

H-15 / H-25 燃气轮机 GAS TURBINE



斯奥动力集团(中国)有限公司



SOAR POWER GROUP (CHINA) CO., LIMITED

产品简介

PRODUCT

我公司供应三菱日立燃气轮机发电机组，H系列燃气轮机是目前世界上100MW等级以下效率最高、业绩最丰富的F级重型工业燃气轮机。燃气轮机发电机组型号有25, H50, H100。其简单循环功率范围覆盖28MW~116MW，联合循环电站功率范围达41MW~163MW。可广泛应用于石油、化工、钢铁、生物合成、IGCC、分布式能源等领域的电力生产及电驱压缩机。燃气轮机能适应严酷的环境条件，对燃料要求低，能适应高、中、低不同热值区间多种燃料的运行需求。其优点是连续运行可靠性高，操作简单，保养维护简便，NO_x排放低，模块化设计、占地面积小。我公司既可为您提供燃机电站主、辅机设备的供应、安装、调试、培训及售后维修服务，也可提供电站工程总包等多样化解决方案。

三菱日立(MHPS)在能源领域拥有雄厚的实力，涉及火力发电、水力发电、风力发电、核电系统及电站控制系统等多个领域，在电力方面，拥有100多年的经验。MHPS燃气轮机生产始于1961年，基于在燃机领域的不断研发，所有燃气轮机是专门为满足电力和环保要求而设计。MHPS燃气轮机长期的表现和高可靠性已得到了世界各地用户的信任和认可；优秀的工程技术、卓越的品质控制和可靠的服务，使MHPS燃气轮机赢得了卓越和高效的声誉。

We supply MHPS gas turbines generator sets, H series gas turbine has the highest efficient and the top performance in the F-class heavy-duty industrial gas turbines family less than 100MW all over the world. Model: H25, H50, H100. The Simple Cycle power output from 28MW up to 116MW, and Combined Cycle power plant output from 41MW up to 163MW. It can be widely applied in petrochemical, steel, biosynthesis, IGCC, distributed energy System and other fields of power production, and also used to Motor Driven compressor. MHPS Gas Turbine Generator Set fuel savings will repay your investment within a few years while allowing you a range of fuels from distillate oil to natural gas. And with cogeneration or combined cycle plants, even higher efficiency will be achieved. Plus an excellent automation system will add ease and precision to your operations after a fast installation.

Mitsubishi Hitachi Power Systems (MHPS) offers products and total project solutions to business partners in the areas of power generation and transmission equipment. With 100 years of experience in the power business. MHPS gas turbine production began in 1961. Based on continuous research and development in the gas turbine field, all MHPS gas turbines are specially designed to meet power and environmental requirements. Long-established performance and high availability of MHPS machines have won the confidence and satisfaction of customers around the world. Excellent engineering, superior quality control, and reliable service has earned MHPS gas turbines a reputation for excellence and efficiency.

性能特点

- 效率高——通过各种复合循环实现高效率(简单循环、联合循环、热电联产等)
- 工业重型机设计——单轴、水平中分设计, 连续运行可靠性高, 现场保养维护简便
- 燃料多样——可燃用气体燃料(天然气、合成气、液化气等高低热值燃气), 液体燃料(轻油、煤油), 及多种燃料切换
- 氮氧化物排放低——通过喷水或蒸汽, 或直接选用先进的干式低氮燃烧器, NO_x排放可低于25ppm
- 安装简便——模块化设计, 占地面积小, 运输、安装更加便捷
- 操作简便——一键起停、系统冗余、全自动化数字控制
- 应用广泛——石油、化工、钢铁、分布式能源、煤化工IGCC、电驱压缩机等
- 保养维护周期长——采用最新材料和冷却技术, 高温部件寿命更长



Features

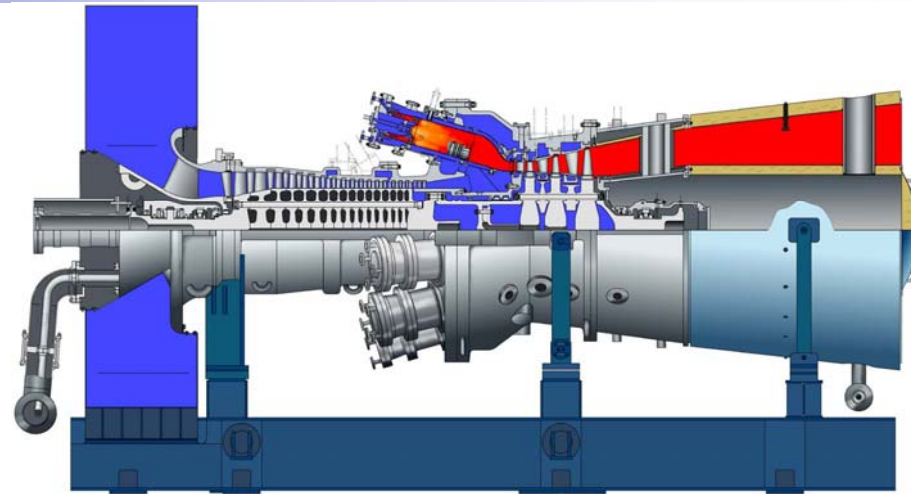
- **High Thermal Efficiency**
With Advanced cycle (simple cycle, combined cycle, Cogeneration, etc.)
- **Heavy Duty Design, Single Shaft, Horizontal Split, High Reliability and Easy Maintenance**
- **High Fuel Flexibility** (Distillate Oil, NG, LNG, Synthesis gas, LPG, low BTU gas fuel etc.)
- **Low Emission (NO_x) Level**, By adopt water or steam injecting, or Low NO_x combustor, can be reduced below 25ppm
- **Easy Installation** with modular package design and small area occupied, easily to deliver and install
- **Easy operation and Fully Automated Digital Control**
- **Widely Applied**, Suitable for Petrochemical, Steel, Distributed Energy System, IGCC, Motor Driven Compressor field etc.
- **Long Time Interval of Maintenance**, Newest Material and cooling technology, long lifetime of hot parts.

H-15/H-25 结构特点

Structure Features

H-25(28MW/ 32MW/ 35MW/ 42MW等级)/H-15(17MW等级)燃气轮机为典型的重型工业燃气轮机，整机单轴设计，具有性能高、可靠性高等特点。

The H-25 (28MW/ 32MW/ 35MW/ 42MW class) /H-15 (17MW class) are the typical industrial heavy duty gas turbine with single shaft design. And it has the characteristic of high performance and high availability.



