

April 2007

ENGINE ROOM



GOOD OIL FOR THE AUSTRALIAN CATERPILLAR ENGINE COMMUNITY

► Hot, dusty, remote Running a desert trucking business



It's tough country and running an outback trucking business requires absolute reliability. G&S Transport in Alice Springs swears by CAT engines.

You're a transport operator and one of your trucks breaks down. A bit of a pain, but no big deal, you reckon? Well how about if that truck is stuck in the middle of the Tanami desert in north-west Australia? And it's hauling a three-dog roadtrain loaded with vital supplies for a remote mining community?

So you take two prime movers down 500km of horrendous, corrugated desert road. One brings the busted truck out, and the other delivers the load to the mine. Worst of all, the entire recovery operation doesn't leave enough change from 10 grand to buy yourself a much-deserved beer when you're finally done.

So when John Bilato, co-owner of Alice Springs-based G&S transport says reliability is important, he's not just making polite conversation. Mr Bilato and his brothers run roadtrains out of Alice Springs, as well as Karratha in Northern WA. The company makes regular runs to the 'Granites,' a gold mine in the Tanami Desert, around 600km north-west of Alice Springs. G&S Transport also service aboriginal communities in the region. The 30-hour round trip to the Granites involves hauling loads of around 130 tonnes along one of Australia's toughest roads, the Tanami Track. Mr Bilato says that driving this road is a specialised skill and there are only a handful of people he trusts with the task.

"After you leave Alice, you're on your own. If something happens out there in the desert, you've got to deal with it by yourself," he said. "So our guys are not your normal truckies, they tend to be very independent-minded. Their job is never straightforward or easy, it requires a lot of planning, and safety is extremely important." G&S currently run 17 triples a week

along the Tanami track, and have been using CAT engines for many years. "With six prime movers, our engines are virtually running all the time. Reliability is paramount," Mr Bilato said.

"We have to make sure all our trucks come home. We've found CAT engines to be very strong, good in the heat, and we've been over the moon with the service we've received from WesTrac and Hastings Deering. If there was a more reliable engine we would have found it by now. In a year, we ran over 1000 roadtrains – that's triples, out the Tanami track, and 1000 CAT trucks came home. That's zero recovery – not bad going in these conditions."

G&S Transport has recently trialed a new CAT C15 ACERT twin turbo. After a gruelling ten weeks, he described the new engine as "marvellous." "This was a high performance engine – 650hp, but it delivered the same economy as the less powerful engines we are running," he said. Mr Bilato said the condition of the Tanami Track was particularly bad at present, and made the job even more demanding. "We give the road a lot of respect. The corrugations are absolutely terrible. It's been extremely dry and the track just keeps getting worse. When the rain comes it tends to glue the road back together, but with this drought, that just hasn't happened."

Despite the difficulties of the job, Mr Bilato said his work had its advantages. "You meet some great people out here, and see some amazing things – the sunrises and sunsets, the storms and lightning in the desert. I've also taken my kids on a few trips. There's plenty of one-on-one time and you get to know them really well."



► **Marine Excellence Centre to capitalise on world trends**

The recently-established Government Marine Excellence Centre (GMEC) holds enormous long term potential, according to new General Manager Neil Vaughan.

The initial role of the Centre is to support the CAT global dealer community in meeting the often daunting documentation and project management requirements of paramilitary and military-related government marine contracts. The GMEC will also manage the classification of engines for military purposes, dealing with various Classification Societies and ensuring their certification requirements are met.

Before joining EPSA, Mr Vaughan worked with Austal on the General Dynamics Littoral Combat Ship – the world's most advanced high-speed military vessel. The project involved bringing a commercial ship up to military specifications. He has also worked on the Australian Air Warfare Destroyer project.

According to Mr Vaughan, the GMEC will provide an intellectual resource, initially supporting CAT engine dealers, but ultimately playing a consultative role with government. "It is important to get involved at the conceptual stage of development. The GMEC will also provide a better understanding and analysis of government sector

opportunities," he said. Mr Vaughan said there were great opportunities for growth in areas such as system integration, where one supplier provides the entire propulsion system for a vessel.

