



Completing the Stage IV / Tier 4 Final range

Improved performance, installation flexibility and dependability are just some of the benefits delivered

to customers by the new Perkins® 854F-E34TA, designed to meet EU Stage IV / U.S. EPA Tier 4 Final emissions standards above 56 kW (75 hp).

The new 3.4 litre model incorporates specially optimised Selective Catalytic Reduction (SCR) technology for the first time. Packaged separately from the Diesel Oxidation Catalyst (DOC) module,

it can be mounted in either a horizontal or vertical position, giving Original Equipment Manufacturers (OEMs) of compact machinery greater installation flexibility in the engine bay. Space saving is further enhanced through the absence of a Diesel Particulate Filter (DPF), which has been made possible by the introduction of a four valve cylinder head and increasing the common rail fuel pressure to 1800 bar.

Performance from the 854F-E34TA has been boosted to 90 kW (121 hp) with

a maximum torque of 460 Nm thanks to its single stage turbo with smart wastegate. Rated speed is between 2200 and 2500 rpm. However, the uplift in performance has not come at the expense of fuel consumption. The eight percent improvement in specific fuel consumption (SFC) previously gained at Stage IIIB / Tier 4 Interim has been retained.

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 **Perkins®**

THE HEART OF EVERY GREAT MACHINE

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Heat rejection remains similar to its predecessor meaning no major changes to the size of the cooling pack, helping to maintain the engine's compact dimensions.

As with all engine models from Perkins the onus is very much on making the transition from Stage IIIB / Tier 4 Interim as seamless as possible so that costly machine redesign can be avoided.

The compact package size of the 854F-E34TA means OEMs will not have to compromise their machine designs across many construction applications including telehandlers, skid steer loaders and compact wheeled loaders.

In addition service intervals remain at 500 hours while maintenance costs have been reduced for the end user via the use of poly-vee belts and hydraulic lash adjustment.

"Moving from one level of emission standards to the next has certainly been a challenge for most construction OEMs, given the need to accommodate the aftertreatment necessary to meet the new standards," says Dan Clayton, Tier 4 product manager.

"We have purposefully set out to minimise the impact of the additional aftertreatment, providing flexible solutions for the mounting of both DOC and SCR modules so that space claim is minimised in the engine bay, a key consideration for compact machinery manufacturers. From Stage IIIA / Tier 3 onwards our engine architecture throughout the range has remained broadly the same.

"This has helped OEMs make a smooth transition from one Stage / Tier to the next, reducing development costs and time," he adds.

A real team effort

In a bid to cut development time and costs, a growing number of construction Original Equipment Manufacturers (OEMs) are taking advantage of a unique collaboration programme offered by Perkins, called Technology Integration Workshops (TIW).

The concept is a simple one: side-by-side working in a purpose-built facility that encourages swift and effective resolution of many of the challenges faced by OEMs when trying to integrate engines into their machines.

Started in 2008 the TIW programme was set up to help OEMs tackle the many technology and engineering issues arising at that time from the Stage IIIB / Tier 4 Interim emission standards. Since then more than 500 engine/machine installations have been completed for over 150 OEM customers.

The results to date have been impressive. Not only are participating OEMs finding the optimal solution to powering their next generation machines, but development times have been cut by up to six months. Furthermore development costs have been reduced and by introducing machines earlier OEMs can start to see a return on investment more quickly.

Four years ago Perkins invested in a Collaboration Centre on-site, which features the very latest in engineering software tools and allows installation capabilities to be explored in a virtual way. Packaging challenges can be met without the expense of cutting metal, and, once the best solution is arrived at, further application specific work can be carried out to ensure that engine performance is tailored to the machine's duty cycle.

A typical agenda for a programme would include legislation, a product overview, emissions technology, aftertreatment, engine architecture and performance, and a virtual installation.

In advance of the TIW, applications engineers use a Computer Aided Design (CAD) model of the application to create an engine design specification. At the TIW itself OEMs have the opportunity to further discuss the technologies used to optimise the engine's performance and enable the creation of a virtual installation.

TIW leader Nick Stephenson explains why there has been such a positive response to the programme: "For many OEMs, packaging new emissions technologies involves high levels of engineering resource, significant amounts of development time and increased risk. Our TIW allows them to share our resource, reduce the time needed to work up final designs, thereby mitigating the risks associated with engine/machine integration.

"In typically two to three days we can achieve together what used to take weeks if not months.

"With OEMs facing huge competition in the marketplace to make their machines more competitive, any advantage in terms of reducing time to market, optimising engine installations and lessening development costs can only be beneficial. By getting a better machine as a result of the TIW process, it has to be a win-win situation for the OEM."

In light of the launch of the 854F-E34TA (see page 1), Power News sets out other key engine options for OEMs at Stage IV / Tier 4 Final.

Excellent torque at low speed

Perkins 1200 Series power solutions are a range of six and four cylinder Stage IV / Tier 4 Final diesel engines which deliver the performance and productivity required by Original Equipment Manufacturers (OEMs) and end users.

For OEMs wanting a lot of torque at low speed, the single turbo 1206F-E70TA is a seven litre, six cylinder unit capable of producing up to 151 kW (202 hp) at 2200 rpm with maximum torque of 870 Nm at 1400 rpm.

The six cylinder range also includes the twin turbo 1206F-E70TTA, which delivers 225 kW (300 hp), giving OEMs who may previously have chosen a larger engine, the choice of the same power from a smaller engine package. It features twin turbochargers – one small, one large – mounted in series.

In developing the new range Perkins has sought to minimise the impact of the aftertreatment required to meet Stage IV / Tier 4 Final requirements, in particular the significant reduction in NOx. Perkins has achieved this through packaging the Diesel Oxidation Catalyst (DOC) / Diesel Particulate Filter (DPF) canister and the Selective Catalytic Reduction (SCR) system into one integrated module, which can be positioned remotely in a machine chassis or directly on top of the engine.