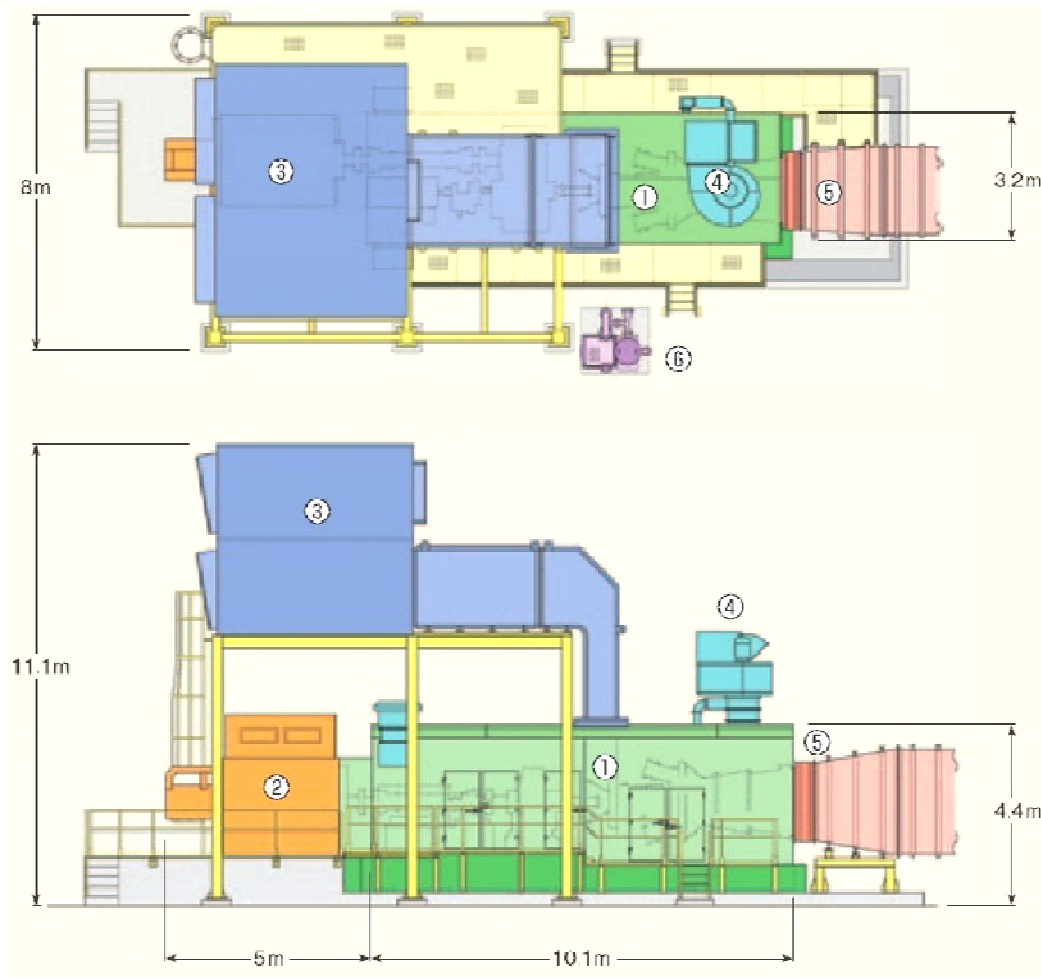
本体结构 Structure Specifications

设备 Equipment	规格 Specification
燃气轮机 Gas Turbine	简单循环 Simple Cycle
	单轴设计 Single Shaft
	水平中分缸体 Horizontal Split Casing
	转速 Rotating Speed : H-25 : 7,280rpm / H-15 : 9,710rpm
空压机 Compressor	压比Pressure Ratio : 14.7
	17级轴流式 17 Stages Axial Type
透平 Turbine	3级冲动式 3 Stages Impulse Type
	冷却形式：冷却空气冷却喷嘴和动叶片(1级和2级) Cooling Type: Air Cooled 1st and 2nd Stage Nozzle and Bucket
燃烧室 Combustor	回流式 Reverse Flow Type
	常规燃烧室、低氮燃烧室（干式） Conventional Type or Low NOx Type (25ppm) Combustor
	火焰筒数量： H-25 : 10/ H-15 : 6 H-25: 10 Combustors / H-15 : 6 Combustors
	缝隙冷却式 Slot Cooling

H-15/H-25 结构特点

Structure Features

H-15 模块化设计 Modular Package Design

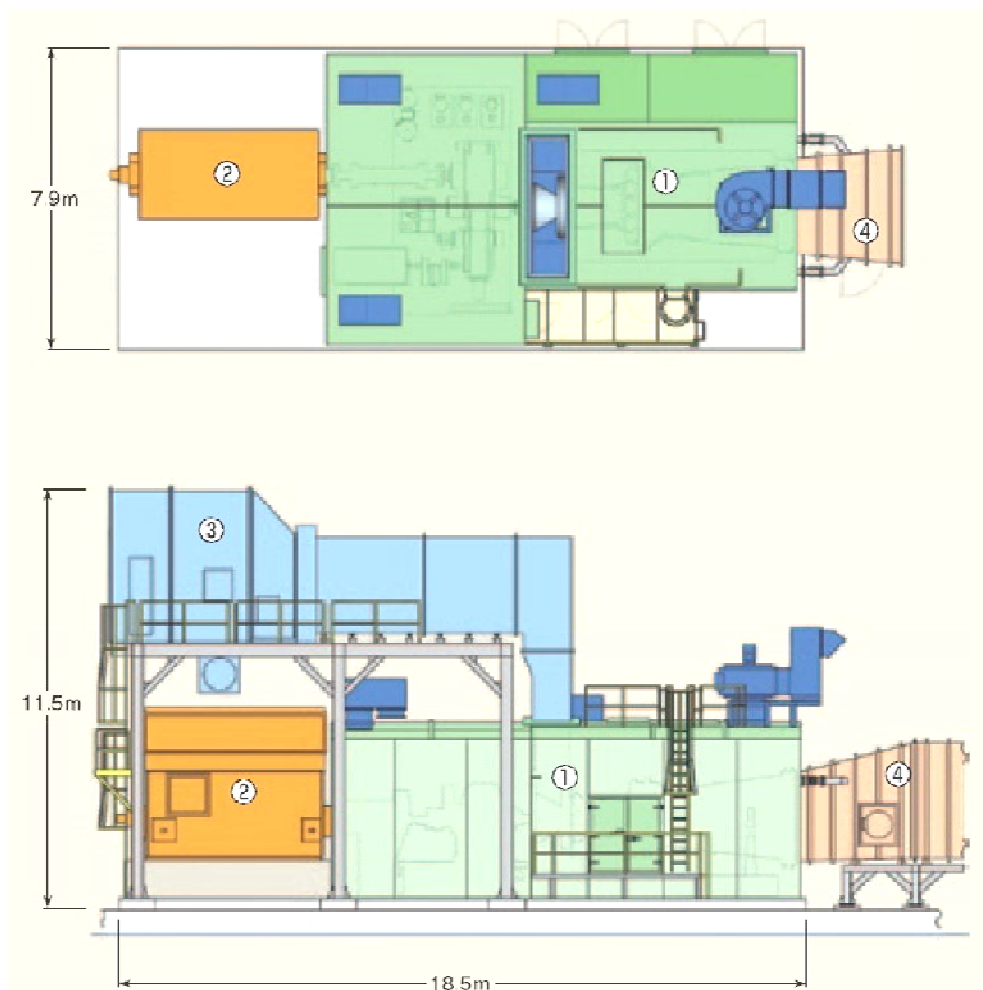


序号 No.	设备 Package	重量 Weight
1	燃机本体+底盘 Gas Turbine +Base	30t
	辅机设备 Auxiliary Equipment	49t
2	发电机 Generator	37t
3	进气系统 Air Inlet System	33t
4	通风扇 Ventilation Fan	1t
5	排气系统 Exhaust System	5.6t

