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Volume 11 • Number 6 • June/July 2009 • *English Edition*





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## A Word From the Publisher

*In this issue of InfraStructures you will find articles on many different topics. The scope of these industries reflects the range of activities in which our readers are involved. From earthmoving to roofing, our readers do all kinds of works... But they have one thing in common: they all use heavy machinery and specialized equipment.*

*InfraStructures now reaches more than 10 000 readers outside Quebec. They are mostly involved in road construction and maintenance, mining and quarrying and building. Readers tell us that they appreciate the quality of the presentation and the wide variety of InfraStructures' editorial content. Short articles, rich in technical information... Stories that they can relate to.*

*Tell us what you think!*

*In August, we will publish our annual "snow removal" issue. In it, you will find everything you need to prepare for next Winter.*

*In the meantime, enjoy the nice weather...*



Editor/Publisher



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On the cover:

a New Holland E215LC excavator working on a road reconstruction site involving the construction of a cycle path in Shannon, near Quebec City.

**AECON IS IN THE NEWS...**

Aecon Group Inc. recently announced that a joint venture in which its Constructors division is a partner has been awarded a \$77.1 million tunnel contract by the Regional Municipality of York.

The project involves the design and construction of two sanitary trunk sewers, each having a minimum internal diameter of 1.8 meters (almost 6 feet). The Bathurst collector sewer will run approximately 5.1 km along Bathurst Street north of Steeles Ave., and the Langstaff trunk sewer will run approximately

3.7 km, primarily along Langstaff Road west of Bathurst Street.

The joint venture awarded the project is owned 70% by McNally International Inc. of Hamilton and 30% by Aecon.

Construction of the sewers will involve Earth Pressure Balance (EPB) tunneling technology, which is designed to limit dewatering during construction. Construction will begin immediately and is scheduled to be concluded in the fall of 2008.

“This contract continues Aecon’s successful partnership with McNally International in

servicing the tunnel construction needs of York Region,” said Don Brophy, vice president of Aecon Constructors. “It will bring our joint venture to nearly 25 km of tunnel construction since we began building tunnels for the Region in 2001.”

This follows another recent announcement made by the company stating that its Construction and Materials division has been awarded a \$40.8 million contract to widen an 11 km stretch of Highway 401 and conduct bridge maintenance work on three overpasses near Woodstock, Ontario.

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**Two New Sidekicks for the World’s Largest Pickup Truck**

For those of you who thought that the International® CXT pickup truck was too flashy, too big and too expensive, International Truck and Engine Corporation now offers the International® RXT, and International® MXT.

The new members of the “International® XT Family” draw on the family bloodlines of their big brother. They are built for business owners who want a truck that promotes themselves as much as their businesses. However, just as people have unique personas, the International RXT and MXT are designed for those who prefer a strong and athletic look rather than a vehicle as big and bold as the International CXT.



The International® RXT is a 4x2 pickup truck. Its exterior design is sleek and refined, offering full-body side skirts, a low step-in height, aerodynamic hood and overall stylish design. From the driver’s seat, the ride is made comfortable by a spacious crew cab that seats five, as well as an air cab suspension and an International® ride-optimized suspension (IROS).



The International RXT features an International® VT 365 diesel V8 engine with an engine range from 230-310 hp with 540-950 lb-ft of torque

and a 10,2 to 13,4 t towing capacity.

The International® MXT has the same distinctive International grill and the same crew cab as all of the XT Family, a whole different look with an aggressive design of headlights integrated in the front fenders, rough terrain tires, low step-in height and outstanding 4x4 capability. It features a 300 hp engine with 530 lb-ft torque and a 7,25 t towing capacity.

The starting MSRP of the MXT is estimated at US\$ 69 900. The RXT is priced from US\$ 76 000 and the CXT starts at US\$ 115 000.

Source: International Truck and Engine Corporation



The project, awarded by Ontario's Ministry of Transportation (MTO), involves expanding Highway 401 from four lanes to six between Oxford Road 2 (formerly Hwy 2) and Highway 403 by adding one inside lane in each direction. It also includes rehabilitation of one overpass and rebuilding the superstructure of two others.

Aecon is the general contractor on the project and will self-perform all of the grading and granular work, sewer placement, paving and structure rehabilitation work on the project. Work will begin almost immediately and is scheduled for completion in late 2006.

"Aecon has a long and productive relationship with the MTO, dating back to the early days of the automobile," said Teri McKibbon, president of Aecon's Civil and Utilities Group. "We are proud of the continued confidence this award demonstrates in Aecon."

Aecon Group Inc. also announced that its Construction and Materials division has been awarded a \$36.5 million contract by GO Transit to design and build a rail-to-rail grade separation in Markham, Ontario.

The project involves designing and constructing a 1,5 km concrete-walled open tunnel through which the GO transit rail line would run, as well as two bridges – one where the tunnel passes under the CNR tracks at what is called the 'Hagerman Diamond' in Markham, and the other where the tunnel passes under 14<sup>th</sup> Avenue.

Aecon is the general contractor on the project and will self-perform the excavation, drainage, tunnel construction, bridge construction and much of the utilities work on the project. The design work has been subcontracted to a team headed by Totten Sims Hubicki Associates. Construction is scheduled to be completed in the fall of 2007.

"Aecon's unique ability to perform both the civil construction and utility installation elements of a project like this gives us a significant advantage in the market," said Teri McKibbon, president of Aecon's Civil and Utilities Group. "We are very pleased to be able to provide GO Transit with a total solution to this complex construction challenge."

Source: Aecon Group Inc.