"The level of expertise is changing and the ability to put a propulsion system together is becoming more specialised," he said. "We are seeing some engine manufacturers pursue this type of business – it is becoming far more common in shipbuilding. Another trend in shipbuilding is integrated logistics systems, where the supplier provides total, through-life support for a vessel. This trend comes from Navies recognising that technical support, maintenance and training are not their core areas of expertise. Their job is to defend their country; engine overhauls are best carried out by the manufacturer," Mr Vaughan said.

"For the supplier, integrated logistics systems mean strong, long-term client relationships which make for sound business. The potential for the GMEC in these areas is very exciting."

Mr Vaughan said that by the end of 2008, Caterpillar would have an engine system capable of driving and powering a destroyer.



The Armadale Class Patrol Boat highlights the potential of Australia's defence technology capabilities.



► Keep your CAT cool

Over 40% of all engine troubles can be linked to the cooling system.

The cooling system has a direct effect on the operation and service life of any engine. So if the cooling system is not properly maintained, is improperly sized, or is not operated correctly, the result can be overheating or overcooling.

Once problems start, power is drained, productivity decreases and major breakdowns can occur. Since overheating or overcooling can shorten engine service life or result in poor engine performance, it is important that the cause of any problem in the cooling system is immediately corrected.

The purpose of the cooling system is to keep temperatures at a level that allows good heat transfer but stays below boiling. If coolant starts to boil or steam, it is forced out the radiator's pressure relief valve. This release lowers the amount of coolant and opens the door to overheating. Once overheating begins, continued operation makes the condition worse, possibly resulting in engine failure. Three factors can change the temperature at which coolant boils.

Here are a few tips on avoiding some costly pitfalls.

1. Amount and type of coolant. The higher the concentration of ethylene glycol-type coolant, the higher the boiling point. Because water has better heat transfer capability, you must mix ethylene glycol with water.

Tip A: Always have a minimum of 30% coolant mixed with water to maintain an adequate temperature to prevent water pump cavitation.

Tip B: Never use a higher concentration than 60% coolant. Higher concentrations actually reduce freeze protection and increase the possibility of deposits forming in the cooling system.

2. System pressure. Cooling systems are designed to operate under pressure. CAT cooling systems generally operate under pressures of 7 to 14 psi. Inadequate system pressure will lead to boil-over and engine overheating.

Tip C: By adjusting the radiator cap or pressure relief valve, cooling system pressure can be controlled and fine tuned.

3. Altitude. Boiling point is related to air pressure. Higher altitudes mean lower boiling points, due to lower air pressure.

Tip D: Be aware of altitude/pressure variations. But regardless of the water and coolant mixture, or the altitude pressure, make sure you keep the proper level of supplemental coolant additives (SCAs) in your cooling system. SCAs help prevent rust, scale, pitting and corrosion.

► Alignment key to growth says new CFO

A cohesive approach to market is the key to sustainable growth for CAT in Australia, according to Michael Keogh, the new CFO at EPSA. Mr Keogh said achieving strategic alignment between CAT dealers was his major challenge.

"This direction will allow us to earn sustainable sales revenue and profitability, while delivering value to all CAT dealerships (EPSA shareholders) and to Caterpillar itself," he said.

"EPSA is in a position to provide dealers with significant medium term revenue gains from service agreements on Caterpillar engines," he said.

"But to do this, we need dealer reps to be our eyes and ears – to leverage their customer contacts into new CAT engine sales opportunities."

"It's all about working together. EPSA makes a sale, the dealer gains a service agreement, and the rep is rewarded for identifying the opportunity, so everybody wins," he said.

Mr Keogh has previously held key financial roles in multi-billion dollar businesses including Visy and the Illinois Tool Works conglomerate. He was attracted by the growth potential of EPSA, and by the opportunity to be involved in building business relationships and executing the company growth strategy.



Father of two, sports fan, red wine appreciator and new EPSA Chief Financial Officer, Michael Keogh.



