
URAL
TURBINE
WORKS
ROTEC


50% of all extraction steam turbines
in Russia are produced by UTW JSC
908 steam turbines were produced during the
existence of the factory (as of 01.01.2019)
1100 employees – staff number
2.5 GW – annual productive capacity
54 invention patents
(since 2004)

ABOUT COMPANY

The Ural Turbine Works (ROTEC holding) produces condensing and extraction turbines for steam power plants, steam turbines for combined cycle power units, marine type turbines for ships with atomic propulsion systems, develops power island equipment for SDW (solid domestic waste) utilization plants. Also, the plant develops and produces heat exchange equipment – condensers, district heating exchanger and regenerative heaters, ejectors. Plant provides services for the maintenance and modernization of energy equipment.

The plant was founded in 1938. About one half of the installed capacity of extraction turbines in Russia and CIS falls on turbines manufactured by UTW. Turbines manufactured by UTW are installed on facilities in the East European countries, Italy, Egypt, Mongolia, China,Korea, India and Japan.

Every year, the plant produces up to 14 sets of turbine equipment of various modifications for both Russian and foreign power plants. Presently, UTW participates in construction of new power units in Moscow, Yuzhno-Sakhalinsk, Kaliningrad, Kazan and other cities of Russia, implements joint projects together with the power engineers from Mongolia, Belarus, Kazakhstan. Share of the export production of the plant reaches 40–50%.

Long-standing experience in turbine design, commercial production of a wide range of machines allow UTW to meet the needs of each customer. Together with ROTEC JSC, the plant offers its customers efficient service programs for steam turbines.

All Ural turbines of the new series are equipped with the intelligent equipment prognostics system PRANA.

PRODUCTS AND SERVICES

- Steam turbines for steam power plants (simple cycle) with capacity of up to **350 MW**
- Steam turbines for combined cycle power plants (CCPP) with capacity of up to **200 MW**
- Modernization and service of steam turbines manufactured by UTW and other manufacturers with a capacity of up to **350 MW**
- Steam turbines for SDW utilization plants
- Marine type steam turbines
- District heating exchanger and regenerative heaters, condensers, ejectors, metal structures
- Servicing and engineering of operating steam turbines

PRODUCT LINE OF STEAM TURBINES

FOR STEAM POWER UNITS

T-type

50–330 MW
To generate heat
and electricity

K-type

50–350 MW
To generate
electricity

Back-pressure

17–110 MW
To generate steam
for industrial purposes

PT-type

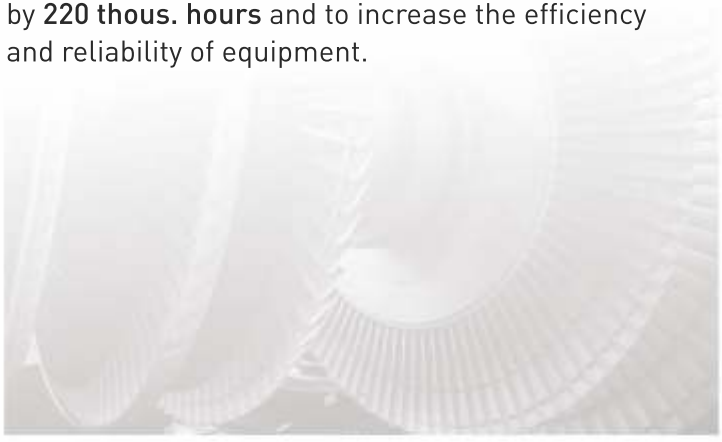
30–165 MW
To generate electricity
and steam for industrial
purposes and heating

For CCPP

25–150 MW
For CCPP of 80–450 MW

MODERNIZATION OF INSTALLED TURBINES

UTW developed modernization packages for the entire model series of turbines, among which there are **T-250, T-185, PT-135, PT-50, PT-25-3(4), R-100,** enabling service life durability of equipment by **220 thous. hours** and to increase the efficiency and reliability of equipment.



