



# MINING & CONSTRUCTION

MECHANIZED ROCK EXCAVATION WITH ATLAS COPCO - NO. 1/2011



**Powder River Basin mine balances nature preservation with energy development**

**New claw bit finding success in Powder River Basin**

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**Modern technology takes over at Kensington**

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*Atlas Copco*

## EDITORIAL



**B**elieve it or not, 2010 has come and gone. Two months into 2011, Atlas Copco continues the momentum of its strong presence in a market driven by continued strong demand for metals and coal, with gold holding well over the \$1,000/oz mark and copper continuing to rise. In the U.S., coal prices and demand rose steadily with coal exports increasing as well.

Atlas Copco's 2011 plans include continued focus on supporting our customers after the capital equipment sale. A top priority, there is always room to improve, so it remains a primary focus with leadership from Jess Kindler, our new Business Line Manager for Parts and Services.

We'll continue focusing on Product Development, such as the new PV-235, as well as continued enhancements to the Pit Viper line up overall with increased Rig Control System (RCS) options. The new Secoroc Grizzly Paw is highly successful. Designed to be the most aggressive bit for coal overburden on the market, the bit's stellar performance proved out more than two years' of R&D with its speed, consistency, endurance and low maintenance.

On all fronts, Atlas Copco finished 2010 strong and has started off 2011 with good cause to be optimistic in its outlook through the rest of the year. Our success is nothing without our valued customers and to all of you, Atlas Copco wishes you a happy, healthy and prosperous 2011!

**Jon Torpy**  
Business Line Manager  
Rotary Blasthole  
& Waterwell Drills

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*The coal is drilled at a 20-degree angle. The mine has two coal formations. Here the lower 55-foot Canyon deposit is being drilled. The 18-foot thick Anderson deposit can be seen behind the drill rig.*



**Powder River Basin mine balances  
nature preservation with energy development**

# **FINDING A PERFECT BALANCE »**

**D**ry Fork Mine is a surface coal mine located in the Powder River Basin approximately seven miles northeast of Gillette, Wyo., on Garner Lake Road. The mine was constructed in 1989 and began commercial operation in 1990. About 70 employees work in the mine, which is well known for its safety and environmental achievements. In 2009 the mine celebrated having gone nearly seven consecutive years without a lost time injury and it recently received three prestigious environmental awards including the Office of Surface Mining (OSM) Excellence in Surface Mining Award, the Wyoming Game, Fish Industry Reclamation and Wildlife Stewardship Award, and an Excellence in Surface Coal Mining from the Wyoming Department of Land Quality.

Western Fuels-Wyoming, Inc. (WFW) is owned by a collective of cooperative power companies. The mine primarily supplies coal to the utilities associated with those rural cooperatives. Dry Fork is an industry showcase representing how mining, energy production and nature can realize sustainable success. Dry Fork practices balance between conservation and mining.

Dry Fork Mine is a 24/7 operation at the heart of the Powder River Basin in Wyoming and is scheduled to produce an estimated 5 to 6 million tons of coal annually, of which 1.5 to 2 million tons will be used in the new Dry Fork Station, a 385 megawatt power plant, located adjacent to the mine.

The Dry Fork Mine is a truck and loader operation with Le Tourneau 1850 and 1400 loaders and Cat 793D 240-ton and 789B 190-ton haul trucks. The drilling is done with a new Atlas Copco DML blast hole rig with the new Atlas Copco Grizzly Paw 10.625-inch bit. In the past, the mine drilled 9-inch holes with an older drill, but with the new DML they were able to increase hole size, allowing them to expand their pattern by nearly 30 percent.

#### **As good as new**

Every element is part of the reclamation plan. Animals, trees, surface rocks—it is all documented in the permitting process. Director of Regulatory Affairs Beth Goodnough is the keeper of the permit. “It’s



“ We’re trying to do in 10 years what it took nature hundreds of years of evolution to accomplish.”

**Beth Goodnough**  
Director of Regulatory Affairs

*Nature and mining live in harmony at Dry Fork Mine.  
The reclaimed land is a peaceful grazing area for wildlife.*



a constantly evolving permit. Currently it's 25 volumes long and growing."

Goodnough sited specifics to the remediation plan: "We make efforts to replace wildlife micro habitat impacted by mining by replacing shrubs, building rock piles, planting trees and bushes, and installing rock and bluff type ledges in the reclamation. The permit requires us to restore one shrub per square meter on 20 percent of the reclamation. The seed mixes are rather complicated and include the Wyoming big sagebrush, silver sagebrush and a variety of native grasses and forbs. The mixes are tailored to grassland areas, wetlands, bottomlands, shrub patches and mixed sagebrush/grassland post mine areas."

To support habitat, rock outcrops are also replaced where the integrity of the rock makes it possible. Another recently constructed feature is a 4-acre alluvial valley floor that was recreated in a reclaimed area to look similar to the one

that had been present prior to mining. In another area, the mine has succeeded in establishing a wetlands channel and has three restored wetlands ponds.

In addition to reclamation, all climate and sub terrestrial elements are examined and monitored. "Wetlands, hydrology, air quality, climatology, archeology, wildlife—everything is monitored, documented and reported monthly or annually. I see different inspectors once or twice a month, federal and state. We have a variety of folks with different focuses watching what we do," said Goodnough.

As for how close reclamation efforts are to pre-mining conditions, Goodnough said, "We're trying to do in 10 years what it took nature hundreds of years of evolution to accomplish." In total the mine manages approximately 10,000 acres of land. Of the mined area, nearly 20 percent of what has been disturbed has been reclaimed to what it was, before any mining activity.

Goodnough said the goal is to restore

disturbed land right behind mined land. "We want a 1 to 1 ratio as we go forward, an acre reclaimed for an acre disturbed."

Dry Fork isn't alone in its efforts to keep the Powder River Basin sustainable. The region is known for following thorough reclamation processes.

### **The right machine**

The DML is a new drill for Dry Fork, but drill operator Mark Lindsey said, "It didn't take but a couple weeks to get comfortable with the controls. I like the carousel system. It's very user friendly. There are good safety features on this rig, too, keeping you from screwing up."

Lindsey thinks the drill has "lots of air power and drills fast overall." The DML is outfitted with a 1900 cfm air compressor.

As for the technology factor Lindsey said, "I wasn't too sure I'd like the GPS, but now I'm spoiled because the depth is always right on the money. Now I really like it."



Mine Superintendent John Barnes said, "It's an advantage with the larger diameter hole because we don't have to shoot daily." He likes that the driller, Mark Lindsey, can be doing other things and they can stay ahead. Each blast usually requires 35 to 40 holes. When overburden is less than 30 feet, they drill vertical holes. Deeper than 30 feet and they drill on a 20-degree angle. The overburden is generally 60 feet deep. He said, "The Grizzly Paw bit performs well when drilling through rock." The drill's penetration rate is typically around 25 to 32 feet per minute.

Dry Fork is toward the north end of the Powder River Basin producing higher moisture, low sulfur, sub-bituminous coal at 8,000 to 8,200 Btu per pound. The mine has two pits with coal of different properties, which allows the mine to mix loads to a power plant's specifications.

Coal depth is a varying factor in the Powder River Basin coal region. This makes reclamation a bit more difficult too. Barnes said, "We map everything to ensure post-mining contours coincide with pre-mining elevations. This includes setting topsoil aside during initial excavation so it can be replaced after reclamation. Basically the reclaimed land will look just like it does before, just lower because the coal has been removed."

The coal in this part of the Powder River Basin exists in two layers. Barnes said, "The coal deposits came in two events." The mineable Anderson layer is on top, which is about 18 feet thick, and the lower Canyon deposit is generally 55 feet thick. A sedimentary stratum about 2 meters thick separates the two coal seams. When drilling in coal, Lindsey said, "The Grizzly bit drills like a hot knife in butter and it's easy drilling. It won't plug up either." When drill hole depths allow, both overburden and coal are drilled in a staggered pattern at a 20-degree angle.

