

QD100燃气轮机发电机组

Package of QD100 gas turbine generator unit



Package of QD100 gas turbine generator unit abstract

- Package of QD100 gas turbine generator unit is a kind of high efficiency , environmental protected machine that is produced by the cooperation of CAGT and GE oil, using GE10 gas turbine of GE as the core engine . it can take use of natural gas ,fuel oil and lower-heat-value gas.
- GE10 series gas turbine keep perfect sale and operating behavior in the market of the world for its good dependability and maintainability . GE10 gas turbine has good reputation in Asian and European market because we try our best to enhance the performance and to reduce contamination exhaust .
- QD100 (QD100A) is packaged by CAGT, inheriting the good performance of GE10, and It has predominance of perfect performance and lower cost to provide clients all-around and high-grade service.



GE10-1燃气轮机

GE10-1 gas turbine

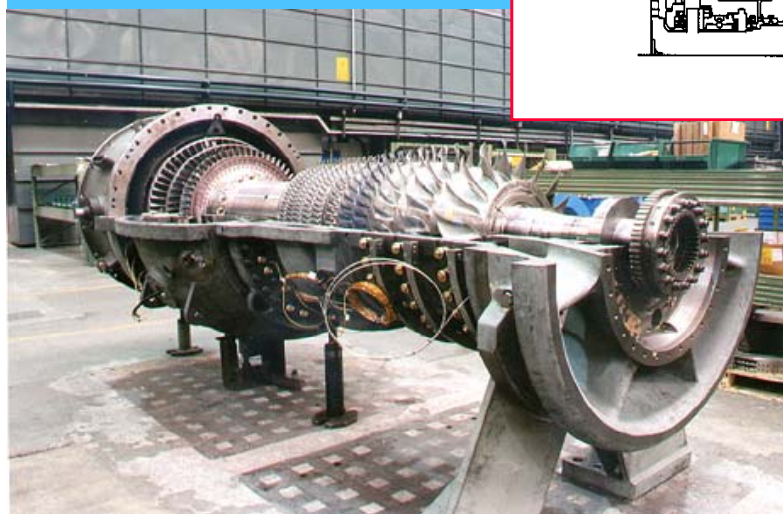
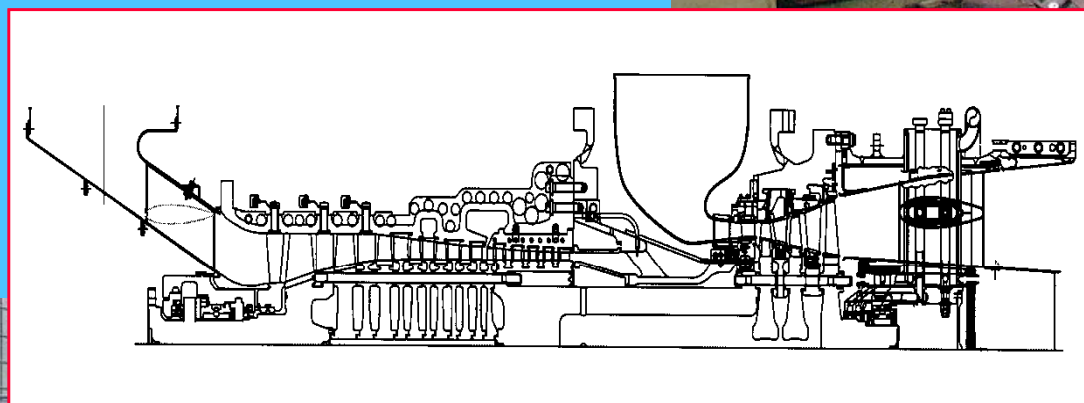
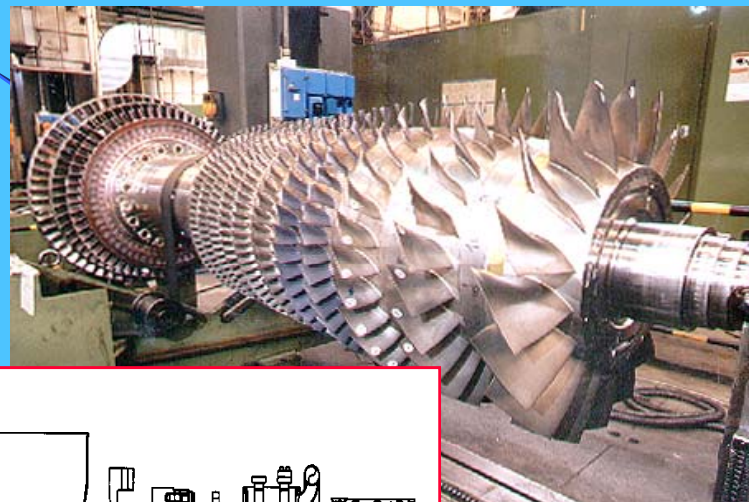
- **GE10-1**是单轴重型燃气轮机，可适用于**50和60Hz**的用电系统。燃气轮机包括一个**11级**高效轴流压气机和一个**3级**涡轮。燃烧系统包括一个气膜冷却的单管燃烧室、燃烧喷嘴、火花塞、火焰探测器等，可燃烧液态、气态燃料，包括低**BTU**值的气态燃料。
- **GE10-1 is a kind of single shaft heavy gas turbine ,it can be used in 50Hz and 60Hz power system .it consists of an 11stage axial compressor and a 3stage turbine .the combustion system consist of a single air-cooling combustion chamber ,spark plug of the nozzle ,flame detector etc. it can burn liquid fuel ,gas fuel (including low-heat-value gas)**