MODERNIZATION OF STEAM TURBINES

T-50

- Extending service life by 220 thous. hours
- Increase of electric capacity by 10 MW, thermal capacity – by 11 Gcal/h.
- Increase in efficiency by 2.2–2.5%

T-100

- Extending service life by 220 thous. hours.
- Increase of electric capacity by 10–25 MW.
- Increase of thermal capacity up to 28 Gcal/h.
- Increase in efficiency by 2.5–3.0%

PT-135

- Reliability assurance
- Increase in efficiency by 1.5–2.0%

PT-60/PT-80

- Extending service life by 220 thous. hours.
- Increase of electric capacity by 8–30%
- Increase of thermal capacity up to 20 Gcal/h
- Increase in efficiency by 1.5–2.0%

K-160 K-200/300

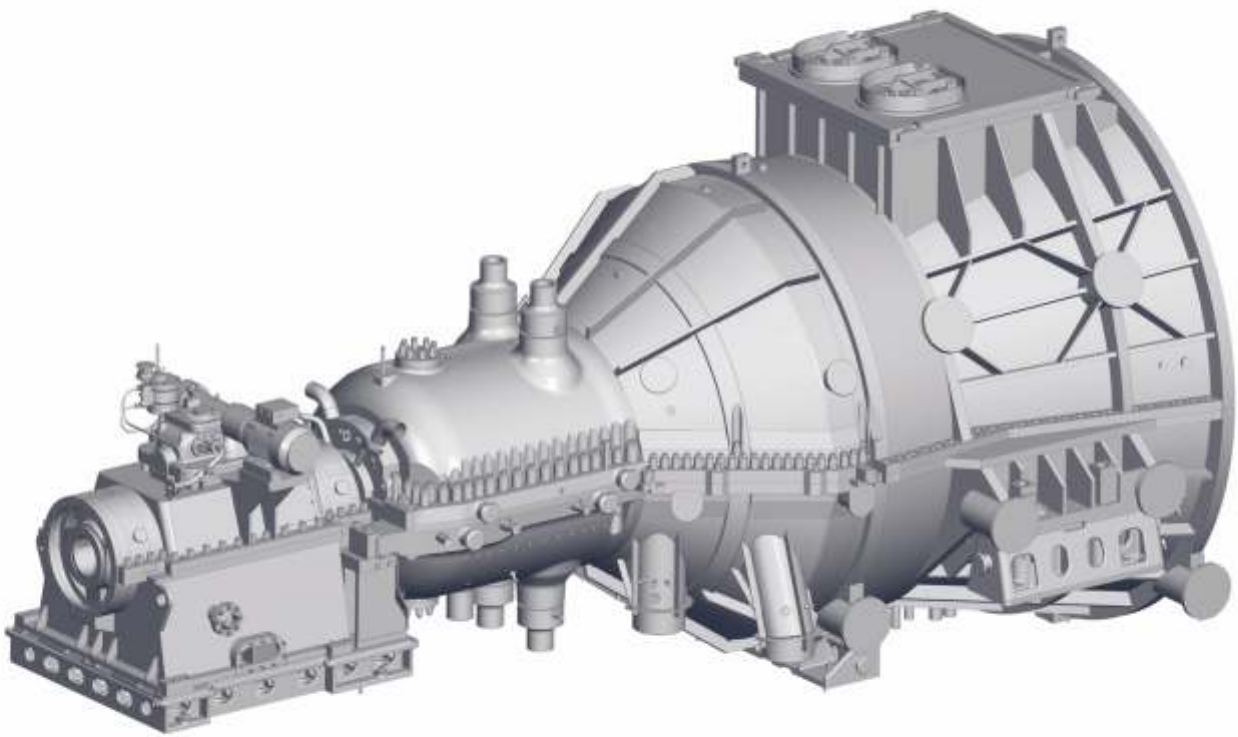
- Extending service life by 220 thous. hours
- Increase of electric capacity by 10%
- Increase in efficiency by 5–10%

ENGINEERING

Design bureau and departments of the plant develop complete design of modern efficient steam turbines and heat exchangers.

In designing steam turbines, UTW experts use a modular design concept. Using this approach, it is possible to adopt proven and reliably operating steam turbine components in various models, as well as to speed up the design process.