The DPF now uses passive regeneration, which is totally transparent to the operator and service free, so reducing maintenance costs over the life of the machine. This also facilitates easier installation in the engine bay since no direct access is required for ash removal.

On site the 1206F delivers an estimated five percent better cycle fluid consumption over previous models, that incorporates the diesel and the



DEF necessary for the SCR technology – allowing the end user to get more done, faster and with lower operating cost.

Meanwhile the 1204F, 4.4 litre, four cylinder aftercooled engine is offered in a choice of two versions. The single turbo aftercooled 1204F-E44TA, produces 110 kW (147 hp), delivering improved fuel economy while offering great power and torque. While the twin turbo, aftercooled model, the 1204F-E44TTA, has powers up to 130 kW (175 hp) and employs twin turbochargers mounted in series, for extra power density, low speed torque and faster transient response.

Both 1204F models use aftertreatment comprising DOC / SCR modules. This compact solution not only achieves the significant reduction of NOx as required by the legislation, it also removes the need for any regeneration strategy for soot, since the formulation of particulate emissions is prevented in the combustion process.

The small size of the DOC / SCR module means it can be mounted in a variety of remote locations, freeing up valuable space in the engine bay, especially in more compact equipment.

Ideal choice for export markets



The new electronically controlled Stage IIIA / Tier 3 1106D-E70TA heads up a range of dependable diesel engines from Perkins which provide a cost effective solution for domestic Original Equipment Manufacturers (OEMs) or OEMs looking to export machines into lesser regulated territories.

The seven litre, six cylinder model features high pressure common rail fuel injection, has a single stage turbo charger and is air-to-air charge cooled. It is capable of producing up to 205 kW (275 hp) at 2200 rpm with a maximum torque figure of 1050 Nm at 1400 rpm.

This latest addition to the 1100 Series boasts increases to delivered power, torque and noise reduction. These have been achieved through changes

to the manifold and combustion areas, turbocharger geometry, increased cylinder displacement and significantly, the inclusion of a high pressure common rail fuel system.

Other features of the 1106D-E70TA include multi-vee belts, four valve cylinder head and high capacity filtration, ensuring long service intervals at 500 hours, and biofuel tolerance of five percent, delivering low cost of ownership. The engine is also available as an Industrial Open Power Unit; a power package comprising engine, radiator, air cleaner and compressor.

The electronic-controlled 1106D-E70TA is scheduled to start production at Perkins Wuxi manufacturing facility in China later this year.

Compact engine packs a punch

The 400 Series is a compact range of engines which continue to offer a dependable and powerful solution to hundreds of Original Equipment Manufacturers (OEMs) and end users around the world.

The latest incarnation of the popular engine range, the 400F, meets the EU Stage IIIB / U.S. EPA Tier 4 Final regulations which came into force in January 2013 in the EU above 37 kW (49.5 hp) and in North America above 19 kW (25 hp).

With its compact power the new 400F range really gets to grips with the challenges facing today's construction OEMs. As they look to build small, high performance yet cost effective machines the 400F range, which peaks at 45.5 kW (61 hp), is a very strong contender. The design flexibility of the engine's Electronic Control Module can be used to provide a custom solution to a machine requirement thereby increasing the 400F's capability across applications.

The 400 Series offers a seamless choice for equipment manufacturers for their own model range development, while the transition to Stage IIIB / Tier 4 Final has been made easy for customers with more than a 95 percent carryover of components from the previous Stage IIIA / Tier 4 Interim engine.

The only addition that manufacturers will see is the aftertreatment which has been designed to be as compact as possible, with flexible mounting arrangements to ease installation.

For the customer, the 400F range delivers improvements in fuel consumption, which minimises running costs, and heat rejection, giving improved ambient clearance. This maintains the compact engine installation dimensions so necessary in this market.

Operators and owners will also notice the improved transient response and appreciate the easy maintenance and serviceability and reduced oil consumption.





Engine performance and reliability are essential for machine productivity so engine validation is an important focus for Perkins to ensure its customers have trouble-free service. Dan Clayton, Tier 4 product marketing manager takes us through this important activity.

Driving quality from the outset

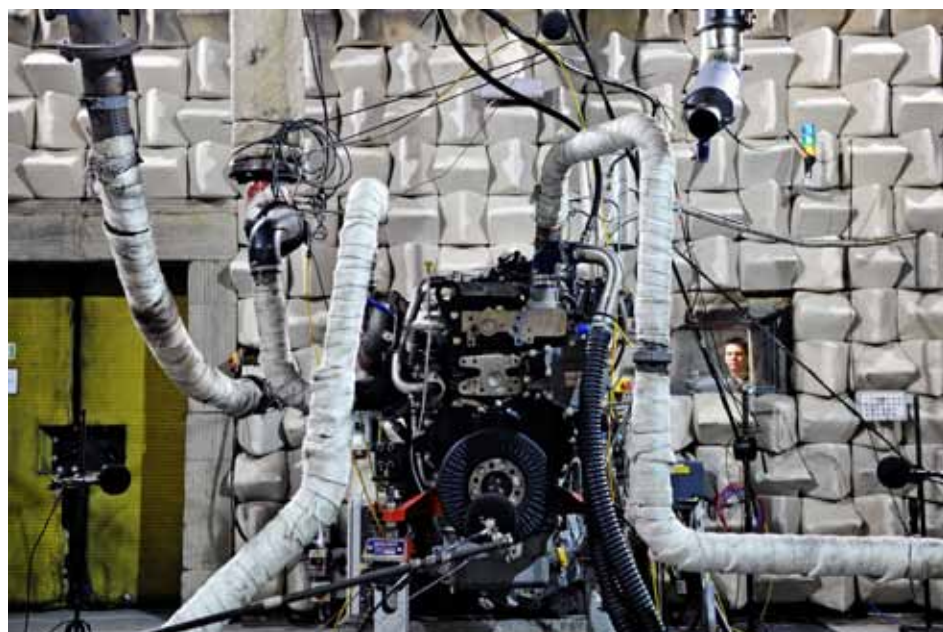
Machine owners and operators demand products that consistently deliver improved performance and efficiency. Couple this with the expectation of a high quality product that can work anywhere in the world and you have a commitment from Perkins that its products will deliver.