To be successful here, a mine has to employ efficient and intelligent people and equipment. Getting the coal is just part of a process that ends in reclaimed land ... where the deer and the antelope will continue to play. 🕒

*The mine has won several prestigious environmental awards for achievements. The photos below show the mine pre- and post-reclamation.*





*This Grizzly Paw bit has drilled 375,000 feet, changing inserts 14 times. Average wear is at least 200,000 feet.*

# THE GRIZZLY IS MAKING A COMEBACK IN WYOMING

New Grizzly Paw bit is finding success in the Powder River Basin »»

Atlas Copco has developed a new drill bit specifically for softer overburden in geology like that of Wyoming's Powder River Basin (PRB). For two years engineers, rock tool technicians, machinists, drillers and many customers have worked together on a bit that would increase productivity in the consolidated sandstone formation that is infused with hard igneous boulders.

Traditionally, the most successful bit in the region has been a bit with hardened carbide teeth. However, when harder rock is encountered, a tricone may be needed to penetrate the formation. The Atlas Copco Secoroc Grizzly Paw bit allows the driller to penetrate glacial till and overburden to the coal seam.

Drilling in the PRB generally requires less than 200 feet of angle holes with 9-inch to 12-inch class bits. The most common are 10 5/8- and 12 1/4-inch bits, although Grizzly Paw sizes are currently available in 9, 9 7/8, 11 and 11 1/4 inches. Other sizes will be designed upon request. Pin sizes available

are 6 5/8 and 4 1/2.

The Grizzly Paw has evolved over nine generations in the last two years. It started out as a sketch on a napkin from Elko Senior Area Manager Jim Wheeler. He knew what he wanted and sat down with engineers to start the process. With the help of computers and programmable logic controls, the angle of the teeth and placement of air holes were moved and adjusted until they were just right.

Atlas Copco Product Manager Rob Fournier said, "There is more to this bit than one would think. This is high tech. At one time we overcorrected a full degree on the tooth angle and the bit didn't cut. This is the best formula for long-term wear and aggressive cutting."

Atlas Copco Rock Drilling Tools Specialist Walt Schroeder has been working with customers in the PRB to test the bit in the varying formations and on different rigs. "We've found the higher the RPM the more aggressive the bit will cut. It took a really fancy machine to make this bit just



The Grizzly Paw bit gives the most aggressive cutting angle while allowing the inserts to rotate in place for minimal wear.

right," he said.

Schroeder pointed out that it takes a different mindset when purchasing this bit; it has to be looked at based on cost per foot. "I will guarantee the Grizzly for 200,000 feet. You can't do that with other bits," he said.

A driller with 22 years' experience who tested the bit said, "I hope we never have to use the old bit again."

The driller pointed out that with the Grizzly Paw bit he will out-drill the compressor. He doesn't apply as much down pressure with the Grizzly Paw. The digital readout shows a maximum of 1,200 feet per hour (FPH) but he keeps it at 800 FPH on average.

This mine drills with an Atlas Copco DMM3 with 2600 cfm. He says at his mine they insert a choke above the bit to keep the pressure up, but he knows others in the area don't do this. "We go deep and like to keep the pressure between 50 and 60 psi and the choke will help with that." He said keeping the pressure up also keeps the compressor from heating up. Overburden at his mine requires drilling nearly 190 feet of hole depth with 12 1/4- and 10 5/8- inch diameter bits.

On the current bit they have drilled 375,000 feet using 14 buckets of teeth. This life-on-bit is not possible throughout the mine as other areas have more abrasive rock. Schroeder said, "200,000 feet drilled is no problem, but every situation after that is different."

The mine's drill and blast foreman said other bits require more weight on bit too. "When you don't have to apply as much weight on bit, wear is reduced. Our old bits could go through as much as a bucket a day."

He said there are benefits to other >>

TRICONE CARBIDE INSERT ROCK BIT SERIES VS. ROCK HARDNESS			
Rock UCS (PSI)	Tungsten carbide insert Tricone bit series		Rock Type
0	40 series 4-1 to 4-4	40 series GRIZZLY PAW	Claystone, Mudstone
4000	50 series 5-1 to 5-4	50 series GRIZZLY PAW	Chalky Limestone
8000		60 series GRIZZLY PAW	Soft Shale
12,000		70 series 7-1 to 7-4	Loose Sandstones
16,000		80 series 8-1 to 8-2	Limestone, Siltstone
20,000			Solid Sandstones
24,000			Medium Shales
28,000			Tuff, Soft Schist
32,000			Andesite, Rhyolite
36,000			Quartzite (Sand, Silt)
40,000			Limestone, Marble
44,000			Monzonite, Granite
48,000			Gneiss
52,000			Diorite, Diabase
56,000			Hard Shale, Slate
60,000			Limestone, Dolomite
64,000			Basalt
68,000			Tactite, Skarn
Higher			Granodiorite
			Taconite
			Quartzite
			Syenite
			Gabbro
			Banded Iron Formation
			Taconite
			Chert
			Quartzite
			Amphibolite
			Hornfels
			Hematite Ore
			'Lava', Basalt, Biwabac, Quartzite

TABLE 4. INSERT BITS VS. ROCK HARDNESS  
 Rock UCS hardness (Unconfined compressive Strength) is only one factor that contributes to the "drillability" of any rock. Other factors strongly influencing drillability are:

- Fracture Toughness
- Shear strength
- Young's Modulus of elasticity
- Internal angle of friction
- Any particular bit may be used in harder or softer rock than this chart indicates.





departments in the mine. “Maintenance is not my area, and it’s hard to quantify, but I can tell you maintenance is less, too, because I don’t have to push the drill as hard.”

The driller agreed with the D&B foreman, “It saves on cables and cylinders. It has to.” He said he averaged weight-on-bit at 9,000 pounds when drilling with the Grizzly Paw versus 12,000 pounds with the bit he was using before.

With the other bit, the driller said, “I have to check the teeth after every hole. With the Grizzly Paw I check every other hole unless I’m drilling in more abrasive sandy areas.”

An average 12-hour shift drills 15 to 16 holes or 3,000 feet. “I can get 20 holes, but I want the rig working for the next guy,” he said with a grin.

The D&B foreman said the most noticeable result of going with the Grizzly Paw bit is consistency. “Driller to driller everyone has a different skill level. This bit is more forgiving and equalizes the less skilled drillers with those with more experience.”

With the increased footage on each

bit, greater penetration rates and lower maintenance costs, he said the bottom line is the biggest benefit: “Overall my cost per foot is down, way down.”

*Mining coal requires casting the blast, or drilling on an angle so the blasted material shoots away from its location to the void. Here two DMM3s are working side by side.*



*The most common Grizzly Paw diameters are 10<sup>5</sup>/<sub>8</sub> and 12<sup>1</sup>/<sub>4</sub>, but 9, 9<sup>7</sup>/<sub>8</sub>, 11 and 11<sup>1</sup>/<sub>4</sub> inch are also available.*

# HISTORIC BC COPPER MINE ON TRACK FOR JUNE 2011 STARTUP



In spite of extreme cold weather arriving earlier than expected, Copper Mountain Mining Corporation's careful planning, perseverance and high tech investment in reopening a 15-year dormant copper mine remains on track to achieve full production by June 2011.

It's a full six months before startup, yet the mine is already rewarding the Princeton, BC, region with new jobs and a promising outlook for an economic windfall from the billions of dollars of copper, silver and gold the mine will generate. It comes none too soon for this area of British Columbia, whose forest industry has suffered from both pine beetle devastation and a downturn in the forest industry overall.

During its previous life, the open-pit porphyry mine had already yielded 1.7

billion pounds of copper, 9.1 million ounces of silver, and 730,000 ounces of gold from 23 years of continuous production before it closed in 1996, when copper prices were low. Exploration in 2006 by its new owner, however, promised that the mountain would reward the company with another 17-years' worth of production from its untapped mineral deposits.

## Data-based confidence in projections

Combined evidence from past drilling and modern exploration convinced stakeholders that there are still at least 1.5 billion pounds of copper left, with precious metal credits of more than 450,000 ounces of gold and 4.5 million ounces of silver.