H-15/H-25 结构特点

Structure Features

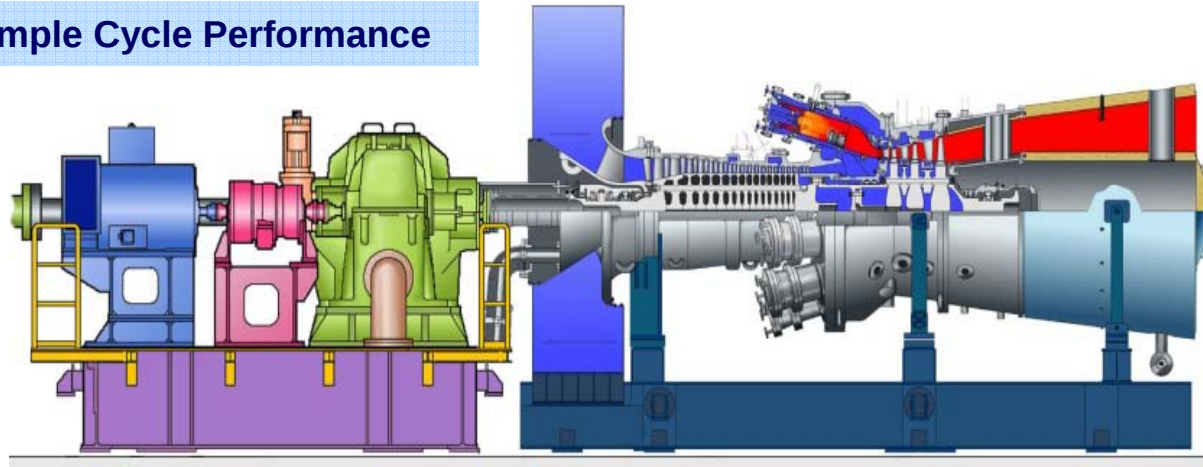
H-25 模块化设计 Modular Package Design



序号 No.	设备 Package	重量 Weight
1	燃机本体+底盘 Gas Turbine +Base	47t
	油箱、齿轮箱及辅机设备 Lube Oil Tank, Reduction Gear and Auxiliaries	82t
2	发电机 Generator	85t
3	进气系统 Air Inlet System	51t
5	排气系统 Exhaust System	7t

H-15/H-25 性能指标 Performance

简单循环性能 Simple Cycle Performance



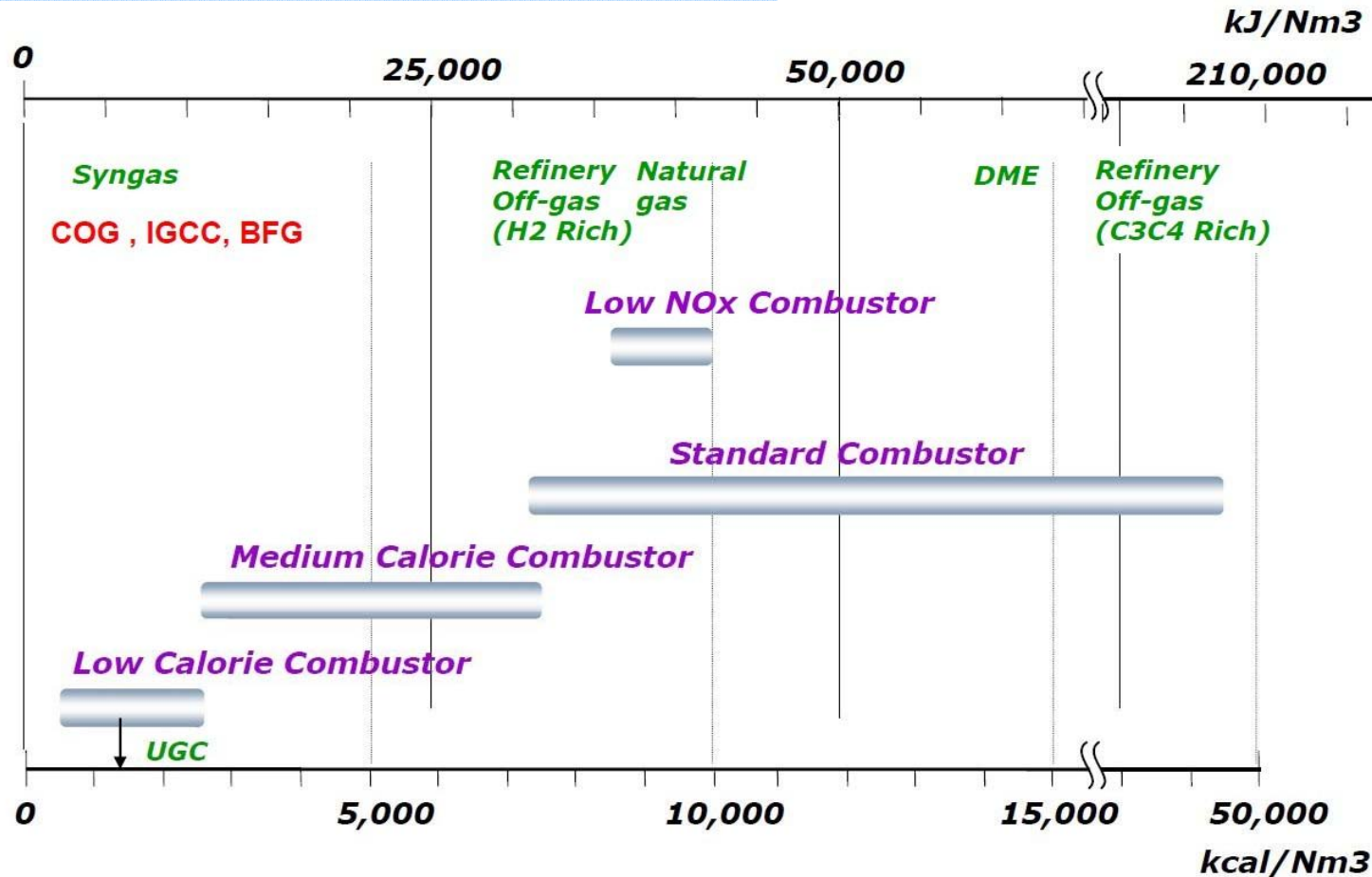
项目 ITEM00	单位 Unit	H-15	H-25(28)	H-25(32)	H-25(35)	H-25(42)
		天然气或其它气体燃料 NG or other Gas fuel				
功率 Output	MW	16.9	28.1	32.3	37.6	42
效率 Efficiency	% (LHV)	34.6	34.2	34.8	35	37.2
热耗率 Heat Rate	kJ/kwh	10,407	10,527	10,338	10,288	9,664
排气流量 Exhaust Flow	kg/s	53.3	90.2	96.6	112.1	111
排气温度 Exhaust Temp.	Deg C	556	552	561	556	556
NOx排放 NOx Emission	ppm@15%O2	15	15	15	15	15

注：上述性能参数基于ISO工况、普通燃烧室、简单循环，如采用低NOx燃烧室，NOx的排放可降低至15ppm。除天然气外，H-15/H-25燃机可通过配置低热值燃烧器等，燃用轻油、生物质气、转炉煤气、合成气、焦炉煤气等中低热值燃料。

NOTES: Above data based on ISO Condition, conventional combustor and simple cycle. With low NOx combustor, the emission of NOx will be reduced to 25ppm. Besides of NG, with low BTU combustor etc, variable fuel (such as light oil, Biogas, LDG, Syngas, COG etc.) can be applied to H-15/H-25.