One of the key secrets to supporting this commitment lies within the culture for designing out quality risk at the earliest possible stage, even before a designer has put the first design on the Computer Aided Design (CAD) screen.

At the heart of this is integrated Failure Mode and Effects Analysis (FMEA). From initial concept the FMEA is used to identify potential causes of failure based on external and internal risk factors and includes analysis of existing in-machine duty-cycle, reliability and durability data. To date over 25,000 hours have been logged across 150 typical customer applications and this is linked with industry leading Computer Aided Engineering (CAE) tools to model the potential risk to new technologies or design features. So prior to design freeze

and manufacture, the FMEA will have driven focused simulation and design optimisation – increasing the intrinsic robustness of the design and reducing product development time and cost.

Once the design has passed the virtual validation, the remaining potential causes of failure are mitigated using the appropriate physical validation – building from component level activities through to complete machine testing. For each,



the FMEA approach ensures that all targets are met, not just for nominal operating conditions but considering all extremes of operation covering different machine installations, operating cycles and environmental conditions from the equator to the Polar regions. This is supported by a world class engine test facility which includes the capability to simulate machine operating cycles at varying engine angle of operation, altitude

and temperature whilst ensuring that Stage IV / Tier 4 Final emission standards are met.

With the increased complexity of modern electronic engines and the greater interaction with machine control strategies there remain failure modes which require machine level validation. To understand these issues we operate our own machine programme with a number of typical applications across the construction, agricultural and industrial sectors. Testing typically includes visits to the Arctic Circle, where machines will complete over several thousand hours at temperatures down to minus 380 °C. At the other end of the scale engines are operated at temperatures of 480 °C with minimal cooling capability. The effects of altitude are also validated with machines simulating a number of duty cycles at heights of up to 4,000 metres.

Often problems can be caused by instinctively 'easy' operating conditions in less extreme environments but again thanks to the rigour of the FMEAs these are investigated and validated. The final stage of the validation process is leveraged through the Perkins application teams, whose worldwide resources work with OEMs to support their machine development programmes. The collected data is fed back to the FMEA process to further support product confidence.

This process has been successfully applied in the development of Stage IIIB / Tier 4 Interim to Stage IV / Tier 4 Final, where development time has been squeezed by the narrow window between the introduction of the two stages of the legislation. A good example of this was the decision to develop the option of mounting the aftertreatment module on the engine itself – offering

OEMs a significant reduction in package size and installation complexity. The system design was optimised using CAE and during the subsequent engine and machine level validation all objectives have been demonstrated right-first-time.

The value to the OEM is enormous. Long gone are the days of conducting its own lengthy machine validation tests as the pressure to shorten development times and to lower costs grows. Our work enables OEMs to develop a machine concurrently with its engine, knowing that every last detail of how that machine is likely to operate has been considered and factored in to its design. Thousands of hours of simulation, duty cycle analysis and targeted validation ensure that, once in service, the machine owner and operators are guaranteed the most efficient and reliable solution possible.



Terex backs Perkins to get the job done

When leading construction OEM, Terex, looked to expand its range of backhoe loaders, the company turned to Perkins to provide the necessary muscle to power its new TLB890 machine.

The new backhoe, which features a distinctive curved boom design, was developed to offer class leading job site performance, including outstanding tear out forces and fast cycle times.

According to Jon Beckley, Terex global product manager - backhoe loaders, customer research had shown that operators wanted their machine to dig deep, have excellent manoeuvrability and provide economic yet powerful performance, all done in some degree of comfort. A big challenge perhaps but one the company was equal to in the shape of the new 890 model.

At the heart of the machine's capability are its new high-pressure hydraulic system, high-force cylinders and new boom design. These improvements result in an impressive slew torque that provides powerful and quick backfilling particularly when working on cross slopes. The curved boom design also allows trucks to be positioned closer to the machine for short loading cycles and a new 'Deep Dig' innerslide extending dipperstick delivers fast working cycles and high retraction force for rapid bucket filling.

At launch in December 2012 the TLB890 was fitted with a Perkins 1104D-44TA engine, but with the new emission standards, Stage IIIB / Tier 4 Interim, now in place, Terex is moving to the next generation 1204E-E44TA model.

This full authority electronic engine, which will feature in all models from later this year, offers a number of advantages, including a powerful 74.5 kW (100 hp) and the introduction of an auto-idle feature as standard, which helps the end user minimize fuel consumption.

Reviewing the choice of Perkins as its preferred engine supplier, Terex's Beckley said: "Perkins has always designed and manufactured an excellent 4-cylinder diesel engine, in terms of both performance and compact packaging. This made the choice of the 1204E Series a straightforward one for this backhoe loader.



"Not only does it provide excellent transient response and good fuel economy for the operator, it also allows us to package the machine in such a way that it has one of the best turning circles in the business, which is great for that all important manoeuvrability on site.

"What also impressed us and was a real added bonus was the superb technical support at the engineering stage and the world class aftermarket support on a global basis," he concluded.

Visit Terex at Bauma - Hall F7, Stand 710/711

Pioneers in pumping technology

Pioneer Pump is using Bauma to launch its new generation of sound attenuated, high performance pumpsets. Used in the rental, construction and mining markets, the new sound attenuated pumpset range, which comes in 100mm and 150mm versions, utilises the Perkins 400 Series which have become the benchmark for small pumpset power units.

