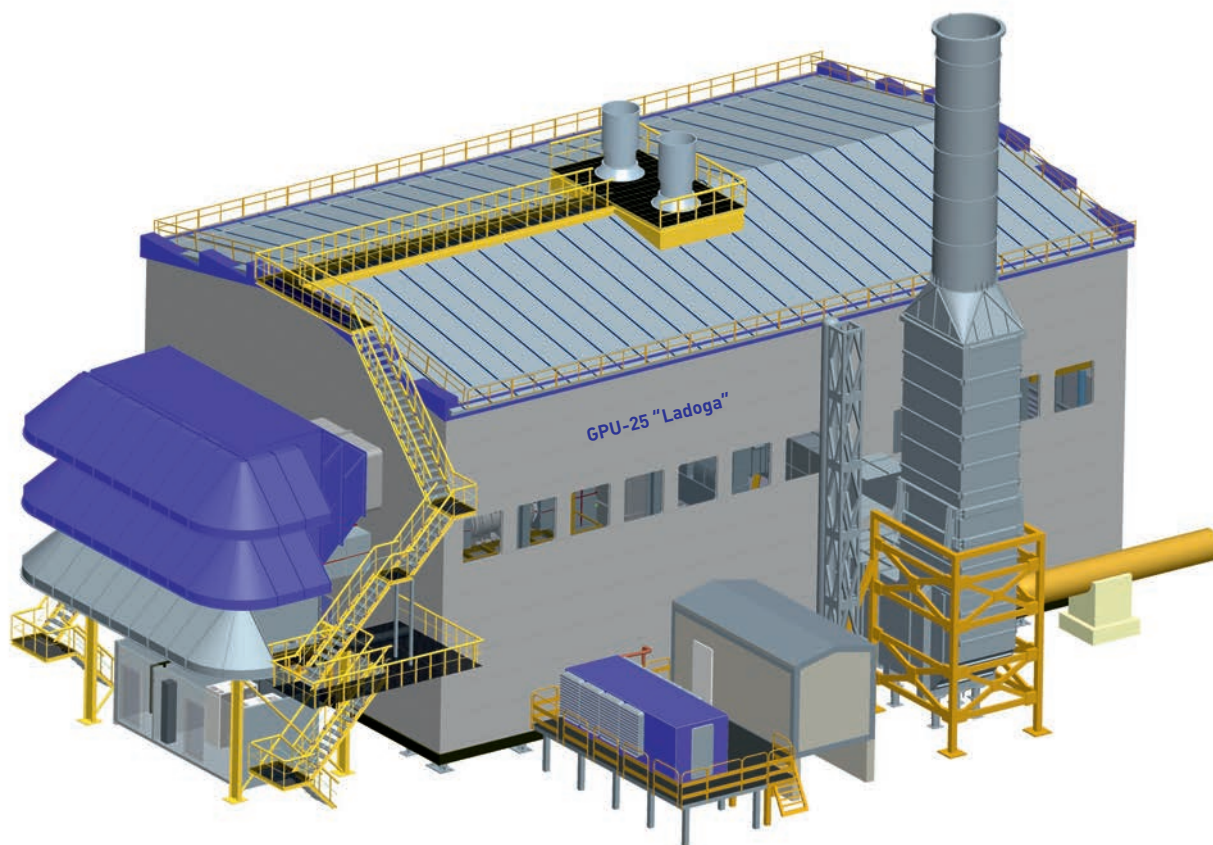




Gas-Pumping Unit GPU-25 "Ladoga"



Package supplies of power equipment

www.reph.ru

Gas-Pumping Unit GPU-16 "Ladoga"

"REP Holding" is the leading Russian power-plant engineering Holding that manufactures and supplies new-generation power-generating equipment.

The company engineers, manufactures, and package-supplies the power-generating and electrical equipment for gas, oil, metallurgical, and chemical sectors, for power generating and power supply complex.

REP Holding offers manufacture of GPA- 25 "Ladoga" on the base of statinary gas turbine rated at 22/25 MW* for installation at compressor stations of the gas trunk-lines with operating pressure from 5.5 to 12.0 Mpa.

GPA-25 "Ladoga" is designed for natural gas transmission and can be used both for reconstruction of existing gas compressor stations and construction of new ones for gas trunk-lines. It is supplied in the individual hangar-type building, in complete ready-to-use modules.

The unit design allows operating in any climatic zones and provides maximum maintainability in the compressor stations conditions.