In their work, the plant's designers use the following soft: **Kompas v.15; Creo Parametric 3.0; WindChill v.10; ANSYS;** software of own design for the calculation of steam distribution, flow path, thermal balances of turbine installations, for strength analysis and calculated estimates of shaft train critical speeds; **START** (pipeline calculations).



DESIGN BUREAU OF UTW JSC

130 people
85% of them have a higher technical education in the field of turbine construction
50% are engineers under the age of 35

FURTHER CONSTRUCTION IMPROVEMENT

- Solid-forged rotors.
- Exclusion of fork-shaped rotor blade tails.
- Rotors without center channel.
- Composed guide vanes for reaction blading
- Welded rotors for reaction blading of IPC (Intermediate pressure cylinder) and LPC (low pressure cylinder).
- New combined types of seals (brush, ceramic-metal).
- Use of additive technologies.
- Use of new materials for the cylinder and rotor group to ensure operation at increased parameters and for extended lifetime.
- Full-scale mastering and transition to a digital product mock-up with a full 3d model, further improvement of a single computing complex.

Power unit refurbishment with T-250/300-23,5 turbine replacement at CHP-22 (Mosenergo)

ISSUES TO BE SOLVED

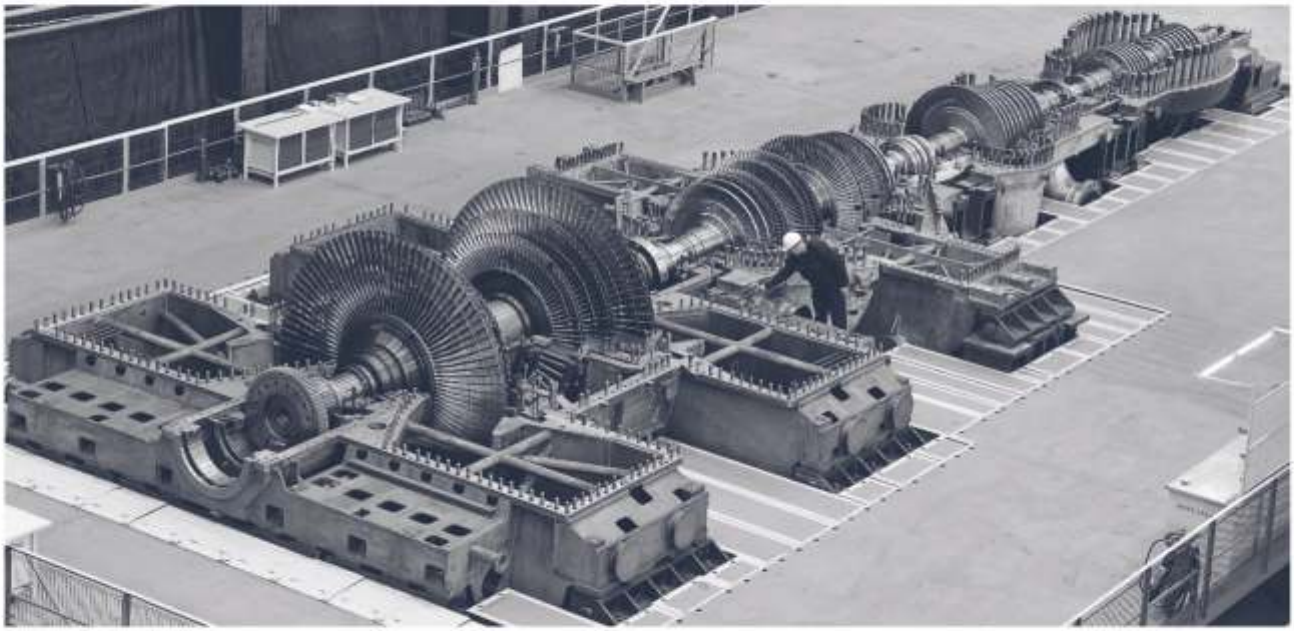
- Installed capacity increase
- Thermal load increase
- Increasing maneuverability
- Use of latest steels for temperature **570°C**

SCOPE OF REFURBISHMENT

Complete replacement of the **T-295/335-23,5** turbine unit with a new one (pilot model)

RESULT

- Electric capacity will reach **295/335 MW**
- Heat load will reach **385 Gcal/h (by 35 Gcal/h)**
- Unit efficiency will increase by **4% (up to 39–40%)**



IMPLEMENTED PROJECTS

During the period from **2011** to **2018**
UTW JSC produced **54** turbine sets.
Most significant projects over the past few years are presented below.