Using both the 403D-15 and 404D-22 Stage IIIA / Tier 4 Interim models, Pioneer designed the new canopy units around the engine and its modular pump design, to be able to offer the greatest number of different pump ends driven by the 404D-22 engine in one canopy.

"The 404D's power to weight ratio and its excellent fuel economy enables us to design compact and environmentally friendly pumpsets for use in EU markets, and we are delighted to be able to extend our market leading position using the Perkins 404D engine in this way," Paul Skippins, operations manager at Pioneer Pump, said of the new designs.

Pioneer Pump has long been a champion of Perkins power, using the 1100 Series in some of its bigger pumpsets.

Visit Pioneer Pump at Bauma - Hall A5, Stand 417



A perfect choice for Hyundai excavators

A major Korean manufacturer opts for the 1204E-E44TA to power its latest series of heavyweight construction equipment.



For more than 110 years ATMOS Chrást has built machines to serve its customers' needs, with the last 60 years having seen them apply their experience to the production of portable compressors.

Perkins power on the move

Based in the Czech Republic, ATMOS launched its first compressor model powered by Perkins back in 2001.

Today Perkins 400 and 1100 Series power solutions are the only source of power for ATMOS' portable compressors, with the line consisting of six platforms which in turn have more than 120 different variations.

The company is now machining its own air-ends following the latest version of high-efficiency air-end having been developed by the City University of London to deliver outstanding energy efficiency.

The new air-ends, coupled with the fuel performance of Perkins engines, has seen ATMOS recently introduce a

range of low fuel consumption portable compressors into the market.

Vit Linhart from ATMOS said: "A very important factor in our decision to select Perkins was its really vast and professional aftermarket network. ATMOS is selling its machines in more than 40 countries worldwide and quick and reliable aftermarket operations are essential for our customers."

The existing platforms utilise Perkins 403D-11, 404D-22, 1104D-44T and 1104D-E44T engines to provide a dependable power source for ATMOS' 2m³/min, 3m³/min, 4.2m³/min, 5 m³/min, 7.2/6.5/6.0m³/min and 9.2/11.6m³/min compressors.

Visit Atmos Chrást at Bauma - Hall A1, Stand 422

Hyundai Heavy Industries Co., Ltd (HHI) has selected Perkins as the power provider for its new 9A Series hydraulic excavators powered by the 1204E-E44TA, rated at 74.5 – 102 kW (99.9 – 136.7 hp)

Headquartered in Korea, HHI has manufactured and supplied a variety of construction equipment from excavators to wheel loaders, and skid steer loaders to forklift trucks since 1985.

It operates an efficient product supply system, powered by an advanced automatic production line, with a focus on quality. With more than 500 distributors in 130 countries, HHI has also established local subsidiaries in the U.S., Europe, China and India.

In keeping with its focus on quality and reliability, HHI has selected Perkins latest Stage IIIB / Tier 4 Interim diesel engine, the powerful 1204E-E44TA which is rated up to 102 kW (136.7 hp), for its 9A Series hydraulic excavators for export to international markets.

The dependable 4.4 litre, 4 cylinder turbo intercooled 1204E-E44TA, uses a single turbocharger, delivering improved fuel economy, while offering great power and torque; important considerations in the construction sector.

By building state-of-the art earthmoving equipment, HHI is focused on ensuring every operator has maximum performance, more precision, versatile machine preferences and proven quality.

The new 9A Series has been developed to meet the customers' needs, with five models from the R110CR-9A which supplies 74.5 kW (99.9 hp) at 2200 rpm and 450 Nm at 1400 rpm through to the R180LC-9A which offers 102 kW (136.7 hp) at 2200 rpm and 560 Nm at 1400 rpm, delivering reliable and dependable solutions for the end user.

Perkins 1204E-E44TA complements the 9A Series, with its proven technologies and robust fuel system; its powerful offering delivers productivity and durability alongside a low cost of ownership through ease of service.

The 9A Series cab is designed with the operator in mind, as the improved visibility, digital gauges and suspension ensure a comfortable working environment.

The operator can easily set preferences for boom or swing priority, power mode selection and optional work tools at the touch of a button.

An improved hydraulic system provides the operator with improved controllability to achieve optimum precision, while an improved pump flow control helps to reduce flow when controls are not being used to minimize fuel consumption for the end user.

Visit Hyundai Heavy Industries Co., Ltd at Bauma - Hall F8, Stand 813A





Digging deep for future growth

Guangxi LiuGong Machinery Co., Ltd is a highly respected construction equipment manufacturer offering a full line of high quality machines to world markets.

Headquartered in Liuzhou, China, LiuGong has one of the most extensive product line ups of any Chinese manufacturer, including wheel loaders, excavators, truck mounted and crawler cranes, bulldozers, rollers, motor graders, forklifts, mini excavators, skid steers, backhoe loaders, pavers, cold planers, concrete equipment, drilling machines and mining dump trucks.

With 24 manufacturing plants in China, Poland and India that adhere to Six

Sigma quality methods, LiuGong also supports a world class research and development function, and has a team of more than 14,000 employees, including 1,000 engineers, standing behind every machine the company produces.

Perkins 400 and 1100 Series engines, delivering between 15 kW (20 hp) to 80 kW (107 hp), have been selected to power LiuGong's backhoe and skid steer loaders, among other applications.

Powered by the Perkins Wuxi facility built 404D-22T which delivers 43 kW (57.3 hp) at 2600 rpm, LiuGong's skid steer loader CLG/375B is equipped with a section steel cab, which ensures a strong, spacious work environment for the operator, who also benefits from

ergonomic pilot controls and integrated instruments to improve efficiency and reduce fatigue.