► **Miners stay cool as sector heats up**

The Australian resources boom has seen mining companies willing to invest in greater production efficiencies. One area of capital investment that is becoming more popular is mine bulk-cooling. Hot mining conditions pose a problem for the health of workers in northern Australia and will become more of an issue as these mines go deeper.

A refrigeration trial at the North Goonyella coal mine, around 150km west of Mackay, proved that mine bulk-cooling was effective, and provided the mine owner, Peabody Energy Australia, with another option to ensure production continuity. Under the mine's heat management plan, crews are entitled to breaks when the measured effective temperature reaches 27°C. Further extended breaks are taken at 28°C and normal work is halted at 29.4°C. This can result in substantial downtime during hot summers.

The mine tried a number of non-refrigeration measures to manage the heat problem. These included: ample ventilation, removal of water bodies, restricting the use of diesel engines, increasing awareness of heat controls and employee acclimatisation protocols. All these efforts met with only limited success. North Goonyella then commissioned international ventilation expert Dr Roy Moreby to review site-heat management.

An increase in ventilation circuit capacity was recommended, and a need for cooling was identified, as ventilation arrangements alone could not maintain work conditions in "normal" temperatures. North Goonyella trialled a CAT Rental Power 2MW (Refrigeration system) installation supplied by EPSA.

CAT Rental Power is Australia's major provider of rental refrigeration equipment and has around 10 mW of refrigeration capacity available in Australia. Due to increasing demand for refrigeration at mines, CAT Rental Power is steadily growing its equipment portfolio.

A CAT 1.5 MVA diesel generator powered two 1060 kW (R) chillers and eight 200 kW (R) bulk air handlers. The chillers, each with four unique chilling circuits, fed chilled water at 4-6°C at a flow rate of 10 litres per second to each of the bulk air handlers. The trial proved effective, with temperature measurements taken before and after cooling showing a drop in wet bulb temperature by as much as 3.5°C. This reduction is expected to have a significant impact on heat-related downtime.



A CAT Rental Power refrigeration system is making life easier for QLD miners.

► **CAT makes sustainability index for 6th year running**

For the sixth consecutive year, Caterpillar has been selected as a member of the Dow Jones Sustainability Index (DJSI World). DJSI uses a best-in-class approach designed to identify best practices across the economic, social and environmental dimensions of corporate sustainability.

Ali M. Bahaj, Caterpillar chief ethics and compliance officer, said the inclusion was "truly an honour. This year Caterpillar leads our sector with the best overall score among industrial engineering companies," Mr Bahaj said.

The Dow Jones Sustainability Index creates specific questions for each industry, to reflect unique sustainability challenges. Each of the Dow's 2,500 companies was invited to take part in the comprehensive assessment, but only 318 companies met the standards for listing. Launched in 1999, the DJSI World is the first global index to track, with an external

auditor, the financial performance of the leading sustainability-driven companies worldwide.

Research for the DJSI World is conducted by the SAM Group, an independent asset management company specialising in sustainability investments. Carl-Johan Francke, equity analyst with the SAM Group, said Caterpillar "continued to be a leader in the social dimension with strong, consistent scores related to hiring, retaining and developing its employees. Other areas of strength include strong risk management and superior product stewardship," he said.

Reflecting this global position, the CAT dealer community works with customers to provide sustainable solutions in industries and applications across Australasia.



► **Powering the Bushmaster IMV - a test of toughness**

Caterpillar engines have a reputation for durability. But when a CAT-powered vehicle is blown up as part of the testing phase, toughness takes on an entirely different meaning. The vehicle in question is the Bushmaster IMV (infantry mobility vehicle), built by Thales Australia and powered by a CAT 3126E six-cylinder diesel.

The Bushmaster is designed to protect the occupants against blast (explosions) and ballistics (bullets) while providing exceptional mobility. The vehicle was subjected to countless explosive and ballistic tests during the design phase to ensure the safety of the occupants.

