

'King Solomon's mines' provide gen-set challenge

A Saudi gold mine strikes pay dirt with a power system which allows it to operate remotely and independently of the grid.

With the largest mineral resources of any country in the Gulf region, Saudi Arabia is a land rich in gold and other precious metals as well as petroleum. But most of the gold deposits are located in remote areas far from the country's electric grid. This makes the mining and processing of the ore at these sites dependent on on-site power generation. The Bulghah gold mine began production in late 2002, as one of the resources surrounding the existing Al-Sukhaybarat gold mine - thought to be part of the fabled King Solomon's Mines. Located 550km (342 miles) northwest of Riyadh, the Bulghah gold mine generates all of its electric power using rental power units from Cummins Power Generation.

Operating 24 hours a day and 365 days a year, the Bulghah gold mine relies on self-generated electricity to power a vast



array of pumps, conveyor systems and crushers as well as lighting and all miscellaneous electric equipment at the site. Bulghah is an open-pit mine and uses the 'heap leach' method of gold extraction. An elaborate electric-powered conveyor system transports the crushed gold ore to a plastic-lined pit to create a large pile of crushed ore. A solution of

chemicals that dissolves the gold in the ore is pumped over the heap and allowed to filter down through the pile where the solution is collected and further refined to produce pure gold. Using this method, the mine produces approximately 82,000 ounces of gold annually.

Complete prime power system

Supplying electricity for this massive operation is a power system composed of seven CP1250-D6 containerised PowerCommand generator sets from Cummins. Each generator set is prime-rated at 1,000 kW for a total system capacity of 7 MW. Depending on the electrical load, only five or six of the generator sets operate at any given time. This allows at least one generator to be offline for maintenance, or in a standby mode, thus guaranteeing a higher level of reliability for a power system that must run continuously.

'The owner of the mine did not want to undertake the day-to-day operation of the power system, so they contracted with our distributor in Saudi Arabia to install, commission and operate the system,' says Don Watson, rental director for Cummins Power Generation in Europe, the Middle East and Africa. 'The station has been operating for over three years already without a single loss of power or interruption of the mining or processing.'

Local distributor runs system

Under the operating agreement, General Contracting Company, the Cummins Power Generation distributor in Saudi Arabia, operates the system and performs all the necessary maintenance. Local environmental conditions can be harsh. Blowing dust can clog air filters, and high summertime temperatures reaching 55 deg C (131 deg F) require careful attention to generator maintenance. Oil and filter changes are made after every 250 hours of operation.

The seven gen-sets are powered by the Cummins KT A50-G3 engine, a 50 litre diesel engine used in many power

Gen-set ranges adapted to meet latest EU rules

Imminent EU legislation is demanding reduced exhaust emissions for all 'transportable engines' with power output below 560kW (2007 EU Stage II Emissions legislation). According to Northern Ireland gen-set manufacturer FG Wilson, the company is currently adapting its product ranges in order to comply with these requirements.

Among recent product launches were the new P450P2 to P688ER2 and P450P3 to P625E3 ranges of generating sets. These models will be powered by a new 15litre 2506-E15 engine, which replaces the previous 2806-E16 engine. There is a choice of two variations of the 2506iesy with 2007 EU Stage II Emissions legislation - it will power the P450P2 to P688ER2 gen-sets range.

The 2506A-E15 variant is produced for markets which do not require compliance with the Stage II EU emissions regulations, so it is able to offer better fuel economy than the fully-compliant engines. It is being used to power the P450P3 to P625E3 gen-set range.

Both versions offer fully electronically

controlled engines that provides lower maintenance costs through longer testing intervals, engine monitoring, protection and control. With 85% commonality of parts with the previous versions, the maker says that adoption of the new product will not result in any escalation of parts inventory for the customer.

Also newly-introduced is the Emergency Rated P688ER2 model with a maximum usage of 200 hours per year.

