

POWER
GENERATION

Gas Expander

Turboden S.p.A.

A Group Company of  MITSUBISHI HEAVY INDUSTRIES

A photograph of an industrial facility, likely a power plant, featuring a complex network of yellow-painted pipes and large industrial valves. In the foreground, a large, grey, multi-ported valve or turbine component is prominent. The background shows more yellow piping and structural elements of the facility. A semi-transparent grey diagonal overlay is present on the left side of the image, containing text.

We aim to provide cutting-edge technologies to enhance the adoption of decarbonization initiatives in the natural gas sector.

Introduction

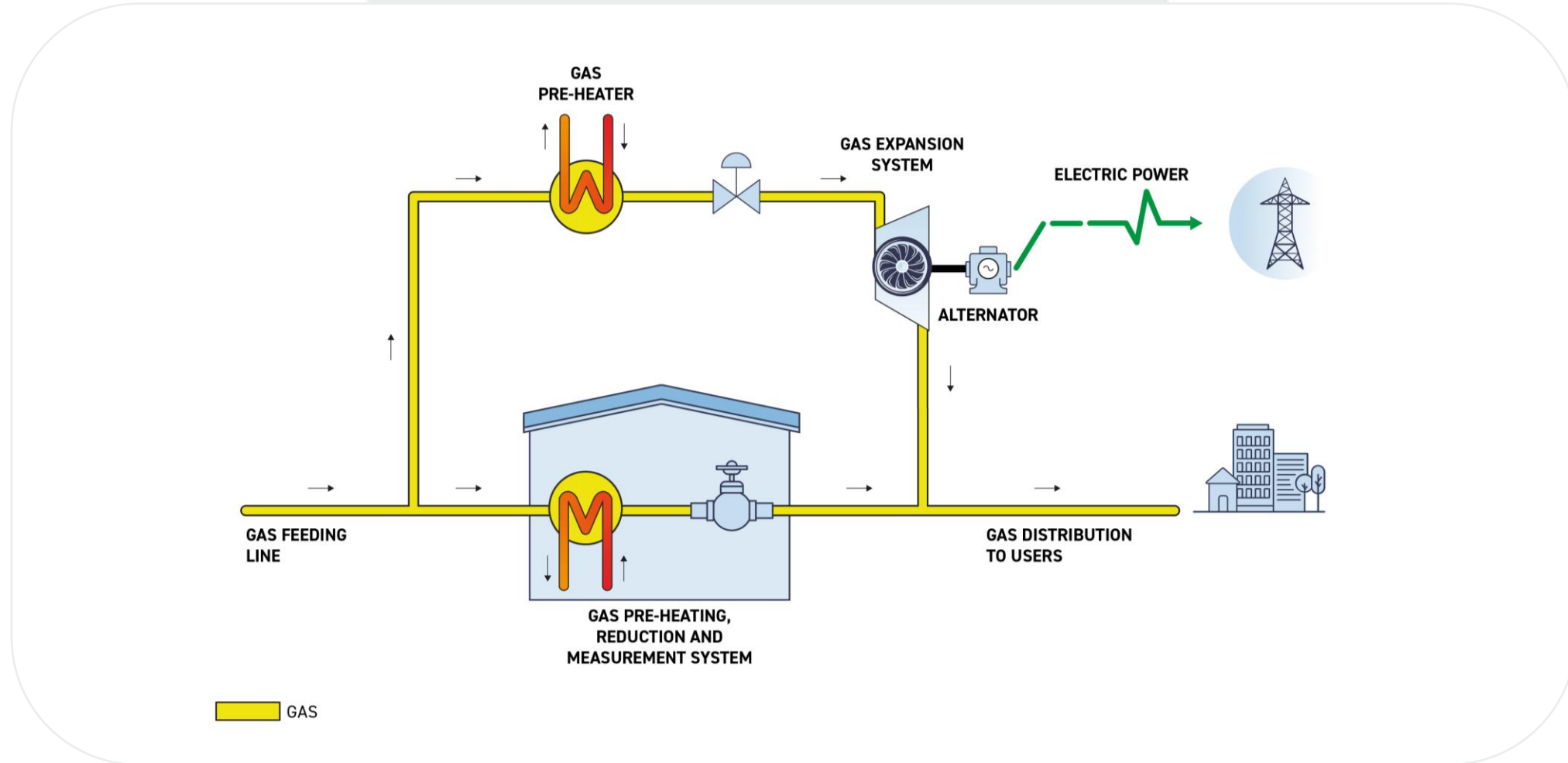


Turboden gas expander is a solution to enhance the energy efficiency of a natural gas network infrastructure, producing electricity by taking advantage of the reduction of gas pressure from the delivery level to the one required by users, be they residential or industrial.

