UKROBORONPROM
Ukrainian Defence Industry

ZORYA – MASHPROEKT

INDUSTRIAL APPLICATIONS



April | 2020

KEY FIGURES AND FACTS

- Established in **1954**
- Manufacturing of the Gas Turbine Engines with total output over **2000 MW** per annum
- Total production area – **1 900 000** sqm
- Number of employees – **10 000**

MAIN ACTIVITIES

MECHANICAL DRIVES

MARINE PROPULSION PLANTS

GAS TURBINE POWER PLANTS

SALES GEOGRAPHY

over **2500**

MARINE GAS TURBINE ENGINES

about **1400**

ENGINES FOR GAS TRANSMISSION

about **500**

ENGINES FOR POWER GENERATION

COMPANY HISTORY

1953 — Establishment of the "Zorya" Southern Turbine Plant and "Mashproekt" Design Bureau

1954 — Development of marine engines of the first generation

1965 — Development of marine engines of the second generation

1969 — First deliveries of gas turbines for power plants

1976 — First deliveries of gas turbines for gas pumping units

1971 — Development of engines of the third generation

1991 — Development of engines of the fourth generation

2001 — Formation of united company SE GTR&PC "Zorya"-"Mashproekt"

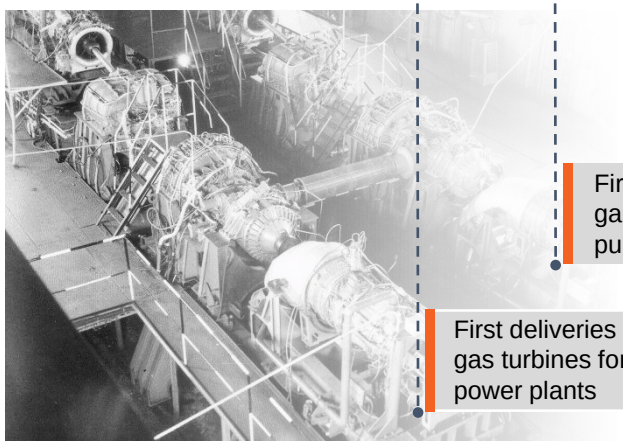
2002 — 110 MW gas turbine developed and delivered to the customer

2005 — Development of 45-60 MW gas turbines for power generation

2007 — Development of 5 MW gas turbines for power generation

2014 — Development of 32 MW gas turbines

2020



SOLUTIONS FOR YOUR BUSINESS

While possessing the full cycle of gas turbine equipment production Zorya - Mashproekt offers unique comprehensive solutions for different industry segments

1 DESIGN

Designing various GT equipment for gas transmission and power generation.

2 MANUFACTURE

- Gas turbine power plants;
- Mechanical drives;
- Gas turbines;
- Gearboxes.

3 SERVICES

- Aftersales support;
- Installation & commissioning;
- Training;
- Supervision.

GAS TURBINE ENGINES

FOR INDUSTRIAL APPLICATION

UGT 3000
Rated power, kW – 3,360
Efficiency, % – 31.0

UGT 5000
Rated power, kW – 5,250
Efficiency, % – 32.0

UGT 6000
Rated power, kW – 6,360 - 6,500
Efficiency, % – 31.0 - 31.5

UGT 8000
Rated power, kW – 8,300
Efficiency, % – 33.2

UGT 10000
Under development
Rated power, kW – 10,500
Efficiency, % – 35.0

UGT 15000
Rated power, kW – 16,700 - 16,900
Efficiency, % – 35.0

UGT 16000
Rated power, kW – 15,900 - 16,700
Efficiency, % – 31.4 - 32.0

UGT 25000
Rated power, kW – 26,000 - 26,700
Efficiency, % – 36.0 - 36.5

UGT 32000
Under development
Rated power, kW – 32,800 - 33,400
Efficiency, % – 38.0 – 38.4