Earlier this year, Copper Mountain Corporation President and CEO, James

O'Rourke, said the company anticipates full production to reach 35,000 tons per day, amounting to over 100 million pounds of copper a year and reaping significant amounts of gold and silver as by-products. With operational and financing costs totaling about \$1.30 (USD) per pound, the copper will sell at about \$2.80, which O'Rourke notes is a significant margin.

The overwhelming evidence that there are significant resource deposits yet to mine come from nearly 5,200 historical drill holes combined with more than 400 of the company's own. Continued exploration of the deep-seated porphyry in the fall of 2010 further confirmed extrapolated predictions. And the life of mine strip ratio is estimated to be just 2:1.



## High profitability, low risk

Although reopening a mine of this size is a formidable task, the project did come with some built-in benefits, such as a ready, skilled workforce from previous mining operations in the area, as well as a pre-existing infrastructure at this site. Only 15 miles from the town of Princeton, a paved highway runs past the mine, and the site has ample water resources with an ideal location for processing the extracted ore. Copper Mountain partnered with Mitsubishi Materials early on, who provided ideal security for the venture with financial backing and by ensuring the mine a reliable buyer for the ore.

The conscious effort to reduce operational risk has been evident in every component of the enterprise, including choice of equipment. For instance, to move the 25 million tons of material by May 2011 in preparation for full startup in June, and then to move the additional 60.5 million tons anticipated during the first production year, all blasthole drilling has been assigned in a three-year agreement to Atlas Copco and its Pit Viper series, as well as all drilling rig parts, ancillary equipment and tools.

Gary Wright, the Atlas Copco sales representative for southwestern Canada, said, "It's good for startups because it creates a partnership with the manufacturer and the mine. It includes everything from service to the steel and bits and allows everyone to work together."

The first rig, a diesel-powered PV-271, which has been in operation since September, was just joined by its electric counterpart in November. A second electric model, a PV-351, will complete the trio of Pit Vipers at the site in January 2011.

Alastair Tiver, Copper Mountain's Chief Engineer, said a mix of electric and diesel is working well. "Use of electric allows us to lower operating costs," he said. "The pit will be developed with a series of push backs, so having a diesel rig affords us some additional mobility to move a rig from one mining area to another, should additional drilling capacity be required."

## Strategy for reaching the metals

Peter Holbek, Vice President of Exploration and leader of the mine's exploration teams, explained the three-pronged approach the company is undertaking to realize the company's production goals. They have incorporated and expanded all three pits



of the mine under one, all encompassing "Super Pit." First the company will drill in areas of known mineralization from the previous operation. Second, they will drill in outer target areas that, although they were drilled previously, were not fully explored. And third, they will go after deeper targets, confident in the corroborative data from the new and historical information.

The company purchased the original, diesel-powered PV-271 for its ability to move quickly into other areas without the need to relocate power. The decision to purchase electric-powered Pit Vipers was based on economy. Although they would have purchased a third PV-271, Mine Manager Art Pratico said the PV-351E was immediately available. »

*Left: Copper Mountain Corporation chose a combination of diesel and electric powered drilling rigs from the Pit Viper series. The diesel PV-271 gave the mine independent versatility, moving quickly to any part of the Superpit.*

*Top: The diesel rig's components arrived onsite in September.*

*Bottom: By December, the rig had already logged more than 1,200 hours.*

“Use of electric allows us to lower operating costs.”

**Alastair Tiver**

Copper Mountain's Chief Engineer

The current PV-271s, with their ample 2600-psi air compressor packages, are well-matched to 10<sup>5</sup>/<sub>8</sub>-inch Epsilon rotary bits, which will allow quick clearing of the holes.

Pratico said the rigs are working well driving 25-foot steels while smoothly operating on the mine's 15-meter benches to stay ahead of scheduling goals. The electric model does give them the benefit of lower operating costs. Other than that, the diesel and electric perform comparably.

**Advantage of having a one-source equipment and service provider**

Copper Mountain Mining teamed with Atlas Copco for the complete supply of all required rock drilling tools. This provides not only the convenience of a one-source supply but also means Atlas Copco is in frequent contact with the company, maintaining prompt access to customer support. Service is instantaneous.

So how has the PV-271 been performing overall? Pratico said he is pleased with the machine. The diesel rig had already logged 1200 hours of operation. It not only performs well, but it is also being used as a trainer. The PV-271's high-tech upgrades give operators rich options without alienating those who are new to the series. It "operates just like any other drill rig," Pratico said, meaning it doesn't require a steep learning curve to train an operator's skills to proficiency on a Pit Viper. That drillers can acquire proficiency with the rigs quickly is just one more contribution to helping the mine keep on track for the June 2011 deadline. ◉



*Rapid drilling on the 15-meter benches is easily achieved by 10 5/8-inch Epsilon rotary bits and well matched 2,000-psi air compressor packages, allowing efficient clearing of the holes and increased tool life.*

# CANAL EXPANDS WORLD SHIPPING, REGIONAL GROWTH

## Consortium of companies selects Atlas Copco to support the excavation of the Panama Canal.

One hundred years ago drilling and blasting was underway to construct the Panama Canal. At the time, this undertaking was ranked with other man-made construction marvels such as the Egyptian pyramids, Roman aqueducts and the Great Wall in China. Today the Panama Canal is becoming even grander by doubling its annual capacity. Modern machinery is making the project much more efficient and productive, but no less monumental, than it was 100 years ago.

The original Canal was constructed by people who had gravitated from all over the world to be a part of building the project. Europeans, Americans, Asians — over 250,000 people in total — converged on Panama for the project that began in 1903 and was completed in August of 1914. Then the project was managed by the United States government. Today the Canal is owned by the Panamanian people and managed by the Panama Canal Authority (ACP) with construction of what is being called the Third Lock Segment being done by a consortium four companies called Grupo Unidos Por El Canal (GUPC).

The players in GUPC include Sacyr from Spain, Impregilo from Italy, Jan De Nul from Belgium and Cusa from Panama. Each company offers elements of expertise to the consortium, including drilling and blasting, dredging, civil infrastructure and excavation.

The three European companies each have drilling and blasting experience but have each taken the lead on various parts of the project, such as planning, working on the gated enclosures within the canal (locks), and excavating on the Pacific and Caribbean sides. There is no blasting necessary on the Caribbean side, only the Pacific side.

Two new lock facilities with three levels, or chambers, will be constructed — one on the Pacific side and one on the Caribbean side. Nine million metric tons of rock will be excavated from the Pacific side. Because



*Standing on the edge of the new Panama Canal, from the right, Atlas Copco Business Development Manager for Central America Hugo Arce, GUPC Plant Equipment Manager Gerd Casteleyn, GUPC Assistant Plant Manager Pieterjan Versteede and Drill and Blast Manager Jorge Perez-Blanco.*

the Caribbean side has no rock, aggregate for concrete will be barged in from the excavation on the Pacific side.

After the overburden removal, rock will be excavated by drilling to full depth in three benches. GUPC is drilling with six Atlas Copco ROC D7-11's with a COP 1840 rock drill. Bench height is 9.5 meters to optimize each scoop from the Terex shovel.

Every blast will have 2,000 meters of holes, drilled with Atlas Copco Secoroc bits (89 millimeter OD diameter with drop center). Hugo Arce, Business Development Manager for Central America & Caribbean from Atlas Copco, said, "Currently they are on very abrasive rock, and we're constantly working with them to find the right bit."

Atlas Copco recently opened a Customer Center in Panama to provide complete customer support at the Panama Canal and the overall Central America and Caribbean

region. Maintaining quality tooling, parts, and experienced technicians is important on a job with the scope of the Canal project. Extended warranty agreements and training programs on the Canal project will benefit GUPC so it can focus on the project.

Two thousand meters of drilling is equal to approximately 22,000 cubic meters of blasted rock per shift. GUPC's Plant Equipment Manager Gerd Casteleyn said, "The primary crushers will handle 1 meter size rock, but optimal size is 30 centimeter. We are very happy with the productivity we're getting from Atlas Copco. We are seeing variable life on the bits because there are so many variations in the basalt formation, but I think we're getting good performance."