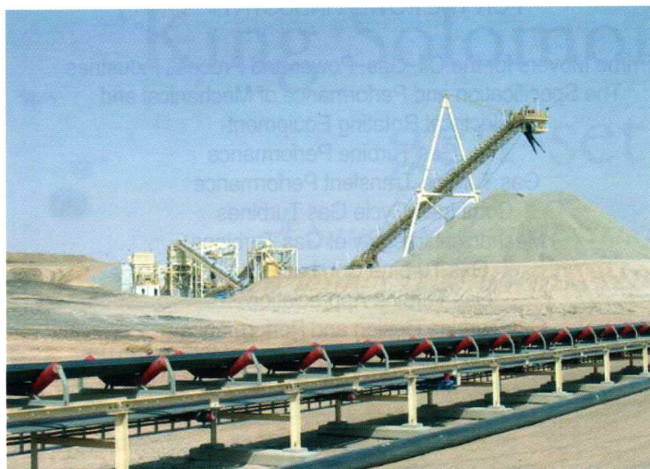
FG Wilson says that it has also adopted an innovative enclosure strategy, offering a choice between an enclosure that complies with 2006 EU Noise legislation and another that is compliant with high ambient environments with no loss of cooling system performance.

According to the company, the more compact package size that has been achieved with the new product range is likely to result in savings on shipping/freight, installation and storage costs.

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E226



generation installations ranging from on-site prime power to emergency standby power for critical applications. Operating at 1800 rpm and producing electricity at 60Hz, the gen-sets are claimed to be easy to start, synchronise and run due to the

digital control systems. All-digital control is said to improve reliability under extreme operating conditions by significantly reducing analogue components and single points of failure.

The power system is installed as a long-term equipment rental for a period of ten years that includes an operating and maintenance agreement with the local distributor in Saudi Arabia.

Saudi Arabia has spearheaded development of the mining sector as part of a programme of diversification away

from petroleum. The government's objectives for the mining sector include establishing industries for extracting and processing the minerals, and developing the transportation infrastructure. It is estimated that Saudi Arabia has close to 20 million tons of recoverable gold ore, and according to a government web site, non-oil mineral activity is expected to grow at a rate of 9.1 percent annually.

The operators of the Bulghah gold mine are pleased with the reliable operation of their 7 MW prime power system from Cummins Power Generation. It is one of the ways that Cummins Power Generation is helping companies worldwide to operate efficiently and economically in areas outside the reach of today's electric grid.

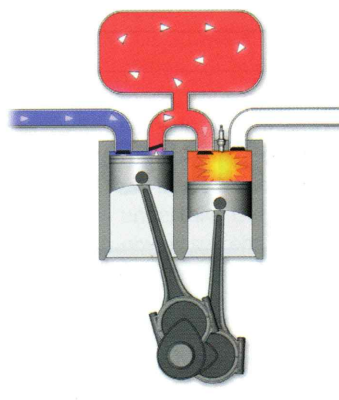
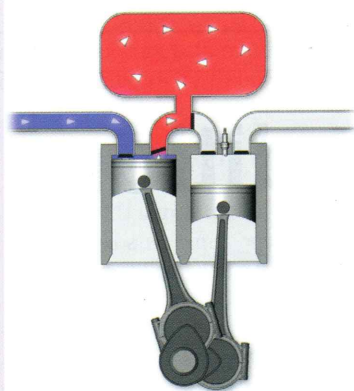
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E227

Gen-sets may suit split cycle air-hybrid engine technology



Diagrams illustrating the principle of the Scuderi split-cycle engine technology, which is being offered for licence to gen-set builders.

US company the Scuderi Group has announced what it describes as the first ever hybrid power generator technology. Scuderi says that it will begin licensing its technology for generator applications ranging from small power back ups to industrial power-plant environments.

Computer modelling has shown that in relatively constant load and speed applications - such as a generator - using the Scuderi split-cycle air hybrid engine technology in a generator application could increase efficiency and decrease emissions. Further, a Scuderi air-hybrid generator would have the additional capability of recapturing energy normally lost through waste heat, increasing efficiency by some 25 to 50 percent and

decreasing toxic emissions by up to 80 percent.

The duty cycle of an electric generator is less stringent than a mobile application, such as an automotive vehicle. Gen-set engines run at narrower speed and load ranges, therefore the claimed inherent advantages of the air-hybrid engine - faster flame speed, lower NOx, and higher efficiency - could be more advantageously tuned to meet these conditions. Generally, power density and efficiency are a trade off in mobile engine applications, but this is not the case in a stationary power generator, which means that the Scuderi air-hybrid engine can be configured for maximum efficiency.

The technology is based on the research and inventions of the late Carmelo Scuderi (1925-2002) who is best known as the inventor of the oil-less compressor technology used in the refrigeration and air-conditioning market to recycle ozone-depleting refrigerant chemicals. The first air-hybrid engine prototypes are expected to be completed in 2007, and the principles can be applied to any internal combustion engine including gasoline, diesel, bio-diesel, and natural gas. The Scuderi Technology is patented in over 45 countries.

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E228