燃气轮机特点

characteristics of gas turbine

压缩机 - 11 级, 前3级导叶可调
单轴涡轮 - 3 级 (1级和 2级采用空冷)
燃烧器 - 单管



**Compressor -11stage , 3 stage IGV
Single shaft turbine -3 stage (the first
and second stage use air-cooling)
Burner –single pipe**

QD100 成套系统特性

key feature of QD100 gas turbine generator unit

- ◆ 钢底座，整体滑油箱 Steel base plate , unitary oil box
- ◆ 交流变频电动机启动 General lube oil system (gas turbine , gear box, generator)
- ◆ 通用润滑油系统（发动机、齿轮箱、发电机） frequency conversion motor start up
 - ❖ 轴驱动主泵、交流辅泵、直流应急泵
Shaft driving main pump , AC auxiliary pump , DC emergency pump
 - ❖ 温控阀控制的油 / 水冷却器或空冷
Temperature control valve / water cooler or air cooler
- ◆ 注蒸汽增加出功（仅用于扩压燃烧室）
Steam injection to increase power (only available on diffusion combustion chamber)
- ◆ 噪声：90 dB(A) @ 1 m, ISO NR50 @ 100 m Noise : 90 dB(A) @ 1 m, ISO NR50 @ 100 m
- ◆ 4 极, 3 相 1500/1800 rpm 发电机 4poles , 3phases 1500/1800 rpm generator
- ◆ Mark VI 控制系统 Mark VI controller system

燃气轮机基本参数

gas turbine Base data

GE 10/1

功率(kWe) output power

11,250

热效率 (%) heat efficiency

31.4

点火温度 (° C) ignition temperature

1090

热耗 (kJ/kWh) Specific heat consumption

11,481

压比 Pressure Ratio

15.5:1

排气温度 (° C) exhaust temperature

482

排气流量 (kg/s) Exhaust flow

47.5

转速 (rpm) Turbine Speed

11,000

ISO条件, 天然气燃料 ISO conditions, natural gas fuel

GT

燃气轮机设备规格

Specification of gas turbine

输出转速 转/分 0-11000	燃气轮机重量 kg 约11350	点火温度 ℃ 1090	压气机压比 15.6 : 1	空气流量 kg/s 46.8
Output speed	weight	ignition temperature	pressure ratio	air flow of compressor