#### GL&V TO ADD NEW MEMBRANE TECHNOLOGIES TO ITS OFFERING IN THE MUNICIPAL WATER TREATMENT MARKET

Management of Groupe Laperrière & Verreault Inc. is pleased to announce the signing of an exclusive letter of intent with Enviroquip Inc. to acquire all the Austin, Texas

based company's outstanding share capital subject to certain conditions. With annual sales of approximately \$25 million, Enviroquip produces water and wastewater treatment equipment, mainly for municipalities. In addition to various aeration, filter underdrain, aerobic digestion, belt filter press and clarifier systems, Enviroquip holds the exclusive U.S. municipal market license for the Submerged Membrane Unit developed by the Japanese multinational Kubota. This wastewater

treatment technology is increasingly in demand by municipalities. The combination of Enviroquip's products and Kubota's membrane provides it with an edge in the marketplace, as it enables it to offer complete high-performance and cost-effective solutions. It should be noted that GL&V has been the exclusive Kubota membrane licensee in Canada since 2004.

This acquisition, when concluded, will be the fourth to be realized by GL&V's Water

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Treatment Group (Eimco Water Technologies) within the past fourteen months. Richard Verreault, president and COO of GL&V, indicated that the Enviroquip acquisition will bring a significant strategic value since it will enable Eimco Water Technologies to establish its presence in a market segment experiencing faster growth than the wastewater treatment industry as a whole, but where there are considerable barriers to entry due to numerous existing patents. "The addition of

this relatively new technology to our current selection of technologies will strengthen GL&V's existing and future positioning in the North American municipal market." As for Enviroquip, a private company owned by its management and employees, being combined into a group of GL&V's size will provide greater leverage and growth potential in this market segment currently undergoing a consolidation movement by some multinationals.

Kubota has already given its basic consent to the transaction which, however, remains subject to certain conditions, including the satisfaction of a due diligence review by GL&V, and the obtaining of all required approvals.

Source: Groupe Laperrière & Verreault Inc.

#### WIDE RANGE OF EQUIPMENT TO BE DISPLAYED AT EXPO GRANDS TRAVAUX

Equipment of all different shapes and sizes will roll into Olympic Stadium in September in anticipation of what will be the largest heavy equipment show ever held in Montreal. Don't let the show name fool you... Yes there certainly will be lots of huge gleaming excavators, dozers and the like, but there will also be smaller equipment such as mini-excavators and tractor loader backhoes to name a few.

Booth sales for this event have far exceeded expectations. The main floor of the stadium has been sold out for well over a month and now space is being sold in the East Hall, which is easily accessible from the Stadium floor. "We knew the demand was there for a show in Montreal, but honestly, we did not expect this response. To say that we are thrilled is an understatement" enthused show manager, Mark Cusack. According to him, "Visitors to this show will not be disappointed. They will be able to see all the new lines under one roof, giving them the opportunity to compare on the spot and make informed purchasing decisions. There will be something for everyone at this event, whether you are one of Quebec's major road builders or a small to medium renovation contractor or even a commercial landscaper. The equipment each one of these groups uses will be there." As an example of the wide range of equipment Mr. Cusack further stated that companies such as Hewitt, Industries Wajax, Federal Equipment, Longus Equipment and Strongco will be front and center with a full range of equipment from







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the massive heavy iron right down to the mini excavators. Plus according to Mark Cusack, there are a number of companies in the show whose focus is the smaller lines such as Lavaltrac, Conagfor/Yanmar, Eastrock Inc., Les Équipements G. Comeau Inc., Les Équipements Manuquip, Montreal Tractor and Thomas Equipment.

Expo Grands Travaux takes place September 22 - 23 at Montreal's Olympic Stadium. Visitors will find the latest exhibitor list online at [www.expograndstravaux.ca](http://www.expograndstravaux.ca) and can register for a discounted fee of \$5.00 (regular admission is \$10.00).

Anyone interested in booth space in the show can contact Mark Cusack at Master Promotions.

Source: Master Promotions Ltd.,  
1-888-454-7469, [www.expograndstravaux.ca](http://www.expograndstravaux.ca)

### FINNISH FIRM BUYS MAJORITY OF MORRIS MATERIAL HANDLING

The U.S. unit of Finnish crane manufacturer KCI Konecranes has purchased a majority stake in Morris Material Handling Inc. for about US\$38,5 million.

Under the deal, HMM Acquisition Corp., a wholly owned subsidiary of Konecranes Inc., has acquired 59,2% of the shares of MMH Holdings Inc., the owner of Oak Creek-based Morris Material Handling, the firms said in a joint statement.

Konecranes Inc., based in Springfield, Ohio, is the U.S. unit of the Finnish company KCI Konecranes plc. Konecranes said intends to explore possibilities to acquire additional shares in MMH Holdings.

Morris Material Handling, once known as the P&H Crane Division of the old Harnischfeger Corp., is a manufacturer of overhead cranes and hoists with about 980 employees. Sales for the first half of fiscal 2006 were US\$102 million, with operating profit of about US\$5,5 million. Its annual sales were US\$170 million in all of fiscal 2005.

Konecranes said, pending completion of due diligence, that it did not believe that Morris Materials Handling's "general business and financial risk profile would materially deviate from what is typical in the United States in this field."

KCI Konecranes is a global manufacturer of industrial cranes, shipyard and dock cranes and lifting equipment with annual sales of more than US\$1 billion. KCI Konecranes acquired Morris Material's United Kingdom-based business, Morris Material Handling Ltd., last year.

The Blackstone Group L.P., a private equity and investment advisory firm based in New York City, advised Konecranes Inc. on the transaction.

Source: KCI Konecranes

### NEXT GENERATION POSITIONING APPLICATIONS TO OPEN-PIT MINES

Working to provide mining customers with the most compelling high-precision GPS applications, Novariant and Wenco

announced a partnership that integrates Wenco's BenchManager suite of applications with Novariant's Terralite™ XPS system. The integrated solution will support virtual ore control and guidance applications for shovels, dozers, and drills with positioning up-time approaching 100%.

The combined offering of Wenco's BenchManager Plus application and Novariant's MX100 receiver delivers the most accurate – and most available – bucket positioning so-

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lution on the market. The system determines cuts and fills, orientation and dig limits. It also sends data to the host system and collects as-built data. One of the unique features of the Wenco system is the ability to determine the precise bucket location by measuring joint angles with accelerometers. When combined with Novariant's MX100 receivers, operators and mine planners can accurately determine the position of each load, ensuring all assignments and ore qualities are based

on the latest dig block model.