Manufacture and assembly of GPA-25 "Ladoga" is carried out at the production facilities of Nevskiy Zavod under license and in cooperation with Solar Turbines company.

*Gradual increase in power is planned



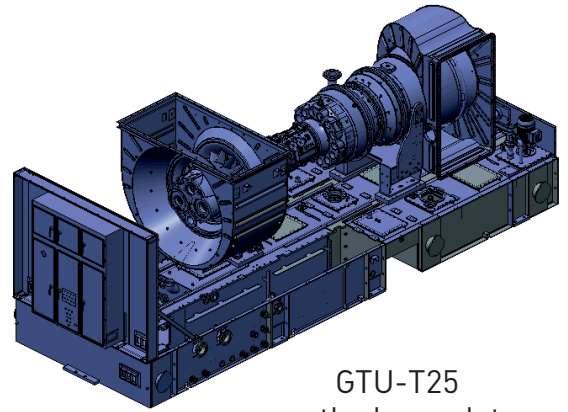
GTU-T25

Gas turbine unit

High-tech simple cycle T25 gas turbine features highest economic efficiency in its power class, with a low level of harmful emissions.

GTU-T25 components

- Gas turbine
- Starting system
- Fuel system
- Lubrication oil system
- Turbotronic 4 control system
- Oil tank - frame
- Electric wiring on the base plate
- Pipelines and headers
- Inlet duct of the turbine air-intake
- Turbine exhaust duct
- Noise- and heat-proof enclosure
- Ventilation system
- Fire- detection and fire-fighting system
- Gas detection system



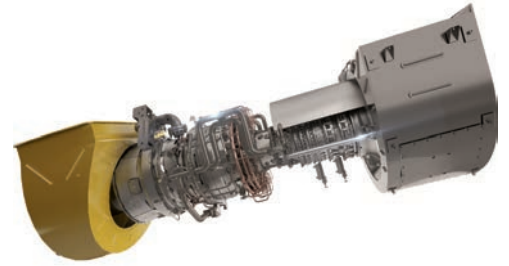
GTU-T25
on the base plate

The main parameters of the GTU-T25

Description	Unit	Value
Shaft power	MW	22.4
Turbine efficiency	%	40.0
Exhaust gas flow	kg/s	68.24
Exhaust gas temperature	°C	465
Pressure ratio	~	24
Fuel gas flow ($Q_{PH}=50000$ kJ/kg)	kg/s	1.11
Output shaft speed, nominal	rpm	6300
Emission (at 15% O ₂ in dry combustion products):		
- nitric oxide	mg/m ³	≤50
- carbon oxide	mg/m ³	≤50

The main indicators

- 22.37 MW - shaft power
- 40% - efficiency, mechanical drive
- 38.9% - efficiency, electrical (simple cycle)
- 200 ths. hours – full service life
- NOx emissions – no more than 25 ppm



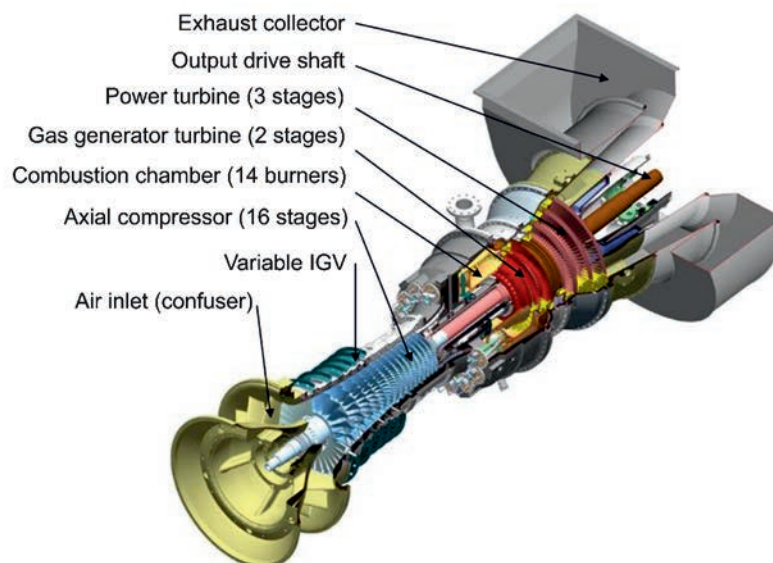
Gas turbine engine 25 MW,
3D model

GTU-T25 advantages

- high reliability
- the best efficiency in its class
- high economical efficiency at different operating conditions
- lateral roll-out of the turbo-unit for holding a technical maintenance