Drill and blast manager Jorge Perez-Blanco said he has no problem holding that fragmentation with the 89-millimeter bit, »



*Atlas Copco's ROC D7 is the drill rig work horse on the Panama Canal expansion project. Panama City high-rises can be seen in the distance.*

but would like to experiment with larger diameter holes and variations in the pattern. “Currently, because the formation is so inconsistent, we are on a tight pattern of 2 meter by 2 meter,” he said.

Originally they started with explosive cartridges but have since converted to emulsion. The drilling portion of the project will take 30 months.

Excavation is conducted in two shifts of 10 hours each day, while the erection of the cement plant and crusher equipment is only done during the day. In addition to the six ROC D7 drill rigs, nearly 300 vehicles are used in the operation. GUPC has three XAS 375 JD6 compressors and one XAMS 850 CD7 compressor to power the pneumatic tools and concrete vibrators.

At this early stage of the project (excavation began in May 2010), the compressors are spending a lot of time with the erection of the crushing and cement facilities.

Also in the large fleet are 31 haul trucks in operation, with nine more scheduled to arrive in the future. The Caterpillar haul truck fleet consists of ten 777s, fifteen 773s and six 740 model trucks. The shovels and crushers are from Terex.

As of October 2010, 1,000 people are employed on the project. “When we are in

full operation, we’ll have 6,000 to 7,000 people working on both the Pacific and Caribbean sides,” said GUPC Assistant Plant Manager Pieterjan Versteede.

### **Hydrology Masterpiece**

The world’s ships are defined by two classifications: Panamax and post-Panamax class ships. That is, if a ship goes through the Panama Canal now, it’s the maximum size that fits in the locks. Those that don’t fit in the Canal either have to go around South America or off-load on one side of the canal where the cargo can go by train to the other side. Going around means millions of gallons of fuel consumed annually that wouldn’t have to be used with wider and longer locks.

Today there are 670 vessels, or 37 percent of the world’s containership fleet, in the post-Panamax class. Going through the Canal is a huge energy saver—7 to 17 percent per 20-foot container.

The new lock dimensions are 427 meters long, 55 meters wide and 18.3 meters deep. The new locks will allow ships up to 366 meters long by 49 meters wide with a 15-meter draft. That equates to a ship that can carry 12,000 twenty-foot containers. Water displacement from a ship that size is significant. To accommodate these huge

ships, water channels are designed into the sides and bottom of the locks. Water will also pass into containment ponds adjacent to each lock. These ponds will also allow the reuse of 70 percent of the water during each lockage.


Drilling, blasting and concrete work has come a long way in the last 100 years. Versteede said, “After you remove the overburden, there are slopes and angles in the rock surface. The drilling has to be perfect. You can’t correct it afterward.”

To ensure accuracy, the ROC D7 rigs are operating with the HQS MKII system. This system gives accuracy in angle of drilling and measures the depth of each hole. Additionally each machine has installed a satellite monitoring system (Procom) to provide data in real time about hammer percussion, engine hours, maintenance schedule and the machine location. The HQS MKII system allows the pre-drill plan to take into consideration the changes in the surface, as well as channels that will be drilled into the bottom of the lowest level to save in pouring extra concrete.

Concrete will also be poured with much more technical care than it was 100 years ago. Channels and contours in the faces will be poured with concrete chilled in the mixing process. Because of the 28–35 C degree

ambient temperature, the aggregate will be chilled during the process by running 4 C degree water over the aggregate as it travels on the conveyer to the mixing plant. Then ice will be added to the mix. To ensure the highest quality of final product, the concrete will be mixed at 8 C degrees, poured at 10 C degrees and laid at 15 C degrees.

To eliminate voids in the concrete, Dynapac pneumatic vibrators will be used for flat and vertical pours to lift air bubbles or improve leveling. The Atlas Copco compressors will power these vibrators to ensure integrity of the final product.

When complete, the Third Locks Project at the Panama Canal will allow shipping to grow and the region to expand, but it will also benefit the world because of shipping expansion and convenience. 



*Top Right: Pouring concrete is a daily occurrence at the Canal project and they haven't even gotten to the Canal cut yet. Here an Atlas Copco XAS 375 provides air for a Dynapac pneumatic screed to level concrete.*

*At Right: Currently the Panama Canal allows access to ships less than 106 feet wide and 965 ft long. The new Canal will allow ships 160 ft wide and 1200 ft long. The depth of the Canal will change from 42 ft to 60 ft deep allowing much heavier ships.*



## Atlas Copco's support for Central America

**R**ecently Atlas Copco opened its Customer Center in Panama that will act as a central support location for Central America and the countries of the Caribbean. Much growth in water development, infrastructure and mining is underway in this region.

To mark the occasion, a ribbon cutting was held at the new offices in downtown Panama City and a gala was hosted for customers of the region at the Intercontinental Hotel. The festivities brought nearly 200 customers and their guests from many of the countries represented by the new Customer Center.

Robert Fassl, President of Atlas Copco Drilling Solutions, sees the Panama Canal as a hub for growth for the region. "With the Canal expansion I see only opportunity for the people of Panama and the Americas."

Business Development Manager for Panama, Hugo Arce said, "As a Peruvian supporting the region, I have been coming to this area for Atlas Copco for a long time. I'm excited about the additional support we will be able to provide our customers."



# BREAKERS NEEDED FOR ACCURACY AT PANAMA CANAL PROJECT

**W**hen drilling isn't perfect on the Panama Canal project, it's necessary to carve away at the surface. "I have never seen rock like this. It varies from meter to meter," said GUPC Plant Equipment Manager Gerd Casteleyn.

"We are very careful on our placement of blast holes. It's very important to be accurate," he commented. Even with specific placement that is hand measured, unconsolidated rock and voids in the basalt can cause energy loss when blasting rock. This creates outcrops or larger boulders.

Pieterjan Versteede, Assistant Equipment Manger said, "The optimal rock fragmentation when drilling and blasting is 30 cm." The crushing process on the Canal project starts off with a jaw crusher that's capable of handling 1 m boulders. Larger boulders will be broken with a hydraulic hammer.

The blast holes need to be nearly perfect, with only 30 cm of slope deviation from top to bottom on each of the three 9.5 meter benches.

If the bench doesn't fit these specifications or if boulders need to be presplit, the Atlas Copco HB3000 hammers selected by GUPC get the job done. Casteleyn said, "We don't want to use the breakers, but it's necessary to have the right tools when we have problems with the blast."

"In the final stage of blasting we have to be very accurate; we can't correct afterward," said Versteede. He cited that the design of the lock walls will be shaped with baffled sides to minimize water displacement from the large ships. Too much rock taken out will result in extra concrete and toes will need to be shaved away.

"It's impossible for me to explain the intricacy of the final Canal face. The plans are extremely intricate and change all along the project," said Versteede.



*Panama: The Atlas Copco HB 3000 Hydraulic Breaker is not part of mining production, but very necessary to keep the shape of the canal wall. Voids and unconsolidated rock will cause poor blast areas.*

## Hand work

Ultimately, as many as 7,000 people will be working on the locks at the Pacific and Caribbean sides of the project. Hand work will be necessary to carve away smaller imperfections and work in tight places. To take this on, GUPC has purchased 150 TEX pneumatic breakers.

The TEX breaker was chosen because of its lightweight and durable design. "It's expected these will get lots of use over the life of the project and we needed a quality breaker," said Versteede.

In total, the company purchased six portable compressors. To power the TEX breakers GUPC chose Atlas Copco XAS 375 JD6 and Atlas Copco XAMS 850 CD7 air compressors. They wanted to be able to operate many breakers from one compressor. Running the main line into a manifold will allow them to operate many breakers in the area. ◉



*Hugo Arce, Atlas Copco's Business Development Manager for Central America & Caribbean, props up a new TEX Pneumatic breaker with Assistant Plant Manager Pieterjan Versteede. They have ordered 150 breakers for detailed hand work.*



# THE HEART OF THE LION

MODERN DRILLING TECHNOLOGY TAKES OVER AT KENSINGTON



*The snow capped mountain that overlooks the Kensington mine portal is called Lions Head. The ore body runs within the mountain on the left ending beneath Lions Head Mountain.*

**O**ne hundred twenty years ago gold was discovered at Comet Beach, 45 miles up the coast from Juneau, Alaska. From this beach, a mountain rises gradually at first, then steeply to a peak about two miles inland at just over 3,000 feet above sea level.