Izhevsk CHP-1,
Vladimir CHP-2,
Kirovsk CHP-3
Construction of **230 MW** combined cycle power plant.
Commissioning year – **2014**.
Cogeneration steam turbine **T-63/76-8,8**

Nizheturinskaya HPP
Akademicheskaya CHP
Construction of **230 MW** combined cycle power plant.
Years of commissioning – **2015, 2016**
Cogeneration steam turbine **KT-63-7,7**

BASIC CHARACTERISTICS OF T-63/76-8,8 TURBINE		
Turbine operation mode	Rated cogeneration more	Condensing mode
HP steam parameters:		
- pressure, MPa	8,8	8,85
- temperature,°C	502,8	517,9
- flow rate, t/h	237	232,5
LP steam parameters:		
- pressure, MPa	1,4	1,4
- temperature,°C	296,2	299,2
- flow rate, t/h	35	32,5
Thermal load, GJ/h	376,2	-
Electric capacity, MW	63	75,5

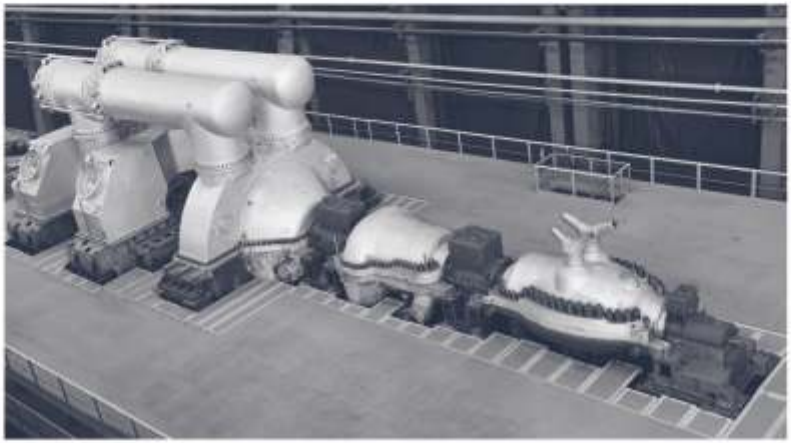
Ulaan Bator CHP-4, Abakan CHP

Increase of installed capacity of CHP by **120 MW**

Commissioning years **–2014, 2015**

Steam turbine **T-120/130-130-12,8-8MO**

BASIC CHARACTERISTICS OF T-120/130-130-12,8-8MO TURBINE	
Parameter	**Value**
Power, MW:	
nominal/maximum	123/130 (до 136)
Power, MW:	
maximum condensing	130 (до 136)
Live stream parameters:	
flow rate, t/h:	
nominal/maximum	520/525
maximum condensing	465
Pressure, kgf/cm^2 (MPa)	130 (12,8)
Temperature, °C	555
Rated thermal load Gcal/h	188



CHP-22 of Mosenergo PJSC

Reconstruction
of **335 MW** power unit

Supply of
equipment –**2016.**

Steam turbine
T-295/335-23,5

BASIC CHARACTERISTICS OF T-295/335-23,5 TURBINE	
Parameter	Value
Power, MW:	
nominal/maximum	295/335
Power, MW:	
maximum condensing	335
Live stream parameters:	
flow rate, t/h:	
nominal/maximum	1011/1030
maximum condensing	985
Pressure, kgf/cm^2 (MPa)	240(23,5)
Temperature, °C	565
Temperature after steam reheat, °C	565
Rated thermal load Gcal/h	372,5

Minsk CHP-3 (Belarus)

Reconstruction of Minsk CHP-3 with the replacement of retired capacities of **14 MPa** stage, 1 stage Equipment supply – **2018**.