交流发电机规格Specification of AC generator

类型 type	外形尺寸 Dimension mm	额定有功功率 Rating power KW	额定电压 Rating voltage KV	转速 Speed r/min	额定频率 Rating frequency
无刷励磁发电机 Brushless excitation	6000×2400×305 0	15000	10.5	3000	50 Hz

齿轮箱规格Specification of gear box

额定功率 Rating power KW (ISO)	最大传输功率 max. output power KW	工况系数 coefficient	额定输入速度 Rating input speed r/min	额定输出速度 rating output speed r/min
10721	12617	1.3	11000	3000

QD100燃气轮机发电机组性能参数表:

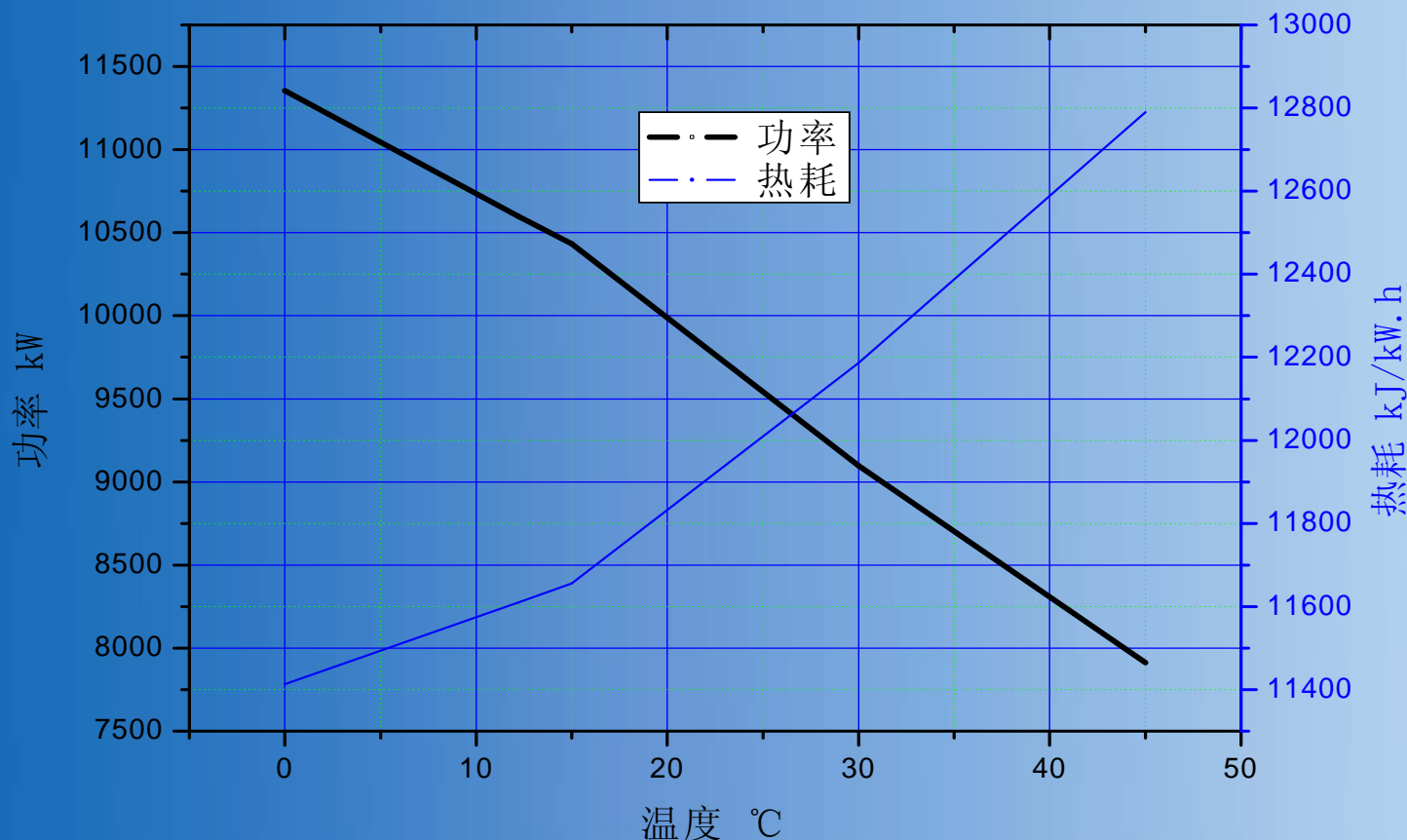
performance diagram of QD100gas turbine generator unit