"Wenco's goal is to bring the most compelling mining solution to our customers," said Phil Walshe, president at Wenco. "We explored a range of alternatives to deliver a system that could operate 24/7 and concluded Novariant's unique approach to the problem was technically sound and proven to work in the challenging environmental conditions of open-pit mines. By partnering with Novariant, we have the opportunity to

add value by integrating our BenchManager suite of products with the latest in positioning technology."

Novariant's Terralite XPS delivers over 99% GPS position availability in open-pit mines, even in areas of the mine where GPS positioning alone is problematic. Machine-mounted MX100 receivers are capable of reception of both GPS and XPS signals from Terralite Transmit Stations set up around the rim of the pit.

"Open-pit mines present numerous challenges for GPS-only or GNSS-enhanced receivers, these challenges have been overcome by Terralites," said Anthony Bruno, general manager for mining at Novariant. "We designed the system to work with any application that requires constant positioning information. Wenco's BenchManager is an excellent example as it provides tremendous utility to the mine, especially when combined with accurate, reliable positioning data from Terralites."

Source: Novariant, Inc.

#### SNC-LAVALIN AND SAIPEM AWARDED CONTRACT FOR LNG TERMINAL

SNC-CENMC G.P., a partnership between SNC-Lavalin Inc. and CENMC Canada Inc., an affiliate of Saipem SpA, has been awarded a contract by Canaport LNG Limited Partnership to design and build a Liquefied Natural Gas (LNG) import and re-gasification terminal in Saint John, New Brunswick.

SNC-Lavalin Inc. and CENMC will jointly carry out the engineering, procurement and construction (EPC) for the onshore portion of this world-scale facility, the first constructed in Canada. Work will be carried out from SNC-Lavalin's offices in Montreal and from project site offices in Saint John.

"This project marks a further milestone for SNC-Lavalin in the growing LNG market sector," said Jean Nehmé, senior vice-president and general manager, Industrial Division, SNC-Lavalin.

The Canaport LNG Terminal includes two LNG storage tanks, each with a nominal capacity of 160 000 m<sup>3</sup>. The facility, located adjacent to Irving Oil's existing Canaport terminal, will have an initial send out capacity of 1 billion scf/d of natural gas. Work on the project has started and the terminal is scheduled to be operational in the fourth quarter of 2008.

"We are pleased to be selected for this landmark LNG receiving terminal in Canada," said Pierre Duhaime, executive vice-presi-



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dent, SNC-Lavalin Group Inc. "The SNC-Lavalin-CENMC partnership offers demonstrated technical expertise in LNG terminals and a proven track record in the execution of large EPC projects."

Canaport LNG, which will own and operate the terminal, is a limited partnership formed between Repsol YPF, S.A. of Spain and Irving Oil Company Limited of Canada. Repsol YPF is an international oil and gas company, operating in more than 25 countries. Irving Oil is a privately owned energy processing, transporting and marketing company that also operates a 280 000 bb/d refinery in New Brunswick.

Source: SNC Lavalin Inc.

### THE FUTURE OF CANADA'S INFRASTRUCTURE

Creative solutions to the economic, environmental and social problems of poor asset management and aging infrastructure is the focus of the Third Annual Summit, The Future of Canada's Infrastructure - Moving Towards a Unified Approach with New Directions for Sustainable Growth, commencing September 27th, 2006, at the Holiday Inn on King, 370 King Street West, Toronto.

Several significant initiatives are underway such as the national round table for sustainable infrastructure and its five working groups. This event will bring together leaders within government and industry and provide the answers to asset management and sustainable infrastructure. The summit is supported by ReNew Canada, Municipal World and InfraGuide.

The guest speakers to be in attendance include Andre Juneau, deputy head, Ministry of Transport, Infrastructure and Communities, Mike Lewis, project director, Central Artery/Tunnel Project, Massachusetts Turnpike Authority, Peter Jones, chair, Ontario Power Authority and Dr. Michael Roschlau, president and CEO, Canadian Urban Transportation Association.

The Third Annual Summit, The Future of Canada's Infrastructure is produced by Strategy Institute, an independent North American, research-based organization that monitors and communicates changes to government and industry leaders.

Source: Strategy Institute,  
www.strategyinstitute.com

### "GREEN ENERGY BENNY FARM" PROJECT TAKES PRIZE AT GLOBAL HOLCIM AWARDS

The "Green Energy Benny Farm" project

took the bronze prize at the global Holcim Awards in Bangkok, Thailand.

The Bronze award winner, the "Green Energy Benny Farm" project, is a model of urban architecture and landscaping. It comprises the sustainable construction and renovation of 187 housing units on four properties, each linked to a common green infrastructure.

The Benny Farm project hopes to obtain LEED (Leadership in Environmental and

Energy Design) certification as a model of green architecture and the enlightened use of various technological innovations to help reduce greenhouse gas emissions, potable water consumption and waste production, and to increase energy efficiency.

The Holcim Awards competition was launched by the Holcim Foundation for Sustainable Construction

Source: St. Lawrence Cement,  
Holcim Group

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## New BOMAG Pneumatic-Tired Rollers

BOMAG Canada introduces the BW24RH and BW27RH pneumatic-tired rollers. The new rollers, which replace the BW24R model, offer a hydrostatic drive system, two-point steering pivot and enhanced access to all maintenance points.

The BW24RH is powered by a 99 HP, water-cooled Deutz diesel engine, whereas the BW27RH features a 131 HP engine with charge air cooling. Both rollers are built with hydrostatic drive systems that provide infinitely variable speed control from 0 to 20 km/h and smooth transitions between forward and reverse. The hydrostatic drive system is also more fuel-efficient and requires less maintenance compared with mechanical drive options.