The Bushmaster minimizes crew fatigue through independent suspension, fully supportive ergonomic seating and split-system full-cabin air conditioning. Ease of driving is achieved through the combination of the CAT engine system and a push-button automatic transmission. Together, they deliver enough power and torque to propel the Bushmaster at highway speeds of 100kph (even while towing a 15-tonne trailer) or climb the energy sapping sand dunes of the UAE desert (assisted by a centralised tyre inflation/deflation system). All of this capability is delivered whilst withstanding the harsh temperatures experienced in Iraq or Afghanistan.

Peter Wootton of EPSA discussed the challenges of powering the 15-tonne Bushmaster. "The level of armoured

protection is very high. The vehicle is designed to withstand small-arms fire as well as land mine explosions," he said. "The engine is set well back in a very tight space, so developing an effective cooling system was a big challenge."

"Naturally, there was a range of army requirements, such as the ability to hold a 60-degree slope, ease of maintenance through the rapid removal of the engine, transmission and cooling system as a single unit (rail mounted), good highway cruising speed, reasonable fuel consumption and compliant emissions levels," said Peter.

The CAT dealer team worked closely with Thales Australia to meet these demanding specifications. According to Peter Wootton, the engine has performed extremely well, with the CAT 3126E using an ADEM electronic brain to deliver instant responses to changes in conditions.

The Bushmaster was on the front line almost as soon as it was available for service and has now seen action in East Timor, Afghanistan and Iraq. The vehicle attracted the envious gaze of other military forces and it is rumoured that certain UN participants and other countries are extremely keen on acquiring a fleet of Bushmasters for themselves. Peter believes it is not surprising that the Bushmaster has attracted international interest given its success in operating in harsh environments.





► **New life for Mack Titan**

When the Cummins engine in their Mack Titan needed another rebuild last year, Piacentini & Son used the opportunity to re-assess the best engine for the job. The WA-based mining and earthmoving company had been using the seven year-old Mack Titan for low-loader work, which meant regularly hauling loads of up to 200 tonnes.

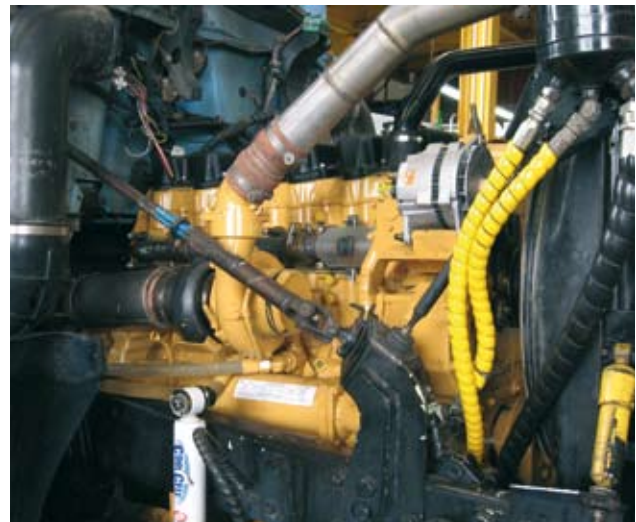
After examining the feasibility of a rebuild, they decided instead to fit a new CAT C-16 engine. Piacentini's Project Manager, Ashley Verwijmeren, explained why. "We looked at replacing the Cummins with something that was established in the industry. We'd heard good reports on the C-16. It had the advantage of a special brake saver and saving brakes on our low loader is an important consideration."

Graham Farmer, WesTrac's Customer Support Manager for Piacentini, said the brake saver was a highly effective piece of technology. "The C16 has two braking systems. Like most truck engines, it has a standard Jacobs engine brake. But it also has another brake saver mounted on the back of the engine, between the engine and gearbox. This works by using engine oil with an impellor to slow the truck down, through the engine."

Piacentini started back in 1949 with a simple CAT D6 bulldozer, which it used to clear land for soldier settlement areas near Margaret River. The company grew into a sizeable earthmoving business that includes the largest CAT scraper fleet in the Southern Hemisphere.

