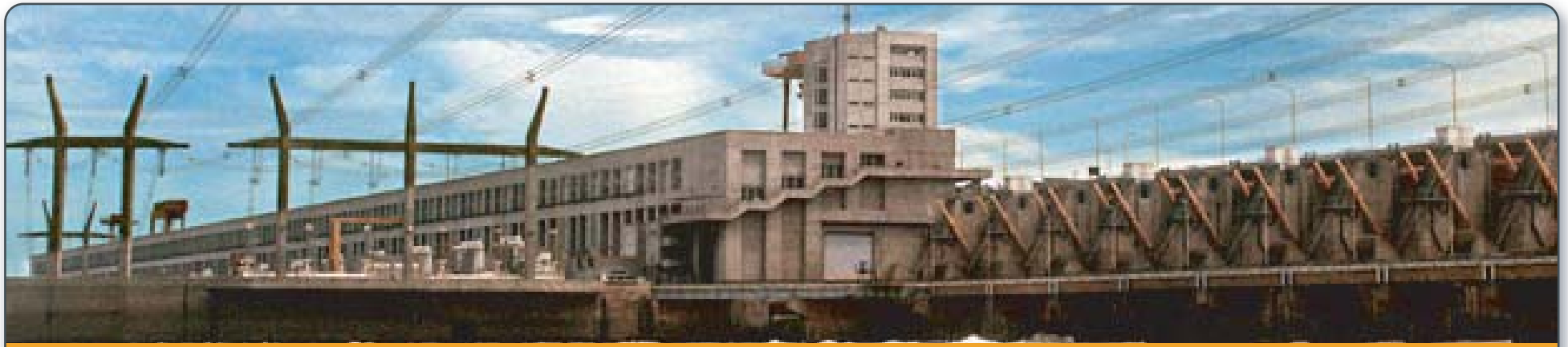
POWER MACHINES
150 YEARS OF SUCCESS

POWER MACHINES



POWER MACHINES

Power Machines is one of the world's leading manufacturers of equipment for hydro, steam, nuclear and gas power plants.

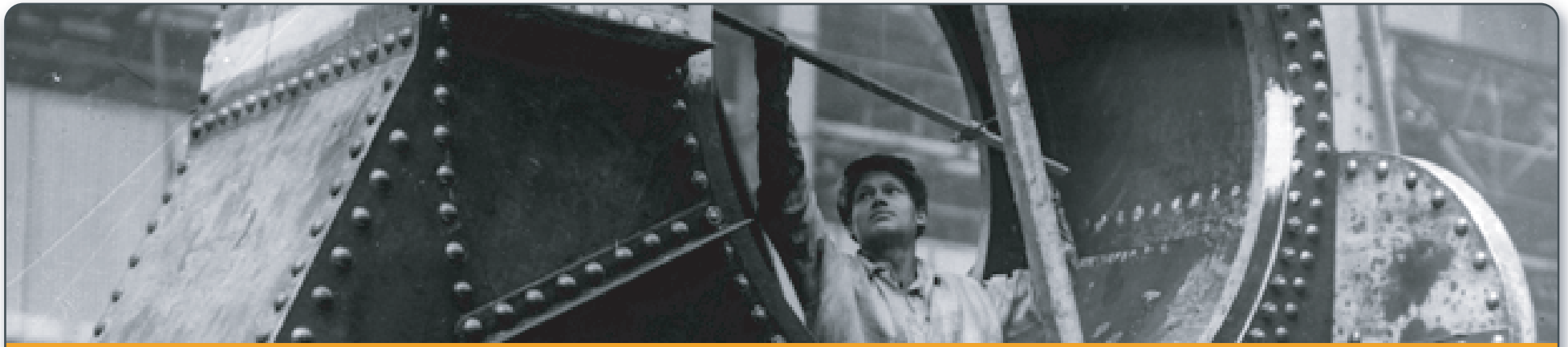
Power Machines presides over sales and marketing function for complete delivery of power generation equipment by uniting the Russian leading power equipment enterprises.

POWER MACHINES

POWER MACHINES UNITES THE CAPACITIES OF THE WORLD-FAMOUS COMPANIES

- Leningradsky Metallichesky Zavod (LMZ)
- Electrosila
- Turbine Blades' Plant (ZTL)
- Kaluga Turbine Works (KTZ)
- Scientific and Development Association on Research and Design of Power Equipment named after I.I.Polzunov (NPO CKTI)
- Energomachexport (EME)

POWER MACHINES



POWER MACHINES – SUCCESS KEYS

- Century and a half of joint technological experience
- Highly qualified personnel
- Huge scientific and production potential
- Modern progressive management system

POWER MACHINES

UBI CONCORDIA,
IBI VICTORIA

HISTORY

HISTORY

1857

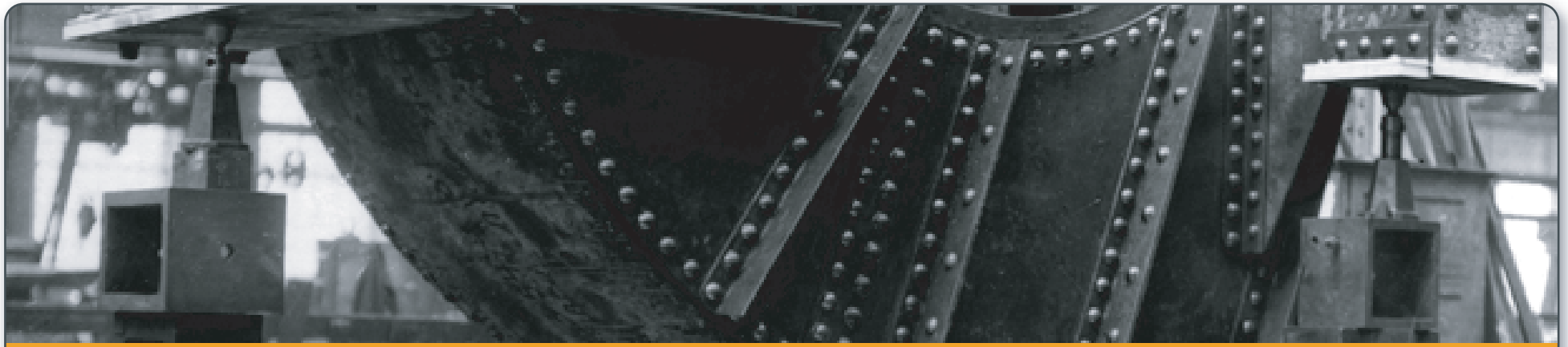
The largest enterprise specialized in power generating turbine production in Russia - Leningradsky Metallichesky Zavod (LMZ) was founded. During the next 10 years, Russia's first facility for producing heating and ventilation devices started to operate at LMZ.

HISTORY

1898

Russia’s first production of electric machines established. Known worldwide as Electrosila a leading producer of electric machines.

HISTORY



1927

CKTI was founded on the base of the Heat-engineering department of the Leningrad Polytechnic Institute (now, SPb. State Polytechnic University). It was intended to give a scientific and technique research support to the Russian power generating industry.

HISTORY

1944

Moscow department of CKTI (later reorganized to All Union Scientific Experimental Institute of Nuclear Power Engineering - VNIIAM) was organized.

HISTORY

1945

- CKTI and its Moscow department were enlisted in the service of the USSR Nuclear project.
- CKTI was named after the famous Russian heating engineer I.I. Polzunov.

HISTORY

1964

- Severnaia Baza (North Base) – Turbine Blades' Plant was established as an LMZ business unit.
- First in Europe steam turbine with 800 MW capacity produced. (LMZ)
- Production of completely water-cooled turbogenerators started; only non-flammable materials were used (Electrosila). Nowadays 11 turbogenerators of that series are installed on power plants of Russia, Belarus and Kazakhstan.

HISTORY

1966

- Turbine Blades' Plant left the JSC Leningradsky Metallichesky Zavod (LMZ), thus forming Leningradsky Turbine Blades' Plant.
- Foreign Trade Ministry of Russia established Energomachexport - a state company specializing in power and transport equipment supplies.

HISTORY

1976

According to the Russian government decision, the Scientific Development Association on Research and Design of Power Equipment – NPO CKTI was founded on the base of CKTI.

The Central Boiler Turbine Institute, the pilot factory of CKTI, and branches in Barnaul and Rostov became Association members.