H-15/H-25 燃料适用性 Available Fuel

H-15/ H-25 燃烧器选择 Combustor Type selection



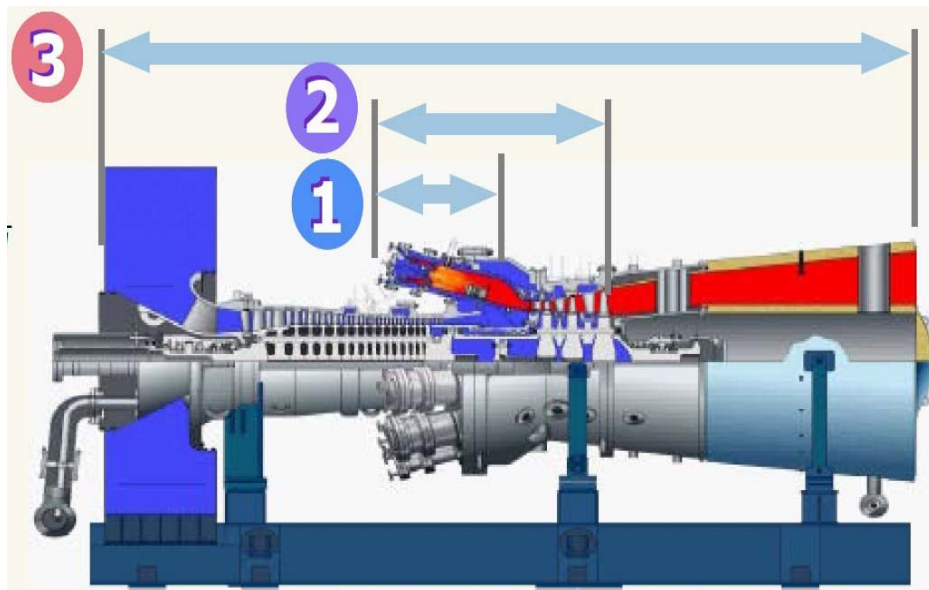
针对不同热值燃料，可分别选择低、中热值燃烧器、标准燃烧器、低NO_x燃烧器对应。

Low Calorie, Medium Calorie, Standard or Low NO_x combustor can be selected for vary heat fuel situations.

H-15/H-25 维护 Maintenance

维护周期 Maintenance Interval

维护方式 Inspection Type	典型维护周期 (Hr) Typical Overhaul Interval	运行维护参考 注1) Reference Interval Note 1)	停机时间 Downtime
燃烧室检修 Combustion Inspection ①	16,000(天然气 Gas) 12,000 (燃料油 Oil)	2年 2 Year	7 天 7 days
热通道检修 Hot Gas Path Inspection ②	32,000 (天然气 Gas) 24,000 (燃料油 Oil)	4年 4 Year	16 天 16 days
大修 Major Inspection ③	64,000 (天然气 Gas) 48,000 (燃料油 Oil)	8年 8 Year	25 天 25 days



维护周期长

*维护周期和停机时间与运行方式等条件相关。

Interval & downtime shall be subject to operating cycle and conditions, etc.

*停机时间不含停机冷却时间(1 天) 和启动时间(1~2天)。

Cool downtime (1 days) and start-up (1~2 days) are not included in downtime.

注1) : 8000小时/年连续运行时。

Note 1): Continuous operation case of 8000h/y.

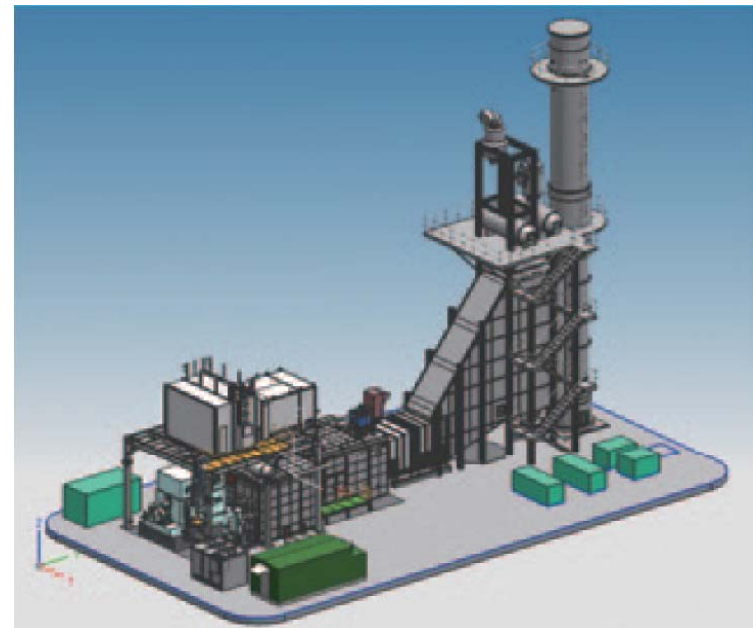
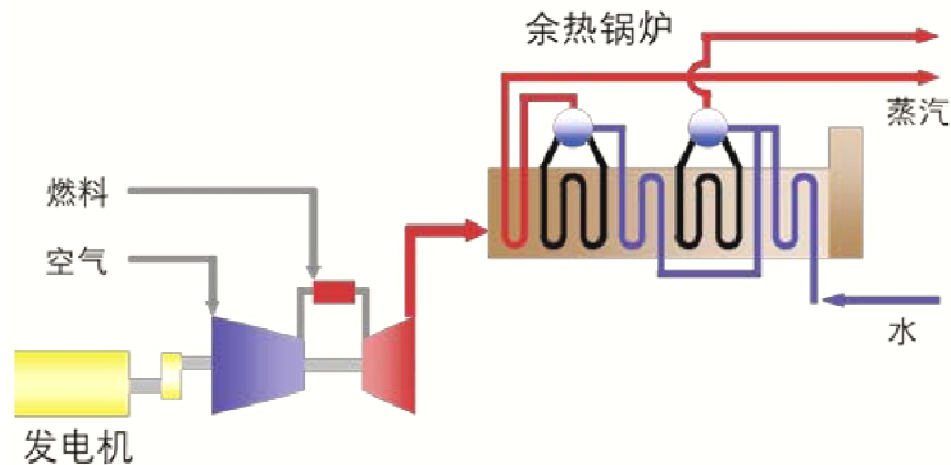
H-15/H-25 典型应用—1.热电联产 Application— 1.Cogeneration

热电联产 Cogeneration Plant

H-15/ H-25燃气轮机高效、高可靠、易维护。高燃烧温度与排烟温度，确保燃机在电力与供热输出上保持高效。通过灵活配置H-15/ H-25燃机热电联供系统，可以满足用户不同的热、电需求。

H-15/ H-25 gas turbine is high efficiency, high reliability and easy maintenance. High combustion temp and exhaust temp make sure high efficiency. Applicable of various cogeneration systems, it can meet various heat and power requirements of clients.