For improved steering capabilities, both rollers feature a two-point steering pivot on the front four tires. Contrary to a standard solid axle that would have all four front tires on a common beam, responding and turning simultaneously, the two-point system allows for sequenced steering. This means that when the operator turns the steering wheel, the inside and outside tire pairs turn at a different rate, allowing for smooth steering transitions and reducing potential damage to the surface of the mat.

The rollers feature ergonomic operator's stations that are designed for optimum visibility. The stations include two steering wheels, sliding/swiveling seats and automotive-style accelerator and brake pedals. This same platform design is shared with BOMAG's current line of heavy tandem rollers, making

for a very comfortable operator transition between rollers.

Offering a fully ballasted operating weight of 24 000 kg, the BW24RH delivers a maximum per-wheel load of 3000 kg, whereas the BW27RH can be fully ballasted up to 27 000 kg and delivers 3375 kg per-wheel.



The eight tires – four in the front and four in the rear – have a total coverage area of 2042 mm with a 500 mm tire track overlap. Additionally, the rollers come standard with an automatic tire inflation system that allows the inflation value of all tires to be easily adjusted from the operator's station.

The BW24RH and BW27RH have been designed for simplified maintenance. With all maintenance points positioned in one area and a wide opening hood, virtually every component is easily serviceable from ground level.

Other standard features include a pressurized water spray system with 400 l tank, ROPS and seatbelt, lockable anti-vandal dashboard protection, back-up alarm, headlights (front and rear) and hour meter. Options include a weather-proof cab, heater, air conditioning and heat retention shields.

Source: BOMAG Canada

# Skyland and Garick Announce Green Roof Partnership

Green Roofs For Sustainable Communities Conference – Skyland USA, LLC and The Garick Corporation roll out details of their joint efforts to make available a “certified” and brand name green roof media, rooflite™. rooflite™ will meet the growing needs of the green roof industry to have access to a standardized and “certified” soil media that can be part of any green roof system regardless of its location or design aspects. “As the green roof industry matures in North America, rooflite™ certified growing media products will meet the needs of our customer base that require the availability of roof top growing media when and where they need it,” said Rick Mahoney, managing partner for The Garick Corporation.

With a combined fifty years of experience in the green roof market place, the partnership of Skyland and Garick melds the production and technical know-how that Skyland brings to the table with the logistics and customer service strengths of the Garick Corporation. Additionally, with the creation

of this partnership all rooflite™ green roof products will now have as its major light weight mineral component HydRocks™ lightweight aggregate.

“We have been using rooflite™ green roof media products since their inception and have been very satisfied with the results,” says Mark Gaulin who is the current president of the National Roofing Contractors Association as well as a board member of Tecta America Corporation and president of MAGCO, a Baltimore Maryland based green roof installing company. “The recent improvements to the rooflite™ product line and the ability to have them available on a nationwide basis will fill a void in our future green roof projects needs.”

“We have a commitment and a duty to our customers for ongoing improvements and innovations for the rooflite™ product line,” said Joe DiNorscia, managing director of Skyland USA, “The Garick Corporation has already played a major roll in giving us the ability to carry these goals out with the addition of



their HydRocks™ lightweight aggregate to all rooflite™ products, and I am certain that our ongoing relationship with the Garick Corporation will give us the ability to continue to meet the demands of the green roof industry.”

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Source: Skyland USA, LLC

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# Overwashing of Existing Cables using HDD Horizontal Bore Rigs

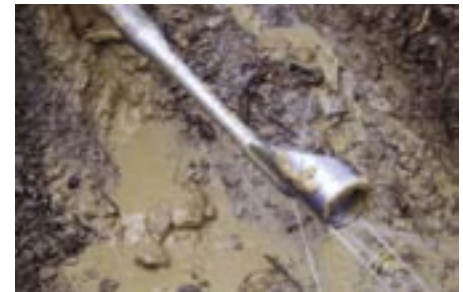


*Dr. Hans-Joachim Bayer,  
Tracto-Technik GmbH*

trenchless exchange of underground cables has been developed to a large extent. Due to the so-called overwashing method the old cable can be bored free in long, economical construction lengths, pulled out and then a new cable can be pulled into the bore hole of the previous old cable.

So far there are five different overwashing methods for the trenchless exchange

cal constraints of certain cable backfill types and also in certain soil conditions, there was never any routine job tasks. Tracto-Technik has developed a total of three overwashing on-line cable replacement methods in recent years and has had them protected with patents. Using the proven TT-overwashing method, trial jobsites have shown very good results, which means that this TT method



Trenchless pipe exchange methods have been available for numerous years, mainly for house connections and network pipes, especially for water, natural gas and sewage. These exchange methods often involve splitting, separating, bursting or replacing the old pipe, whereby old pipe sections are continuously pulled out or pressed out of the soil or remain split open inside the soil.

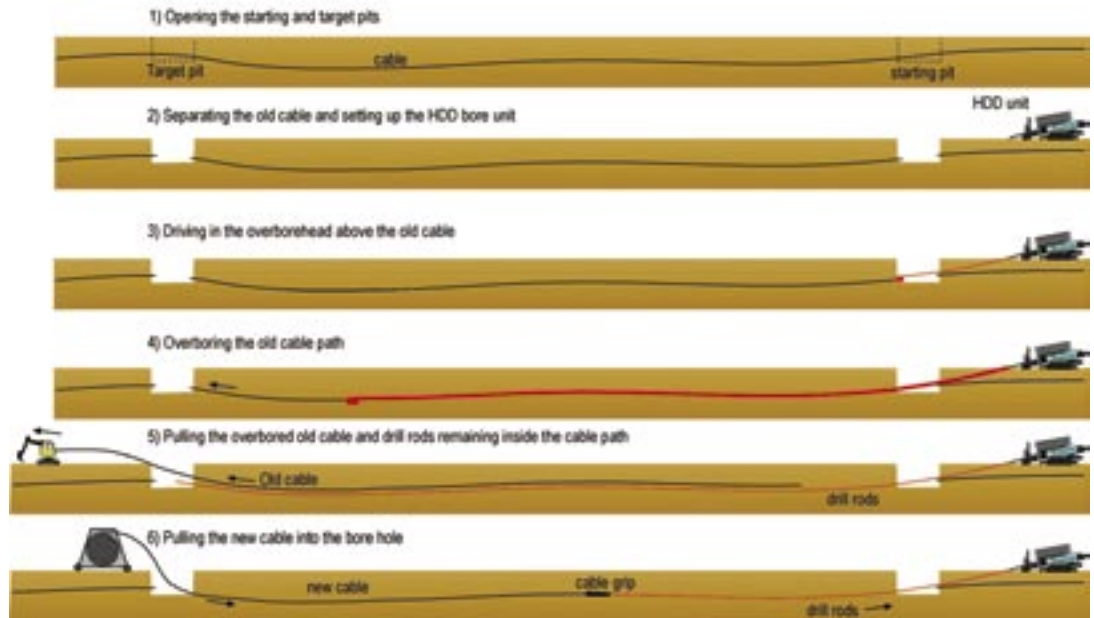
In the underground cable field there has also long been the request for trenchless exchange methods, especially as large quantities of cables from the 60's and 70's with faulty casings or with insulation damages incline to cause short circuits and need to be exchanged. Energy suppliers are nowadays often judged by their conscious approach towards the environment. That is why environmental friendly and cost saving installation techniques are preferably applied.