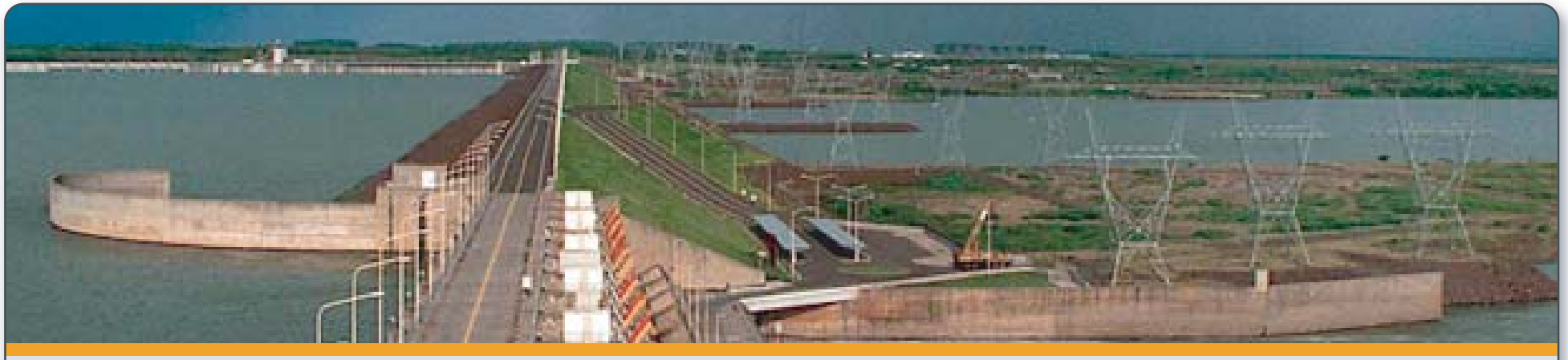
HISTORY

2000

Power Machines Group (LMZ, Electrosila, ZTL, KTZ, Energomachexport) created.

Power Machines Group - a contractor and supplier of equipment produced by the plants of the Group (LMZ, Electrosila, ZTL, KTZ). Managing company: OJSC Power Machines, sales: Energomachexport.

HISTORY



2003

- OJSC Power Machines and Energomachexport (sales unit of the Group) formed a new company called JSC Energomachexport – Power Machines combining two business functions: sales and management.
- Energomachexport - Power Machines obtained controlling stake in Leningradsky Metallichesky Zavod, Electrosila, Turbine Blade Plant, and also blocking minority ownership in Kaluga Turbine Works.
- NPO CKTI joined the Power Machines Group.
- Energomachexport was excluded from the state register of legal entities. All rights, responsibilities and assets of the company were passed OJSC Power Machines.

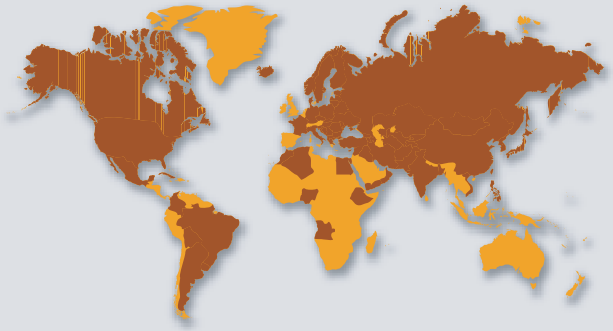
HISTORY

2004

- In the beginning of 2004 ZTL, LMZ and Electrosila were excluded from the state register of legal entities and formed a single legal entity through joining OJSC Power Machines.
- OJSC Power Machines became a universal legal successor of all joined companies. All rights, responsibilities and assets of the three companies were passed OJSC Power Machines. Adjoined companies received branch status approved by the Board of Directors of OJSC Power Machines.

REFERENCES

REFERENCES



AFGHANISTAN
ALBANIA
ALGERIA
ANGOLA
ARGENTINA
ARMENIA
AZERBAIJAN
BANGLADESH
BELARUS
BOLIVIA
BOSNIA AND HERZEGOVINA
BRAZIL
BULGARIA
CANADA
CHINA
COLUMBIA
CROATIA
CUBA
CYPRUS
CZECHIA
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA
DENMARK
EGYPT
ESTONIA
ETHIOPIA
FINLAND
FRANCE
GEORGIA
GERMANY
GREECE
HUNGARY
ICELAND
INDIA
IRAN
IRAQ
ITALY
JAPAN
KAZAKHSTAN
KIRGHIZIA
KOREA
LATVIA
LITHUANIA
MACEDONIA
MEXICO
MOLDAVIA
MONGOLIA
MOROCCO
NIGERIA
NORWAY
PAKISTAN
PARAGUAY
PHILIPPINES
POLAND
ROMANIA
RUSSIA
SERBIA AND MONTENEGRO
SLOVAKIA
SWEDEN
SYRIA
TAIWAN
TAJIKISTAN
TURKEY
TURKMENISTAN
UKRAINE
UNITED ARAB EMIRATES
UNITED STATES OF AMERICA
URUGUAY
UZBEKISTAN
VIETNAM
YEMEN

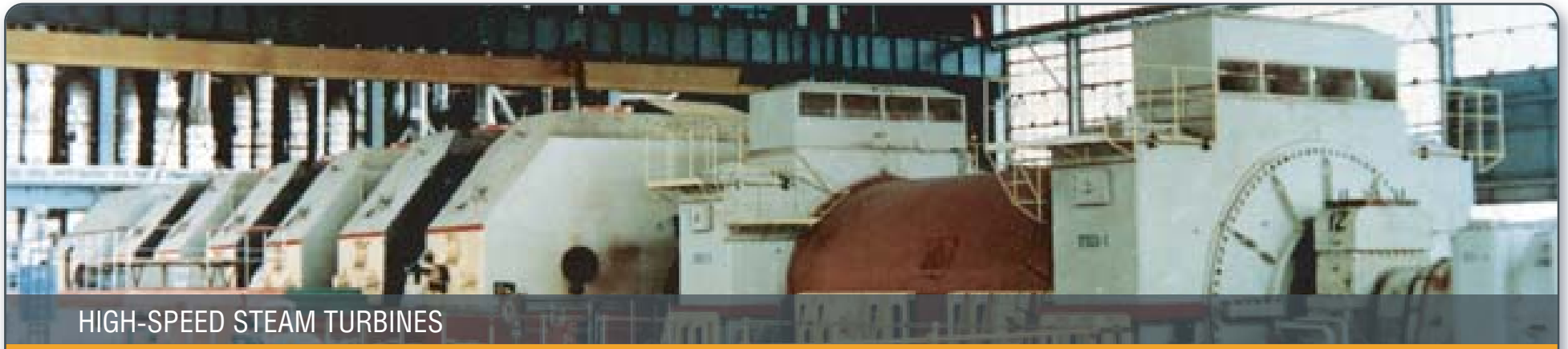
SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

HIGH-SPEED STEAM TURBINES

- One of the most powerful - 1000 MW capacity
- 20 high-speed steam turbines are installed all over the world
- Five of them were produced by the Power Machines branch - Leningradsky Metallichesky Zavod

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS



HIGH-SPEED STEAM TURBINES

ADVANTAGES OF HIGH-SPEED TURBINES OF 3000 RPM

- Low capital expenditures for construction and installation of turbine island
- Low operation costs for repairs and service of turbo unit due to considerably smaller dimensions and weight of stator and rotor details
- Power units work interruptions caused by the turbine - average 37,9 hours per year
- Guaranteed lifetime - 13-15 years

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

TYPE OF ABSOLUTELY SAFE TURBOGENERATORS THREE WATERS

THREE WATERS

Three Waters is an absolutely safe hydrogen-free technology of full turbogenerator water-cooling.
It is used in turbogenerators for nuclear and steam power plants with capacities of 100 to 1500 MW.

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

TYPE OF ABSOLUTELY SAFE TURBOGENERATORS THREE WATERS

THREE WATERS

The Three Waters turbogenerator is characterized by indirect and direct water-cooling of three main parts of a turbogenerator:

- core stator
- stator winding
- rotor winding

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

TYPE OF ABSOLUTELY SAFE TURBOGENERATORS THREE WATERS

THREE WATERS

The design of the completely water-cooled turbogenerators is both explosion- and fireproof and does not require fire-extinguishing systems.

