft drafter. "This will allow us to expand the line in both directions." ▲

"In lean times such as these, partnering with Caterpillar and OEM Solutions has allowed us to expand into new markets."

Jason Haswell, Master Craft Industrial Equipment Corp.

WHAT MAKES UP A C-SERIES FORKLIFT?

The Master Craft C-Series rough terrain forklifts are built from approximately 70% Caterpillar components. These components are purchased from Cat OEM Solutions, through Cat dealer Yancey, in the form of a Cat 416E power module, which is based on the powertrain of the Cat 416E Backhoe Loader.

Each 416E power module consists of an:

- **Engine (Cat C4.4 ACERT)**
- **Transmission — including converter and drive group**
- **Front axle and mounting group**
- **Rear axle and mounting group**
- **Wheel groups**
- **Steering column and console**
- **Steering wheel**
- **Shifter**
- **Differential lock switch**
- **Parking brake control**
- **Radiator group and mounting group**
- **Suction fan group**
- **Transmission filler group and controls**
- **Implement pump shaft**

DRILLING DEEP

DAVEY DRILL CHOOSES CAT ENGINES AND OEM SOLUTIONS FOR ITS DK720, DK820 AND DK920 DRILL RIGS.

Cat® C7 ACERT® provides 215 hp (160 kW) at 2,200 rpm in the Davey Drill DK720 and 240 hp (179 kW) at 2,200 rpm in the DK820 drill rig. Both machines also use additional Cat components such as sleeve bearings, seals and engine hold-down latches.

Drilling for ground improvement is the day-to-day focus at Davey Drill, the drilling division of Davey Kent in Kent, Ohio, — drilling for the purpose of infrastructure projects and construction to be more precise.

"We are designers and manufacturers of geotechnical drill rigs [and related drilling equipment] that is used primarily for ground improvement — not to be mistaken for the drilling of minerals," explains owner Tom Myers.

"Our drills are used for the installation of bridge abutments, deep foundations for high-rise buildings, rehabilitating hydroelectric dams, etc. Infrastructure is what we are all about," he adds.

The key word to focus on in Myers' explanation of his family-owned company, started in 1929 by his grandfather under the name of Davey Compressor Co., is "designers."

"Of course we are an OEM, but we view ourselves as an engineering company with a manufacturing arm, not a manufacturing company that designs — our main emphasis and focus is on design and creativity," he stresses.

This is evident in the innovative drills the company produces — the DK920, for example, has features not available anywhere else in the world. (See sidebar at right.)

"Most of our competition is European," explains Myers. "Over the past several decades, probably as a result of rebuilding from World War II, a robust industry of drill rig manufacturers developed in Europe. We identified a niche here in the United States and have found ourselves to be the only designer of drill rigs like ours [that we know of] here in the U.S."

To date the company has produced about 1,800 drill rigs and still counting. These rigs are partially custom-designed for the drilling contractors that use them and, depending on the application, have been

(Left photo) The DK720, powered by Cat® C7 ACERT®, incorporates a rotary bearing and a zoom-boom mast connection for micro-pile and anchor drilling. The sturdy mast structure and hinge support allow the DK720 to be mounted with some of the industry's largest rotators and drifters.

(Right photo) The DK820 provides mast and body articulation rarely found in a machine of this size. With 240 hp (179 kW), provided by a Cat C7 ACERT, a mast pull of over 10 tons and a rotary torque in excess of 20,000 ft.-lbs., this machine will take on the most difficult drilling tasks.

mounted on trucks, trailers, skids, tracks and even excavators like the DK920, mounted on a Cat 330CL or 330DL excavator base. (See sidebar.)

WORKING WITH LIKE-MINDED SUPPLIERS

All these attributes have contributed to Davey Drill carving out a niche market and offering a distinct edge to both U.S. and global markets in the areas of customer support and product quality.

Another key attribute of the company is partnering with like-minded suppliers like Caterpillar.