As well as 83 scrapers, their CAT fleet includes numerous wheel loaders, dozers, graders and excavators. Three generations of the Piacentini family manage the company and they employ more than 500 people.

Their head office is in Picton, near Bunbury. And according to Mr Verwijmeren, their newest CAT acquisition is living up to expectations. "The C-16 is still loosening up, but it's performing well," he said.



The CAT C-16 has given Piacentini's Mack Titan a new lease of life.

► **Sydney operator buys 80th CAT Truck engine**



Richard McArthur sticks with CAT for performance, longevity, reliability and dealer support.

According to Sydney transport operator Richard McArthur, the decision to purchase its 80th Caterpillar engine was an easy one. The owner of McArthur Express chose Caterpillar-powered vehicles for his long-haul business, based on performance, longevity, reliability, and dealer support.

Mr McArthur praised the service and support of CAT dealer WesTrac, since he began working with the CAT dealership two and a half years ago. "The support effort placed behind our business has been fantastic," he said. "It has made our decision to purchase our 80th CAT engine extremely easy."

Mr McArthur is a strong believer in 'replace before failure'. The support agreement his business holds with WesTrac involves major component change-outs at regular intervals, saving unnecessary downtime and allowing better budgeting of running costs.



▶ **ACERT technology earns CAT truck engine award**

A heavy-duty CAT ACERT truck recently won a prestigious American customer satisfaction award. International marketing information firm J.D. Power and Associates awarded Caterpillar's C-12 clean power engine (to be replaced by the wider horsepower band C-13 Evolution in Jan 2008) its highest levels of customer satisfaction in the 2006 Heavy Duty Truck Engine and Transmission Customer Satisfaction Survey.

In particular, the firm recognised Caterpillar's efforts in meeting the challenges set by new emission standards with the creation of the innovative ACERT technology. "CAT's success is clearly evident in how satisfied customers are with their engines." Caterpillar's C-12 engine won the award in the "Vocational" category, which includes trucks used in demanding applications such as construction, refuse hauling and utility services. The C-12 utilises the building blocks of Caterpillar ACERT Technology – a long-term solution that reduces emissions at the point of combustion without sacrificing engine performance and reliability.

ACERT is a systems approach to emissions reduction. It relies on advanced technologies in four key areas: improved

air management, precision combustion technology, advanced engine electronics and a simple after-treatment process.

The award was based on interviews with 2,529 customers who own two-year-old Class 8 trucks (weighing approximately 15 tonnes or more). It measured customer satisfaction in four areas of engine performance: engine quality, engine performance, engine cost of ownership and engine warranty. "The credibility of the J.D. Power and Associates award is that it is customer-driven, directly reflecting the feedback of the end-users who rely on Caterpillar's engines," said Jim Parker, Caterpillar USA Vice President who is responsible for the company's Power Systems Marketing Division.

"This is an exciting time for Caterpillar. We continue to see strong customer acceptance for our engines powered by ACERT technology," said Parker. "ACERT remains the solution for future engines. We currently have 100 engines meeting the even tougher 2007 USA emission regulations in customer hands today. Caterpillar's extensive and industry leading testing will achieve more than 12 million miles on these evaluation units by mid-October."

▶ **ACERT - engine technology for a changing world**

ACERT is a hi-tech response to changing global expectations in areas such as emissions.

CAT ACERT technology combines proven systems with innovative new technologies to precisely shape the combustion process. ACERT maintains engine performance, efficiency and durability while dramatically reducing emissions. ACERT was developed in response to the US EPA and European Union passing a series of aggressive new diesel engine emissions standards in 1994. CAT took a leading role in developing the technology to meet these standards.

The investment of time, expertise and capital was massive, with over \$500 million spent so far. Caterpillar's aim was to find and develop a long-term emissions reduction solution – a platform to meet current and future standards while delivering maximum performance and value.

The core concept behind ACERT technology is advanced combustion. ACERT carefully controls the combustion process to reduce pollutant levels, while maintaining performance and efficiency. In theory, the controlled combustion concept is simple. Precise management of the process results in lower combustion temperatures, which produce fewer harmful exhaust emissions. But in practice, controlling combustion with a high degree of precision is extremely difficult. The combustion process is complex and varies with changes in engine speed and load.