项目 item	单位 unit	参数 parameter
燃料 fuel		天然气 (ISO标准大气条件下) Natural gas (ISO)
机组输出功率 out put power	KW	10,820
机组热效率 heat efficiency	%	30.31
机组热耗 heat consumption	KJ/KW·h	11,877
发动机转子转速 rotor speed	RPM	11,000
排气温度 exhaust temperature	℃	485.6
排气流量 the flow of exhaust	kg/s	47.52
燃机箱装体外形尺寸 Dimension of gas turbine enclosure	mm	6535×3200×3050
发电机箱装体外形尺寸 Dimension of generator enclosure	mm	6880×3200×4128
燃机重量 Weight of gas turbine	t	48
发电机重量 Weigh of generator	t	125



环境温度对输出功率和热耗的影响

The influence to output power and heat consumption of circumstance temperature



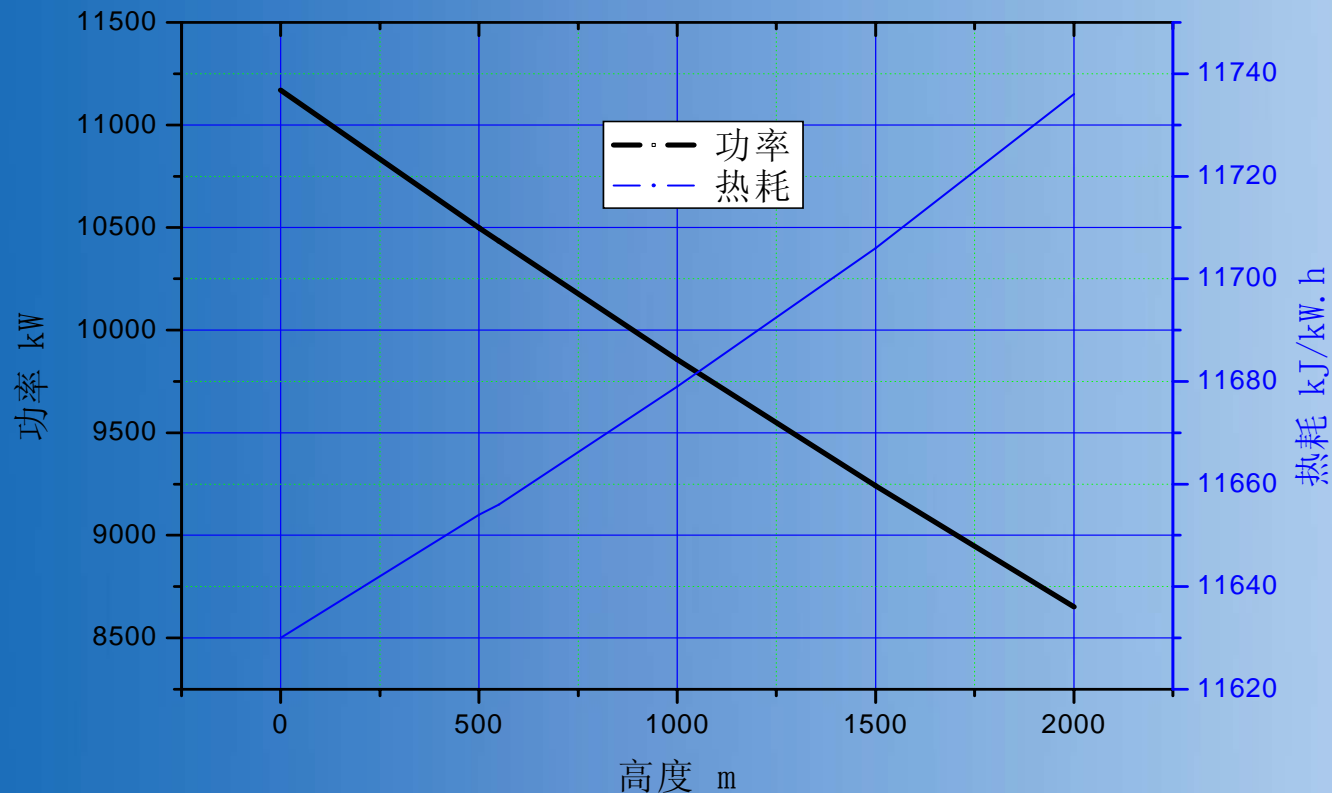
图中列出了环境压力为101.3 kPa、相对湿度60%保持不变，环境温度从-30°C ~ +45°C不同温度条件下，各主要参数随环境温度变化的数据。