UGT 60000
Under development
Rated power, kW – 63,500
Efficiency, % – 38.8

according to the ISO 2314 standard

POWER GENERATION APLICATIONS

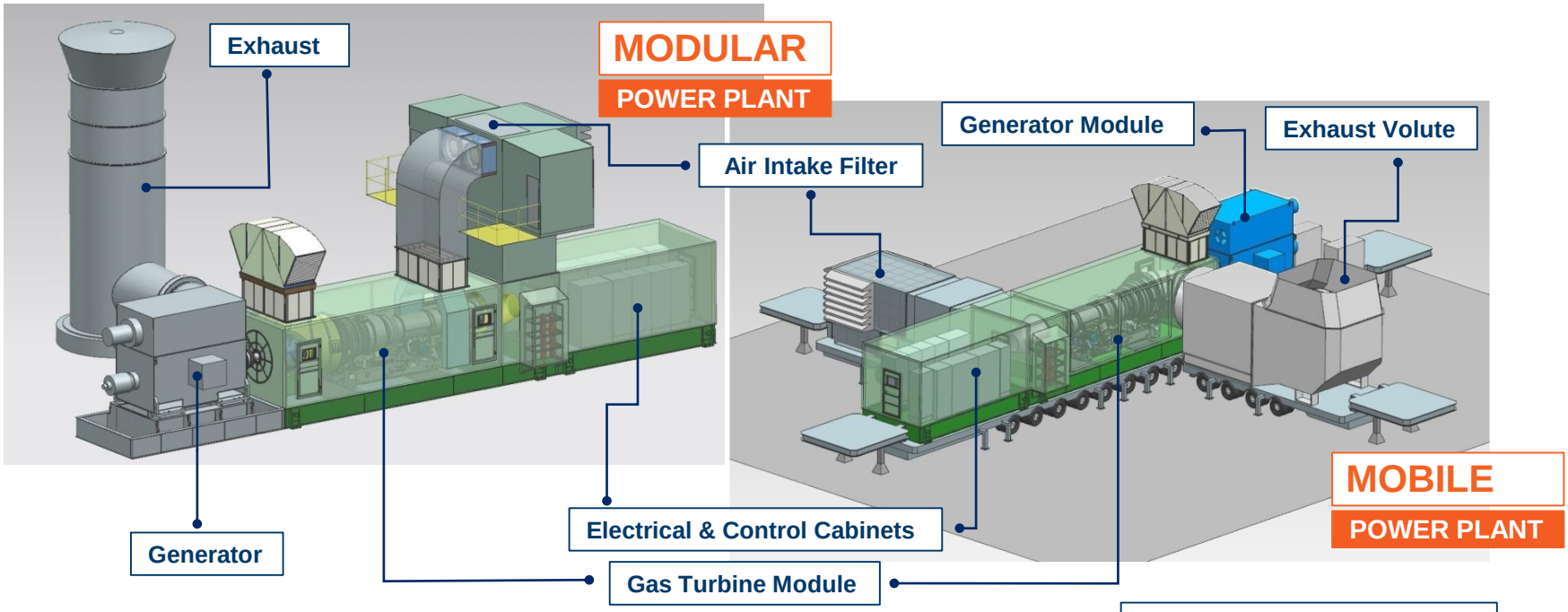
Simple Cycle
GTPP (Gas Turbine Power Plant)

Cogeneration
CHPP (Combined Heat and Power Plant)

Combined Cycle
CCPP (Combined Cycle Power Plant)