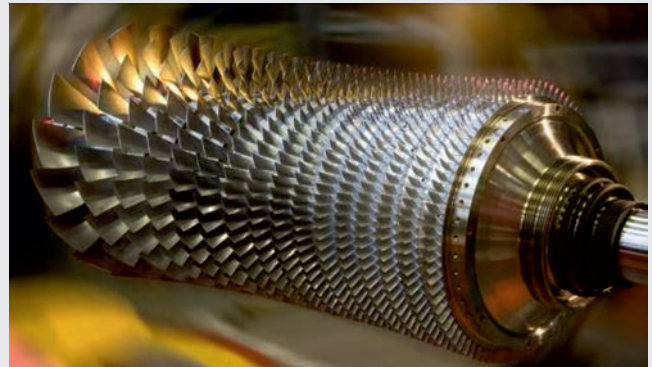
T25 Gas turbine unit configuration

- inlet section
- axial compressor
- annular combustion chamber
- high pressure turbine (gas generator turbine)
- power turbine



Axial Compressor

- 16-stage, with 6 rows of variable guide vanes, high pressure ratio (24:1) and extractions:
 - for anti-surge valve - downstream of the 9th stage;
 - to cool the power turbine - downstream of the 11th stage.
- Rated mass flow of cycle air – 67.3 kg/s.
- Inlet guide vanes and guide vanes of the first five stages are variable, controlled by a special driving actuator



Combustion Chamber

- Annular
 - SoLoNO_x or common (conventional)
 - Fuel: gas, liquid fuel, dual fuel, associated gas
- Expanded operating range
 - Load range: 40% - 100%
- LPT outlet temperature: 465 °C
- Fuel burners: can be maintained on site

Power Turbine – Low Pressure Turbine

- Three uncooled stages
- 1st and 2nd st. rotor blades are equipped with interrelated peripheral damping shrouds to minimize vibration
- The power turbine module is supplied completely assembled and is attached through a gas-tight flange connection to the end face of the gas generator turbine casing

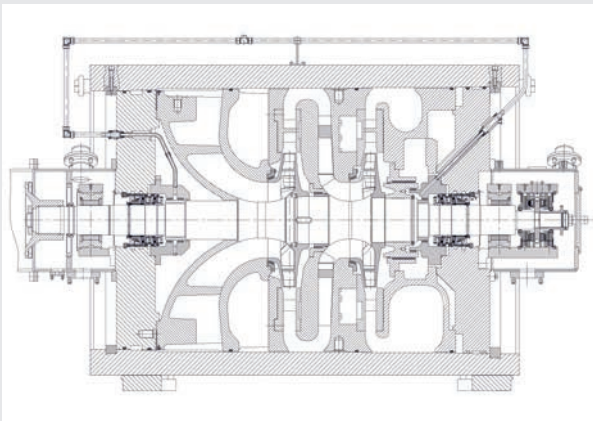
High Pressure Turbine

- 2-stage, with cooled nozzles and rotor blades

Centrifugal Compressor*

Parameter	Value
Capacity referred to the initial conditions, m ³ /min	340
Gas pressure at the suction branch pipe inlet, MPa	8.24
Final gas pressure, abs., at the discharge branch pipe outlet, MPa	11.86
Pressure ratio	1.44
Polytropic efficiency, no less than	0.88
Power consumed by the compressor, MW	21.5
Compressor rotor speed, rpm	6300

* Centrifugal Compressor option for GPU-25 "Ladoga"



Centrifugal Compressor for GPU-25 "Ladoga", plan



Unified body of Centrifugal Compressor for T25

Integrated Automatic Control System (KSAU) of the GPA (MSKU 6000)