Meanwhile the method technology for a

of old cables, but also for the exchange of old pipes. FlowTex, together with ABB AG

has the potential for routine applications. The expertise, as is usually the case, is based on

Method sequence of overbore technology for exchange of cables



in Mannheim developed an overwashing method in the 90's, and also the company Leonhard Weiss in Göppingen. Single cable lengths were overbored and exchanged using the FlowTex/ABB method. Due to the techni-

the detail of the method of working and on the professional handling of the overboring tools and the overboring process itself.

# Drilling Business is Booming

*Brian O'Sullivan,  
Sandvik Mining and Construction Oy*

There is a management theory that encourages salesmen to adopt the same mannerisms as their potential clients when selling to them. The thinking is that people like to buy from people like themselves. While this theory is doubtful on an individual level, it appears to be true when it comes to companies – Big companies do like to work with Big companies. This is because the cultures are often similar, the management systems are the same and the volumes involved are much larger than smaller players can cope with. (You never find McDonalds ordering its buns from the local baker do you?)

The UK quarrying industry has undergone a fundamental change over the last 15 years. Continued consolidation has led to a large proportion of the country's quarries being

held by a handful of multi-billion dollar cement or aggregates producers. With a focus on their core competencies, these owners are increasingly outsourcing non-core roles to specialists. Drilling and blasting is just such a role – but one that has forced contractors to not only get big fast, but get professional too.

“In the past the standard of equipment and service could be hit and miss – and



*Ben Williams, general manager  
Blasting Services*

## New Heavy-Duty Addition to the Might-E Line of Electric Vehicles

Canadian Electric Vehicles, based in Errington, British Columbia, has added a heavy duty truck to its line of Might-E products.

The new Might-E Truck HD has a load capacity of 1000 kg and includes larger brakes and upgraded suspension. The trucks have a battery powered range of up to 100 km and a top speed of 40 km/h.

The 72 V direct drive system offers excellent hill climbing power and utilizes regenerative braking to increase range and reduce brake wear.

Might-E Truck HD is available with a variety of back ends ranging from a pickup box with electromechanical power dump to flat decks, van bodies, garbage tippers or custom



designs. The cab forward design offers maximum cargo space with minimum vehicle length. Steel cabs come standard with steel doors, opening side windows, heater, wiper and lighting package.

Source: Canadian Electric Vehicles Ltd., [www.canev.com](http://www.canev.com)

## CONEXPO Asia 2006 a Success!

CONEXPO Asia 2006 was a great success. The show, produced by the Association of Equipment Manufacturers in partnership with the China Chamber of Commerce for Import and Export of Machinery and Electronic Products, Transport Technology Exchange Center of Ministry of Communications and E.J. Krause and Associates, attracted a total of more than 13 100 visitors from more than 75 countries around the world.

The top attendee countries were China, followed by Australia, the United States, Korea, India, Japan, Russia, the Philippines, Singapore and Malaysia. International visitors accounted for about 18% of total attendance and came from countries around the globe, including Argentina, Brazil, Cuba, Egypt, Germany, Iraq, Italy, South Africa, United Arab Emirates and United Kingdom. Chinese attendance came from all mainland provinces/municipalities plus Hong Kong and Macao.

Source: Association of Equipment Manufacturers, [www.conexpoasia.com](http://www.conexpoasia.com)



very localized,” states Ben Williams, general manager of Blasting Services, one of the largest drilling and blasting contractors in UK quarrying. “Now clients demand the latest machines from the leading suppliers, well maintained and operated by smart, highly trained and safety conscious operators with regional coverage. There has been a sea change in our sector.”

The reaction times involved are now very short; an unexpected order may mean clients needing contractors on site quickly, providing shot rock on the ground. Such ‘just in time’ working is unforgiving of mechanical breakdown, and the average age of rigs has fallen accordingly. “In 2001 the average age in our fleet was six years,” says Mr. Williams. “Now it’s three. Total cost of ownership starts to rise after that, and despite full repair and maintenance agreements with our supplier, we would rather replace rigs than risk a reduction in machine availability.”

Although also involved in explosives supply, consultancy, training and environmental analysis, the efficiency of the rigs is the key component affecting drill and blasting contractors’ profitability. As customers are only charged for the amount of rock that is put ‘on the ground’, any machine downtime directly impacts top line sales. In 2005, Blasting Services put 22 million t on the ground in 70 sites around the UK, helping it towards a \$10 million turnover and making it one of the largest players in UK quarrying. A large proportion of that has been put back into the business in acquiring new rigs. Leading supplier Sandvik has provided a Ranger 800 and four Titon 500 diesel powered, self-contained crawler mounted down-the-hole drilling rigs in the last two years. The Titon rigs are matched with Sandvik’s Drilltech Mission range of Mirror Impact DTH hammers and drill bits. “We expect to get 1000 m a week out of these rigs to justify our investment,” says Ben Williams.