KEY POINTS

- Design based on 45+ years of experience, leveraging Mitsubishi Heavy Industries support
- Long experience in the energy efficiency sector
- Profit generation while reducing the gas pressure
- Solution for natural gas network decarbonization
- Unmanned installations, thanks to specific technology features
- Turn-key equipment capabilities
- Over 60 Turboden turbine models within the 470+ power plants fleet

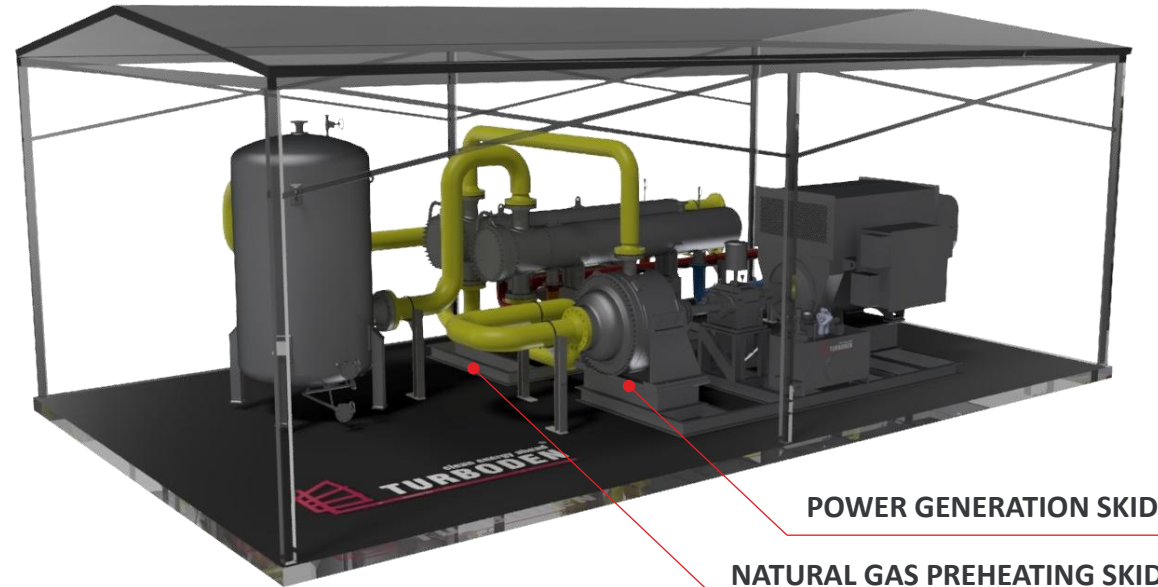
The Configuration



The Solution

Natural gas turboexpanders **reduce gas pressure** from the delivery level to the one required by users, be they residential or industrial.

Unlike common pressure regulators (still present in by-pass to the turboexpander, for safety reasons, as a redundant system), the turboexpanders exploit the pressure drop to **produce electricity, improving the energy efficiency** of the entire gas distribution system.



POWER GENERATION SKID

NATURAL GAS PREHEATING SKID

Features



SIMPLICITY

- Skidded solution of the complete expansion system
- Simple and robust power set with proven track record
- No major overhaul

FLEXIBILITY

- Wide range of solutions, starting from 300 kWe
- Ease of integration into existing gas network facilities
- Simple and automatic handling of partial loads

EXPERIENCE

- Over 60 Turboden turbine models within the 470+ power plants fleet
- 45+ years in the design and production of turbomachinery
- Long experience in the energy efficiency sector