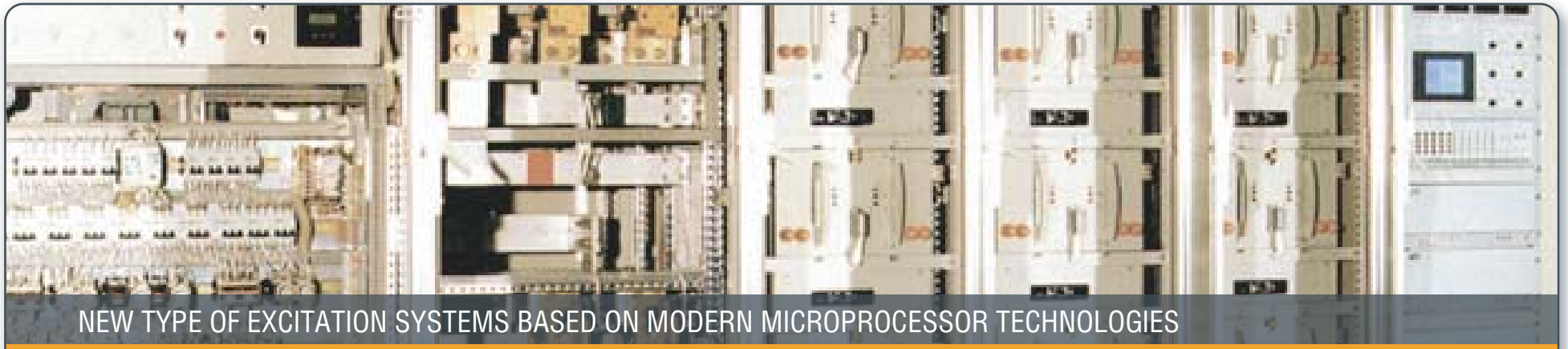
SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

UNIQUE TECHNOLOGY OF TURBINE BLADES' PRODUCTION

UNIQUE TURBINE BLADES

- Longest in the world – up to 1200 mm
- Aerodynamic optimization and computer-based calculations
- Integrally milled shrouds and section
- Blades vibration damping
- Increased economical efficiency of stage
- General reliability and life extension of the turbines

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

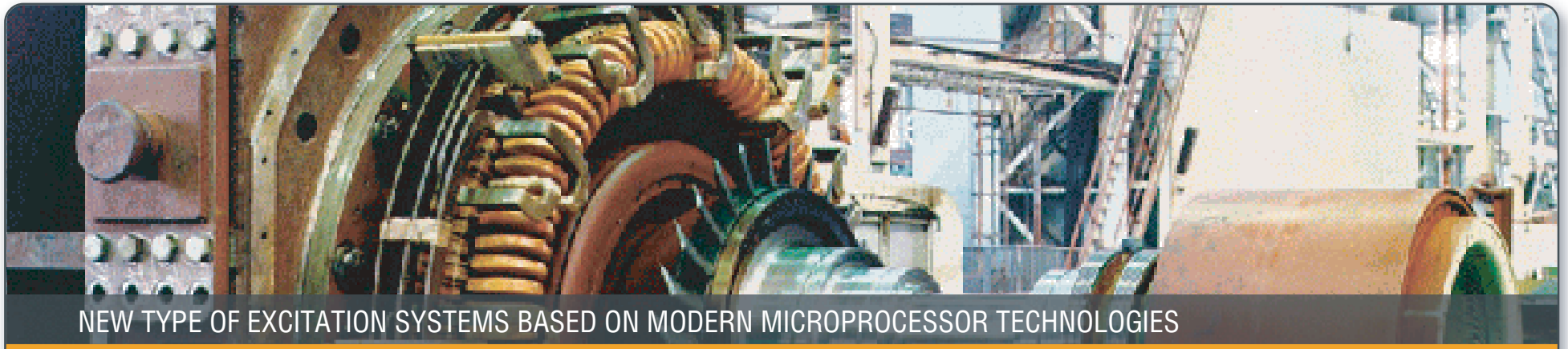


NEW TYPE OF EXCITATION SYSTEMS BASED ON MODERN MICROPROCESSOR TECHNOLOGIES

NEW TYPE OF EXCITATION SYSTEMS

- Maximum safety
- Convenience of excitation board maintenance
- High level of readiness
- Diversity of designs
- Improved board design
- Increased stability and reliability factors of work ensured by on-site adjustment and testing of systems

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS



NEW TYPE OF EXCITATION SYSTEMS BASED ON MODERN MICROPROCESSOR TECHNOLOGIES

NEW TYPE OF EXCITATION SYSTEMS

- Thyristor self-excitation systems (TSES)
- Thyristor independent-type excitation systems (TIS)
- Brushless diode systems (BDS)
- Diesel generator excitation systems
- Thyristor standby systems (TSS)

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

FRANCIS TURBINES

FRANCIS TURBINES

- Manufacturing the runner blades from high quality plates by using the mould pressing method
- The welding technology and assembling of the runners guarantee minimum residual voltage
- Identity and accuracy of mould pressed blades, which reduces non-stationary flow effect
- Advances method for calculating residual service life based on the material corrosion and fatigue strength research
- Reliable operation, even with considerable head changes due to seasonal adjustments and irrigation

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

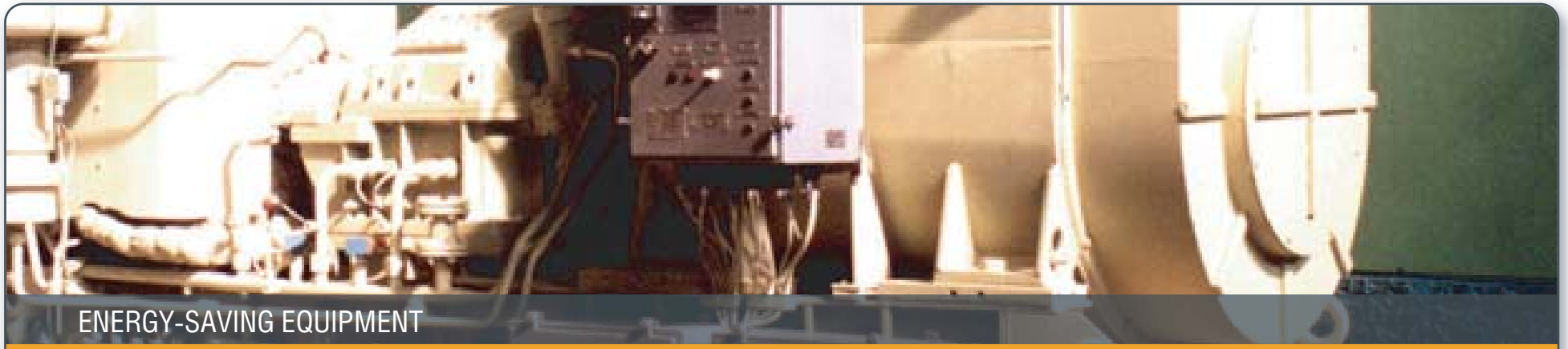
ENERGY-SAVING EQUIPMENT

ENERGY SAVING

Energy saving equipment in metallurgy, chemical, oil refining, food production, woodworking and building industries:

- Package-type turbogenerator
- Condensing package-type turbogenerator with steam extraction
- Geothermal modular power-generating units
- Package-type recovery heat power complexes
- Gas expansion turbo sets for electric power generation without fuel at gas pipe lines

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS



ENERGY-SAVING EQUIPMENT

PACKAGE-TYPE TURBOGENERATOR KUBAN A3

Usage:

Electric power generation using the waste steam for technological and heating needs.

Delivery:

Supplied in package-type as ready to-operate.

Package includes:

- back pressure turbine
- electric generator
- electric gear

Main and auxiliary equipment is installed on oil tank frame.

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

ENERGY-SAVING EQUIPMENT

CONDENSING PACKAGE-TYPE TURBOGENERATOR WITH STEAM EXTRACTION P 1,2-13/6 MUSSON

Usage:

Power and heat generation on reprocessing of solid waste at garbage-disposal plants for process and heating needs.

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

ENERGY-SAVING EQUIPMENT

GEOTHERMAL MODULAR POWER-GENERATING UNITS

Usage:

Small-sized power plants allowing using the steam and water of geothermal fields or utilizing the waste heat industrial plants.