"Anybody we purchase engines or power systems from has to be our partner," explains Myers. "Caterpillar has been our partner since the 1980s — and we started relying on Cat power not because people asked us to, but because we required an engine supplier that was more flexible than those we were working with."

Davey Drill designs and manufactures many models of drill rigs. The DK720, DK820 and DK920 all use Cat® C7 ACERT® as well as Cat OEM Solutions products in part because of the flexibility offered by Caterpillar and local Cat dealer, Ohio Cat.

"Especially in the case of our DK720 and DK820, we are confined by a very small engine envelope," he explains. "Our Cat dealer sent experts to our facility and together we engineered an entire power system that includes a specially sized radiator to fit our engine envelope. Our Cat dealer also provided specialized air intakes and exhaust locations, which make the installation of our air filters, exhaust manifolds and silencers infinitely easier. Without this flexibility, our piping process would be a nightmare."

ENGINE IS THE HEART

The Cat C7 ACERT is the engine of choice for Davey Drill. This engine is available in three of its models, with plans to offer it in additional drill models in the future.

The Cat engine powers each of the machine's hydraulic pumps (sometimes as many as five pumps per model).

"The Cat C7 ACERT is the heart of our machine," says Myers. "It performs well and is another key reason we work with Caterpillar. The Cat warranty and product support is second to none. We know that if there's a problem out in the field, it will be taken care of right away."

Nearly all of the company's models incorporate sleeve bearings, seals, engine hold-down latches or other Caterpillar OEM Solutions products. A few of the models, like the DK720, DK820 and DK920, use Cat OEM Solutions components like bearings, swing drives and swivel groups.

Throughout the years, Davey Drill has also purchased undercarriages, hydraulics, electronics and intellectual property from Caterpillar.

"Caterpillar knows their product and is prepared worldwide to respond to issues and challenges if they arise."

Tom Myers, Davey Drill

LOOKING AHEAD

"The long-term future [next five to 10 years] looks bright for our business," forecasts Myers. "We are heavily tied into infrastructure construction, and unlike residential or even commercial construction, our business isn't experiencing a dramatic slowdown — which, of course, depends on different areas of the country. Some areas are slower than others.

"Although we have seen some slowdown, infrastructure is what our customers are all about. Bridges and highways and subway systems still need to be built. Hydroelectric dams need to be repaired. And even though the economy is going through wild gyrations right now, we are optimistic about the future." ▲