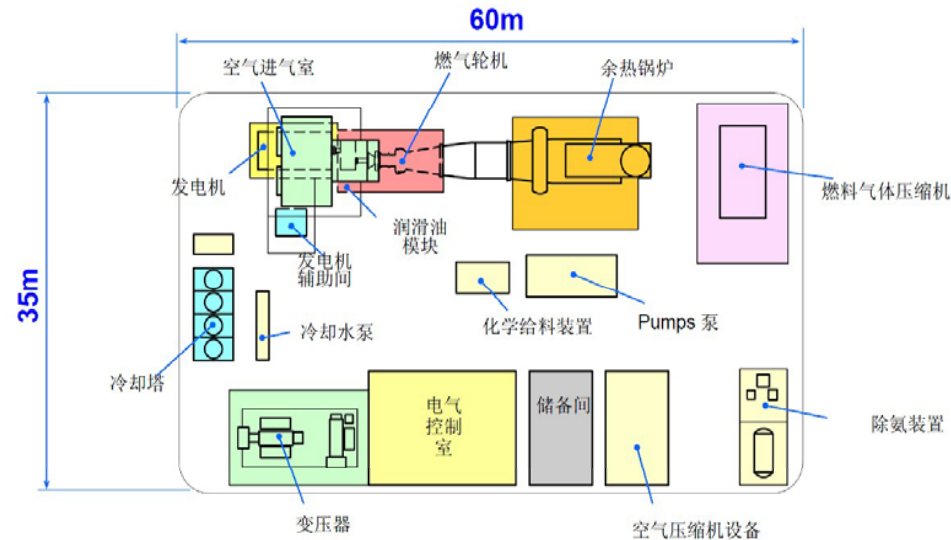
系统流程图 Flow diagram



H-15/H-25 典型应用—1.热电联产

Application— 1.Cogeneration

H-25热电联产电站布置图 H-25 CHP Layout



注:

- 1) 热电联产电厂占地面积因系统设备而定, 如不需考虑燃料压缩机、脱硝设备、冷却塔等。则电厂占地面积在长45米x宽25米内。
- 2) 定期检修时, 须考虑放置检修设备的空间。

Note:

- 1) Cogeneration plant area is variable based on system configuration, if without fuel gas compressor, denitration device, cooling tower etc, the area will be 45m(L)x25m(W).
- 2) The space for disassembly device while maintenance should be considered.

典型性能参数 Typical Performance

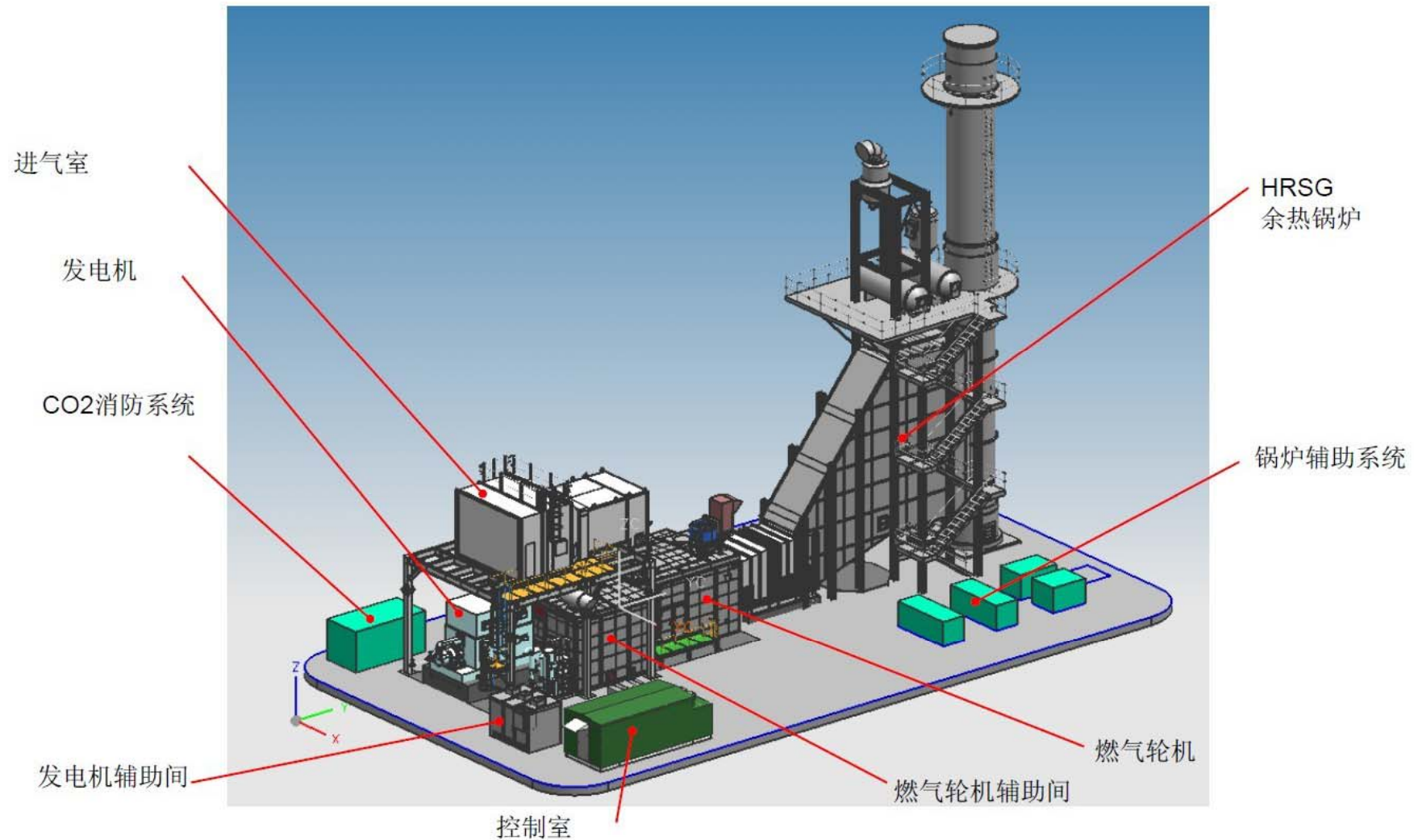
天然气燃料, ISO工况 (1013hPa, 15℃, R.H. 60%) 余热锅炉 (不补燃, 入口温度约560℃)
NG, ISO condition HRSG (without supplemental combustion, inlet temperature: about 560℃)

燃气轮机 Gas Turbine	H-15	H-25 (28)	H-25 (32)	H-25 (35)	H25 (42)
燃机输出功率 Power Output	16.2 MW	27MW	31.1MW	36.4 MW	40.6 MW
蒸汽条件 Steam Condition	1~8MPa 200~530 ℃	1~8MPa 200~530 ℃	1~8MPa 200~530 ℃	1~8MPa 200~530 ℃	1~8MPa 200~530 ℃
蒸汽量 Steam Flow	25~38 t/h	35-58	45-65	51~72 t/h	51~75 t/h
电厂综合效率 Overall Efficiency	大于80%	大于80%	大于80%	大于80%	大于80%