- Yearly production - up to 12 MW
- Coal equivalent savings - 4500-7300 tons per year

Delivery:

The units are delivered as ready to-operate container modules of a van type – short time for installation and delivery. The complete equipment also includes plants for heating and cleaning the steam and primary heat- transfer medium of geothermal fields respectively.

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

ENERGY-SAVING EQUIPMENT

PACKAGE-TYPE RECOVERY HEAT POWER COMPLEXES BUTEK

Usage:

Electric power and heat generation for process and business due to waste heat of outgassing without fuel burning.

Delivery:

- Package-container
- Package-complete

Capacity: from 500 to 37000 KW.

SCIENTIFIC AND TECHNOLOGICAL ACHIEVEMENTS

ENERGY-SAVING EQUIPMENT

GAS EXPANSION TURBO SETS FOR ELECTRIC POWER GENERATION WITHOUT FUEL AT GAS PIPE LINES

Usage:

Designed to operate as a part of expander-generator units (DGA), generating electric power at gas regulating stations (GRS) of the gas pipe lines. In order to generate useful electric power in DGA potential power of compressed gas, lost at its throttling to GRS of gas pipe lines.

Capacity: up to 12 MW.

SOCIAL RESPONSIBILITY

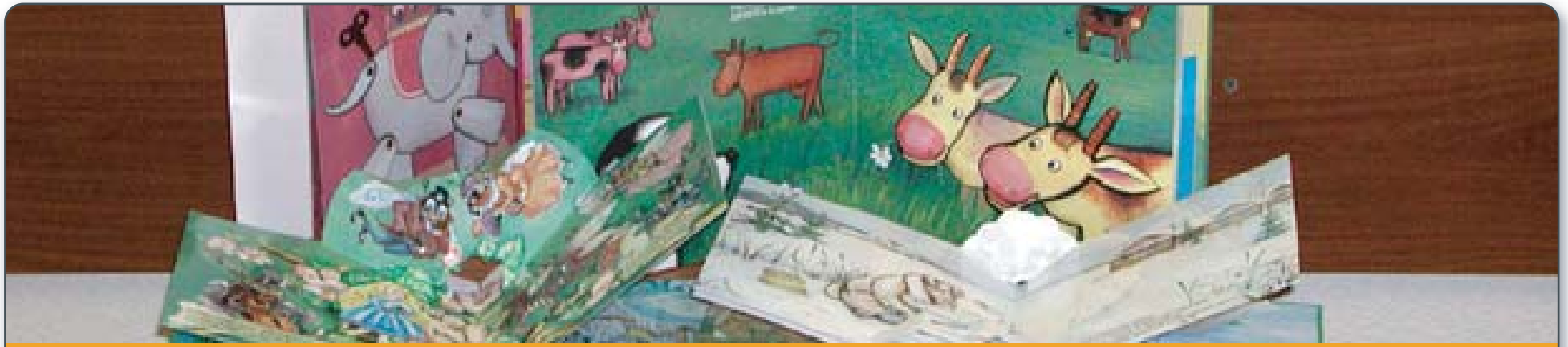
SOCIAL RESPONSIBILITY

SOCIAL RESPONSIBILITY

Power Machines supports:

- Children
- Sports
- Veterans and people with limited abilities
- Educational institutions
- Arts and Culture

SOCIAL RESPONSIBILITY



THE "ILLUSTRATED BOOKS FOR SMALL BLIND CHILDREN" PROGRAM

The "Illustrated books for small blind children" program, part of the United Nations' and UNESCO's 10th World Anniversary of Culture Development.

Unique editions with 3-dimensional illustrations, specially designed to strengthen the motor and tactile functions of children with weak sight.

SOCIAL RESPONSIBILITY

SUPPORT SPORTS

An International Judo junior tournament named in the memory of USSR hero V.Y. Petrov and patronized by the President of Russia is regularly sponsored by Power Machines.

SOCIAL RESPONSIBILITY

SUPPORT VETERANS AND PEOPLE WITH LIMITED ABILITIES

Continuous help to veterans' organizations, charity funds and social rehabilitation centers for people with limited abilities.

SOCIAL RESPONSIBILITY

SUPPORT EDUCATION INSTITUTIONS

- Furnishing of a computer laboratory at Saint-Petersburg Institute of machine building.
- Reconstruction of auditoriums at Saint-Petersburg State Technical University and Moscow Energy Institute.

SOCIAL RESPONSIBILITY

SUPPORT ARTS AND CULTURE

Since 2001 Power Machines has been a general sponsor of the Russian State Academic Bolshoi Theater of Tovstonogov.

SOCIAL RESPONSIBILITY

SUPPORT ARTS AND CULTURE

To the St. Petersburg 300th anniversary celebration Power Machines sponsored the restoration of one of the historical monuments of art-sculpture group by Triskorni – Dioscury.

GROUP STRUCTURE

GROUP STRUCTURE

- LMZ – turbines for hydro, steam, nuclear and gas power plants
- Electrosila – hydro and turbo generators, traction engines, large electric machines and low-voltage equipment
- KTZ – steam turbines of small and medium capacity
- ZTL – machined blades for steam and gas turbines
- NPO CKTI – development, research and improvement of power equipment of all kinds

LENINGRADSKY METALLICHESKY ZAVOD

LENINGRADSKY METALLICHESKY ZAVOD

LMZ produced:

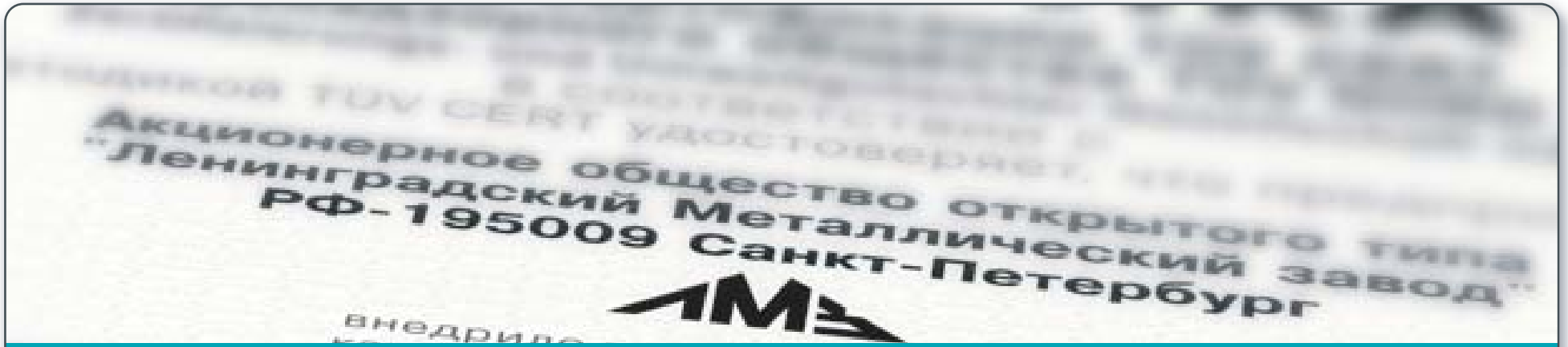
- First in the world turbine of 25 MW capacity with controlled steam extraction for district heating cogeneration (1933)
- First in Europe high-speed turbine with capacity of 100 MW, 3000 rpm
- First in Europe steam turbine of 800 MW capacity, 3000 rpm
- High-speed turbines of 1000 MW capacity for nuclear power plants

LENINGRADSKY METALLICHESKY ZAVOD

Unique expirience:

- Highest capacity of high-speed turbines in the world.
- Small overall dimensions of high-speed turbines for nuclear power plants as compared with their low-speed analogies.
- Environmentally safe Kaplan turbines technologies that prevent water pollution.
- New generation of microprocessor control systems. Guaranteed system operating life – 40 years.
- In-house developed technology of internal and external shells casting of HPC (high-pressure cylinder) for the saturated steam turbine of 1 mln KW capacity.
- Special fire-resistant lubricants used.