Gold seekers panned their way upstream, and then began underground tunneling nearly two-thirds up the mountain. Those early miners had no idea what they were standing on. Modern exploration has identified the major find known today as the Kensington vein. It's roughly 400 feet wide, 1,200 to 1,500 feet long and extends from the mountain top to 120 feet below sea level.

Mining on the opposite side of the mountain from the original mine workings, Kensington's mine camp looks up to the mountain peak called the Lions Head. The gold runs into the depths of that mountain.

Coeur Alaska, which took 100 percent ownership of the property in 1995, began mining at Kensington in July of 2010. In the first two months, the mine transitioned from a development crew of nine to a production crew of 50. Today 180 miners and another 20 consisting of camp support construction workers and contractors are in camp. It took just eight months to get the operation to full speed, producing 1,200 to 1,300 tons of ore per day.

## **Second Chances**

Coeur actually started mining at Kensington twice. From a September 2008 startup, mining operations continued to June of 2009. The ensuing permit battle went all the way to the U.S. Supreme Court, which ultimately favored Coeur.

The brand of drilling equipment Coeur purchased for use in the mine's first operation were sent to another Coeur property. When operations started again, management looked closer at other suppliers. The technology and support from Atlas Copco and its Alaska distributor, Construction Machinery Industrial (CMI), tipped the scales. »

Mine Superintendent Ezekiel Easley has been at Kensington since the beginning. “We’ve come a long way in a short time.”

The mine operates five Atlas Copco drills: a Simba M7C long-hole production drill, two Boltec MC bolters and two Boomer M2C face drills.

Mine Maintenance Planner Naomi Hammond is responsible for coordinating parts and communicating with vendors like CMI. “They have been a real life saver at times,” she said.

Maintenance General Foreman John Hecker agreed, commenting on the very limited space to warehouse parts — even critical parts. “Although we have substantial resources we are lacking real estate and really count on CMI,” he said.

The mine’s goal is to have three maintenance technicians on each of the three shifts. Scheduling is important because they have only one bay, but the drills have not been a problem. “The drills have a 93 percent availability overall while the Boltec is 90 percent,” said Hammond.

One of those maintenance techs is Shawn Duval. He said the only real problems to date have been related to human error. “There are fail-safes built into the rigs that make it hard to wreck anything. The computer doesn’t let the rig drill over its boundaries. In the old days, drillers would push them till they would come apart or blow a hose. You can’t do that with these.”

He said it’s also gotten easier to be a mechanic with the technology on these new rigs. “It can be intimidating — for drillers and mechanics — but you just have to trust what the computer is telling you. If there is



a problem, nine out of ten times it requires something as easy as cleaning a magnetic pick up.”

Duval said, “These things are made to have rocks drop on them and be wet all day. Most damage comes from tramming or operator error. Problems are usually self-inflicted.”

For the mechanics, fixing a drill includes drilling a hole. “The machine tells you what the problem is, which makes it easy to work on and operate. Like I said, you just have to trust what the rig is telling you. And they run so smooth, once a guy operates this rig, he won’t want to go to anything else.”

Duval added, “You’re not forcing things on these drills. Drilling requires a different mental attitude and a little finesse. With the older drills, if you’re running three levers

*The operator explains to Mine Superintendent Ezekiel Easley that having a second control station improves efficiency. Kensington had ordered the option of two screens on their Boomer M2C as a training tool.*

you really feel like you’re getting a lot done. With these rigs, it’s about working efficiently and not rushing it. You will get more done if you just trust the rig and move at its pace.

“Before computers, a driller had to feel it, hear it, hold the hole. A driller can’t be as accurate as a computer, not after a full day, on every hole,” said Duval.

Duval is talking about Tunnel Manager, Atlas Copco’s Rig Control System. The computer program on the rig integrates with the mine’s survey program. For software, the mine uses Vulcan, but Easley said Gemcon does the same thing.

Accuracy is important at Kensington. “We have to make sure our holes are put where they are supposed to be,” said Easley. He said, “Eighty percent of the mining at Kensington is long-hole stoping—but it’s more involved, there’s more to it.”

The mine advances 40 feet per day in four rounds. There are four or five working headings in five different areas. Mining follows the ore body. “We are not getting any dilution. Before shooting, everything is surveyed—collar to bottom. We use cameras to grade everything.”

He pointed out that other mines may focus on tons, but their goal is to be accurate >>



*Tunnel Manager makes it easy to position into a 90-degree crosscut.*

and keep dilution to a minimum.

“It’s important to be accurate and we watch it close. Once the ore rolled over on us and the east hanging wall went to a west hanging wall within the same longitudinal stope,” said Easley.

Mining is done with a slash-cut drift 15 x 15 feet in 45-foot lengths. An upper and lower drift are cut. The Simba drills lateral holes angling at varying degrees that fan out from the upper stope down 60 to 110 feet.

### The Equalizer

When drilling the angled holes, Tunnel Manager makes a big difference for accuracy. Easley said, “Top quality long hole drillers are hard to find. The most experienced long hole driller at Kensington, Jeff Corner has been drilling most of his career. “His skill as a driller ranks with the best,”” said Easley.

Tunnel Manager makes mid-level miners top quality miners in weeks. “Jeff can place the bit exactly where he needs it, but that skill is developed over time. The computer does it for the driller. He just needs to watch

the computer screen. The computer also gives him all the parameters and drilling data. Over time the computer’s consistency makes everyone faster and more accurate.”

Not that the computer will replace a quality driller. A driller’s skill helps set up faster, and if something on the wall makes it so the hole cannot be drilled at the computer’s selected location, the good driller can adjust without the computer giving him the angle.

Easley said, “An experienced driller can drill thousand feet a shift, but with Tunnel Manager a mid-level miner can be drilling thousand feet after the first month, and in two months he’s drilling like an expert.”

Even for expert miners, Tunnel Manager makes the job easier. “Ninety degree holes are where this thing really shines,” said Kensington’s trainer Justin Wilbur. Wilbur also conducts performance evaluations and establishes checklists to ensure miners follow a routine.

“We want everybody doing everything the same so each person is doing it the same. Tunnel Manager equalizes everybody, even

the experienced guys like it.”

Easley added, “Who wants to be pulling levers all day when you can operate the boom with a joystick and push a button and the machine does all the work?”

### Faster bolting

Easley said bolt-hole drilling goes smoother too. With the Atlas Copco Boltec a driller can get 20 to 30 more bolts in a shift. “Setup is faster because you can look ahead to what’s next rather than watching the current installation.”

The Boltec also installs both friction bolts and Swellex bolts. The mine uses 8-foot Super Swellex. “Operationally it’s nice because it’s easy to switch bolt types without having to go to a different machine,” said Easley.

As for the rock drill used on the Boltec, the mine has operated both the 1132 rock drill and the 1532 rock drill. Easley said the 1132 is slower because it’s lighter, but it causes less stress and maintenance on the machine. A miner can install 150 bolts per shift when drilling a 1 3/8-inch hole, and that >>



Maintenance, parts and training are vital to the operation at Kensington. At the right Justin Wilbur has implemented training programs and checklists so each miner follows a routine. Center, Mine Maintenance Planner Naomi Hammond has been here since the mine opened. She ensures all parts and mining equipment makes it here on time. Left, Maintenance General Foreman John Hecker and his people have kept the drills running at 93 percent availability.



“Kensington is a real family-oriented mine with families interacting in the community and participating in community activities.”

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**Travis Naugle**

Mine Manager, COEUR Alaska

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*In the Simba M7C the operator sets up the rig to drill holes at any angle in perfect placement. Most of the time this Simba is drilling vertically to accommodate long hole stopeing, but here the operator is drilling 5-inch diameter holes from one drift to another to run electrical lines.*

goes down to 100 to 120 bolts with the 2 inch needed for the Super Swellex. They usually don't have to screen in ore.