H-15/H-25 典型应用—1.热电联产

Application— 1.Cogeneration

H-15/ H-25 热电联产标准布置设计 H-15/ H-25 CHP Standard Layout Design



H-15/H-25 典型应用—2.联合循环 Application— 2. CCPP

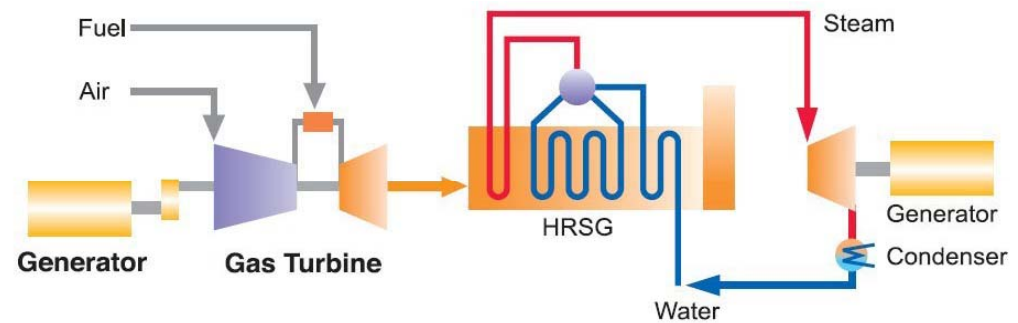
联合循环 CCPP

作为F级燃机，H-15/H-25的高透平初温与排烟温度确保其无论是简单循环还是联合循环均能获得超高效率，成为100MW以下热效率最高的重型工业燃气轮机。模块化设计缩短了整个联合循环电站的建设周期，并使后期维护更为便利。

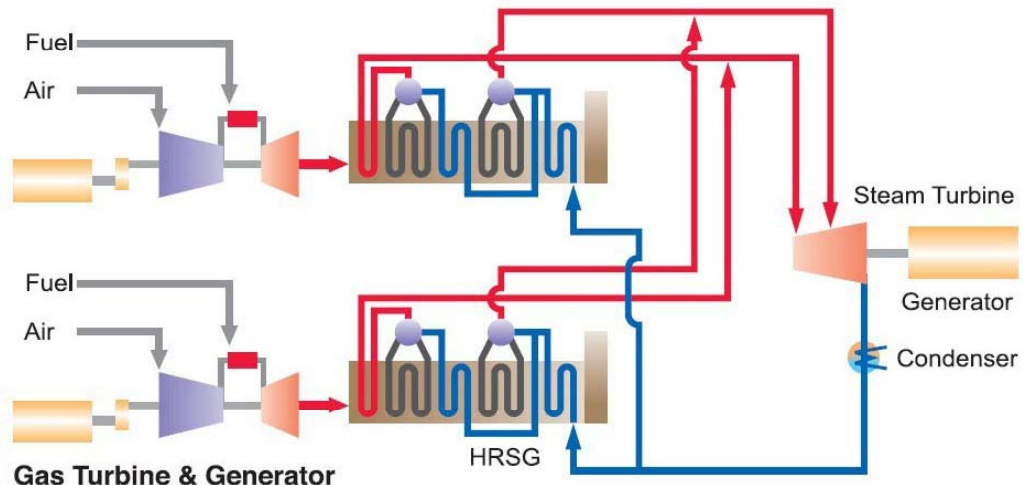
As the F class gas turbine, H-15/ H-25 has high turbine initial temp and exhaust temp, it makes the simple cycle and combined cycle high efficient, become the top performance heavy duty industrial gas turbine below 100MW class. Modular design reduces CCPP erection period, and make the maintenance more conveniently.



1拖1系统流程图 1-1-1 Flow Diagram

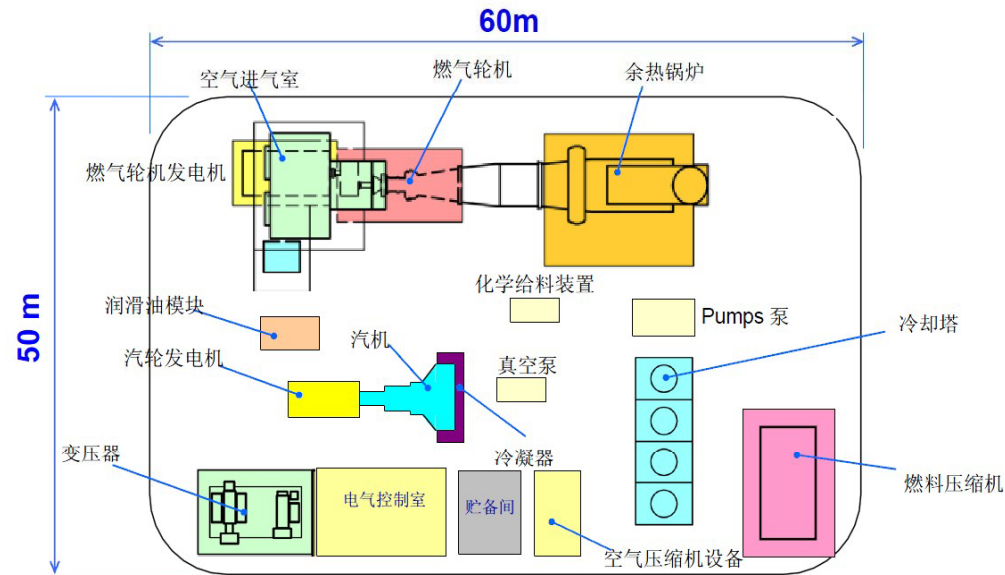


2拖1系统流程图 2-2-1 Flow Diagram



H-15/H-25 典型应用—2.联合循环 Application— 2. CCPP

H-25联合循环电站布置图 H-25 CCPP Layout



注:

- 1) 由于分轴布置, 汽机的布置相对灵活。
- 2) 电站实际布置根据系统和设备配置确定。
- 3) 定期检修时, 须考虑放置检修设备的空间。

Note:

- 1) The steam turbine is split axis arrangement with gas turbine, the plant layout is flexible.
- 2) The actual layout will be variable by system and device configuration.
- 3) The space for disassembly device while maintenance should be considered.