THE DK920: MUCH MORE THAN A CAT® ENGINE

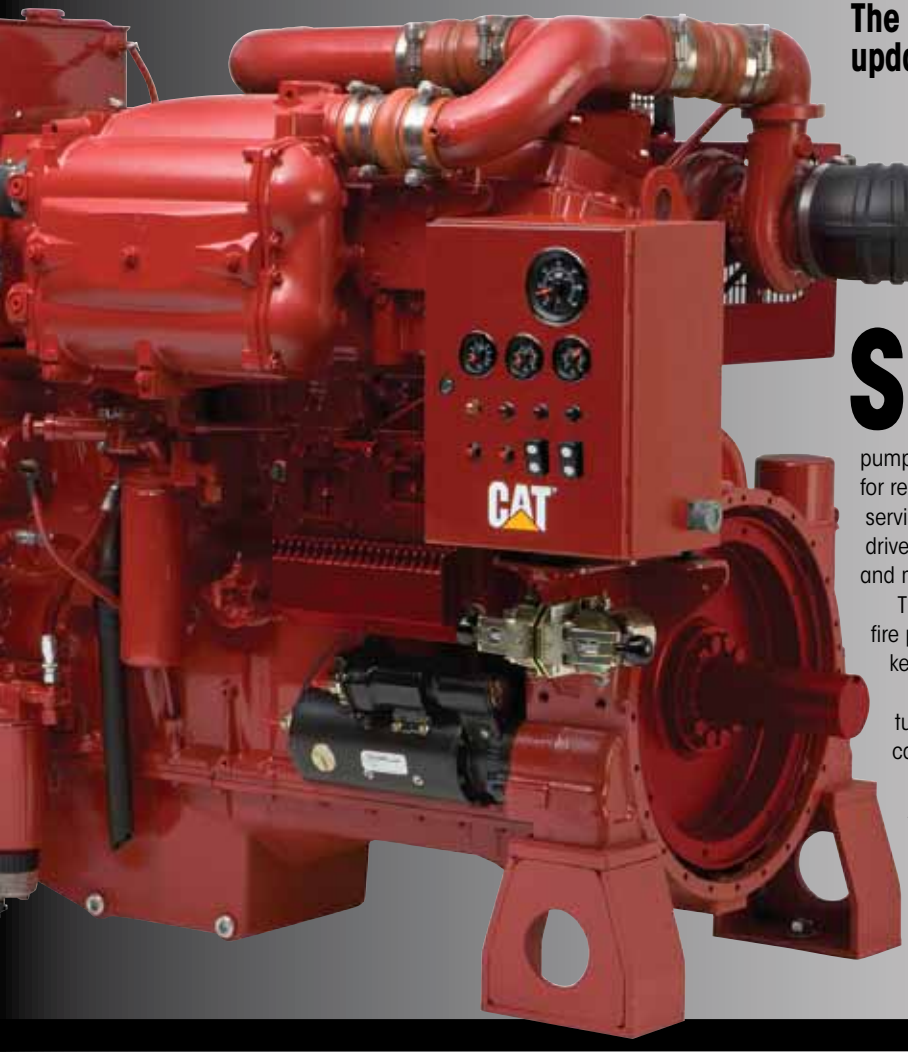
The DK920 is Davey Drill's newest geotechnical drill rig. Current production is underway for the company's fifth DK920 unit, according to Tom Myers, Davey Drill owner.

"This machine is unique for what it does," he explains. "In a nutshell, it is built around a large Cat excavator and provides the mast articulation that you would normally find only on small machines." This mast articulation allows hole setup in the most difficult areas of a jobsite.

The massive 95,000-lb. (43,000 kg) DK920 is designed exclusively around a Cat 330CL or 330DL excavator carrier, which provides about 222 hp (166 kW) at 2,200 rpm. Additional Caterpillar components are added to the machine for integrating the drill attachments to the Cat machine base. The components, which are provided by Cat OEM Solutions, include multifunction joystick handles, auxiliary pump drives, sleeve bearings, seals and foot pedals.

The DK920 offers single-stroke drilling capability up to 65 ft. (19.8 m) while providing complete stability on the roughest terrain.

Although originally designed for long soil nails, the DK920 control system also provides for more conventional drilling found in the installation of micropiles and anchors.



The Caterpillar fire pump engine lineup gets an update with the new C18 ACERT® fire pump engine.

A NEW MA

Starting on demand is a must for a fire pump engine — always. Caterpillar fire pump engines have a reputation for reliable starts and long, efficient service. That's why they are trusted drives for fire pumps, compressors and more.

The industry leading Cat® 3412 fire pump engine has been a market leader since 1986.

However, as any manufacturer knows, a "good" product can always be made better.

Enter the new Cat® C18 ACERT® fire pump.

EPA CERTIFIED

The C18 ACERT fire pump is Tier 3 compliant (Tier 2 compliant for the 800-hp rating) and is not required to meet Tier 4 emission requirements. (Industry standards prohibit exhaust aftertreatment on fire pump engines.) With the Tier 2 and Tier 3 compliant emissions standards, the C18 ACERT fire pump will be available for sale within the United States. This opens up a market that has not been available for several years with the 3412.

The C18 ACERT engine package includes all components needed to meet UL, FM and NFPA-20 requirements.

"The Cat 3412 was the premier, dominant fire pump engine in the industry for a long time," explains Mike Reinhart, marketing manager for the industrial power division of Caterpillar. "The C18 ACERT fire pump is the bridge from that legacy in a more effi-

TIER 4 TECHNOLOGY PLANS

Caterpillar continues to leverage its design and integration expertise to provide a spectrum of emissions aftertreatment systems to non-road customers.