circumstance pressure is 101.3kPa,relative humidity is 60%,the circumstance temperature varies from -30°C to +45°C



海拔高度对输出功率和热耗的影响

The influence to output power and heat consumption of altitude above sea level



表中列出了在环境温度20°C、相对湿度60%保持不变的条件下，海拔高度从0米~2000米不同高度下，各主要参数变化数据。

circumstance temperature is 20°C,relative humidity is 60%,the altitude above sea level varies from 0m to 2000m



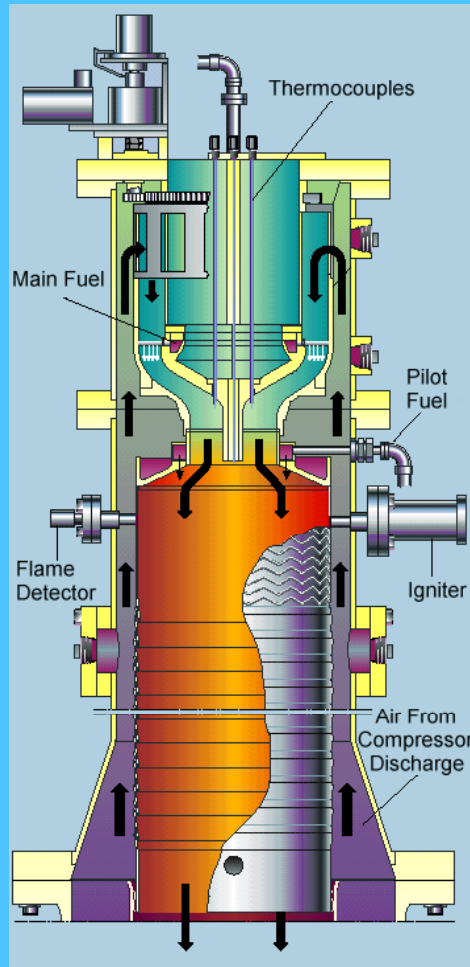
GE10-1燃气轮机转子

The rotor of GE10 gas turbine



GE 10/1 干式低 NO_x 燃烧室

GE10/1 DLN combustion chamber



- ◆ 单管燃烧室
single combustion chamber
- ◆ 可变几何，单级回流燃烧，可应用多种燃料
Adjustable figure, can use deferent fuel
- ◆ 压力损失较低
Lower pressure lose
- ◆ 低排放标准（扩散燃烧室）
DLN (diffusion combustion chamber)
- ◆ 天然气性能：
Ability that use natural gas
 - ❖ 25 ppmvd NO_x @ 15% O₂
 - ❖ 20 ppmvd CO @ 15% O₂
- ◆ 可选择低排放双燃料系统
The version of dual fuel is available
- ◆ 单燃料系统
Single fuel system
- ◆ 快速组装和易维修
Quick assembly and easy maintenance