SIMPLE CYCLE

POWER GENERATION UNITS



KEY SPECIFICATIONS

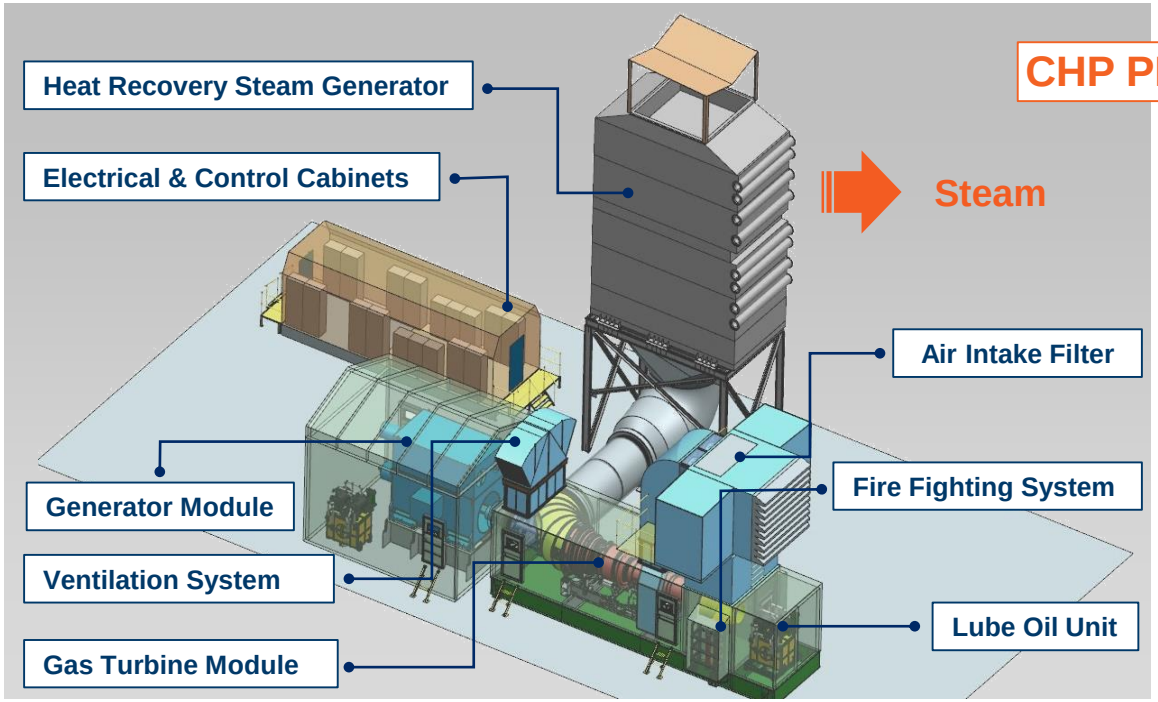
Units	Electric power, MW	Efficiency at generator terminals, %	Heat Rate BTU/kW h	Fuel consumption Natural gas, Nm^3/h
UGT5000	4.87	30.3	11260	1620
UGT6000	6.0	29.5	11570	2045
UGT15000	16.0	33.5	10190	4800
UGT25000	25.0	35.0	9750	7180
UGT32000	32.0	37.1	9200	8670

Characteristics of power plants in operating conditions

Hu = 8555 kcal/Nm^3

COGENERATION

POWER GENERATION UNITS



CHP PLANT

APPLICATION

- Industries
- Utility
- Distillation Desalination Units

where there is a constant need for electric and thermal energy in the form of steam or hot water.