Recently Caterpillar announced technology plans to meet upcoming U.S. EPA Tier 4 Interim, European Stage IIIB and Japan MLIT Step 4 mobile non-road emissions regulations that take effect in the year 2011. These emission standards will require emissions reductions of particulate matter (PM) by 90% and oxides of nitrogen (NO_x) up to 50% beyond EPA Tier 3/EU Stage IIIA standards.

These recent technology plans cover all Caterpillar industrial engine applications and regions subject to these emissions regulations, including engines in the 75- to 750-hp (56 to 560 kW) range.

Tier 4 Interim plans for Cat engines with horsepower ranges less than 75 hp, which are now in production, were announced in 2007. (See "Cat® C0.5 to C2.2 compact engines . . . ready for EPA Tier 4 & EU Stage IIIA emission standards" article in the Winter 2007 edition of *Industrial Engine Power Report*.)

EXPANDING ON PROVEN PLATFORMS

Caterpillar previously achieved dramatic reductions in regulated engine emissions through ACERT Technology for Tier 3/Stage IIIA. Caterpillar continues the commitment to customer needs for highly integrated, yet flexible engine systems, with its Tier 4 technology plans. This technology launched by Caterpillar establishes the foundation for virtually zero particulate matter non-road emissions by 2014. These reductions are coupled with the additional environmental benefit of fewer greenhouse gas emissions

RKET LEADER

C18 ACERT® FIRE PUMP RATINGS

HP (KW)	RPM	TIER COMPLIANCE
600 (447)	1,750 OR 1,900 OR 2,100	TIER 3
700 (522)	1,750 OR 1,900 OR 2,100	TIER 3
700 (522)	1,500	NON-EMISSIONS CERTIFIED
800 (597)	1,750 OR 1,900 OR 2,100	TIER 2

cient size, but in a stronger, and just as reliable, package."

CAT POWER BENEFITS

The C18 ACERT fire pump is a water-cooled, electronic engine with redundant Electronic Control Units (ECU). The water-cooled center section of the turbocharger prevents damage to turbo bearings during a hot shutdown of the engine in fire pump installation, increasing turbo life.

All Cat fire pump engines are dynamometer tested before leaving the factory. Each unit is tested beyond rated capacity to ensure it meets certified rating standards and starts whenever needed.

BIGGER IS NOT ALWAYS BETTER

The Cat C18 ACERT fire pump is smaller, lighter and more compact than the 3412. The 3412 weighs in at 5,020 lbs. (2,277 kg) with dimensions of 78 in. by 53 in. by 61 in. (1,981 mm by 1,346 mm by 1,549 mm) for the turbocharged model. The C18 ACERT is lighter, at 4,300 lbs. (1,950 kg) and more compact with dimensions of 74 in. by 43 in. by 54 in. (1,880 mm by 1,092 mm by 1,372 mm).

