

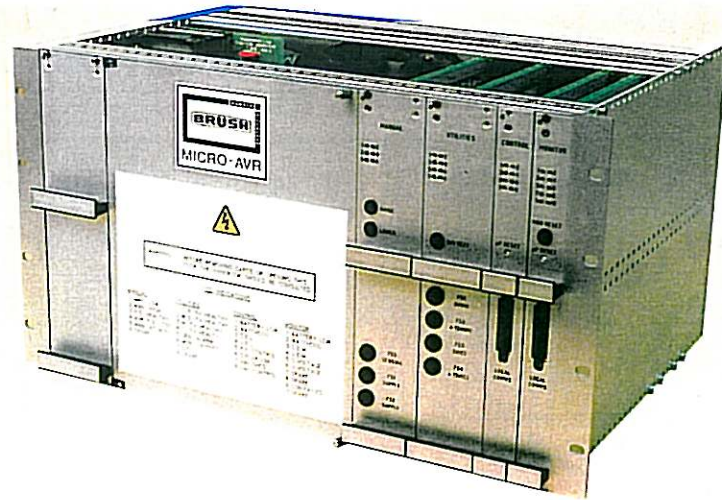
Customer: Stewart & Stevenson Services - Houston, U S A
Project: Ubungo Power Plant - Dar es Salaam - Tanzania
Equipment: Two 40MW air cooled generators and modular automatic voltage regulators.

As part of a project to alleviate serious power shortages in the Tanzania Electric utility system, Stewart & Stevenson has supplied two LM6000 gas turbine packages. The generators and their support systems were fully tested at the Jacintoport facility in Houston - Texas. Short cycle time was a key ingredient in S & S securing this contract, and using Brush BDAX 7.290ERJ generators and other pre-fabricated major components, enabled the first unit to be despatched and commissioned within six months of contract signing.

Customer: Dresser Rand Power - Norway
Project: Hibernia offshore oil/gas production platform - Canada
Equipment: Two TEWAC enclosed brushless turbo-generators each rated 26.4 MW, 3600rpm.

The BDAX7.193ERH generators for this offshore project are installed in single lift modules with their drivers, and mounted into the topsides facilities of this oil production development being built by a consortia of Mobil, PetroCanada, Murphy Oil and Chevron. The generators include top mounted air to water heat exchangers and are driven by General Electric LM2500 gas turbines. Five smaller generators from the Brush BJS range, driven by Caterpillar diesel engines were supplied to provide emergency, black start and standby power needs for this massive structure due to be moved onto station 190 miles offshore in the North Atlantic, off St John's Newfoundland - Canada later in 1997.

Micro AVR



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BRUSH ELECTRICAL MACHINES

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POWER WORLDWIDE

Brush is a UK based manufacturer of high voltage electric motors and generators and their controls for the specialized needs of energy companies both on and offshore. We provide generators for diesel engine, gas and steam turbine drivers up to 200 MW output capacity.

Meeting the needs of individual turbine packagers for physical layout requirements and having flexible electrical designs, enables the most challenging project requirements to be met. Brush turbine generators for geared and direct drive applications meet the demanding specifications of major power generation companies worldwide. Comprehensive testing is carried out on all finished equipment including efficiency and short circuit tests to prove contracted performance values. This bulletin is a summary of recent projects/contracts where Brush Electrical Machines generators and control equipment have been selected.

BRUSH is an ISO 9001 certified Quality Assurance manufacturer.



Ubungo Power plant - Tanzania
 (details on back page)

Whitby Cogeneration - Canada

Customer: Westinghouse Electric Co for Whitby Co-generation Partners
Project: Atlantic Packaging - Canada
Equipment: Packaged 57 MW 3600 rpm direct air cooled turbo-generator, oil system and static excitation.

The first Rolls Royce - TRENT aero derivative turbine project includes a packaged filtered air cooled YDAX7.290PR generator at Whitby, south of Toronto - Canada. The Westinghouse "Econopac" installation comprises pre-designed modules which streamline jobsite installation and commissioning. The Brush generator scope includes static/slipring excitation to meet Ontario Hydro power system regulations, and an integrated lubricating oil system for the generator bearings within the acoustic and weather-protecting enclosure. Excitation controls were packaged into a separate control cabin, also supplied by Brush.

GENERATORS - customized to suit specific project requirements

The Brush DAX range of turbogenerators cover 3600 rpm (or 3000 rpm @ 50 Hz) ratings from 8 MW up to approximately 200 MW, either arranged for direct ambient air cooling or fitted with TEWAC air to water heat exchangers. Smaller generators from the Brush Medium Machines product range are available up to approx. 30MW in slower speed designs for geared steam turbine and diesel engine drives. All of these ranges offer a wide variety of pre-designed options which will match all types of mechanical drivers, and can be customized to meet the special needs of the OEM/packager, either for particular site conditions or enhanced electrical designs for local power system or special loading conditions.

Customer: CEGELEC (UK), part of the Alcatel - Alstom Group
Project: US Navy - Integrated Power System (IPS)
Equipment: 20MW BDAX generator and voltage regulator.