15000KW 燃气轮机发电机

15000KW generator of the gas turbine unit



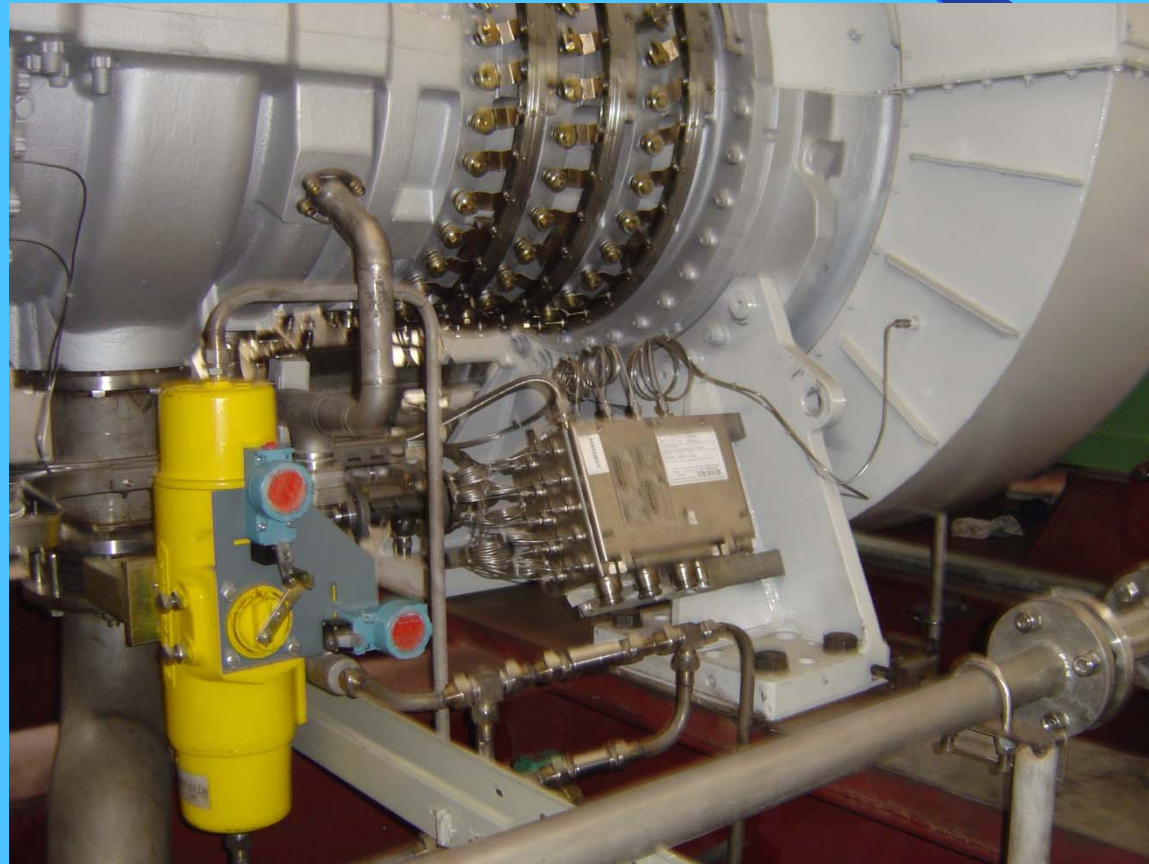
- 无刷励磁、空冷式交流同步发电机。
Brushless excitation ,air cooling AC synchro generator
- 额定功率15000kW。
Rating power 15000KW
- 额定转速3000rpm。
Rating speed 3000rpm
- 额定频率50Hz。
Rating frequency 50Hz
- 额定电压10.5kv。
Rating voltage 10.5kv