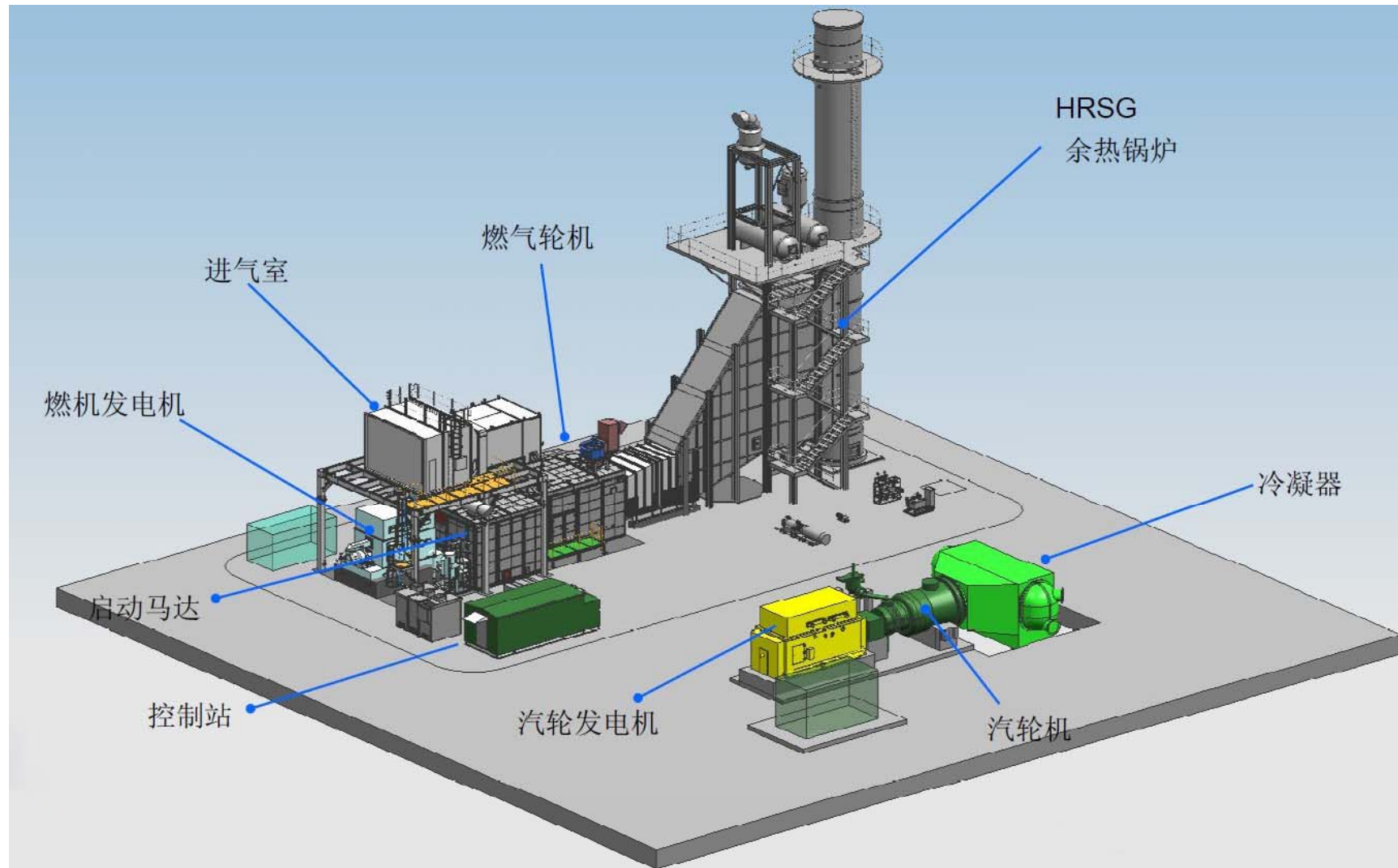
典型性能参数 Typical Performance

天然气燃料, ISO工况 (1013hPa, 15°C, R.H. 60%) — NG, ISO condition

燃气轮机 Gas Turbine	H-15	H-25(28)	H-25(32)	H-25(35)	H25(42)
联合循环输出功率 CCPP output	24.2 MW	41.5 MW	47.2MW	54.9 MW	59.1 MW
燃机输出功率 GT Output	16.2 MW	27 MW	31.1MW	36.4 MW	40.6 MW
汽轮机输出功率 ST Output	8 MW	14.5 MW	16.1 MW	18.5 MW	18.5 MW
联合循环效率 CCPP Efficiency	50.5 %	50.9 %	51.3 %	51.4 %	52.8 %

H-15/H-25 典型应用—2.联合循环 Application— 2. CCPP

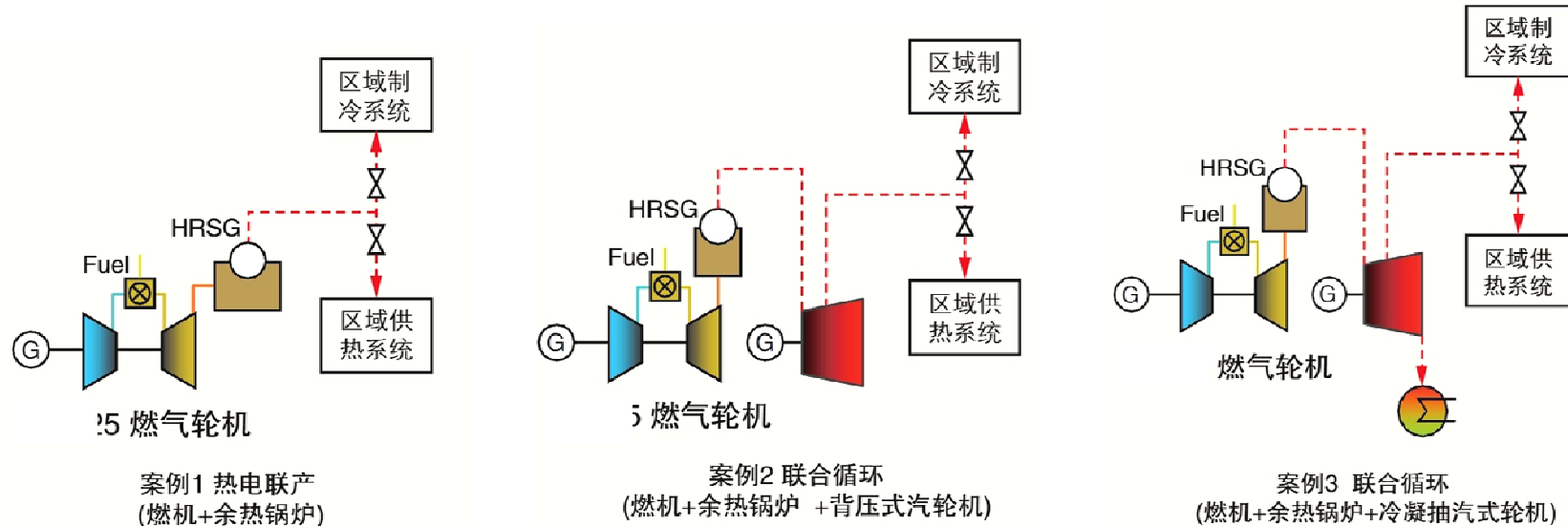
H-15/ H-25 联合循环标准布置设计 H-15/ H-25 CCPP Standard Layout Design



H-15/H-25 典型应用—3.分布式能源 Application— 3. Distributed Energy Resources

利用H-15/ H-25高发电效率、高排气温度及紧凑型设计，可以广泛应用于分布式能源领域，构建有效的冷热电三联供系统。

For high generating efficiency, high exhaust temp and compact design, H-15/ H-25 can be widely used in Distributed Energy Resources field, establish efficient CCHP systems.