KEY SPECIFICATIONS

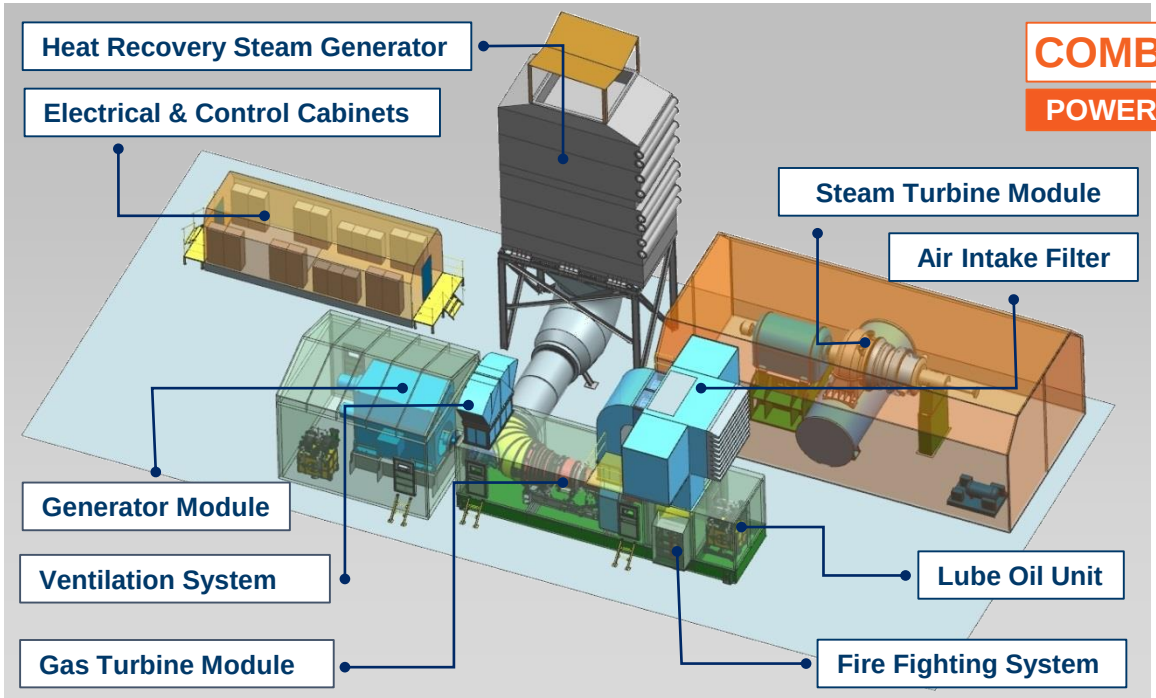
Units	Electric power, MW	Thermal power, MW	Efficiency at generator terminals, %	Available heat factor, %	Heat Rate BTU/kW h	Fuel consumption Natural gas, Nm^3/h
UGT5000C	4.87	8.9	30.3	85.7	11260	1620
UGT6000C	6.0	11.0	29.5	83.6	11570	2045
UGT15000C	16.0	25.0	33.5	85.8	10190	4800
UGT25000C	25.0	37.0	35.0	86.8	9750	7180
UGT32000C	32.0	40.0	37.1	83.5	9200	8670

Characteristics of power plants in operating conditions

Hu = 8555 kcal/Nm^3

COMBINED CYCLE

POWER GENERATION UNITS



COMBINED CYCLE

POWER PLANT

ADVANTAGES

- High efficiency of GTCC plants
- The possibility of steam injection into the combustion chamber to reduce emissions
- Lower capital costs per kW of installed capacity.

CCGT can be used for the modernization of existing TPPs by adding gas turbines according to the Topping Cycle

KEY SPECIFICATIONS

Units	Electric power, MW	Efficiency at generator terminals, %	Heat Rate BTU/kW h	Fuel consumption Natural gas, Nm^3/h
UGT15000S1 (STIG)	25.0	42.0	8130	5980
UGT15000CC1	20.6	43.1	7920	4800
UGT15000CC2	41.5	43.4	7860	9600
UGT25000CC1	33.3	46.6	7320	7180
UGT25000CC2	67.0	46.9	7280	14360
UGT32000CC1	42.0	48.7	7010	8670

