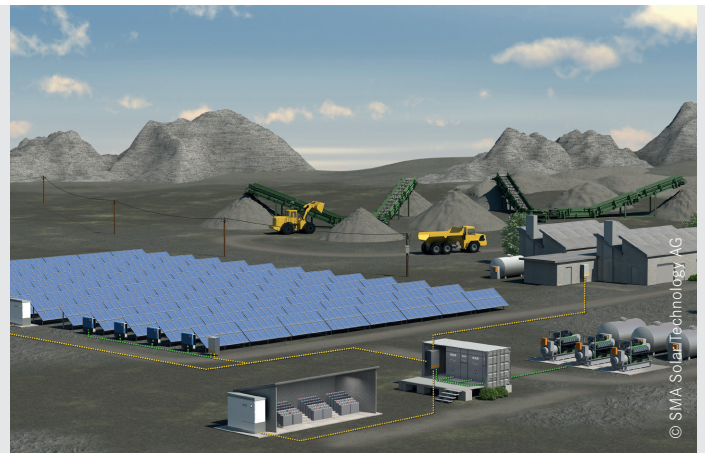
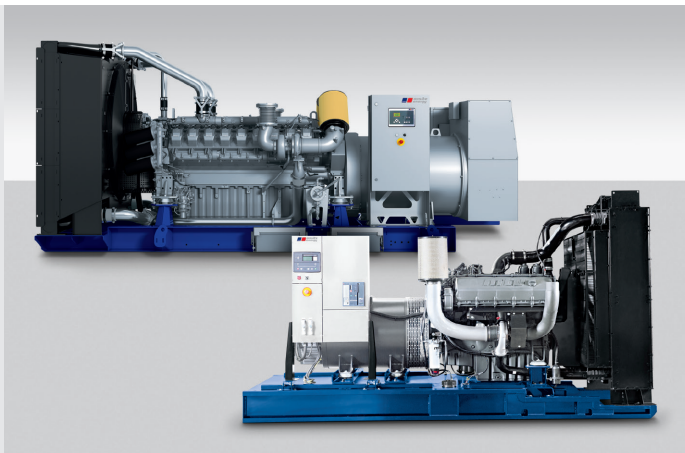


Energy

PHOTOVOLTAIC DIESEL HYBRID SYSTEM

MTU Series 1600 and 2000 engines (224 – 1,000 kW_e)



PHOTOVOLTAIC DIESEL HYBRID SYSTEM FOR A STABLE POWER GRID

MTU Onsite Energy and SMA, leading specialist for photovoltaic systems worldwide, are working closely with each other on the development of hybrid power plants. This concept makes it possible to combine the benefits of diesel gensets and photovoltaic power generation in a single system. For remote mining operations in particular, such hybrid systems can offer numerous benefits. This is due to the fact that mines are generally located in remote areas far from any form of area-wide power supply. In such cases, diesel gensets are frequently the most practicable solution for providing a reliable supply of electric power. They are designed to generate predictable and controllable electricity. Using diesel gensets exclusively to provide a permanent supply of electricity, however, results in high operating costs.

Solar energy is environmentally friendly and costs nothing. Unfortunately, it is not continuously available and is unpredictable. Fluctuations in the supply of energy caused by darkness, clouds and inclement weather are the result. The key prerequisite for the use of solar electricity is the availability of a stable power grid, since photovoltaic modules cannot create a power network on their own. When photovoltaic modules are combined with diesel gensets, their benefits complemented each other ideally, resulting in a stable supply of electricity, high availability, reliability, flexibility (due to the diesel

engine), low operating costs and excellent environmental compatibility (photovoltaic). If energy is available from the photovoltaic system, the diesel gensets are shut down. MTU Series 1600 and 2000 offer a particular benefit in that they can be run for up to 12 hours in low speed mode. This means that the mine operator can use the entire solar-generated energy while the engines are running without any load whatsoever. As a result, the operator incurs only minor operating costs. If the sun should disappear, the MTU gensets are ready to operate immediately. A control system developed by SMA determines how much energy is to be fed into the grid by the photovoltaic system or by the gensets.

INFORMATIONS

// Partner

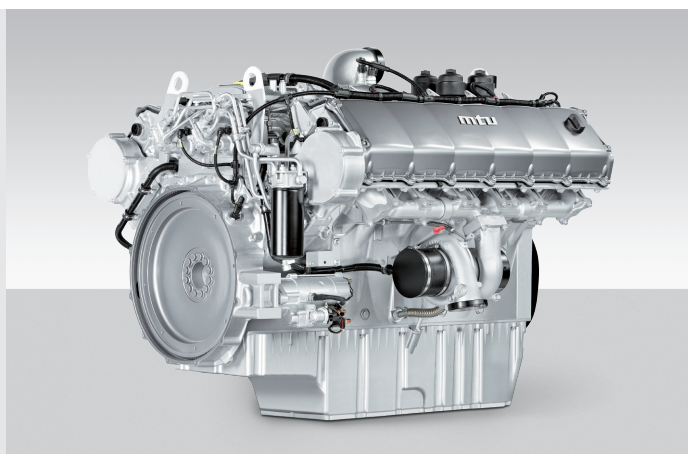
SMA Solar Technology AG

>> The MTU brand is part of Rolls-Royce Power Systems, providing high-speed engines and propulsion systems for marine, rail, power generation, oil and gas, agriculture, mining, construction and industrial, and defense applications. The portfolio is comprised of diesel engines with up to 10,000 kilowatts and gas engines up to 2,530 kilowatts power output. MTU also offers customized electronic monitoring and control systems for its engines and propulsion systems.