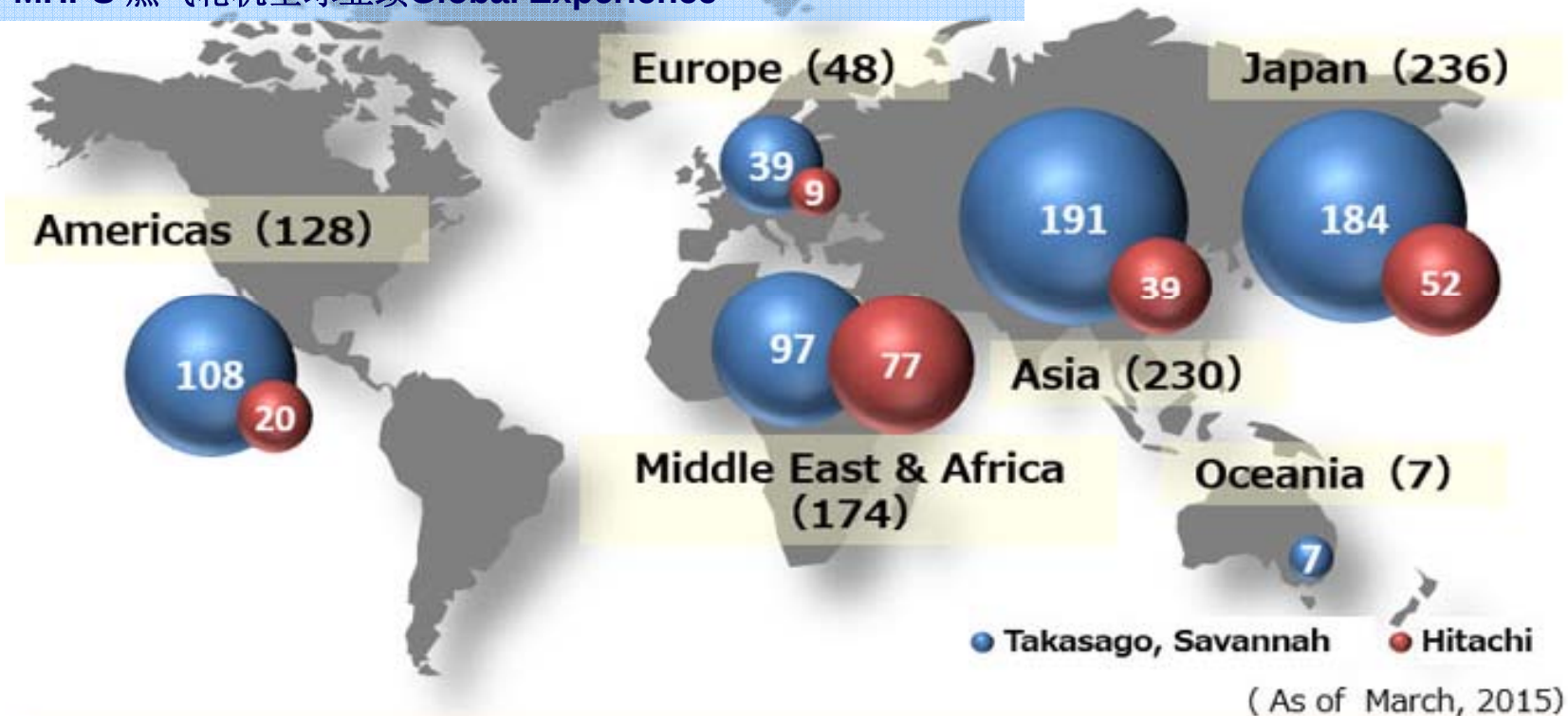
项目 Item	案例1 Case 1		案例2 Case 2		案例3（可变） Case 3	
	H-15	H-25	H-15	H-25	H-15	H-25
燃机输出 GT Output (MW)	16.2	32	16.2	31.1	16.2	31.1
汽机输出 ST Output (MW)	-	-	2.2	4.3	3.9~8	7.5~15
电力输出 Electric Output (MW)	16.2	32	18.4	35.4	20.1~24.2	38.6~46.1
蒸汽流量 Steam Flow	35	62	29	52	20~0	36~0

注：上表为典型性能参数，基于天然气燃料，ISO工况。

Note: Above table lists the typical performance data, base on NG fuel, ISO condition.

H-15/H-25 全球业绩 Global Experience

MHPS 燃气轮机全球业绩Global Experience



Total Number of Units : 823

H-15×6	M501D×25	M501F×73	M501G×74	M501J×34	Other Models
H-25×171	M701D×93	M701F×125	M701G×11	M701J×2	
H-100×20					
197 units	118 units	198 units	85 units	36 units	189 units

H-15/H-25 市场业绩 Market Achievement

近年业绩举例 Achievement Example of These Years

序号 No.	客户 Customer	国家 Country	机型 Model	应用类型 Application	商运时间 Commercial Operation
1	伊藤忠商事株式会社/ 中国天辰化学工程有限公司/英格洛聚合物和化学品有限公司 Itochu Corporation / China Tianchen Chemical Engineering Corp./ Engro Asahi Polymer & Chemical Ltd.	巴基斯坦 Pakistan	H-25	热电联产 HRS	2009
2	伊藤忠商事株式会社/ 山西三维集团股份有限公司 Itochu Corporation / Shanxi Sanwei Group Co., Ltd.	中国 China	H-25	热电联产 HRS	2009
3	琥珀（安吉）燃气轮机热电有限公司 Amber (Anji) Gas Turbine Thermal Power Co. Ltd	中国 China	H-25	联合循环C/C	2012
4	三菱重工有限公司/ 阿尔及利亚阿曼化肥项目（AOFP） Mitsubishi Heavy Industries, Ltd. /Algeria Oman Fertilizer Project (AOFP)	阿尔及利亚 Algeria	H-25	热电联产HRS	2012
5	丸红株式会社/ Moham Shargh 集团（雷伊电厂项目） Marubeni Corporation/ Moham Shargh Group (Rey Power Plant Project)	伊朗 Iran	H-25	简单循环 S/C	2012
6	TBM公司（TBM油气田及输油气管道项目） Tarbagatay Munay LLP (TBM Gas Field and Pipe Line Project)	哈萨克斯坦 Kazakhstan	H-15	简单循环 S/C	2012
7	关西电力株式会社/ 姬路一号热电站 Kansai Electric Power Co., Inc./ Himeji No.1 Thermal Power Station	日本 Japan	H-25	简单循环 S/C	2012

H-15/H-25 市场业绩 Market Achievement

序号 No.	客户 Customer	国家 Country	机型 Model	应用类型 Application	商运时间 Commercial Operation
8	东北电力公司/ 新潟热电厂 Tohoku Electric Power Co., Inc / Niigata Thermal Power Station	日本 Japan	H-25	简单循环S/C	2011
9	三菱重工业株式会社(安哥拉阿曼化肥工程项目)(AOEP) Mitsubishi Heavy Industries, Ltd. (Algeria Oman Fertilizer Project (AOFP)) / EL SHARIKA EL DJAZAIRIA EL OMANIA LIL ASMIDA Spa	安哥拉 Algeria	H-25	热电联产 HRS	2012
10	巴哈马电力公司 Bahamas Electricity Corporation	巴哈马 Bahamas	H-25	简单循环S/C	2013
11	三菱重工业工程服务有限公司/ 鞑靼斯坦共和国化肥项目MHI Industrial Engineering & Services Private Ltd. (MIES) / Tatarstan Ammoni Fertilizer Project	鞑靼斯坦 Tatarstan	H-25	热电联产 HRS	2013
12	丸红株式会社/ Keramasan电厂扩建工程 Marubeni Corporation/ Keramasan Power Plant Extension Project	印尼Indonesia	H-25	联合循环 C/C	2013
13	东北电力公司/ 塔什干TETS公司 Tohoku Electric Power Co., Inc/ Tashkent TETS	乌兹别克斯坦 Uzbekistan	H-25	热电联产 HRS	2013
14	特迈斯有限公司/ OMPL公司 Thermax Ltd./ ONGC Mangalore Petrochemicals Ltd.	印度 India	H-25	联合循环 C/C	2013
15	日立电力系统加拿大有限公司/ 萨斯喀彻温省电力公司 Hitachi Power Systems Canada Ltd./ Saskatchewan Power Corporation	加拿大Canada	H-25	联合循环 C/C	2015

H-15/H-25 市场业绩 Market Achievement



日本千叶县五井海岸电厂H25x3台



日本飞鹰IGCC电站项目 H25X1台



中国天辰化工工程公司总承包巴基斯坦ENGRO PVC项目自备电厂
H25x2台



山西景源焦炉煤气燃机热电项目H25x1台



公司名称: 斯奥动力集团
网 址: www.soar.hk
电 话: +86-4008111308
电子邮箱: sale@soar.hk