The Titon 500 is built in Sandvik’s Austrian facility and is designed for drilling 105-152 mm diameter holes to depths of up to 35 m when equipped with 76 or 89 mm diameter drill pipes (5 m long). Drill power is supplied by 24 bar air pressure provided in 22 m<sup>3</sup>/min lungfuls and the operator is insulated from the action in a FOPS/ROPS air-conditioned cab. The ‘mirror impact’ element of the Mission hammers refers to the way that the drill bit is shaped to mirror the hammer piston: optimizing the energy transfer from the piston to the rock and resulting in

faster progress. “One operator told me that he preferred our Mission hammers and drill bits because their better efficiency meant he could take Saturday mornings off – as he had made his target for metres drilled by Friday,” laughs Sandvik’s UK sales manager Mark Haywood.

It’s not just the speed of the Sandvik rigs that makes life easier for contractors; there are a number of issues that help to increase safety, productivity and therefore profitability. Not least among these is the integrated dry dust collector, which offers both environmental and operator safety advantages. The powerful Caterpillar C11 engine helps provide the energy to provide compressor air volume sufficient to operate 4 - 5 in. DTH hammers at high pressure. The Titon’s 5 m long drill pipes have the combined benefit of both improved productivity and added stability to the rig when drilling.

“Because our rigs are continually being moved from one customer’s site to another, the Titon’s compact design makes transporting them a straightforward exercise,” says Mr. Williams. “The heavy duty frame and excavator tracks mean that they can cope with poor access (which is common), and their relatively high speed tramming mode (4 km per hour top speed) helps get the rigs quickly to the work area.” he concludes.

#### **SAFETY IN NUMBERS**

Specialist drill and blasting is increasingly being taken over by larger operators and it is leaving behind the smaller family owned companies. Ben Williams’ Blasting Services evolved from such humble beginnings. He recognized the change that was coming in the industry and negotiated the company’s own acquisition by Exchem, the UK’s largest explosives supplier to the quarrying industry. This not only provided the financial backing to go on the acquisition trail, buying up several other family owned contracting firms, it also provided access to the latest thinking in training, environmental & safety care – not to mention modern explosives techniques.

Blasting Services now employs over 40 people and has adopted a corporate culture rather than a family owned one. Its turnover



may ‘only’ be in the millions, but it now talks the same language as its billion dollar customers. “The biggest change we have undergone is in our training regime,” believes Mr. Williams. “How an operator uses a drilling rig is the primary factor influencing how well it drills, how often it breaks down and how long it lasts. A well trained operator can get the best out of a rig just by using it properly. All our rig operators have the NVQ level 2 qualifications. How we service the rigs is also important: we have a preventative maintenance program that, in partnership with Sandvik, keeps the rigs at peak condition and helps prevent downtime through component failure.” Sandvik’s Mark Haywood has also noticed the change: “Potential problems with the machines are now being spotted early, allowing us to plan preventative work, avoiding component failures, lost working time – and waiting for the emergency supply of spare parts. This partnership approach is not revolutionary – but it just didn’t happen in the past in this industry,” he says.

Having quality products and maintaining them well is no longer the order winning criteria when considering which drill rig supplier to choose. Contractors like Blasting Services are also relying on rig suppliers to provide financial services that allow an optimal mix of capital investment (in machine purchases) and operating cash flow (via leasing agreements). “All the market leading firms make good machines,” says Mr. Williams, “but the key factor is Support – I don’t ever want to hear the word... ‘But!’”

# RockCracker Helps in the Rescue of Two Trapped Miners

RockCracker® cartridges were used as part of the array of methods involved in the safe release of the two trapped miners in the Beaconsfield Mine, at Beaconsfield in north-east Tasmania, Australia. A rock fall inside the gold mine killed miner Larry Knight and trapped his colleagues Todd Russell and Brant Webb.

RockTek Limited and Eastrock Inc. are proud that RockTek's RockCracker® product has been associated with the mine rescue through the efforts of Darren Flanagan, technical representative for RockTek's Australian Distributor. Mr. Flanagan, who has many years experience with RockCracker® and is an expert in the use of the PCF® (Penetrating Cone Fracture) technology, supervised the use of the RockCracker® products in completing the final stages of the rescue tunnel that had to be dug to get to the two trapped miners in what was deemed an extremely sensitive geotechnical environment coupled to the proximity of the trapped miners who were at the final stage

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Source: Eastrock Inc.

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Wacker Canada is pleased to announce the addition of Stéphane Riggi as District Manager for Quebec and the Maritime Provinces. Mr. Riggi has extensive experience within the rental industry and will be working with Tom Aebil, Technical Trainer and Steven Filiatrault, Jobsite Demonstrator. To learn more about Wacker Canada visit [www.wackergroup.com](http://www.wackergroup.com)

Wacker Canada also announced the purchase of Ground Heaters Inc of Spring Lake Michigan, a major manufacturer and supplier of surface and air heaters for the construction industry. To learn more about Ground Heaters visit [www.groundheaters.com](http://www.groundheaters.com)

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# Exhibit Space Sales Open for Conexpo-Con/Agg & IFPE

Companies signing up by August 15, 2006 to exhibit at Conexpo-Con/Agg 2008 or IFPE 2008 will be included in the first space assignment process for the shows. After August 15, companies will be assigned space on a first come, first served basis, according to product category.

The next Conexpo-Con/Agg and co-located IFPE expositions will be held March 11-15, 2008 at the Las Vegas Convention Center in Las Vegas, USA. The shows are held every three years.

Conexpo-Con/Agg is the largest gathering place in 2008 for the construction industries. IFPE is the leading international exposition and technical conference devoted to power transmission and motion control through hydraulic, pneumatic, mechanical and electrical technologies.