LENINGRADSKY METALLICHESKY ZAVOD



Quality certificates:

- Certificate of Compliance with the requirements of ISO 9001:1994
- Certificate of Compliance with the requirements of ISO 9001:2000
- Certificate of Compliance with the requirements of ISO 9002-1994(TÜV NORD)
- State Supervisory Committee for the Atomic Industry of Russia license for design and production of equipment for nuclear power plants

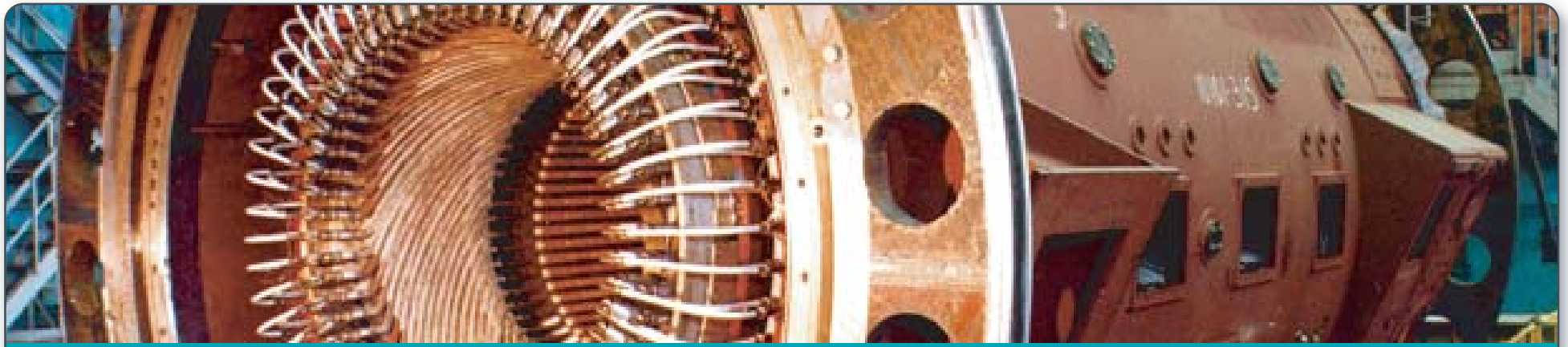
ELECTROSILA

ELECTROSILA

Production of electrical equipment for power generation, metallurgy, shipbuilding, the coal and mining industry, transport and other industries:

- Turbogenerators
- Hydrogenerators
- Various versions of large a.c. and l.c. electrical machines
- Low voltage equipment

ELECTROSILA



Unique expirience:

- Over 1570 turbo generators with the capacity rating of 0.5 to 1200 MW
- More than 600 hydrogenerators with the capacity from 4 to 640 MW have been produced
- Over 500,000 various electrical machines have been manufactured and delivered practically for all industries
- The world’s most powerful air-cooled 335 MW hydrogenerator

ELECTROSILA


СЕРТИФИКАТ ОДОБРЕНИЯ

Настоящим удостоверяется, что система управления качеством компании:

ОАО «ЭЛЕКТРОСИЛА»

Санкт-Петербург, Россия

Quality certified:

- Certificate of Compliance with the requirements of ISO 9001:1994
- Certificate of Compliance with the requirements of ISO 9002-1994(TÜV NORD)
- Soviet Quality Association (SovASK) Certificate
- State Standards Committee of Russia Certificate
- Lloyd's Register Quality Assurance
- Licenses granted by State Supervisory Committee for the Atomic Industry of Russia for development, constructional design and manufacture of equipment for nuclear power plants

ZTL

TURBINE BLADES' PLANT

TURBINE BLADES' PLANT

Turbine Blades' Plant:

- Modern precision equipment
- Special equipment for producing means of technological equipage: press-molds, stamps, tooling
- Newest design CAD/CAM systems
- Modern quality control system

TURBINE BLADES' PLANT

Unique expirience:

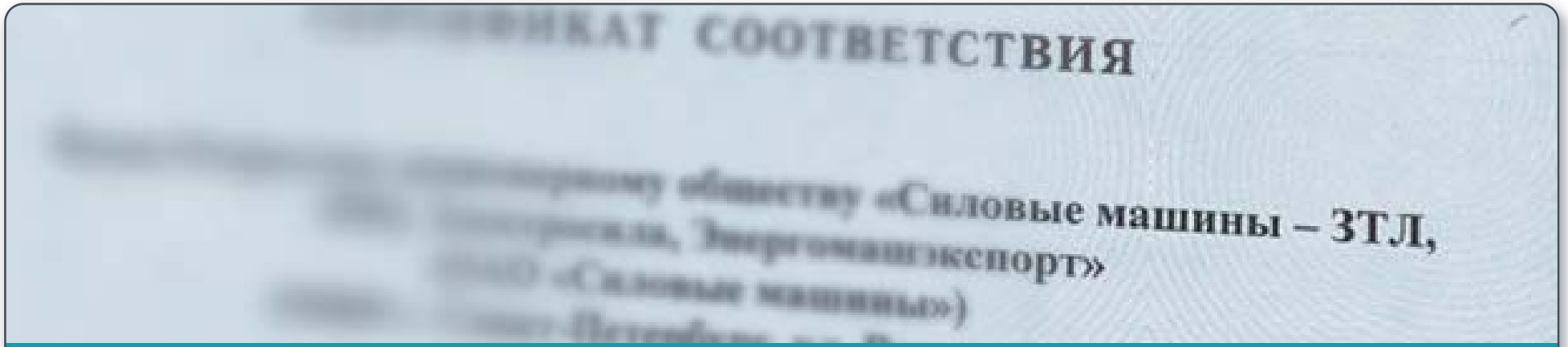
Vanes and blades, including unique 1200 mm long titanic blades for steam turbines with the capacity of 1000 MW, installed on Bushehr NPP (Iran) and Tianvan NPP (China).

TURBINE BLADES' PLANT

Perspective projects:

- New blade mechanisms for gas turbine, which are now being created by the specialists of Power Machines
- Technical re-equipment
- Development of the precision casting complex for manufacturing of advanced level products - blades with complicated inner configuration

TURBINE BLADES' PLANT



Quality certificates:

- Certificate of Compliance with the requirements of ISO 9002-1994 TÜV NORD
- Soviet Quality Association (SovASK) Certificate

KALUGA TURBINE WORKS

KALUGA TURBINE WORKS

Production of low and middle capacity steam turbines (up to 35 MW):

- Steam turbines to direct drive of power units
- Driving steam turbines
- Package-type turbo generators
- Steam geothermal turbines and power units

KALUGA TURBINE WORKS

KTZ produced:

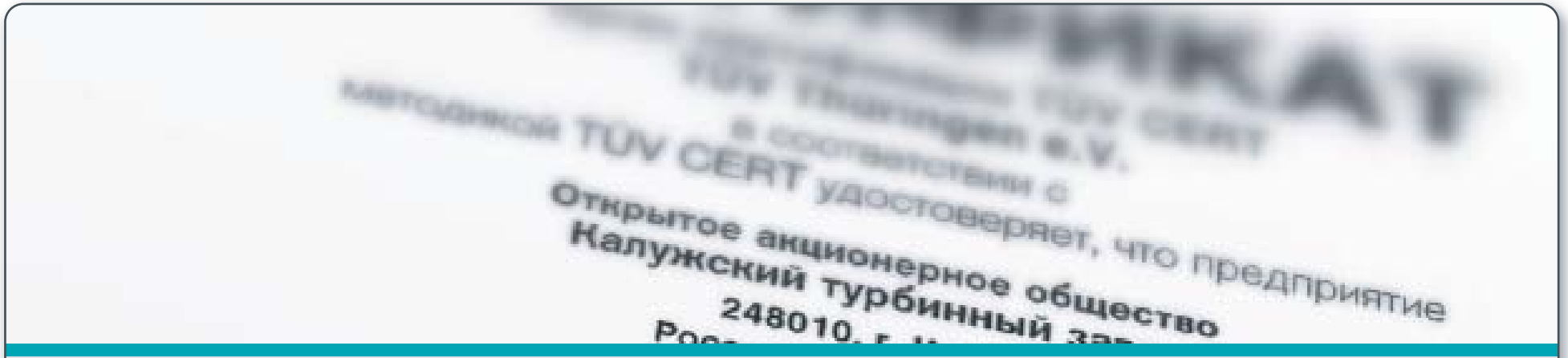
- 2642 power sets with the total capacity of 17091 MW.
- Unique geothermal turbines for Mutnovskaya geothermal power plant.
- Turbine of 37 MW capacity as a part of the 140 MW combined-cycle unit.