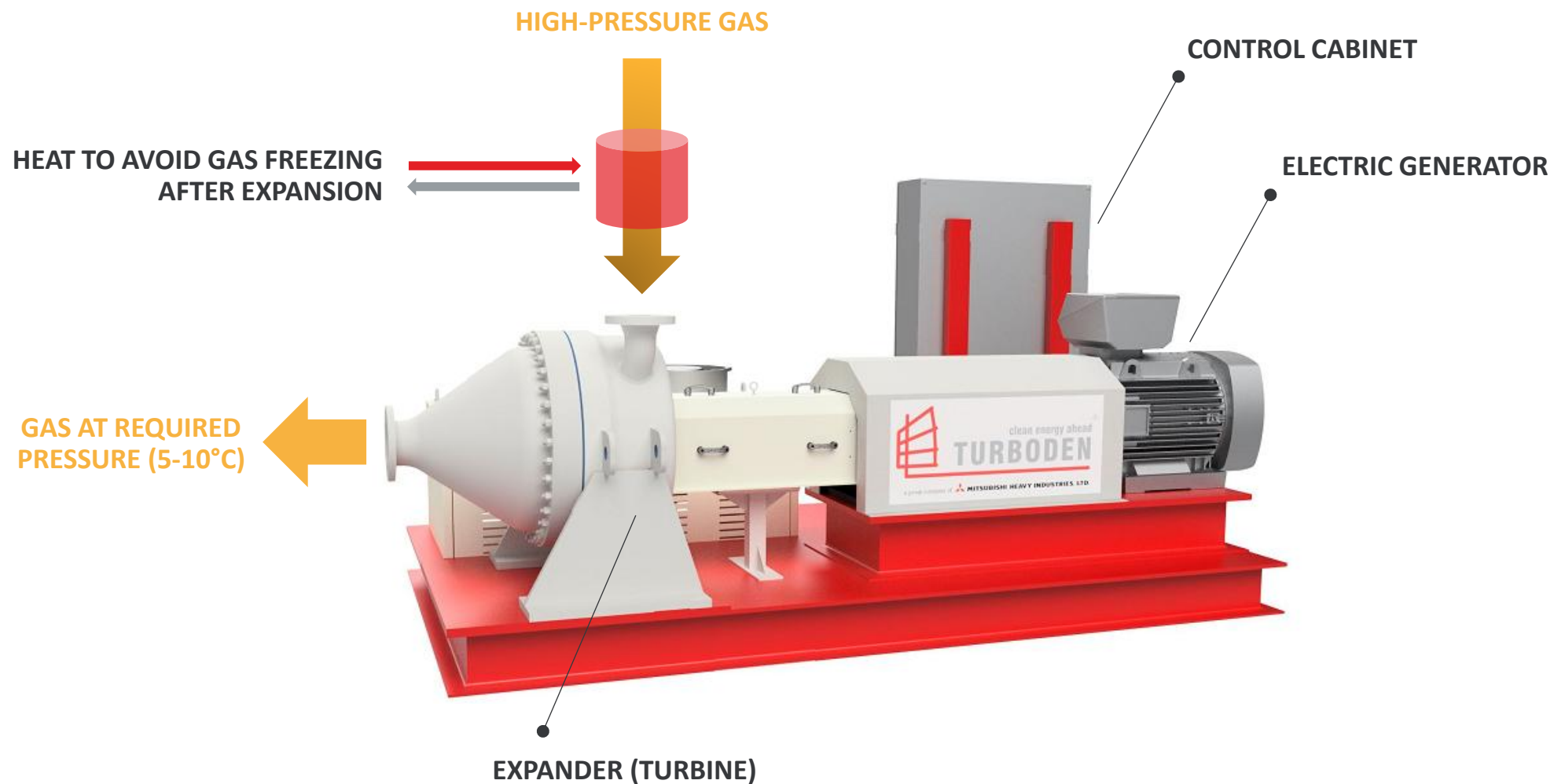
OPERATION & SERVICE

- High availability
- Designed to last over time (> 20 years)
- Structured after sales team, prompt assistance, personalized services