Caterpillar was able to take advantage of a number of proven engine technologies such as CAT ADEM electronic engine controls, CAT HEUI and MEUI, fuel injectors, crossflow cylinder heads, and wastegate and non-wastegate turbochargers. The key ACERT breakthrough was the highly precise way these systems were combined and controlled. By continually refining ACERT elements, Caterpillar is ensuring that ACERT technology remains well ahead of emission regulations, while delivering superior power and durability.

April 2007

ENGINE ROOM



THE SUMP!

**Humour, rumour
and innuendo**

► **Nasty old bag**

I was queuing for baggage check-in at Indianapolis Airport after a visit to the Lafayette Engine Plant. The check-in operator was an elderly, softly spoken black man. Ahead of me in the queue was a well-dressed woman with very expensive luggage.

As the woman approached the counter to have her bags weighed and tagged, she addressed the operator, saying "Don't you scratch my bag, boy", and "be careful, boy". She followed this with "Hurry up boy, I don't have all day."

The operator responded in a gentle voice. "Where will ma'am be travelling to today?" he asked. "New York and hurry up," the woman snapped. With that, the man tagged her bag and she walked away. I approached the check-in counter, said good morning to the operator, and commented on the woman's rudeness.

"Yes sir. Where would you be travelling to?" was his reply. "Los Angeles," I said. I then asked him if he realised he had put Los Angeles tags on the woman's luggage after she said she was flying to New York. "Yes sir," he said with a laugh.

At that point my bag disappeared down the chute, correctly tagged. The moral of the story: always be civil to people. That woman is probably, and deservedly, still waiting for her bags.

Garry Dann
Regional Manager - Northern
Energy Power Systems Australia Pty Ltd

► **Achieve fame and glory! Win fabulous prizes! Contribute to The Sump.**

Got a good story to tell? Seen or heard something funny or unusual? Send us your story by e-mail and you could become instantly famous by having your piece published in The Sump. If your contribution is judged best for the issue, you will receive riches beyond your wildest dreams. (Like an entire bottle of wine, with the cork still in it!) So get cracking, and remember the old journalist's maxim: 'Never let the truth stand in the way of a good story.'

► **Team play**

Mt Gambier-based wood-chipping operation LV Dohnt found itself in a tough spot after one of their chippers went down. These machines are not your average garden mulchers. The chipper in question is powered by a 990hp twin turbo CAT 3412E industrial engine and can dispose of an entire pine log in seconds. Replacement turbochargers were required.

The business was initially looking at 10 days of downtime, with the effects flowing through the production chain, affecting the whole chopper and haulage operation. Machine downtime is now a major cost to business because of this flow-on effect.

However, a bit of team play from EPSA and Cavpower in SA meant the machine that went down on Friday was running again by 10am Sunday. Here's how they did it.

When Brian Williams, Sales Engineer at EPSA SA, was advised of the situation, he located a new CAT twin turbo engine at the ESPA Warehouse in Hallam, Victoria.

Workshop Supervisor Peter Davis arranged to have the turbos removed from the new engine that afternoon. That night he took the turbos to his Melbourne home, and early next morning in a coordinated effort they were collected and driven to Mt Gambier, where Cavpower had the machine up and running again on Sunday morning.

In a letter to CAT, LV Dohnt General Manager Clem McAuliffe congratulated the Caterpillar team on being one of the few suppliers who understood the costs involved in downtime.

Fine work gentlemen.

Employment claws

Around 12 months ago, EPSA advertised for a person to work at the CAT rental operation. They received an extremely enthusiastic reply from a person who went to great lengths to convey how much they liked cats.

The applicant went on to say that cat rental was a great idea because many people did not have the time for full-time cat ownership.

Email your contributions to: melissa.kovacic@energypower.com.au

April 2007

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For CAT engine system sales, engineering support and technical advice call Energy Power Systems Australia from anywhere in Australia on 1800 800 441

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