Reliability is very important for LiuGong and its customers, so high quality components such as Rexroth tandem piston pumps, PAKER working pumps and Eaton leveling valves are used in their machines.

The same focus on reliability applies to the engine, with Perkins 400 Series selected on the skid steer loaders and the 1104D-44T for the CLG/766A, 777A backhoe loaders, due to the proven performance and robustness of the engines.

Built for operator ease and efficiency the CLG/375B skid steer loader has a quick-

change attachment coupler, which aids customer productivity, while the Perkins 404D-22T engine is quiet, reliable, offers low fuel consumption, excellent torque and has a long service life.

Used in one of the toughest environments in the world in terms of run times between maintenance, rough operating conditions, cost demands and productivity, LiuGong only uses proven technologies to ensure the customer has an efficient, durable, easy to run and service machine which offers the customer affordable value.

Visit Guangxi LiuGong Machinery Co., Ltd at Bauma - Hall F4, Stand 417

TLD takes flight with Perkins power

TLD is a leading industrial group which specialises in airport ground support equipment, with full expertise in engineering and manufacturing.

The company offers a complete range of products which are renowned for performance and reliability and operates an extensive worldwide sales and service network, ensuring a fast response to customer demands.

With a global clientele including airlines, airports, freight forwarders, ground handlers and military organisations, TLD was first attracted to Perkins by the engine brand's strong recognition in the international market.

Initially TLD installed the Perkins 404 range in two of its products and was impressed by the reliability and performance of the engines. Today, more than ten different TLD applications are powered by the Perkins 404D-22 engines.

Speaking about Perkins competitive edge, TLD's production and operation director Yu Tao said: "I believe Perkins greatest strength lies in the high reliability of its engines. We, as OEMs, have to provide our customers with two-year warranty.

"During these two years, we must ensure downtime is kept to a minimum. Our vehicles operating in airports are all assessed by their availability. Our products are rarely found to break down because of engine failure. This is one important reason why we believe Perkins engines are worth our expectation."

Since Perkins opened its engine facility in Wuxi, China, in 2008, TLD has taken delivery of its 400 Series engines direct from Wuxi.

Mr Yu added that the performance and quality of the Perkins engines had won TLD's complete trust and the company was looking forward to a long-term partnership with Perkins.



Reaching new heights

Zhejiang Dingli Machinery Co is an expert manufacturer in the research and development, production, sales and service of aerial working platforms, in addition to manufacturing a wide range of self-propelled telescopic booms, articulating booms, scissors, personal lifts, mast-climbing work platforms and aerial order pickers.

Working in partnership with Lei Shing Hong Machinery (LSHM), Perkins distributor for eastern China, Dingli took receipt of its first Perkins 404D-22 back in 2007 for its JCPT1223RT/JCPT1523RT/GBZ1823RT models.

Two years later LSHM successfully introduced the 804D-33T to Dingli for its 36, 38 and 43 metre aerial work platforms, continuing to provide a range of products to cover most of company's access platforms.

Now Dingli has recently launched three Perkins powered products destined for European markets: a 26 metre platform powered by the 404D-22; a 32 metre platform which uses the 1104D-44 and self-propelled, rough-terrain scissor lifts powered by the 403D-11.

Dingli produces a wide range of aerial work platforms from 16 metres to 43 metres which are sold in China, as well as Europe, America, Asia and over 80 other countries and regions. With this in mind, Perkins worldwide reputation and well-established product-support service are helping Dingli to open up these key markets.

For the future, Dingli is investing tens of millions RMB in the research and development of new Intelligent access platforms. The strong partnership with LSHM is therefore set to continue; with more Perkins powered innovations in the pipeline.

Visit Zhejiang Dingli Machinery Co at Bauma - Hall F11, Stand 1101/6B

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The ideal partner for Chinese manufacturer

Zhejiang Forway Heavy Industry Company Limited is China's largest manufacturer of skid steer loaders, with 30 years' experience in the sub-sector.

The company also produces a range of small and medium-sized construction equipment including mini wheel loaders, backhoe loaders and tree spades which are exported to more than 80 countries.

In 2007 Forway undertook extensive market research and found that the Perkins brand had a very high approval rating among skid steer loader customers both in China and overseas. The findings showed that Perkins engines were reliable; delivered excellent performance and were backed by a worldwide product support network.

Perkins was initially selected for the company's skid steer loaders and now the 400, 800 and 1100 Series engines power Forway's three major product lines; mini skid steer loaders, backhoe loaders and wheel loaders.

Forway's products are mainly sold for export to European and North American markets but recently the company has begun to supply the domestic market, which has been met with a very good response. Sales director at Forway, Annie Wang, said she was optimistic about the domestic potential of the skid steer loaders: "This is one of our established products and the technology is relatively mature; our brand enjoys reasonably strong recognition among both domestic and international customers."

Supported by Perkins distributor Lei Shing Hong Machinery (LSHM), Annie said Forway would like to continue working with Perkins and LSHM to ensure timely solutions are brought to the market, while enhancing customers' satisfaction with their products.

Visit Zhejiang Forway Heavy Industry Company at Bauma - Hall F9, Stand -901/5





Zhejiang Maximal Forklift Company Limited was founded in 2006, with its headquarters in the Lushan Industry District, Hangzhou city.

Versatile power for leading OEM

Recognized by the Chinese state government as an “Important High-tech Enterprise” by virtue of its persistence in technological innovation, its product portfolio comprises several equipment series, offering more than 300 models of forklifts, stackers, trucks and tractors. These are exported to over 100 countries and districts while some 150 sales and service outlets are operated across China.

Maximal started its partnership with Perkins through Lei Shing Hong

Machinery (LSHM), the Perkins distributor for eastern China. Currently the Perkins 1104D and 1104C engines are being used to power its forklifts, which are mainly exported to overseas markets.