Turboden Rating

EXPANDERS SIZES	EXP 300	EXP 600	EXP 900	EXP > 1 MW
✓ Turbine stages/admission	Single stage radial turbine	Multi stages axial turbine		
✓ Flow rate	> 8,000 Sm3/h	20,000 – 150,000+ Sm3/h		
✓ In - out gas pressure range	50 - 1 bar(g)			
✓ Bearings	Self-lubricated rolling bearings	Rolling bearings		
✓ Seals	Single tight casing for impeller and generator	Double mechanical		
✓ Generator	Permanent Magnet Generator	A/Synchronous LV - Eff. 97%		
✓ Containerization	Sandwich panel REI 120 if 10m gate distance possible; or concrete if 2m gate distance possible. Necessary to segregate electrical panel and hot water boiler.			
✓ Gas pre-heating	Custom based on project specific features (e.g. gas fired boilers, waste heat, heat pump...)			

Core Components



References



Italgas

Italy

CONFIGURATION: power generation from gas pressure reduction in the natural gas network infrastructure of Rome

EXP POWER: 1.3 MWe (2 gas expanders, 650 kWe each)

KEY FEATURE: 2 x 80,000 Sm³/h @ 50 - 24 barg

HIGHLIGHTS: high efficiency project, electrified by two turboexpanders and two cogenerative gas engines.



A2A

Italy

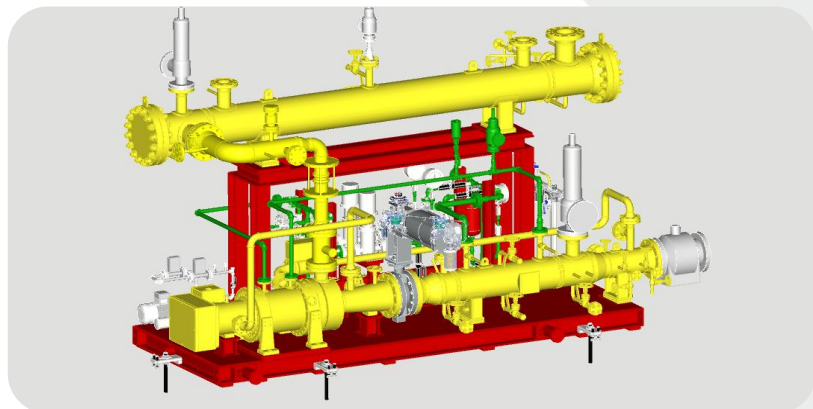
CONFIGURATION: power generation from gas pressure reduction within Brescia's natural gas network infrastructure

EXP POWER: 0.3 MWe

KEY FEATURE: 25,000 Sm³/h @ 12 - 6 barg

HIGHLIGHTS : smart city project – expansion of the natural gas entering the Brescia's gas distribution network, exploiting the district heating for the natural gas pre-heating.

References



Pietro Fiorentini/Italgas

Italy

CONFIGURATION: power generation from gas pressure reduction in the natural gas network infrastructure of Turin

EXP POWER : 0.3 MWe

KEY FEATURE: 9,000 Sm³/h @ 24 - 6 barg

HIGHLIGHTS: power generation from gas pressure reduction implemented in one of the reduction and measurement station of Turin natural gas distribution network.



HERAtech

Italy

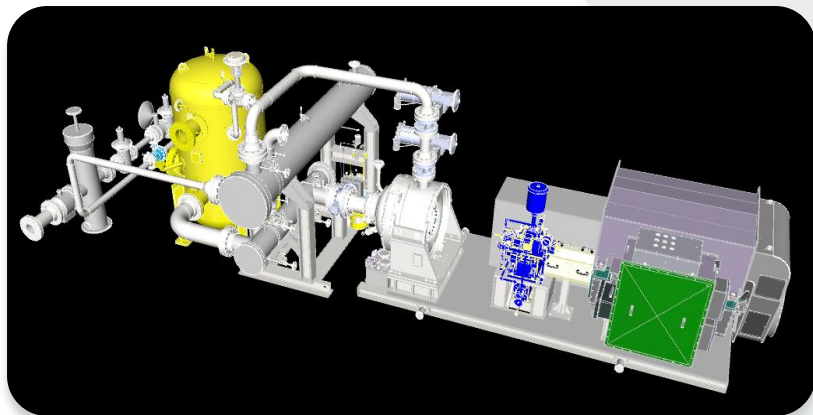
CONFIGURATION: power generation from gas pressure reduction in the Ravenna natural gas network infrastructure

EXP POWER: 0.7 MWe

KEY FEATURE: 25,000 Sm³/h @ 45 - 5 barg

HIGHLIGHTS: high efficiency expansion system to exploit the natural gas expansion at one of the main gate of Ravenna natural gas distribution network.