The Ural Turbine Works JSC made a complete delivery of all equipment.
At the first stage of reconstruction, a modern **Tp-115/130-12,8** turbine will be installed to replace the retired one.
Planned year of commissioning – **2020**.

BASIC CHARACTERISTICS OF Tp-115/130-12,8 TURBINE	
Parameter	Value
Power, MW:	
nominal/maximum	115*/130
Power, MW:	
maximum condensing	130
Nominal parameters of steam:	
Pressure, MPa(kgf/cm^2)	12,8 (130)
Temperature °C	555
Live steam flow rate, t/h	
nominal	458
maximum	567*
Thermal load:	
- production, t/h	70
- rated heating load, GJ/h (Gcal/h)	754 (180)*

* - rated heat-extraction mode with capacity of 115 MW with rated thermal load of 180 Gcal/h and maximum live steam production flow rate of 70 t/h

Primorskaya CHP

Construction of three power units with capacity of **65 MW** each.

Expected year of commissioning –**2019**.

Steam turbine **K-65-12,8**

BASIC CHARACTERISTICS OF K-65-12,8 TURBINE	
Parameter	Value
Electric capacity (max), MW	65
Live steam nominal parameters:	
Pressure, MPa(kgf/cm^2)	12,8
Temperature, °C	555
- rated (maximum) flow rate, t / h	237
Cooling water passing through the condenser:	
- rated (maximum) flow rate, t / h	8000
Temperature at the condenser inlet, °C	20
Pressure in condenser, kPa	5,7
Feed water temperature, °C	232
Heat load (rated),Gcal/h (t/h)	10 (19)
Additional process steam extraction flow rate, t/h	10

CERTIFICATES AND LICENSES

- ISO 9001:2015, acknowledged by British Standards Institution
- License for the right to design marine type equipment for atomic propulsion systems (ships and other watercraft)
- License for the right to produce marine type equipment for atomic propulsion systems(ships and other watercraft)
- License for the right to design equipment for nuclear installation (NPP)
- License for the right to produce equipment for nuclear installation (NPP)
- Customs union, Certificate of conformity: steam turbines of K, P, T, PT, R, PR, TR, TK, KT-types, series production
- Customs union, certificate of conformity: HNH-type network heaters (horizontal network heater), HNH-type network water heaters, HWH-type condensate collection systems (heater drain pan), serial production
- Customs union, certificate of conformity: type-FV feedback valves, serial production

PATENTS

- 04.07.2018 – Utility model:
  "Steam turbine flow path compartment for steam flow mixing"

- 26.04.2018 – Utility model:
  "Device for two-way transmission of axial force"

- 24.11.2017 – Utility model:
  "System of additional power automatic generation in T-type turbines"

- 27.06.2016 – Invention:
  "Method of two-stage delivery water heating"

- 05.02.2016 – Invention:
  "Steam turbine cylinder with adjusting compartment"

- 20.08.2013 – Invention:
  "Single cylinder cogeneration turbine for combined cycle gas turbine unit"

- 10.10.2011 – Invention:
  "Three-channel turbine unit protection system"

TOP-MANAGEMENT

LIFSHITZ,
Mikhail Valerievich
Chairman of the Board

SOROCHAN,
Igor Pavlovich
Director General

BUTRIM,
Anatoly Antonovich
Executive Director

NIKONOV,
Dmitry Vladimirovich
Deputy ED for Economy
and Finance

KOZYREV,
Arkady Aleksandrovich
Deputy
ED for Production

IZOTIN,
Dmitry Aleksandrovich
Sales Director

VALAMIN,
Aleksander Evgenyevich
Technical Director

SHIBAYEV,
Taras Leonidovich
Chief Designer

YAKSON,
Victor Robertovich
Director of Security

SMOLIN,
Andrey Aleksandrovich
Director of Legal Affairs

VENEDIKTOVA,
Elena Yuryevna
Chief of Protocol
and PR division

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