Su Jun, general manager from Maximal Foreign Trading Company (Maximal’s trading arm) said: “Perkins engines enjoy quite good recognition in the international market. This works favorably towards increasing Maximal competitiveness when exporting forklifts to overseas markets. Moreover, as Perkins engines are more cost-effective compared with

Japanese brand engines, this adds to our advantages.

“In selecting power systems, our prime consideration is customers’ acceptance. If a customer doesn’t approve of a particular engine, or the supplier does not have local service points to support the customer, generally it would not be possible for us to use the engine. Perkins operates a global service network covering all parts of the world; our customers can be assured of timely product support service.”



Carrying the load

Anhui Heli Company Limited is China’s largest forklift manufacturer, boasting a complete industry chain and independent marketing network.

It currently operates 23 provincial marketing networks and over 300 second-tier agency sales service centres across the country. In addition, international sales are supported by an overseas agency network covering 72 countries.

Chinese distributor forges a lasting partnership with OEM

Since 2008, Perkins and its distributor for southern China, Sime Darby Elco Power

Systems Limited have been working strenuously to build a long-term strategic partnership with Xiamen XGMA Machinery Company Limited; a leading construction equipment manufacturer in China.

Cooperation spans over various business divisions of XGMA including mini machinery, forklifts and concrete machinery.

Over the years, Perkins and XGMA have been actively exploring opportunities for cooperation. Today, XGMA has chosen several models from Perkins engines range to power its machinery products.

While the mini machinery division has seen the greater part of the cooperative projects, trial production is also currently in progress with the forklifts division (front loading forklifts) and the concrete machinery division (portable pumps and pitot pumps).

In 2011, XGMA mini machinery division signed a strategic cooperative agreement with Elco, signifying a



new page in the partnership which started half a decade ago. Under the agreement, Perkins is the sole engine supplier of six XGMA machinery models, including mini wheel loaders and skid steer loaders, with Elco, providing comprehensive after-sales support and value-added services such as purchase credits and dedicated warehousing facilities.

Last year leaders from Perkins, Elco and XGMA met to discuss ways to further the strategic partnership, resulting in the signing of a formal

agreement which detailed cooperative projects, commitments and order intentions.

A dozen projects are now underway at XGMA mini machinery division involving installation of Perkins engines in its backhoe loaders, skid steer loaders, mini static hydraulic loaders and the ever popular mini loaders series.

Visit Xiamen XGMA Machinery Company Limited at Bauma - Hall F9, Stand 903A/3

Heli products are sold in some 130 countries around the world with the annual production capacity for forklifts at around 100,000 units. One-third of the output is exported, with the applications widely used in harbours and ports, airports, construction sites, shopping malls and warehouses all over the world.

Heli general sales manager Yu Zaiyang cited the reasons for selecting Perkins in the first place. “At that time, we had made extensive search for power solutions and found that some of

the international brands just didn’t have engines which could fit Chinese emission requirements. Finally, we made up our mind and chose Perkins as our supplier. Since then, we have seen a gradual increase in share of Perkins products in our total order of engines.

“Nowadays, the engine in a forklift produces far more power than the machine needs. A lot of the power is kept in reserve. As such, many engines offered in the market are capable of meeting the required performance.

Our priority consideration is cost-effectiveness of the power system.”

Currently, Heli mainly uses Perkins engines for its 5-10 tonne range of forklifts, and also some of the heavy-duty equipment above 16 tonnes, the majority in the 16 tonne category. Of these, the 8-10 tonne forklifts are equipped with the four-cylinder Perkins 1104D-44TA engine, chosen for its quality engineering, low noise, low fuel consumption and low operating cost.

Perkins powers the U.S. energy boom

“Fracking” and sophisticated horizontal drilling technologies have produced a boom in oil and natural gas production from previously inaccessible formations across the United States. Like all booms, this one has created huge challenges for oil patch suppliers who produce the equipment needed to support drilling and production operations.

Perkins Master Distributor Perkins South Plains, Inc., located in Houston, Texas, supports a network of a dozen Perkins dealers in Texas, Oklahoma and New Mexico plus major OEM customers with Perkins engines, generator sets, parts and service in this demanding market. The strength of the energy boom is reflected in their sales that have doubled each year since it began in 2008.

Perkins South Plains currently keeps more than 1,100 engines in inventory along with a commensurate stock of spare parts in their Houston, Midland, Texas, and Oklahoma City facilities.

“The 400 and 1100 Series engines are our sweet spot,” says Perkins South Plains General Manager Steve Stem, “with most of our OEM applications clustered around the 100 horsepower mark. With the growth of the ‘fracking’ market, though, we are now seeing new demand in the 200 to 225 horsepower range for various other oilfield applications, so the market continues to change.”

Perkins South Plains’ OEM customers include companies that supply high-pressure water jetting systems for tank and equipment cleaning; transfer pumps for fracking slurries and drilling mud; pipeline welding systems; and high-pressure hydrostatic testing systems – all powered by clean, efficient Perkins diesel engines.

“Every OEM has their own set of requirements,” Stem continues, “so every engine is dressed to specification before it’s shipped. The requirements are so varied that we don’t even keep a standard price list;

every customer gets exactly what they want, every time.”

Knowing that nothing lasts forever, particularly a boom in the oil patch, Perkins South Plains devotes a great deal of time and attention to building long-term, service-based customer relationships. One example is the two-page list of items checked pre-shipment that accompanies every engine.

“We developed the checklist in cooperation with our customers,” Stem says. “They told us what they considered the critical items to be and we developed a plan to make sure that each of them was checked every time an engine is built.