References



A2A

Italy

CONFIGURATION: power generation from gas pressure reduction in the natural gas network infrastructure of Milan

EXP POWER: 3 MWe + 1 MWe

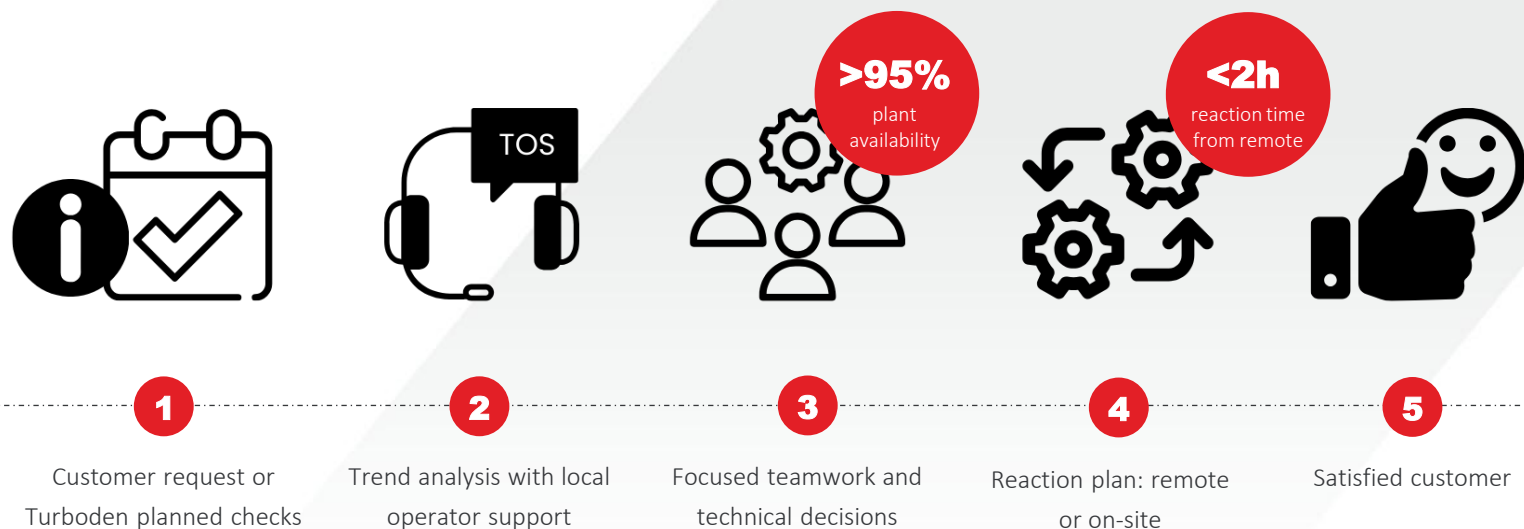
KEY FEATURE: 115,000 Sm³/h @50 - 13 barg

40,000 Sm³/h @ 14 - 4,5 barg

HIGHLIGHTS: power generation from gas pressure reduction implemented in one of the reduction and measurement station of Milan natural gas distribution network.

Dedicated After-sales Service

Qualified staff is exclusively dedicated to the customer assistance, both from remote and on-site, with the aim of optimizing the management of the plants. The customer can choose the most suitable service package thanks to the wide range of services offered.



COVERAGE

1 main office in Brescia, 3 service subsidiaries and 3 international service partner companies.

ASSISTANCE

- Turboden 24/7 for troubleshooting and remote consultancy.
- Turboden software for automatic performance monitoring and operation parameters control.

CUSTOMISED SERVICES

- dedicated staff for remote technical support.
- dedicated staff of fields technicians for on-site planned maintenance, predictive maintenance, unplanned and extraordinary maintenance.
- dedicated spare parts warehouse.
- availability guarantee.



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MOVE THE WORLD FORWARD  **mitsubishi
heavy
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