Energy

ELECTRIC POWER GENERATION FOR STONE QUARRY IN RUSSIA

MTU Series 1600 (550-668 kW)



ELECTRIC POWER GENERATION FOR STONE QUARRY IN RUSSIA

Mud, wet and clouds of dust – these are the operating conditions for 17 MTU Series 1600 engines in service at a stone quarry in southern Russia. With only unsealed sheet-metal boxes to protect them from the all-pervading dust, the engines are in action up to 20 hours a day. The filters are changed and the units are cleared of dust every day. In 2009, the site operator Donskoy Kamen began a search for new and smaller power generators capable of powering the company's three large stone-crushing plants. The decision went in favour of three MTU Series 1600 engines each producing 668 kW. The engines are not operated at the limits of their performance range but are regulated to produce 550 kW of electricity. Today, the company operates 17 engines generating up to 8.5 MW of electricity for the three big stone-crushing plants. The diesel drives are connected in parallel in three production units to ensure that any engine not in operation can be immediately replaced by the others. According to Donskoy Kamen, the company benefits from MTU product features such as excellent exhaust emission performance, extremely positive surge load capabilities, low fuel consumption and simple construction for straightforward maintenance and repair. Donskoy Kamen's open-cast, sandstone quarry produces up to six million tonnes of stone products

and aggregates a year. The rock deposits are loosened by blasting before the stone-crushing plants reduce them to specific grades suitable for their intended use in applications such as highway construction, concrete manufacture or shoreline and riverbank stabilization.

INFORMATIONS

// Customer

Donskoy Kamen, quarried stone and aggregates

// Commissioned

2009 to present

// Location

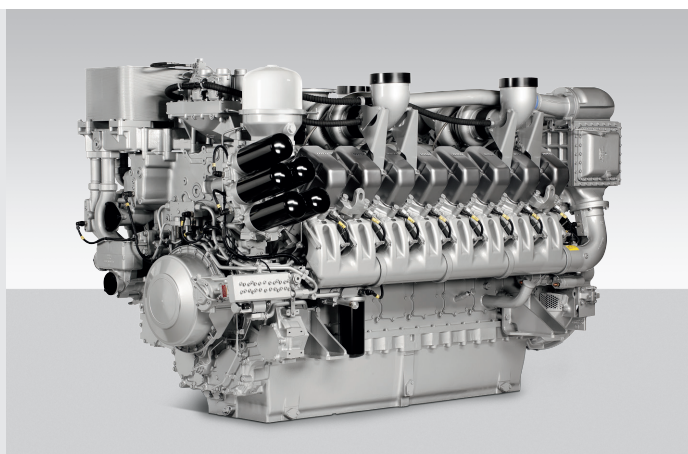
Grachev, Russia

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Energy

RENTAL FLOW BY CONTAINER GENSETS

MTU 16V 4000 container gensets (1.7 Megawatt)



© Jozi Power

MTU ONSITE ENERGY RENTALS

Jozi Power has been using MTU engines for its containerized genset rental business in South Africa, Namibia, the Democratic Republic of the Congo as well as Sierra Leone and Liberia since 2007. 2015, MTU Onsite Energy delivered five fully assembled container gensets powered by MTU 16V 4000 G63 engines. Each of the gensets will supply 1.7 MW. They were transported to the customers by ship or truck.

The rental facilities available from Jozi Power already include an exclusive fleet of MTU engines. The African company growing fleet is able to rent out more than 50MW based on Series 1600, 2000 and 4000 drive units. The gensets usually operate at the end-user's site for two or three years. Fuel efficiency and 24/7 reliability are of paramount importance in our main market, being the power supplier for remote mines. The scenario is different for every project. Some customers might provide no more than an area cleared for installation whilst others can offer an infrastructure with power connections and fuel tanks.

INFORMATIONS

- // **Customer**
Jozi Power
- // **Year of Commissioning**
2007 to 2015
- // **Location**
Africa

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Energy

ENERGY SUPPLY FOR A WORKER DESERT CAMP IN AUSTRALIA

3x 6R 1600 DS300 with 275 kVA each



ENERGY SUPPLY FOR A WORKER DESERT CAMP IN AUSTRALIA

Three diesel generator sets with MTU Series 1600 engines supply energy for the Wildflower desert camp in Western Australia. Each producing 275 kVA of electrical output. The electricity is used to supply private rooms and communal amenities such as the canteen and meeting rooms, air-conditioning and lighting systems, as well as cooking facilities. The generators from customer Calibre Rail have been in use since April 2013. The engines have to contend with heat, fine desert dust and floodwater. To enable the MTU engines to function reliably in the arid desert conditions, each unit is fitted with special air filters and a protective enclosure to protect it from extreme weather conditions and to minimise noise outputs. The three 6R1600 DS300 generators produce a combined output of 825 kVA. The Wildflower Camp is intended to provide a home for rail and mine workers for ten years. Rio Tinto Iron Ore is investing in extending the iron ore mines, rail and ports of Pilbara to expand production of iron ore. The mined iron ore has to be transported to one of the two shipping ports up to 500 km away. To improve transport links, Rio Tinto aims to extend and improve the existing rail network, which covers some 1,500 km. The mine operator has contracted Calibre Rail to engineer and manage the improvements to the existing rail network. To provide accommodation

for the people who work in that harsh environment, Calibre Rail built a special camp called the Wildflower Camp. As part of the project, Calibre Rail commissioned MTU to install a power plant to supply the camp with electricity.

INFORMATIONS

// **Customer**
Calibre Rail

// **Year of Commissioning**
2013

// **Location**
Australia

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