KALUGA TURBINE WORKS

Unique experience:

- Decreased axial dimensions of the rotor
- Increased tightness without any loss of operational dependability due to autofrettage
- Flexible original construction of turbine rotors
- Rotor shafts are made of high-quality steel providing mechanical strength in all modes of operation
- Enhanced high-temperature operational reliability due to repeated heat treatment and thermal tests
- Development testing of all manufactured products

KALUGA TURBINE WORKS



Quality certified:

Certificate of Compliance with the requirements of ISO 9000 (TÜV NORD)

SCIENTIFIC AND DEVELOPMENT ASSOCIATION FOR RESEARCH AND DESIGN OF POWER EQUIPMENT named after I.I POLZUNOV

SCIENTIFIC AND DEVELOPMENT ASSOCIATION FOR RESEARCH AND DESIGN OF POWER EQUIPMENT named after I.I POLZUNOV

- 75 years of knowledge and experience
- Highly qualified personnel
- Unique Russian research base
- Power Equipment Testing Center accredited by State Standards Committee of Russia
- Head organization of Russian Gosgortechnadzor specialized on the problems of industrial safety of boilers, vessels and pipelines, analysis and prevention of the man-caused risks
- ASME, ISO, ICE, CIMAC, EOQ active partner

SCIENTIFIC AND DEVELOPMENT ASSOCIATION FOR RESEARCH AND DESIGN OF POWER EQUIPMENT named after I.I POLZUNOV

NPO CKTI took part in development of:

- Power-generating units for steam power plants with the capacity up to 1200 MW
- Industrial reactors
- The world's first nuclear power plant
- VVER power-generating units of up to 1000 MW
- RBMK power-generating units of up to 1000 MW
- BN-350, BN-600, BN-800, BN-1600 power-generating units for gas-turbine plants of up to 150 MW
- Combined cycle gas sets of various configurations
- Hydro turbine equipment
- Equipment for industrial and municipal power-generating facilities

SCIENTIFIC AND DEVELOPMENT ASSOCIATION FOR RESEARCH AND DESIGN OF POWER EQUIPMENT named after I.I POLZUNOV

NPO CKTI scope of activity:

- Power-generating equipment for hydro, steam and nuclear power plants.
- Industrial and municipal power-generating facilities.
- Power generating and waste recovery installations in metallurgical, chemical, oil processing, gas, pulp and paper and other industries.
- Power-generating equipment repair and life extension technologies research and development.

SCIENTIFIC AND DEVELOPMENT ASSOCIATION FOR RESEARCH AND DESIGN OF POWER EQUIPMENT named after I.I POLZUNOV

NPO CKTI licenses:

37 licenses granted by various institutions:

- Gosgortechnadzor RF
- State Standards Committee of Russia
- State Supervisory Committee for the Atomic Industry of Russia
- Sevzapgosenergonadzor
- The ministry of the industry, science and technology of Russia
- RAO UES of Russia

CATALOGUE

POWER GENERATION EQUIPMENT

POWER GENERATION EQUIPMENT

- Hydro turbines and generators with the capacity from 4 to 1000 MW
- Steam turbines and generators with the capacity from 0,6 to 1200 MW
- Gas turbines with 160 MW capacity
- Geothermal steam turbines with the capacity from 2,5 to 25 MW
- Blades for steam and gas turbines

POWER GENERATION EQUIPMENT

HYDRO TURBINES AND GENERATORS

- Hydro turbines
- Hydrogenerators

POWER GENERATION EQUIPMENT

HYDRO TURBINES AND GENERATORS : HYDRO TURBINES

Power Machines produces:

- Kaplan turbines capacity from 4 to 300 MW for 5 to 70 m heads
- Francis turbines capacity from 10 to 1000 MW for 18 to 700 m heads
- Francis pump turbines
- Pelton turbines capacity from 10 to 300 MW for 250 to 1400 m heads

POWER GENERATION EQUIPMENT

HYDRO TURBINES AND GENERATORS : HYDRO TURBINES

Auxiliary equipment for hydro turbines and generators:

- Excitation systems
- Turbine shut-off valves
- Automatic control systems
- Governors
- Oil pressure systems
- Automatic controls of oil pressure systems
- Pumps
- Heat exchange equipment

POWER GENERATION EQUIPMENT

HYDRO TURBINES AND GENERATORS : HYDRO TURBINES

The total installed capacity of the hydro turbines operating in 30 countries of Europe, Asia, Africa and America exceeds 60,000 MW.

POWER GENERATION EQUIPMENT

HYDRO TURBINES AND GENERATORS : HYDRO TURBINES

Hydro turbines competitive features:

- Use of 3D modeling of the water passage flow and hydro turbines components tensions
- Hydro turbine laboratory bench tests and field tests
- Know-how related to the development of environmentally friendly Kaplan turbines
- Development of highly reliable, programmable, microprocessor-driven control systems for hydro turbines
- Use of high-tensile steel of the 15/4 type for the rotor wheels and guide blades in Francis turbines and Kaplan turbines

POWER GENERATION EQUIPMENT

CERTIFICATES AND LICENSES

Certificates of conformance to EN ISO 9001:1994 and ISO 9001:2000 requirements

POWER GENERATION EQUIPMENT

HYDRO TURBINES AND GENERATORS : HYDROGENERATORS

Hydrogenerators:

- Vertical-shaft or horizontal-shaft design of umbrella, semi-umbrella and suspension types
- Bulb-type generators with the direct and indirect forced cooling
- Advanced construction of separate components, units and systems

POWER GENERATION EQUIPMENT

HYDRO TURBINES AND GENERATORS : HYDROGENERATORS

Low-speed hydrogenerators ensure:

- Free-running
- Design simplicity
- High assemblability and compatibility

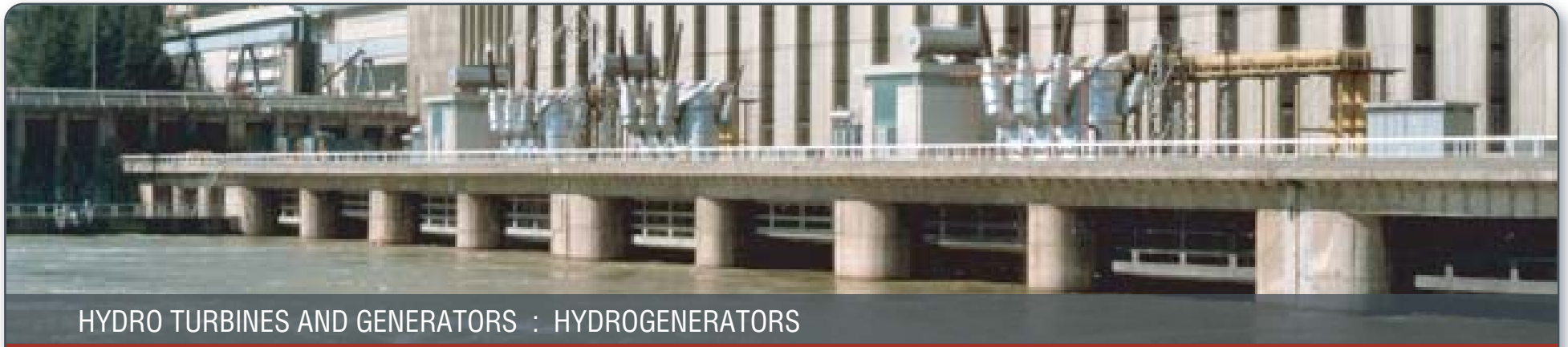
POWER GENERATION EQUIPMENT

HYDRO TURBINES AND GENERATORS : HYDROGENERATORS

The total production:

- 600 hydrogenerators with a total capacity of 65 million KW — that is approximately 9% of the world's total installed hydro power plants capacity.
- 140 hydrogenerators with a total capacity of 17,2 mln KW supplied for export.
- 31 bulb-type generators with a total capacity of 904 MW of different configurations equipped with various cooling systems.
- 53 hydrogenerators with water-cooled stators of 15,2 mln KW capacity.
- 27 machines with water-cooled rotors.