Some 125 000 industry professionals from around the world are expected to attend the co-located events to comparison-shop for the latest equipment, products and services; participate in targeted education sessions that increase industry knowledge; and network with peers and competitors to exchange ideas and information.

A value-added "exhibitor package plan" is again included in the shows' exhibit space rates, to provide maximum return on investment to companies participating in the expositions. The plan covers full drayage services (including the unloading/loading of all crated materials and machinery and delivery to exhibit spaces from the marshalling yard and pick-up at show close), general stand cleaning, and pipe and drape for standard inline exhibit stands.



More information is available online in the exhibitor section of [www.conexpoconagg.com](http://www.conexpoconagg.com) or [www.ifpe.com](http://www.ifpe.com)

Source: Association of Equipment Manufacturers



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# Designing Bearings for Wind Turbines

*Werner Göbel, senior business manager  
Renewable Energy, SKF*



to the dimension of the plant due to decreasing speed.

The degree of irregularity of the skidding movements is determined predominantly by the amplitudes and frequencies of the vibrations acting on the bearings, but also by the degree and mode of deformations, which are forced on to the bearings by the environment. Both criteria are assessed and considered within the framework of conventional bearing design, however, not in great detail, since the classical design tools allow this only to a limited extent.

## **A NEW LOOK AT THE PROBLEM**

The following is a comparison of the different concepts of the classical and the new dynamic bearing design and their respective solutions.

For a long time, rotor shafts have been almost exclusively supported by two spherical roller bearings, or alternatively one spherical roller bearing (picture 1), and the gearbox itself. In both variants, except for a few exceptions, the end of the rotor shaft is mounted into the hollow input shaft of the gearbox. The shafts are then fixed to each other by means of a (shrinkage) coupling, which clamps both ends together. In the first variant, the gearbox mass is supported by the rotor shaft, and the torque support at the gearbox housing takes up only the bearing reaction forces resulting from the torque. In the second variant the torque support has to bear also the gearbox mass and part of the rotor load. In this case, the proportionate rotor load is transmitted via the planet carrier bearing into the torque support.

Due to the flexibility of the machine frame and the interplay of numerous manufacturing tolerances, it is practically impossible in this design to align the housing in a way that the bearing seatings are aligned to the shaft within narrow limits, as it is required for most roller bearings. As deviations may

be considered bigger, it is only self-aligning bearings, such as spherical roller bearings, or SKF CARB toroidal bearings, that could be used without problems.

In the past, there have occasionally been



problems due to the displacement of the non-locating bearing, as it occurred in the spherical roller bearing by displacement of the outer ring in the housing. Thus, a loose fit is required. Due to the wind turbulences, the direction of the load acting on the outer ring does not remain absolutely stable, but varies at least slightly. This increases the risk of fretting corrosion, which eventually impedes the displacement of the non-locating bearing, and in the worst case reduces the service life of housing and bearing. This problem could be solved after the introduction of the SKF CARB toroidal bearing, as the displacement of the non-locating bearing – similar to cylindrical roller bearings – occurs within the bearing, and therefore, the outer ring can be firmly located in the housing. In the case of the classical design, the ideal construction requires that the rotor shaft is supported by an SKF CARB toroidal bearing as the non-locating bearing, and a spherical roller bearing as the locating bearing.

With the classical design method, there are still quite some improvements that can be made in order to minimize additional loads caused by the system vibrations (blade passage frequency, natural frequencies of tower and blade) and the skidding movements

Main gearboxes in wind turbines can exhibit the phenomenon of torque inversion; where the load transfer in rolling bearings changes and leads to a displacement of the shafts relative to each other. These relative movements become bigger with increasing elasticity of the whole construction and with increasing bearing clearance. Due to the inertia of the construction parts that are in motion, the shaft displacements lead to undesired additional loads on the bearings.

The major shaft displacements are axial displacements. In roller bearings, this increases the probability of axial skidding of the rolling elements, which can lead to wear. Wear reduces the service life, and in the worst case, this can lead to total bearing failure. Skidding of rolling elements is not damaging, as long as there is a sufficiently thick lubricant film to prevent direct metallic contact of rolling elements with the bearing rings and the cage. But, the development of such a separating lubricant film becomes more difficult due to:

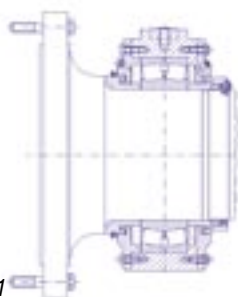
- the bigger the degree of irregularity of the skidding movements
- the lower the speed, and
- the lower the lubricant viscosity.

The required minimum viscosity for a separating lubricant film increases according



within the bearing. The spherical roller bearings that are fitted in wind turbines, are radial bearings, which can also accommodate axial forces. Especially in a flexible environment, radial bearings need at least a small radial clearance. The clearance increases with the size of the bearing.

Due to the relatively small thrust angle of the spherical roller bearing, the axial clearance can be, depending on the bearing series, 3.8 to 6.5 times higher than the radial clearance. As in the case of the wind turbine design described before with only one spherical roller bearing, this bearing also assumes the function of the locating bearing and, as it is usually placed at the wide diameter of the shaft, the required load capacity is



Picture 1

reached with a bearing series 230. However, in comparison to series 240, the 230 series has a smaller thrust angle, and therefore is in the upper range with respect to the axial clearance. In contrast, bearings of series 240 are in the lower range, i.e. axial clearance is up to 35% lower. Moreover, bearings of series 240 have a considerably higher load capacity.

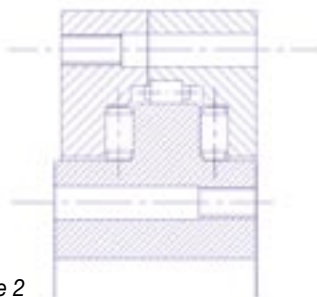
In the design variant with two rotor bearings, the performance capability of series 240 allows the location of the locating bearing at the thinner end of the shaft, which leads to another reduction of axial clearance by 15%. In practice, this would mean that the function of the locating bearing is taken over by a spherical roller bearings 24096 instead of a 230/600, which cuts the axial clearance by half.