“Reliability and service are extremely important because downtime can cost our customers thousands or even tens of thousands of dollars an hour,” Stem says. “We don’t normally sell parts directly to end users because that business is normally handled by our dealers. But, we recently opened our Oklahoma City warehouse at 9:00pm to hand a starter to a customer who had just driven 80 miles to pick it up so his rig wouldn’t be down all night.”

It is that level of attention to detail and willingness to go the extra mile to support customer needs during today’s boom times that will ensure success for Perkins South Plains tomorrow and into the future.

Perkins powered products from Reliable Pumps Consultants live up to their name.

Reliable option for pump OEM

Reliable Pumps Consultants, Inc. of Houston, Texas, designs and builds high-pressure pump systems for the international oil and gas industry. Its products are used to test critical blowout prevention valves and valves used in its customers’ hydraulic fracking systems, as well as in the water blasters and dedicated tank-cleaning machines they produce for the oil and gas market.

With customers in the United States, South America, China, Mexico and Canada, reliability, ease of service, and local availability of spare parts are all extremely important factors in their selection of an engine.

“Packaging, maintenance, parts and service availability, and above all reliability were the key factors in our decision to use Perkins engines on our products,” said Reliable Pump international sales engineer Russell Reed. “We get the engines fully

dressed from Perkins South Plains which simplifies our inventory and manufacturing operations.”

Reliable Pump uses a number of different Perkins engines in their products, from the 1104D-44T at 60 kW (80 hp) through to the 1106D-E66TA at 168 kW (225 hp).

“Perkins extended service cycle is a huge plus and a great value add to our product,” Reed added, “and so is the global parts and service availability from Perkins distributors and dealers. Uptime is everything to our customers, and most of them are well aware of Perkins reputation in the global market. They really enjoy the minimal problems and dependable operation of the engines.

“We do occasionally use other engines to satisfy specific customer requests,” Reed noted, “but Perkins is definitely our preferred engine and with few exceptions our customers definitely agree.”



Perkins-powered giant goes to work

A first-of-its-kind Perkins powered telescopic handler is now at work at Freeport-McMoRan's El Chino copper mine in New Mexico.

Built by Xtreme Manufacturing of Las Vegas, the new XR4030 is one of the largest telehandlers available in North America. Weighing in at 28,576 kg (63,000 lbs.), the XR4030 can lift an 18,144 kg (40,000 lbs.) load more than 4.57 m (15 ft.) into the air with its boom retracted, or 4,536 kg (10,000 lbs.) almost 11m (35 ft.) into the air with the boom fully extended to 5m (16.3 ft.).

"Telehandlers like the XR4030 are rapidly replacing straight-mast lift trucks in many applications because they offer equal or greater lift, greater forward reach, and a superior ability to traverse uneven ground," said Lee Kramer, president of Xtreme Manufacturing. "The 20 mine employees who took part in the orientation walk around were quite excited about the capabilities this machine would give them."

Xtreme chose a 129.4 kW (173 hp) Perkins 1204E-E44TTA twin turbo-diesel to power the XR4030. That choice was largely based on Xtreme's extensive



experience with Perkins engines on other equipment and their relationship with Perkins Master Distributor, Southwest Products of Phoenix. The 1204E-E44TTA is a four-cylinder, 4.4 litre (268.5 in3) turbocharged and aftercooled direct injection engine that meets Stage IIIB / Tier 4 Interim emission standards.

"We've had a lot of experience with Perkins engines," Kramer said, "and we are well satisfied with their quality and performance, as well as their reliability under the rugged conditions encountered by our equipment. Our customers expect to work their machines

hard without an excessive amount of maintenance and Perkins engines deliver under those rugged circumstances year after year. That's one of the reasons you'll find them on Xtreme machines like the XR4030. And, of course, we know we can depend on the Perkins service network to be there when we need them wherever our telehandlers and forklifts may be used."

The Perkins powered XR4030 may be the first of its kind, but it won't be the only example much longer. Xtreme is forecasting five more of these super machines during 2013.

Smaller tasks get a big helping hand

Road building and paving jobs for massive equipment powered by the biggest engines Perkins offers. Well, that's one thing.

But what of the smaller jobs, the sidewalks, shoulders, bike trails, and even covering the cuts left by the burial of gas lines and cables?

Tanguay Machinery of Roberval, Quebec, has a Perkins powered solution for those challenges too. Their Arseno J100 mini-paver is designed specifically for jobs between 18 and 48 inches wide, with optional accessories extending that up to 72 inches.

"The Arseno J100 is a compact self-propelled precision paver designed to push a truck and spread asphalt or aggregate on its side," said Piere Perron, Tanguay president.

"We designed it to be extremely productive in paving long, narrow strips, jobs like spreading aggregate along roads for widening or shoulder maintenance and naturally shoulder paving. The J100 mechanizes a normally backbreaking manual task."

With a long history in the North American logging and wood handling industries, Tanguay had extensive experience with Perkins engines and their Perkins master distributor Perkins Quebec-Maritimes (PQM). So, when it came time to specify an engine for the J100 a Perkins diesel



was at the top of the list. The engine Tanguay chose is a Perkins 404D-22 rated at 38 kW (51 hp) at 3000 rpm. It's a 2.2 litre (134 in3), four cylinder in-line engine that meets Stage IIIA / Tier 4 Interim emission standards for off-highway engines.

The 404D-22 achieves very high power density along with clean quiet operation and outstanding fuel economy. On the Tanguay J100 it is directly connected to three hydrostatic hydraulic pumps, one double and one single which power all the functions of the vehicle.



Perkins is the power behind new gas application

The current boom in natural gas production has created a tremendous demand for pipeline infrastructure to deliver the newly-discovered fuel to market. That in turn has created both challenges and opportunities for companies like Sideline.