Characteristics of power plants in operating conditions

Hu = 8555 kcal/Nm^3

GAS TRANSMISSION APLICATIONS

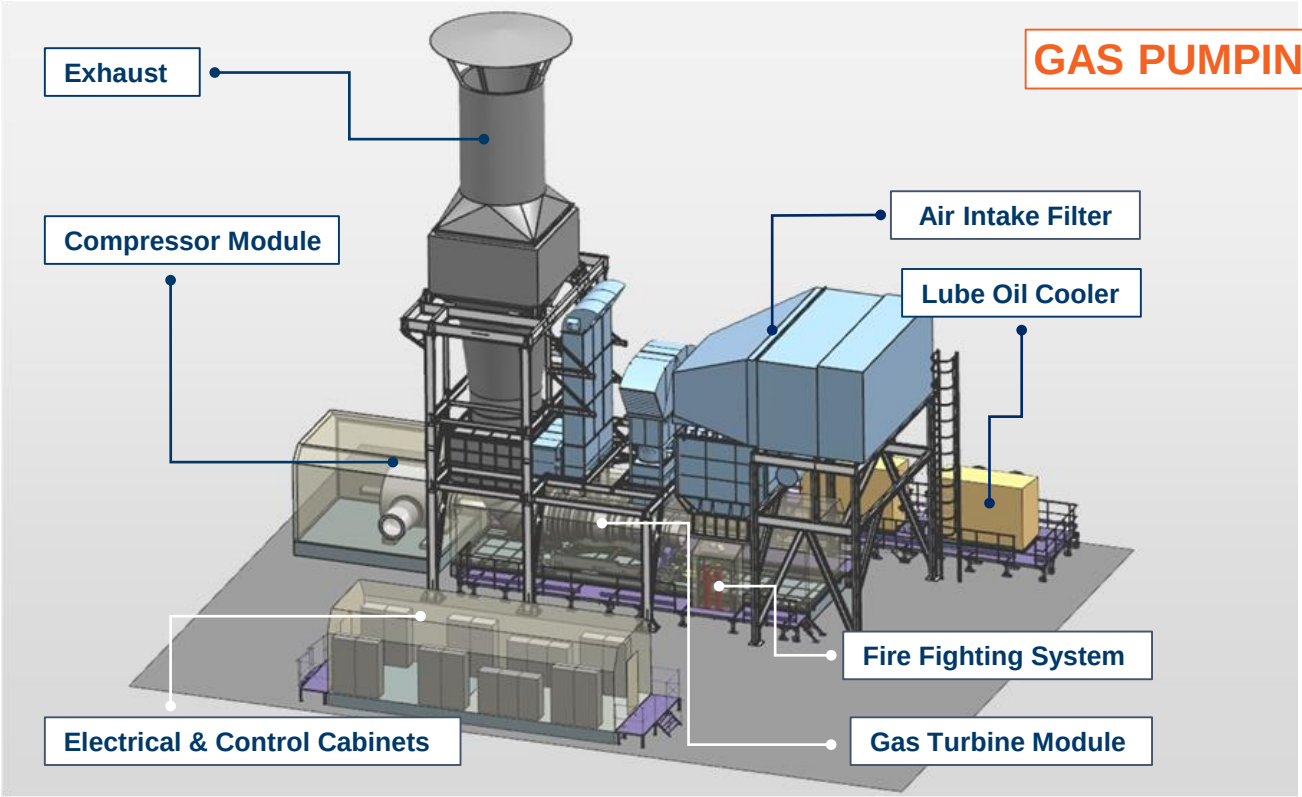
Mechanical Drives For Gas Pumping Units

Mechanical Drives For Industrial Application

Compressor Stations Modernization

MECHANICAL DRIVE

FOR GAS PUMPING UNITS



APPLICATION

- Linear compressor stations;
- Booster compressor stations;
- Gas lift compressor stations;
- Underground gas storage facilities;

COMPRESSOR DRIVES

FOR INDUSTRIAL APPLICATION

Chemical Industry Project

Ammonia storage cooling shop with 2 compression units. The left unit is equipped with WHRB for process steam supply

Project Summary

Customer - **Odessa Port Plant**

Location - **Ukraine**

Qty – **2 x UGT15000**

ODESSA PORT PLANT

MODERNIZATION

DESCRIPTION

Odessa Port Plant (OPP) was originally equipped with Avon driver and Dresser-Clark gas compressor.

On facing aging problem of driver, OPP made a decision for replacement project on utilizing **UGT15000** mechanical drive.

ECONOMICAL EFFECT

+ 25% transportation of the additional ammonia

upon (project implementation) driver replacement and gas compressor upgrade

MODERNIZATION

EXISTING COMPRESSOR STATIONS

ADVANTAGES

- project management from design to after-sales support ‘in one hands’;
- quality assurance from the main equipment manufacturer;
- reduced project implementation costs;
- optimal modernization time.

GREBENKOVSKAYA COMPRESSOR STATION

MODERNIZATION

- Recondition of 3×GPU-16 gas pumping units with gas turbine upgrade from UGT16000 for **UGT15000**
- Performed upgrade has **improved** economic and environment **performance** to the level of modern European standards
- Commissioned - **2019**

THANK YOU

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