**Efficient face drilling**

The Boomers use the 1838ME rock drill. In the beginning it would take an hour and a half to drill the 15-foot face. That equals 65 to 70, 12-foot deep, 1 3/4 inch holes. A round would take two hours, including hook-up and scaling. Now they have changed the pattern and are drilling 90 holes in two hours.

When they purchased the Boomers, they decided to go with two computer screens rather than one. The intention was to have one for a trainer. Now the drillers are using a screen for each boom. The driller will set up and start one boom drilling and move to the next, going back and forth until the pattern is drilled out. “Although this can be done with one screen, you can see the operation while the other is working and it gives the driller time to visualize and think ahead,” said Easley.

The operation is as simple as putting the bit face to match the spot on the computer screen and adjusting to the angle shown on the screen. Once in place, the driller pushes a button and the computer takes over until the hole is drilled, automatically flushed and the rock drill retracted.


The mine uses Secoroc R38–HEX35–R32 for the 14-foot steel.

Although the mine went through many legal hoops before it became operational, Mine Manager Naugle said it's a great operation now and has become an excellent asset to the community. The permitting included a commitment to employ 25 percent of the workforce locally, which has been made easier because of the automation of the drills.

As in almost any mine, crews fly in from all over, but many employees have moved to the area and become part of the community. Naugle said, “Kensington is a real family-oriented mine with families interacting in the community and participating in community activities. It makes for happy miners if their families are close,” said Naugle. Although many of the miners stay in camp, many others take the ferry and mine bus back to town at night.

They also employ many subcontractors from the native population to work in support organizations, such as security, catering and transportation services.

The mine has known reserves of 1.6 million ounces of gold and 5.5 million tons of ore. Naugle said with current and known reserves, “that puts the mine's life out 20, 30 years, or beyond.”

Mining has been a big part of the local history for a long time, and Kensington will continue that tradition for years to come. 

# ASARCO'S COMPLEX EQUIPMENT SOLUTIONS

**EFFICIENT, PROFITABLE OPERATIONS RELY ON THE RIGHT EQUIPMENT FOR THE JOB AT ASARCO MISSION COMPLEX, ONE OF THE LARGEST MINING OPERATIONS IN THE U.S.**



**M**ission Complex, located 18 miles south of Tucson and operated by the Grupo Mexico subsidiary Asarco Inc., is one of the largest copper mines in Arizona, a state that produces 65 percent of the nation's raw copper. Mine management concluded that the combined features of having both diesel and electric rigs meet the demanding conditions of a mine of this size and rock this hard on tools.

On average the total Mission Complex produces an average of 160,000 tons of rock daily, equating to 53,000 tons of ore. Annual production in 2009 was 56.2 million tons. The mine's ore-to-waste cutoff is .25 percent copper.

Mission's bench patterns vary depending on the formation, which vary from limestone to wollastonite with many variations in the middle. The softer rock is a 30- by 35- foot pattern. They pull it in to 18 by 22 feet in the harder formations. In the past this presented them with problems with pipe because the rock is very abrasive. When they were selecting rigs to replace their aging fleet, Asarco management looked for those that could provide cost-effective, high production management of the mine's 40-foot benches with an additional 7 feet of

sub-drill. They focused on two Atlas Copco Pit Viper blasthole drill models, ultimately choosing the single-pass capability of the PV-271 over the 351s.

They are now running two PV-271s. One is a diesel model, just under three years old. The second, the electric model, entered service in December 2009.

They purchased the diesel model to extend the drill reach from the existing power capacity and to add versatility to their drill fleet. At the time, they were operating vintage electric-powered rigs and one fairly new diesel-powered DMM2 in three pits. Adding a diesel-powered PV-271 met the bench and drilling requirements in a single-pass drill rig that also offered versatility and could move in any of the pits.

To make the 47-foot holes they run the PV-271 with two 25-foot and one 8-foot section of Atlas Copco 8 5/8-inch Teamalloy pipe. Below that they use a 41-inch stabilizer above a Secoroc air-bearing 10 5/8-inch tricone bit.

### Diesel versus electric

Aside from one having a power cable, "the drills operate identically," said Juan Salido, a Mission mine driller. The electric

drill came with a larger compressor, 2,600 CFM, whereas the diesel Pit Viper has a 1,900 CFM compressor. In regard to drilling productivity, both average 8,000 to 10,000 meters per month.

Mine manager Hal Galbraith said the diesel PV-271 worked great for his mine. "I wouldn't say we ran the tracks off the rig, because we did haul it on our lowboy too, but it went everywhere in the mine." Since then, the mine has focused operations to just two of the pits, but the diesel Pit Viper still moves wherever needed within the mine.

### Time on task favors Diesel

Drill and blast manager Larry Maddox noted that the diesel rig offers a significant advantage, working well at moving into tight spots on the bench to allow drilling to continue before power is moved into the working area for the shovels. "Moving an electric drill just takes more time compared to a diesel rig: having the cable crew available, cutting the power, moving the cable, planning the cable drops. You just can't put a value on the mobility you get from a diesel drill."

Salido added that "it may only take 20 minutes to move the cable but 40 minutes



The Diesel Powered PV-271 moves with ease back and forth on the bench increasing productivity by reducing setup time.

or more for the crew to get there.” Anything that slows a cable moving crew stops operations. For example, if the cable needed to be moved for an afternoon blast and the crew got a flat tire on the cable truck, everything would be held up until the tire could be changed.

The diesel model obviously maximizes time spent drilling. Softer rock at the mine may take only 20 to 30 minutes to drill each 47-foot hole. Other formations that contain more garnet-tectite and wollastonite, however, may require as much as two hours for the same hole requirements. Maddox said, “I think if you had plenty of time, electric would be better because of the cost to operate and maintain, but mobility more than makes up for it with the diesel drill.”

**Comparing operating costs**

One exception to this preference for diesel is in operating cost. The electric drill currently operates at 61 percent of the energy costs of the diesel drill. There is a point when this advantage outshines the time-saving, independent mobility of the diesel rig. For

instance, when diesel fuel edged up to \$4 a gallon, the electrical rig was more attractive.

Galbraith listed some of the additional, indirect costs to factor in with use of an electric drill before making a decision. Each electric rig requires four 4,000-foot cables at \$100,000 each. A 138-4160 substation to power the drill costs \$250,000. Additional manpower required to build the infrastructure and to move the cable during each relocation must be included in the comparison.

**Outfitting the rigs for the demanding rock applications**

Efficient drilling operations at Mission are the result of strategically matching pipe and bits to these PV-271s. Teamalloy pipe has a much higher cost-per-piece price than other pipe but its durability and longevity mean cost-per-foot is less in the long run.

A 25-foot section of Teamalloy pipe lasts six weeks at Mission. Initial outside dimension of the pipe is 8.65 inches. They will run it down to 8 or 7.9 before replacing it. The pipe shows its wear at the lower

end of the joint, in what operators refer to as a “pencil” effect. They rotate these sections, since sections closer to the bit wear faster. This distributes wear evenly among the sections to increase longevity overall.

As for bits, the air-bearing works the best in this formation with an average life for a bit at 7,500 to 8,000 feet. Each drill will go through about two bits a week, depending on the ground.

**So Diesel or Electric?**

For Larry Maddox the choice is simple. “I want to keep them both.” He said each has characteristics that make the operation more efficient and productive. For the company, that means greater profitability. “Electric may be cheaper, but the mobility with diesel is better.”

Galbraith said the decision to buy the right equipment for the drill and blast process is justified by the bottom line: “For every dollar more you spend up front on drilling, you’ll make \$10 on the back end.”