"Our equipment has to operate in some of the harshest environments imaginable," said Sideline president Bill Marhofer. "And it's

not just temperature extremes that our machines have to cope with," Marhofer continued, "dust, mud, sand, rain, snow, ice and just about anything else mother nature can throw at you are all part of a day's work for a pipeline crew. Throw in the fact that everything is mounted on a track-type chassis moving through all kinds of terrain, and the design challenge becomes very interesting."

Sideline supplies weld decks that can be mounted to a variety of vehicles. During the initial design of their current welding product line, Sideline created prototypes using two different diesel powered generator sets.

"After the initial build, testing, and prototype use on a project," said Sidelines operations manager Dee Neuroth, "the 1104D-E44TAG2 Perkins-powered

generator was chosen for multiple reasons, including low noise, ease of serviceability, reliability, and support from our supplier, Perkins South Plains."

"Perkins extended service cycle and single-side maintenance is very important on all of our systems," Neuroth said, "but, it's especially important on our rental fleet where maintenance opportunities tend to be limited."

A chip off the engine block

“We’ve had great feedback from our Model 1390XP customers on the power of the Perkins 1104D engine,” said Jason Morey, small equipment sales manager for Bandit Industries.

“It’s rated at 97 horsepower, but it makes as much if not more torque than many higher horsepower engines in its class, and the torque is really what our customers need to power through material.

“Combined with our oversized chipping drum in the Model 1390XP, the Perkins gives our customers the better fuel efficiency they want, along with the chipping power they need.”

The compact Model 1390XP is an efficient hydraulic feed, drum-style hand-fed chipper with an oversized drum that can be configured to



be a either a 13” or 15” diameter capacity chipper. On a standard Model 1390XP, the feed wheels will open up to 13-3/8” to easily accommodate a 13” diameter piece, whereas an upgrade to the feed system can allow it to open up to 15-1/2” in order to accept pieces 15” in diameter.

“If you fill one 30-yard chip box a day, the Model 1390XP with the 97 horsepower Perkins will save you over \$1,000 a year in fuel costs while still out producing the higher horsepower machine,” Morey said.

As supplied to Bandit by Perkins Master Distributor Power Great Lakes of Wood Dale, IL, the engine is completely dressed and ready to install.



Precious metal and a durable solution

Powerful partner for construction applications

Customers around the world depend on Lincoln Electric Company’s portable, engine-driven welder/generators to support their construction and maintenance operations. Because they have to deliver reliable performance under all kinds of operating conditions, every component is selected to deliver both quality and durability along with minimal maintenance requirements.

“We chose a turbocharged Perkins 404D-22T for both the 60 Hz Vantage 500 sold in North America and other areas and the 50 Hz version sold in Europe,” explained Lincoln’s senior product manager – engine driven welders, Eric Snyder. “The decision was based on our experience with the 400 Series engines in our smaller Vantage 400 unit.

“The goal was to build a 500 amp welder in the same package used in

our 400 amp units so customers could easily mount them on truck beds with limited space and weight capacity. The 404D-22T lets us do that, and also delivers extra horsepower at high altitudes than a naturally-aspirated engine, which is an important advantage in many applications.”

Lincoln’s Vantage 500 is believed to be the most compact 500 amp welder/generator available. Used as a generator, the 60 Hz version produces peak power of 22 kW (29.5 hp) 3-phase 240 V AC and 13 kW (17.4 hp) 1-phase AC.

The 50 Hz version of the Vantage 500 produces peak power of 14.5 kW (19.4 hp) 3-phase 400 V AC, 6.9 kW 1-phase 230V, and 3.4 kW 1-phase 115V AC. It also is equipped with additional noise reduction features to meet European legal requirements.



“Based on our experience with Perkins 400 Series engines on our portable welder/generator products,” Snyder added, “selecting the 404D-22T as a standard engine for the Vantage 500 was a simple decision.”

Mecfor, Inc. of Chicoutimi, Quebec, Canada, is a major supplier of stationary and mobile equipment for the global aluminum industry.

Their MVA and MVR series of heavy-duty multi-functional vehicles fill a number of roles ranging from molten metal transport in the cast house to coil handling on the shipping dock.

Mecfor’s Quick Connect tool changing system allows either vehicle to be reconfigured in seconds, extending their utility well beyond that of a conventional heavy-duty lift truck.

Both the MVA, which is articulated, and the MVR, which has a rigid chassis, utilize efficient, reliable Perkins engines as their standard power plant.

“Every Mecfor vehicle is custom built to meet customer requirements,”

explained Mecfor product advisor Patrice Morin, “which makes it a unique piece of art. The Perkins engines supplied by Perkins Quebec-Maritimes (PQM) come completely dressed, including a customized cooling package that PQM helped us engineer.

“And, of course,” said Dario Tremblay, Mecfor chief engineer, “they are supported by the worldwide Perkins parts and service network. That is very important because more than 60 percent of the MVA and MVR vehicles we build annually are exported to customers around the world.”

The Mecfor MVR can handle loads from 6,800 to 11,340 kg (15,000 to 25,000 lbs.). It is powered by a 4-cylinder Perkins 1104D turbo-diesel that produces 73.8 to 100.7 kW (99 to 135 hp) and meets Stage IIIA / Tier 3 emission standards.

The MVA, which can handle loads from 6,800 to 22,680 kg (15,000 to 50,000 lbs.) uses either the 1104D or the 6-cylinder Perkins 1106D rated at 168 kW (225 hp). In both vehicles the engines are directly connected to a hydrostatic transmission and auxiliary pump which powers both propulsion and load handling systems.

“We completely re-designed the MVR in 2006,” Morin said, “and Perkins QM helped us integrate the power plant into the new vehicle. All we had to change was a mounting bracket for a compressor.

“The long service intervals and ease of maintenance are also major advantages of the Perkins engines,” Morin said. “The single-side access lets us use a unique side-tilting cab design that really simplifies routine maintenance tasks. Customers really appreciate that.”

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