POWER GENERATION EQUIPMENT



HYDRO TURBINES AND GENERATORS : HYDROGENERATORS

CERTIFICATES AND LICENSES

- Certificate of Compliance with the requirements of ISO 9001:1994
- Soviet Quality Association (SovASK) Certificate
- State Standards Committee of Russia Certificate
- Lloyd's Register Quality Assurance

POWER GENERATION EQUIPMENT

STEAM TURBINES AND GENERATORS : STEAM TURBINES

STEAM TURBINES

- Condensing turbines capacity from 1.7 to 1200 MW
- Extraction turbines capacity from 25 to 185 MW
- Extraction turbines with process steam extraction capacity from 30 to 80 MW
- Back-pressure turbines capacity from 1.45 MW to 85 MW
- Back-pressure turbines with process steam extraction
- Condensing turbines with extraction for district heating capacity from 600 KW to 330 MW

POWER GENERATION EQUIPMENT

STEAM TURBINES AND GENERATORS : STEAM TURBINES

AUXILIARY SYSTEMS AND EQUIPMENT

- Air condensers
- Heaters
- Oil coolers
- Valves
- Air-removing devices
- Water filtering units

POWER GENERATION EQUIPMENT

STEAM TURBINES AND GENERATORS : STEAM TURBINES

UNIQUE FEATURES

- Low weight and dimensions characteristics (as compared with those of the low-speed), ensuring reduction of costs associated with creating the turbine island for a nuclear power plant
- High economic efficiency of the turbines with steam extraction for district heating
- High reliability and serviceability
- Economic efficiency of installation and maintenance
- Use of fireproof liquid in the control and lubrication systems of steam turbines instead of the flammable hydrocarbon oil

POWER GENERATION EQUIPMENT

STEAM TURBINES AND GENERATORS : STEAM TURBINES

CERTIFICATES AND LICENSES

- Certificate of Compliance with the requirements of ISO 9001:1994
- State Supervisory Committee for the Atomic Industry of Russia licenses for design and manufacture of equipment for nuclear power plants

POWER GENERATION EQUIPMENT

STEAM TURBINES AND GENERATORS : TURBOGENERATORS

- Forced hydrogen-cooled turbogenerators
- Hydrogen-water-cooled turbogenerators
- Completely water-cooled turbogenerators
- Completely air-cooled turbogenerators

POWER GENERATION EQUIPMENT

STEAM TURBINES AND GENERATORS : TURBOGENERATORS

ADVANTAGES

- High mobility
- Excellent ability for frequent startups and shutdowns
- Operation in asymmetric conditions
- Emergency oil supply and removable brush blocks
- Noise-proof housings, elastic stator core suspension and hydraulically operated rotor hoist

POWER GENERATION EQUIPMENT

STEAM TURBINES AND GENERATORS : TURBOGENERATORS

CERTIFICATES AND LICENSES

- Certificate of Compliance with the requirements of ISO 9001:1994
- Soviet Quality Association (SovASK) Certificate
- State Standards Committee of Russia Certificate
- Lloyd's Register Quality Assurance
- State Supervisory Committee for the Atomic Industry of Russia license for design and manufacture of equipment for nuclear power plants

POWER GENERATION EQUIPMENT

GAS TURBINES

The GTE-160 gas turbine is designed for generator for a rotational speed of 3000 rpm - peak or base operation mode.

Components:

- Turboset (a compressor and a turbine)
- Two combustion chambers
- Oil tank with fitted equipment
- Compressor inlet
- Exhaust run-out
- Three pipeline stands

POWER GENERATION EQUIPMENT

GAS TURBINES

FEATURES

- Oil and gas fuel
- Optimal layout of the combustion chambers
- Use of hybrid jets reduces exhaust emission without water or steam injection
- Ecological injection system

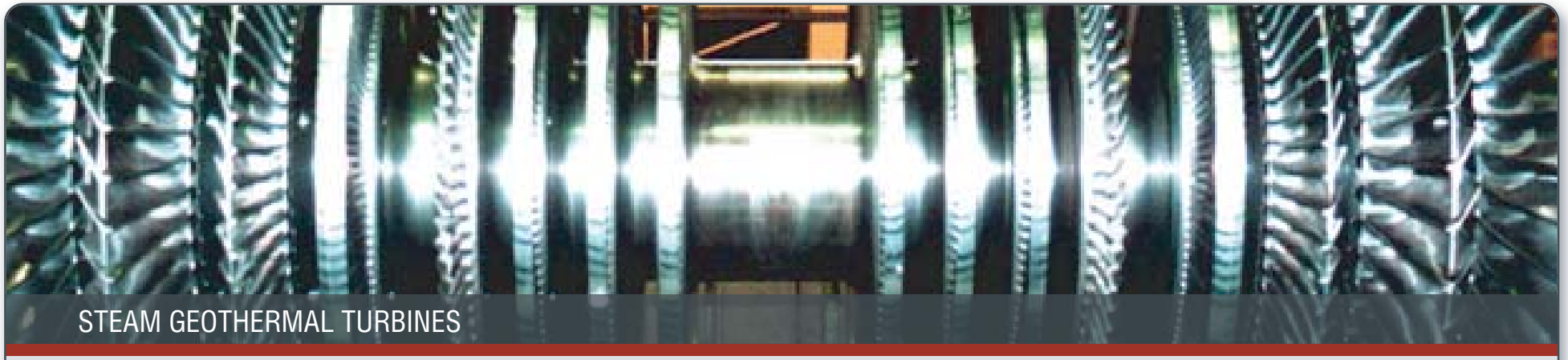
POWER GENERATION EQUIPMENT

STEAM GEOTHERMAL TURBINES

POWER MACHINES SUPPLIES:

- Geothermal modular power-generating units
- Geothermal modular turbine units

POWER GENERATION EQUIPMENT



STEAM GEOTHERMAL TURBINES

GEOTHERMAL MODULAR POWER-GENERATING UNITS

Usage:

Small-sized power plants allowing using the steam and water of geothermal fields or utilizing the waste heat industrial plants.

- Yearly production - up to 12 mln KW
- Coal equivalent savings - 4500-7300 tons per year

Delivery:

The units are delivered as ready to-operate container modules of a van type – short time for installation and delivery. The complete equipment also includes plants for heating and cleaning the steam and primary heat- transfer medium of geothermal fields respectively.

POWER GENERATION EQUIPMENT

STEAM GEOTHERMAL TURBINES

GEOTHERMAL MODULAR TURBINE UNITS

Represented by a standardized inventory of geothermal turbines with a broad range of power generating capacities.

Unique engineering solutions:

- Dual-flow turbine
- Heat exchange assemblies with mixing-type water equipment
- Large ejectors
- Use of plated materials in the equipment exposed to aggressive working environment

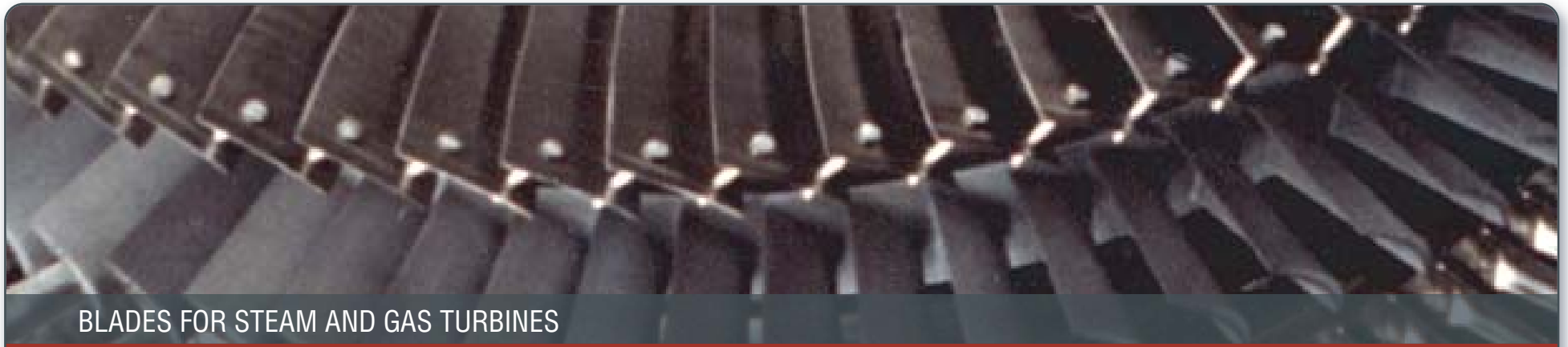
POWER GENERATION EQUIPMENT

STEAM GEOTHERMAL TURBINES

GEOTHERMAL MODULAR TURBINE UNITS

An co-channel separation system and a special separator cascade within the turbine ensure effective moisture removal (up to 80%) and enhance the turbine degree of efficiency up to 1.7%.