QD100燃气轮机发电机组的 变频起动部份

frequency conversion motor start up system



QD100燃气轮机发电机组防喘放气系统
Antisurge System of QD100 gas turbine
generator unit



GE10燃气轮机气体燃料系统

gas fuel system of GE10 gas turbine generator unit



二氧化碳灭火系统 CO2 fire fighting system



QD100燃气轮机发电机组进气过滤消声系统
air inlet filtering and noise elimination system of
QD100 gas turbine generator unit



QD100燃气轮机发电机组箱体通风

enclosure ventilation system of QD100 gas turbine generator unit



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水冷却系统 water cooling system



QD100燃气轮机发电机组箱装体

acoustic enclosure of QD100 gas turbine generator unit



QD100燃气轮机控制柜

control cabinet of QD100 gas turbine unit



MARK-VI控制器

MARK-VI controller



- GE10-1采用MARK-VI控制器作为燃机运行、故障诊断、事故报警和记录的核心控制器。
- GE10-1 take MARK-VI controller as the core controller to control the running of gas turbine , alarm and record the accident

二氧化碳灭火系统控制柜

control cabinet of carbon dioxide fire fighting system



QD100机组高压开关柜

high voltage switch cabinet



马达控制中心 (MCC) 柜



QD100变频启动柜、直流柜

startup motor transducer cabinet, direct current cabinet



仪表柜、发电机励磁柜

instrument cabinet, generator excitation cabinet



调试中的QD100燃气轮机控制柜

local control room of gas turbine in testing



- 仪表柜
- instrument cabinet
- 发电机励磁柜
- generator excitation cabinet
- 二氧化碳灭火系统 控制柜
- control cabinet of carbon dioxide fire fighting system



调试中的QD100燃气轮机就地控制房 local control room of gas turbine in testing



QD100燃气轮机发电机组电厂

QD100 gas turbine generator unit power plant



Design control

- First of all ,CAGT pay much attention on the planning of design and development . Before the design launched, CAGT will workout the design quality plan , propose the concrete demand to control the quality in each stage of design. Meanwhile , arranging the human resource , classify the personal duties and phase division , arranging the audit and the inspect for each stage.
- For the input ,output control of the each stage in design , CAGT carry on seriously evaluation according the arrangement of the plan. Inviting experts from related speciality to participate in the evaluation, which assure the quality of the evaluation and design. The design division will workout detailed scheme aiming at the question put forward in evaluation , so as to final and solve the problem existed in design.
- The design division also have a complete set of evaluation and approval system ,which assure the adaptability of the design modification.

完善的供货商体系

Sourcing system

建立完整的、先进的供货商体系

Setting up intact , advanced sourcing system

寻求稳定、成熟的供货商，保证供货顺畅

Seeking steady ,experienced supplier, guarantee smooth supplying

来自国际知名公司和国内重点生产企业的产品
更值得信赖

Confiding on the product from the famed company both domestic and abroad .



Inspection control

- Inspect & test procedure include sourcing inspect, process inspect and product inspect
- CAGT have a integrated inspect procedure on the material purchasing from the sub-contractor .The main inspect method include : inspecting on workshop or supplier`s premise .When purchasing the vital material , the quality and the technical department and related department will sent representative to the supplier`s plant to supervise and inspect & accept.
- CAGT compile "product monitor & measurement procedure" for the processing inspect and final product inspect, according to which ,the inspectors inspect if the process and the product meet the requirement of related technical documentation and standard , then keep the related inspection data.

QD100(QD100A)燃气轮机发电机组

——国际合作的典范成果：

QD100(QD100A) gas turbine generator unit
—the typical result of international cooperation

中航世新燃气轮机股份有限公司，在燃气轮机燃用中低热值燃料成套机组方面，与美国通用电气动力系统石油和天然气公司（GE/NP）进行了卓有成效的国际合作。

CAGT cooperate successfully with GE /NP in research of gas turbine that use the low-heat-value gas