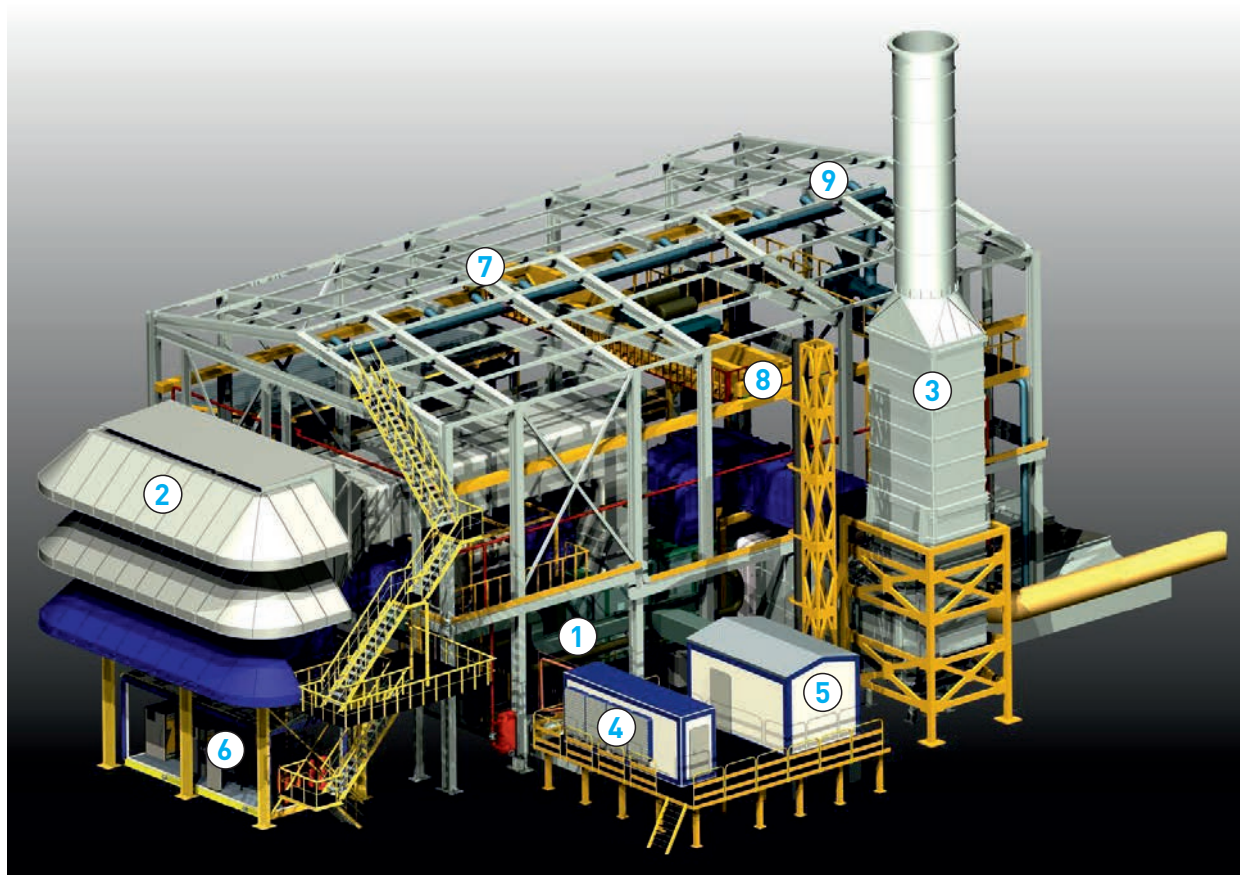
- Serially produced certified control system for GPA with GTU of all types
- Fuel control valve manufactured under the license agreement with the turbine manufacturer is integrated into the combustion chamber

Innovative distributed KSAU of MSKU 6000 type based on AIS smart stations

- Entirely ready-to-use control system and instrumentation mounted and tested at the Manufacturer's plant
- Fault tolerance increasing the GPA reliability
- Reduced overall dimensions of the cubicle and amount of the cables, lower cost of the GPA automation

GPA Configuration

- Gas turbine unit rated at 22.4 MW
- Natural gas centrifugal compressor
- Integrated Automatic Control System (KSAU)
- Filter house
- Exhaust system
- GTU cooling system
- Axial compressor washing system
- Dry gas dynamic control systems
- Separation and buffer gas treatment units
- Oil supply system of the turbine and compressor
- Fuel gas treatment and supply unit
- Individual easy-to-assemble hangar-type building with the system of forced draft, exhaust, emergency ventilation and heating, lighting, gas detection, gas detection, fire-fighting and alarm



Components of GPU-25 "Ladoga"

1 - GTU; 2 - Filter House; 3 - Exhaust System; 4 - Oil Cooler; 5 - Building Heating Unit;
6 - Instrument Air Treatment; 7 - Metal Framework of the Hangar-Type Building; 8 - Lifting Equipment; 9 - Ventilation System of the Building

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