POWER GENERATION EQUIPMENT



BLADES FOR STEAM AND GAS TURBINES

BLADES STEAM TURBINES WITH THE CAPACITY FROM 20 TO 1500 MW

- Hot-stamped from chromium stainless steels and titanium alloys
- Profile and bands are predominantly machined with an alternating height
- Increased economic efficiency
- Vibration damping
- Blade length — 50 to 1200 mm
- Blade width — up to 500 mm
- Profile length — up to 1500 mm
- Weight — 0.1 to 100 kg

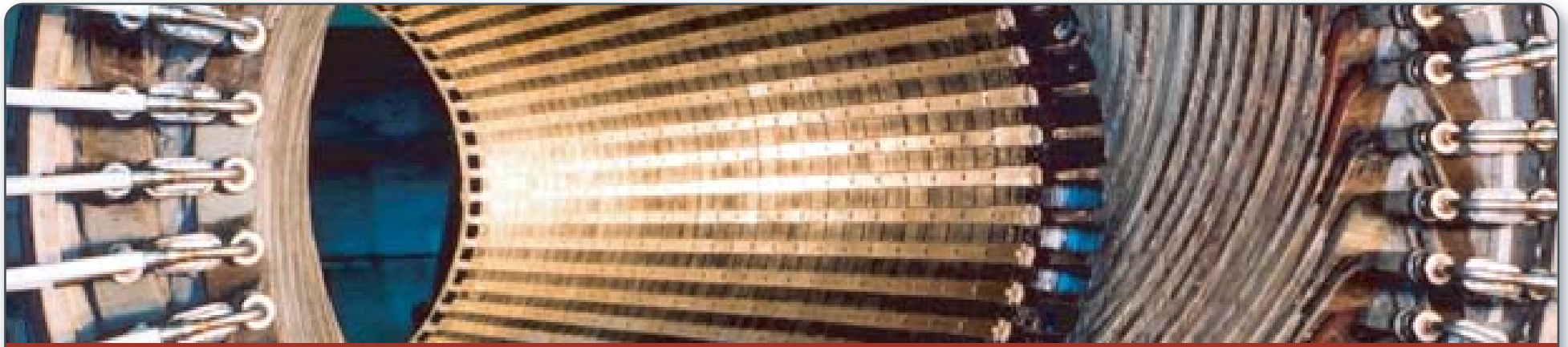
POWER GENERATION EQUIPMENT

BLADES FOR STEAM AND GAS TURBINES

THE BLANKS OF THE BLADES FOR GAS TURBINES AND GAS-COMPRESSOR UNITS OF 6 TO 180 MW CAPACITY

- Manufactured of superalloys on nickel, austentic and chromium base
- By the methods of investment casting, forging and bar technology steels
- Protecting coating is applied by the method of plasma application, of gas-circulating application, by the suspension method

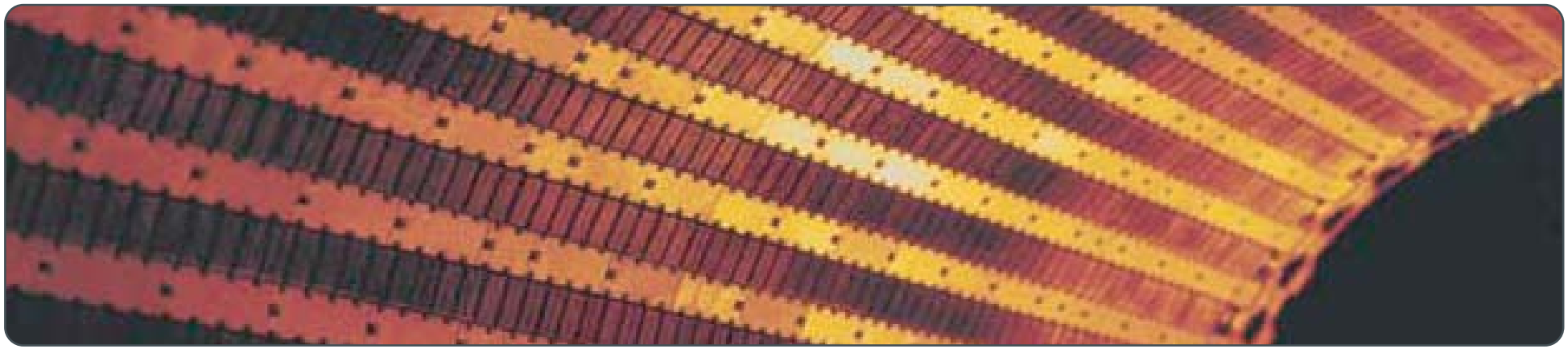
POWER ELECTRICAL EQUIPMENT



Electrical equipment for power generating industry and transport:

- AC synchronous motors with capacity from 315 to 11 000 KW
- AC asynchronous motors with capacity from 75 to 6000 KW
- DC electric motors with capacity from 40 to 14 000 KW
- Electrical machine control and commutation equipment

SERVICE AND MODERNIZATION



SERVICE AND MODERNIZATION

SERVICE

- Power generating equipment testing and diagnostics
- Power units maintenance, installation and commissioning
- Extensive service solutions that maximize the potential of power generation capabilities

SERVICE AND MODERNIZATION

MODERNIZATION

- Increase in the reliability of the equipment to extend its operating life
- Optimization of the day to day operation of the plant
- Improved plant efficiency and capacity, leading to lower production costs and enhanced environmental compatibility
- Full or parallel re-powering
- On-site maintenance & repair capabilities
- Continuous customer support

CONTACTS

HEAD OFFICE

25a, Protopopovsky pereulok, Moscow 129090, Russia
3a, Vatutina str., Saint-Petersburg 195009, Russia

Tel: +7 (495) 725-27-63
Fax: +7 (495) 725-27-42

E-mail: mail@power-m.ru

REPRESENTATIVE OFFICES AND SUBSIDIARIES

ARGENTINA : Buenos Aires
Te.l: (54-114) 373-0599/0699/0799
Fax: (54-114) 372-4381
e-mail: energo@intermedia.com.ar

BULGARIA : Sofia
Tel.: (359-2) 971-3837/3947
e-mail: evv@rpower-m.bg

CHINA : Beijing
Tel.: (86-10) 6467-8822 #1307
Fax: (86-10) 6467-8199
e-mail: pm_beijingoffice@inbox.ru

COLUMBIA : Bogota
"EMEC Ltd"

Tel.: (57-1) 611-4111
Fax: (57-1) 611-5631
e-mail: emec@cable.net.co

EGYPT : Giza
Tel.: (202) 762-4721
e-mail: powermashegypt@mail.ru

GERMANY : Berlin
"Enermasch Handels GmbH"

Fax: (49-30) 280-7588
e-mail: enermasch@yahoo.de

GREECE : Athens
Tel.: (30-210) 981-8020
Fax: (30-210) 982-7668
e-mail: energo@ath.forthnet.gr

INDIA : Delhi
Tel.: (91-11) 4165-7090/91/92/93/94
e-mail: lmzgroup@ndb.vsnl.net.in

IRAQ : Bagdad
Tel./Fax: (964-1) 541-4524
e-mail: eme-iraq@warkaa.net

MEXICO : Mexico
Tel.: (5255) 110-77362/63/64
e-mail: rodionov_sy@power-m.ru

RUSSIA : URAL REGION : Ekaterinburg
Tel./Fax: +7 (3432) 17-9477, 17-9478
e-mail: ural_power-m@rustel-e.ru

SERBIA AND MONTENEGRO : Belgrade
Tel.: (381-11) 3674-255
Fax: (381-11) 3674-268
e-mail: office.yu@power-m.co.yu
cvetkov@power-m.co.yu

SYRIA : Damascus
Tel./Fax: (963-11) 332-4915

TURKEY : Ankara
Tel.: (90-312) 436-6092/93
e-mail: turkeybranch@power-m.ru

VIETNAM : Hanoi
Tel.: (844) 562-2918/2919
e-mail: tatarinov_am@power-m.ru