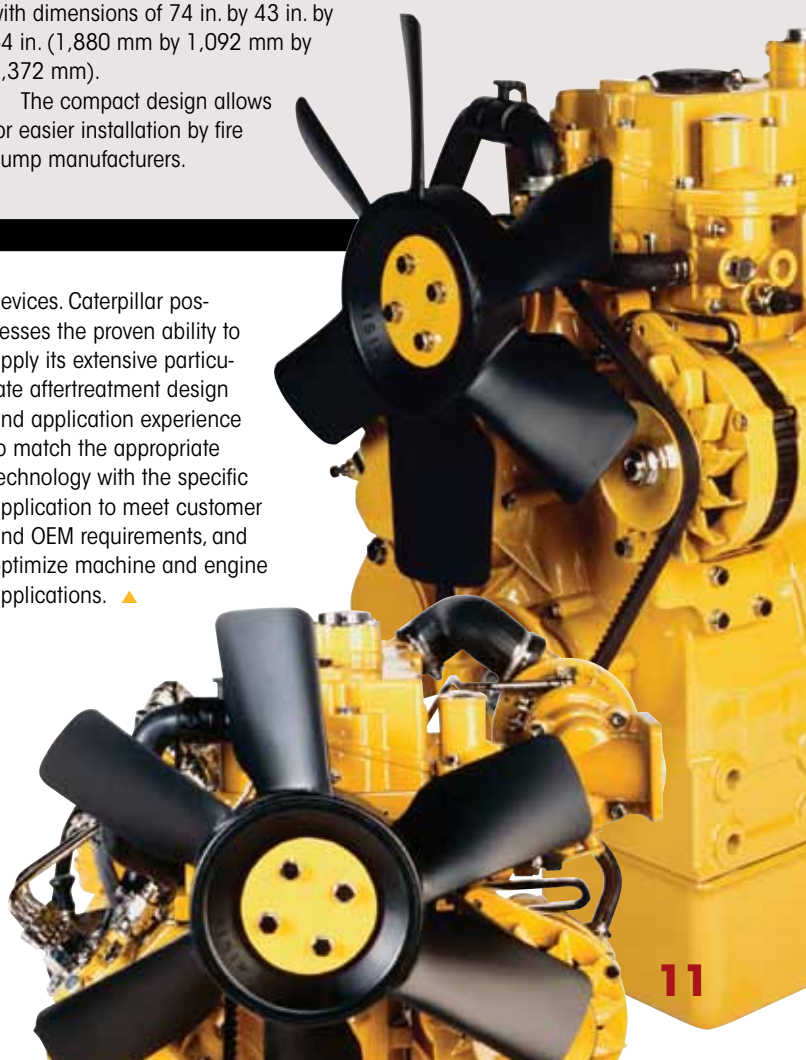
The compact design allows for easier installation by fire pump manufacturers.

CAT PRODUCT SUPPORT

Regardless of application, Cat fire pumps are backed by the global Cat dealer network. Dealers can provide low-cost maintenance agreements tailored to specific operating requirements. The purchase of a fire pump engine includes start-up assistance from your nearest Cat dealer.

Plans call for a March 2009 release of the C18 ACERT fire pump.

Contact your dealer for more specific information, including availability, of the C18 ACERT fire pump. ▲



achieved through planned fuel efficiency improvements.

Utilizing ACERT Technology as a foundation, Caterpillar will add next-generation turbocharging, advanced electronics, advanced fuel systems, particulate aftertreatment systems and a suite of NO_x reduction technologies to provide tailored emissions solutions to industrial engine OEM customers. Through years of proven results with ACERT Technology, Caterpillar has provided the broadest range of emissions technology solutions in the industry with a full range of fuel system, engine system, aftertreatment, machine system design and integration capabilities.

ADDITIONAL CHOICES

To provide additional customer value and further leverage successful platforms, Caterpillar will offer a new 7-liter engine designed specifically for Tier 4 Interim and future emissions compliance. In addition, the industrial C9 ACERT™ will feature increased displacement. These two developments will offer customers additional power choices in the very important 250- to 400-hp (186 to 298 kW) segment.

As Caterpillar continues to leverage its ACERT Technology solutions, particulate reduction technology will include the use of advanced combustion technology, oxidation catalysts and diesel particulate filters with advanced regeneration systems that will optimize uptime, fuel efficiency and operator convenience.

During the past 14 years, Caterpillar has produced over 1 million particulate aftertreatment devices. Caterpillar possesses the proven ability to apply its extensive particulate aftertreatment design and application experience to match the appropriate technology with the specific application to meet customer and OEM requirements, and optimize machine and engine applications. ▲

Cat diesel powered ground support helps provide smooth landings.

For fuel efficiency and flexibility, Cat engines are the perfect choice for your aircraft ground support equipment. Backed by the most responsive global support network in the world, Caterpillar engines deliver outstanding performance and reliability.

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