#### STIFFER ARRANGEMENTS BUT UNSATISFACTORY SOLUTIONS

However, these solutions are not ideal and there is a need for stiffer bearing arrangements. Contributing to stiffer arrangements are :

- increase of the thrust angle
  - reduction of bearing clearance up to bearing preload
  - elimination of the self-aligning function
- Some of these measures were thought

to be solved by using the moment bearing concept, which is sometimes also referred to in the technical literature as single bearing concept. This refers to a solution, in which one single rolling bearing, similar to the azimuth bearing, can also accommodate tilting movements. Therefore, this single bearing was thought to be sufficient to support the rotor. This concept was used in wind turbines more than 10 years ago. At the time, this was still done with a triple-row cylindrical roller bearing (picture 2); a design that had been used for a long time in the case of azimuth bearings. However this solution was unsuccessful in wind turbines and the bearings failed prematurely.



Picture 2

#### DYNAMIC ANALYSIS LEADING TO NEW BEARING CONCEPTS

By the application of modern simulation, analysis and calculation methods, better designs can be developed.

First, in wind turbines the bearing environment is not necessarily stiff enough that the required rotor support and dimensional stability are achieved. The bigger the deformations to which a bearing is subjected to in operation, the higher the risk of wear and early failure.

Second, the failed bearing design had a further handicap. In both axial rows, cylindrical rollers, which due to their geometry have a natural tendency to roll in a straight direction, are forced to follow a circular raceway around the bearing center. This causes friction at the rolling elements.

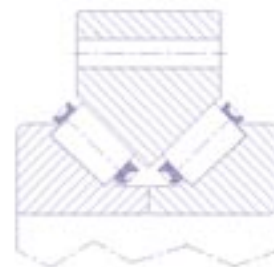
Both criteria lead to wear, and thus increase the load acting on the cage.

The material dimensional stability and its effect on performance can be investigated by means of FEM calculations that also take into consideration effects of the operating environment. This analysis provides much information from which the bearing design can be modified, in a way that it is better suited to accommodate the stresses resulting from the application.

However, only by the application of dynamic simulation can the interaction between rolling elements, rings and cage be seen and quantified. SKF's self-developed software for bearing simulation, BEAST, is an extremely powerful design tool and was used in the search for a solution. In particular, BEAST gives information about the cage function and interaction that no other design tool can give.

#### SKF – NEW SOLUTIONS

The results have shown that the measures to increase the bearing stiffness can be ideally realized by a bearing concept based on a double-row taper roller bearing in conjunction with a flexible cage and a thrust angle up to 45°. (Picture 3). Due to the taper design,



Picture 3

the rollers roll without the “circular raceway generated” friction, mentioned earlier. The friction occurring in taper roller bearings at the bearing shoulder remains small due to a small roller angle. The combination of a small cross section with a large pitch diameter leads to this small roller angle also for bearings with a large thrust angle. In addition, the bearing shoulder is designed in a way that is favourable from the tribological point of view, in order to ensure that an ideal lubricant film can develop in the roller-shoulder contact area. The decisive advantage, however, lies in the flexible cage, by which the total friction moment of the bearing is considerably lower than in all other variants designed so far.

Another design that would be successful are hub bearing arrangements with taper roller bearings, proposed by SKF in the early designs for wind turbines. At that time sophisticated dynamic analysis was not available and verification, by long term field trial and error testing, was not considered economical by the wind turbine industry.

An added advantage of the new SKF solutions is that they also transmit considerably smaller external vibrations to the gearbox, or the generator, which means less stresses and longer life on those components.

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## Agenda

### 10<sup>th</sup> International Conference on Asphalt Pavement

August 12 - 17, 2006  
 Quebec City, QC Canada

### 7<sup>th</sup> International Conference on Short and Medium Span Bridges

August 23 - 25, 2006  
 Montreal, QC Canada

### SIVIC - International Industrial Vehicle & Body Trade Show

August 29 - September 1, 2006  
 Saint-Jean-sur-Richelieu, QC Canada

### ROAD ENGINEERING - 2<sup>nd</sup> International Fair of Road Construction, Industry, Infrastructure, Construction Equipment and Special Vehicles

September 4 - 6, 2006,  
 Kiev, Ukraine

### DEMOMAT 2006

September 8 - 10, 2006  
 Mons, Belgium

### Oil Sands Trade Show & Conference 2006

September 12 - 13, 2006  
 Fort McMurray, AB Canada

### EXPO Grands Travaux 2006

September 22 - 23, 2006  
 Montreal, QC Canada



### Third Annual Summit The Future of Canada's Infrastructure

September 27 - 12, 2006  
 Toronto, ON Canada

### Garden Expo (buying show for the Green & Floral industry)

October 17 - 18, 2006  
 Toronto, ON Canada

### INTERROUTE 2006

October 24 - 26, 2006  
 Rennes, France

### North American Quarry & Recycling Show

October 26 - 28, 2006  
 Atlanta, GA USA

### 24<sup>th</sup> International NO-DIG 2006

October 29 - November 2, 2006  
 Brisbane, QLD Australia

### Bauma China 2006

November 14 - 17, 2006  
 Shanghai, China

### CONGRESS 2006 (International lawn & garden show)

January 9 - 11, 2007  
 Toronto, ON Canada

### Work Truck Show

March 7 - 9, 2007  
 Indianapolis, IN USA

### World of Asphalt Show & Conference

March 19 - 22, 2007  
 Atlanta, GA USA



### National Heavy Equipment Show 2007

March 22 - 23, 2007  
 Toronto, ON Canada

### Bauma 2007

April 23 - 29, 2007  
 Munich, Germany



### CIM Montreal 2007

April 29 - May 2, 2007  
 Montreal, QC Canada

### WasteTech 2007

May 29 - June 1, 2007  
 Moscow, Russia

### Hillhead 2007

June 26 - 28, 2007  
 Buxton, Derbyshire, United Kingdom

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