**TECHNICAL DATA**

Drilling Method Rotary and DTH—Single pass  
 Hole Diameter 6 3/4 in – 10 5/8 in (171 mm – 270 mm)  
 Hydraulic Pulldown 70,000 lbf (311 kNm)  
 Weight on bit 75,000 lb (34,000 kg)  
 Hydraulic Pullback 35,000 lbf (156 kNm)  
 Single pass depth 55 ft (16.8 m)  
 Maximum hole depth 105 ft (32 m)  
 Feed speed 127 ft/min (0.6 m/s)  
 Rotary head, torque 8,700 lbf•ft (11.8 kNm)  
 Estimated weight 185,000 lb (84 tonnes)

**DIMENSIONS TOWER UP**

Length 41 ft 3 in (12.6 m)  
 Height 87 ft (26.5 m)  
 Width 18 ft 4 in (5.6 m)

**DIMENSIONS TOWER DOWN**

Length 83 ft 7 in (125.5 m)  
 Height 22 ft 1 in (6.7 m)

**ENGINE (TIER II)**

- Caterpillar** C27 800HP / 597 kW@1800RPM (LP 1900)
- Cummins** QSK19 755HP / 563 kW@1800RPM (LP 1900)
- Caterpillar** C32 950HP / 708 kW@1800RPM (LP 2600)
- Caterpillar** C27 800HP / 597 kW@2100RPM (HP 1450)
- Cummins** QSK19 755HP / 563 kW@2100RPM (HP 1450)
- Weg motor** 6808 700HP / 521 kW@ 50 or 60Hz
- Weg motor** 6811 900HP / 671 kW@ 50 or 60Hz

**DRILL PIPE SPECIFICATION**

Drill Pipe diameter	Bit diameters	Thread
6 1/4" (159 mm)	6 3/4" - 9"	4" BECO
7" (178 mm)	9" – 9 7/8"	4 1/2" BECO
7 5/8" (194mm)	9 7/8" – 10 5/8"	5 1/4" BECO
8" (203 mm)	9 7/8" – 10 5/8"	5 1/4" BECO
8 5/8" (219 mm)	10 5/8"	6" BECO

**HIGH PRESSURE DTH DRILLING**

Up to 8" DTH hammer and max. 9" bit diameter





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## **POWERCRUSHER PC6 ON DISPLAY**

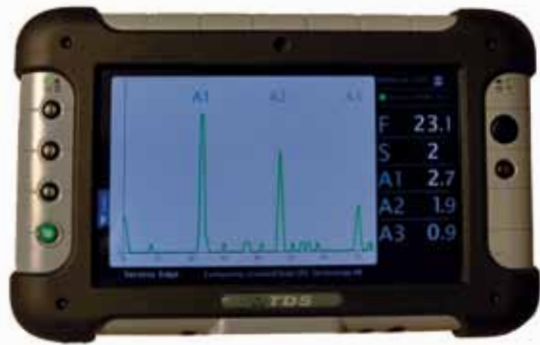
**T**his year's breaking news is that Atlas Copco now offers a wide range of mobile crushing and screening plants suited for demolition, quarrying and road construction applications. Atlas Copco Powercrusher machines offer high performance while being straightforward and reliable. The units have some significant technological advantages – quattro movement in the jaw crushers, optimized geometry in the impact crushers, basic design in the cone crushers and efficiency in the screening plants. All of these points wrapped up into units that have optimized transport dimensions and weights. These are exactly the qualities in crushing and screening plants that customers want. Couple this with the 67 Atlas Copco customer centers around the globe and the combination is unbeatable.





## ROC F9C

With true 127 mm top-hammer capability, the ROC F9C crawler is one of the most powerful drill rigs in its class. It's available with either a single or folding boom for quarrying and construction. The ROC F9C's fuel-efficient diesel engine provides fast penetration and perfect flushing. The result is an environmentally friendly combination of high strength, productivity and hole quality.



## EDGE DRILL MONITOR

The "art" of drilling is the ability to read signals given off by the drill bit's impact and react to those signals to optimize penetration and extend tool life. In shallow blasthole drilling, that process has been mastered and is available through automation features on Atlas Copco's drill rigs. Down-the-hole hammer drilling has always been done by feel, relying solely on the experience of the driller. Now, a little bit of artistry has been removed through a new technology from Atlas Copco: EDGE. This electronic drill monitoring system shows the driller what is happening at the bottom of the hole so he can make changes at the controls.

EDGE enables a driller to optimize hammer and bit performance and detect any changes caused by a drilling problem, geologic feature, or product wear or failure developing below the surface. Through a sensor mounted on the rotary head, vibrations are translated to a display at the driller's station. The driller can instantly react to these anomalies.

The benefit of percussion drilling over rotary drilling is well established: increasing the penetration rate is money in the bank. To drill with a down-the-hammer takes longer to learn and even longer to master. Hammers and bits are also more expensive and easier to damage than a tricone bit. EDGE's benefits will revolutionize down-the-hole hammer drilling.

## QAS 120

The Atlas Copco QAS 120 skid mount generator's versatility provides power for a wide variety of construction, prime power and stand-by applications. Tested to exacting standards, the QAS 120 consistently maintains optimal performance in even the most demanding conditions. Its rugged Zincor steel-coated canopy provides extreme weather protection, and its sealed, spillage-free frame ensures complete regulatory compliance.



## XAS 185 JD7 PE

The Atlas Copco Hardhat compressor is the most efficient air end in the industry, reliability delivering 185 cfm with its EPA CARB-compliant 49-hp John Deere engine. Its award-winning design features a polyethylene canopy that resists rust, dents, corrosion and extreme temperatures to protect the compressor at the worksite. Its durability not only lowers the cost of ownership, it also makes it ideal for the rental industry.

## QAS 20/25

The QAS 20/25 line provides quiet, cost-efficient power. The 29.6-hp, Kubota diesel engine and Leroy Somer LSA series alternator provide 19.2 kW of standby power, 17.3 kW prime power, and up to 29 hours of operation on a single 30-gallon fill at 75% load. The Atlas Copco QC1002 control system provides easy startup and control. All key operating functions can be monitored from easy-to-read gauges without having to open the canopy. Unit provides 110% fluid containment and is EPOA IT4 compliant.



## HYDRAULIC BREAKERS AND HANDHELD DEMOLITION EQUIPMENT

- MB 1500
- HB 3600
- HB 10000
- TEX P90
- LPP 10HD



Atlas Copco offers hydraulic demolition equipment in a variety of proven models, including handheld breakers such as the new TEX P90 with the largest hammer in its class—over 15% heavier than its closest rival—to its carrier-mounted models. Atlas Copco's newest mounted-breaker offerings span the carrier weight classes up to 70 tons (63 tonnes) and include the MB 1500 medium-sized breaker, new HB 3600 heavy-duty breaker, and the HB 10000, a powerful, high-production alternative to drill and blast techniques and for use as a primary breaker.

The LLP 10HD post puller's hardened jaws and automatic chain tightening clamp make it the choice of road construction crews everywhere. Pulls all types of wooden or steel posts, including IPE, HPE, and UPE profiles, plus round/square steel tubes. The built-in hand lever controls 11 tons of pulling force.

## Dynapac Equipment visit us at booth C-6633

Dynapac's complete selection of road construction equipment is designed to be quiet, productive and fuel efficient. Dynapac also provides industry leading systems for compaction control and job validation on soil or asphalt. Come see the new lineup of small CC-model tandem asphalt rollers. The highway class CC-models feature large drum diameters, maintenance-free articulated steering and unmatched operator visibility and ergonomics. The new hydraulically propelled CP 274 tired-roller can be ballasted with water, sand or steel and achieve a maximum weight of 59,500 lb. Dynapac's redesigned asphalt planers let you match the unit to the job with ample power and superior cut cleaning. Shown here is the compact PL 500TD, capable of cutting 20 inch (500 mm) wide asphalt, 8 in (200 mm) deep.

- CP 274
- CA 362D
- CS 142N
- PL 500TD
- CC 424 HF
- CC 900
- CC 1300
- CA 134D

TO SEE MORE  
DETAILED INFORMATION,  
VISIT [WWW.DYNAPAC.US](http://WWW.DYNAPAC.US)



# GOOD NIGHT

Atlas Copco generators and high heat won't "let the **bedbugs** bite"



Just 90 minutes at 120–130 degrees ensures 100 percent mortality of bedbugs and their eggs. On Site Energy rents heating equipment, including portable generators to power them, such as this Atlas Copco QAS 330 with 280 kW (350 kVA) standby power, 255 kW (310 kVA) prime power.