This gas turbine driven 20MW BDAX 7.193ERH generator is part of a program for advance surface ships' power machinery. As part of a modular power and propulsion system for future warship construction, standard pre-designed elements will be multiplied to match the vessel's power needs. The generator will be driven by the WR21 gas turbine, a joint development of Westinghouse and Rolls-Royce. Lockheed Martin is the US Navy's managing contractor. A full scale test program of the propulsion machinery and the power generation and distribution system, including the Brush generator, will be carried out at a Philadelphia - USA shore based facility.

Customer: Motoren-und Turbinen Union (MTU) Ludwigsfelde GmbH - near Berlin, Germany
Project: LM2500 & LM6000 Engine "on load" test cell facility
Equipment: 55 MW, 60 Hz air cooled generator, oil module and AVR control, synchronizing and protection cubicle.

MTU, the Daimler Benz Aerospace group member which overhauls LM2500 and LM6000 General Electric aero-engines, chose a Brush BDAX 7.225ER generator to load test rebuilt engines in their Ludwigsfelde facility. The new test cell which is expected to be operational late in 1997, is being built by MDS Aero Support Corporation the Ottawa Canada based engineering design and contracting company. Brush scope includes a filter ventilated direct air cooled generator with roof mounted filter house, lubricating oil module, including jacking oil for the generator bearings, plus a comprehensive excitation control and protection cubicle.

Customer: Westinghouse Electric Co for Fauji Power Limited
Project: Kabriwala Power Complex - Pakistan
Equipment: Two combustion turbine and one steam turbine driven BDAX generators and their support systems.

This Westinghouse designed combined cycle power plant is based on two W251D industrial combustion turbines which each drive a Brush TEWAC enclosed BDAX 7.340ERH generator which are rated at 49MW. A 66MW frame BDAX 8.335ERH water cooled generator is driven by the steam turbine in combined cycle operation. The generators include outdoor acoustic and weather protecting enclosure, and Modular Automatic Voltage Regulator (MAVR) excitation controls.

BRUSH has a full capability to provide excitation controls, synchronizing and generator protection/relay equipment to meet the most demanding customer's requirements. The PRISMIC power management system is available for the operation and control of multi-generator and load installations.

Stewart & Stevenson International Gas Turbine Products - Houston - Texas, packages Brush generators with the General Electric LM Series aero-derivative gas turbines for industrial and marine power systems. New orders have been received for generators and voltage regulator systems for the following projects:-
Brazil One LM2500 unit - 24 MW for Petrobras Oil company for the Replan Refinery project - Pavlinia.
Argentina One LM2500 unit - 24.5 MW for Rio Grande Public Service Co. , Tierra del Fuego.
United Kingdom Two LM6000 units - 45 MW for Southern Electric (independent Regional Electric Co.) - These peak lopping units will be situated at Chickerell - Weymouth and Burghfield - Reading.

Thomassen International (Netherlands) for the ETAP Project, in the UK North Sea. Brush has delivered two - 45 MW DAX type electric generators, each to be driven by General Electric Frame 6 industrial gas turbines. The ETAP project co-ordinates the resources of eight relatively small discoveries and pools the development costs by sharing production facilities between a number of normally competing oil companies. Brown & Root is the managing design contractor for the development, and AMEC and Kvaerner John Brown Engineering are constructing the principal offshore processing complex.

Recently ordered by Kvaerner Energy - Norway: One BDAX unit rated 22MW generator, for the Siri Central oil and gas production platform - offshore Denmark. This generator will be packaged with a General Electric LM2500 aero-derivative gas turbine.

ABB Stal, Sweden. For the Conoco Banff field development, two type GT35 gas turbine driven 19MW generators have been ordered for floating production storage and off-loading vessel (FPSO) for operation in the UK North Sea. The ship for this project is being built in the Hyundai Shipyard in Korea.

For Ishikawajima Europe BV. (IHI) - for Kalimantan Power barge - one LM6000 gas turbine driven generator for a floating power plant, initially to be operated to support the main utility system in Indonesia.

JUDGE US BY THE COMPANY WE KEEP

BRUSH has more gas turbines applications experience than any other generator manufacturer in the world. Continued success in the field of gas turbine generation can be attributed to BRUSH's ability to meet the demanding interface requirements of the turbine manufacturers, coupled with competitive prices and keen deliveries.

ABB Type 11
ABB GT35
Allison 501
Allison 571
Dresser Rand KG2
EGT Ruston TA1750
EGT Ruston TA2500
EGT Ruston TB5000
EGT Ruston Tornado
General Electric Frame 3
General Electric Frame 5
General Electric Frame 6
General Electric Frame 7
General Electric Frame 9
General Electric LM1600
General Electric LM2500
General Electric LM2500 +

General Electric LM5000
General Electric LM6000
Mitsubishi MF111
Orenda OT-3
Orenda OT-2100
Pratt & Whitney FT4
Pratt & Whitney FT8
Rolls Royce Spey
Rolls Royce Avon
Rolls Royce Olympus
Rolls Royce RB211
Rolls Royce Trent
Solar Mars
Westinghouse W191
Westinghouse W251
Westinghouse W501
Westinghouse W701

From the "BJS" range rated at less than 1MW, to the "DAX" series up to 200 MW, BRUSH has a generator to match every available gas turbine. So the next time you need a turbine driven generator, specify BRUSH - You will be in good company !