CLOSE-UP



ADULT ACTUAL SIZE



SIZE WHEN HATCHED

**W**hen bedbugs come out at night to feed on humans or other warm-blooded animals, the bedbugs are rarely seen or felt by their prey. The parasitic insects escape from view in the smallest of places—behind a picture frame, in the seams of a throw pillow, in the crack of a leather bag. People who travel frequently or even those who work in public places run the risk of bringing home the hitchhikers on clothes, belongings or their bodies.

One New York company is relying on Atlas Copco generators in their unique and successful bug-killing strategy. On Site Energy, with offices in New York, New Jersey, Connecticut, Massachusetts and throughout the Midwest, sells and rents generators and heating and cooling systems and equipment. On Site Energy is often called upon to provide quiet and efficient power distribution and heating or cooling for high-end functions such as fashion shows and concerts, which can take place under tents, on city streets or in parks. The company also rents such things as light towers, dehumidifiers, transformers. A newer venture for the company is fighting the growing problem of bedbugs, using Atlas Copco QAS generators to run superheaters that kill the bugs. Vice President of Operations for On Site Energy, Mike French, said he hopes the market to exterminators grows for sales and rental of the heaters, and added that individuals can also rent them.

Bedbugs frequently hang out in hotels, movie theaters and buses. French said traditional treatments might not reach all of the pesky bedbugs' hiding places, but heat radiates everywhere and bedbugs can't hide.

The rental heaters run like large convection cooking ovens, circulating

heat up to 130 degrees throughout a room or building. According to the company's temperature-time chart, renters should use at least 120 degrees for 90 minutes to sufficiently ensure not only 100 percent mortality for adult bedbugs but their eggs as well. On Site Energy recommends people remove from their rooms any oil paintings, candles or makeup that might melt. Otherwise, there is no prep work for the customer.

Heat or steam wands and frozen gas wands aren't thorough enough, French said, because those treatments don't reach everywhere. Pesticides might take multiple treatments since bedbugs are resilient. "Killing with heat the proper way is a methodical process that will most likely take an entire day to accomplish—don't be fooled by a few chemicals and 10 minutes of heating—that will not kill all the bedbugs," French said.

French's father and company owner, Irvin French, said, "We started on the subject of extermination 20 years ago because we have a rental fleet of 200–300 heaters of various sizes and we wanted to use them year round." The extermination-through-heat business began in large food processing centers where flour beetles are problematic. On Site Energy can handle large factories and public facilities.

Along with using Atlas Copco for its newer venture of killing bedbugs, On Site Energy carries up to 75 Atlas Copco generators in its rental fleet in the 35 kW to 300 kW range.


Irvin said, "As we've gotten further into this—it's gone way beyond my original intent." On Site Energy is now manufacturing heaters under the brand

name Thermoclave, a broad umbrella that includes the compact and portable Little Tin Man, or the LTM. The LTM is easier to use in homes or other locations where large equipment is difficult to reach.

Although it is marketed largely for bedbugs, On Site Energy and Thermoclave heaters can also provide heat that's effective against harmful bacteria, mold, most household insects, reducing odors and providing a general disinfection.

Usually bedbugs simply leave bites that develop into welts. Some people have worse reactions than others. Though bedbugs may not transmit disease, the Centers for Disease Control and Prevention recognizes the potential emotional and financial trauma bedbugs can cause. The CDC and the Environmental Protection Agency issued a joint statement in August noting that public health agencies had been overwhelmed by complaints. In New York State, a new law is in effect that requires landlords to disclose whether bedbugs have been reported in their buildings. In 2009, New York City created a Bedbug Advisory Board to guide city administration in addressing infestations.

Because bedbugs can live up to a year without feeding, they can be in a home or workplace without being immediately noticed. Research says that most people don't detect bedbugs until their population is about 200. In a room that is about 70 degrees and has 40 bugs, there would be 5,905 bugs in six months, judging by average reproductive habits of bedbugs.

Since bedbugs are a serious problem, the Frenches take their job seriously and use Atlas Copco generators to get the job done. 



# MINING THE PAST BRINGS HISTORY ALIVE

**T**he National Mining Hall of Fame and Museum is a monument to the men and women who pioneered the discovery, development and processing of our nation's natural resources. Located in the famous 1880s silver mining boomtown of Leadville, Colorado, the museum brings mining's colorful history to life, while the hall of fame honors those people who have significantly contributed to the mining and natural resource environment.

When you walk through the doors of the nation's only federally chartered mining museum, the story of mining unfolds with a variety of exhibits that will appeal to all age groups. Educational hands-on exhibits such as the Room of Industrial Minerals demonstrate the importance of minerals in our lives.

The Mountain Mining Town Model Railroad and the 22 intricately detailed dioramas portray mining life in miniature. To get a glimpse of a working mine, one need only walk through the realistic replicas of underground hard rock and coal mines. The sounds of drills echo throughout the tunnels as the "miners" stand frozen in time, mining for silver or taking coal to the surface.

The beautiful specimens of gold, crystal and minerals vividly portray the fruits of the miner's labor.

Future exhibits are planned. The museum was awarded a \$121,295 NASA grant to complete a long-awaited lunar exhibit that will commemorate former astronaut and geologist Dr. Harrison Hagen Schmitt, a member of the Apollo 17 mission and one of the museum's Board of Governors. Another exhibit will focus on the molybdenum industry and the nearby Climax Mine.

There is no doubt that the National Min-

ing Hall of Fame and Museum fulfills its mission: Tell the story about mining, its people, and its importance to the American public. However, as the museum looks to its future, it is clear that additional financial support from the mining industry has become critical to the "Smithsonian of the Rockies."

Executive Director Bob Hartzell, the staff and the Board of Directors have developed a strategic plan for the museum that not only includes adding exhibits but also expanding the museum's reach beyond Leadville to further develop relationships with other mining organizations and the larger museum community throughout the United States.

As Hartzell explains, "My predecessors left me with a wonderful museum with which to work. Visitor comments such as 'Great museum, Loved the mine replicas, Awesome, Wow! Wish we had more time!' tell us that we are on the right track. Everything we do nowadays is measured against

our mission statement. If we don't tell the story of mining or about mining people or the importance of mining, we move on to exhibits and programs that do measure up to our mission. We are partnering with more and more mining-related companies and organizations. Together we must continue to tell the American public about the importance of mining, about mining's safety record, and how environmentally responsible we have become."

More than just a repository of documents and a collection of artifacts, the National Mining Hall of Fame and Museum is a testament to the "American Mining Industry and its inestimable impact on the national lifestyle, the American economy, wealth, defenses, scientific, technological and medical advances." With the support of the industry, the National Mining Hall of Fame and Museum will continue to fulfill its mission and tell the "miner's story."

**THE NATIONAL MINING HALL OF FAME NEEDS YOUR FINANCIAL SUPPORT. YOU CAN LEARN ABOUT DONATION OPPORTUNITIES BY CALLING BOB HARTZELL AT 719-486-1229.**





## Secoroc PARD system – a huge boost to rotary drilling

Atlas Copco Secoroc presents the latest innovation in rotary drilling — the Secoroc PARD system — designed to boost rotary drilling performance by combining the best of DTH and rotary drilling technology.

The new Secoroc PARD system combines a unique, high frequency, low impact DTH hammer and a specially designed tricone drill bit that’s mounted onto a standard rotary drill rig and drill string. The result is a combination of percussive power and rotational force that provides significant increases in the rate of penetration (ROP). In fact, case studies show ROP increases up to 50 percent.

The Secoroc PARD hammer is designed to operate on pressures from 50 to 110 psi, which is low compared to standard DTH hammers. Optimal air flow is achieved with the unique Secoroc PARD parallel air flow system, which distributes the air proportionately between the hammer and the tricone drill bit.

The Secoroc PARD tricone bits can withstand the additional stresses and strains and still retain the same service lives of standard tricone bits. All this adds up to more holes drilled per shift and lower total drilling costs (TDC).

The Secoroc PARD system is ideal for large mines and quarries where blast holes from 9 7/8 inches to 12 1/4 inches are standard. There are two models currently available — the Secoroc PARD 10 and the Secoroc PARD 12 — and a comprehensive selection of Secoroc PARD tricone bits.

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