Solar® Turbines
A Caterpillar Company

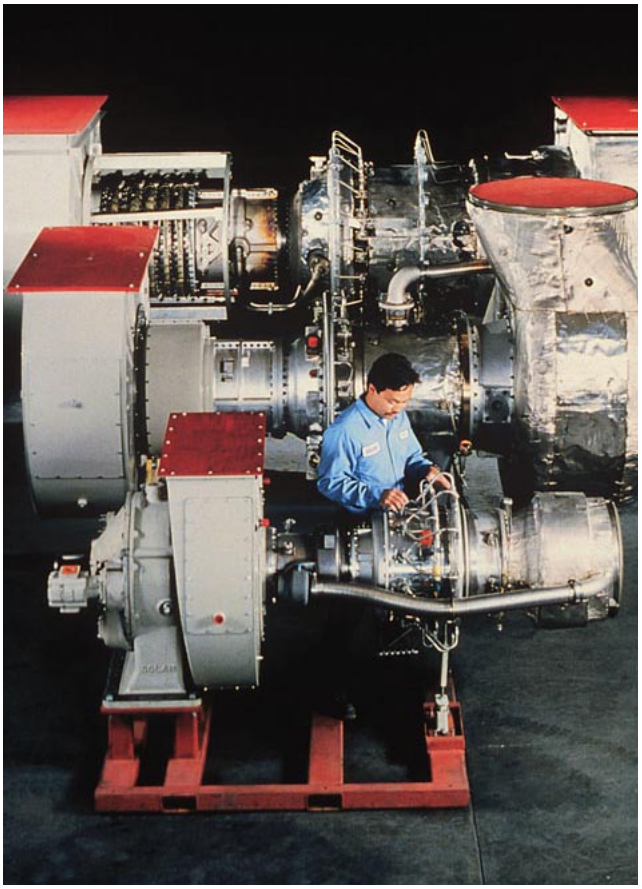
Industry Leader for Gas Turbine Power

Solar Turbines Incorporated, a subsidiary of Caterpillar Inc., is a leading producer of industrial gas turbines and turbomachinery packages in the 1-to-15 MW (1500-to-30,000 hp) range.

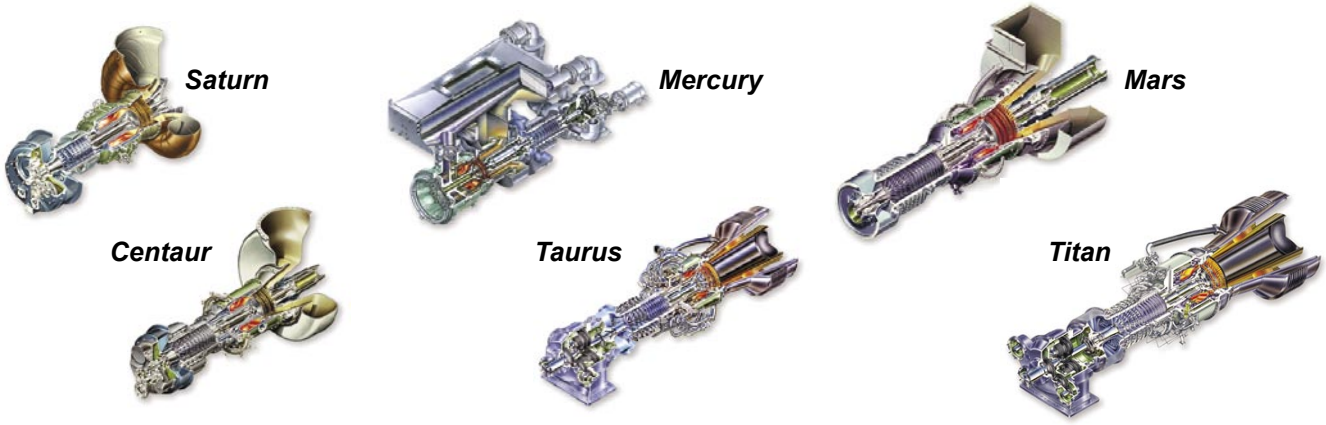
Headquartered in San Diego, California, Solar designs and manufactures its proven line of compressor sets, mechanical-drive packages and generator sets using state-of-the-art operations certified by DNV to conform to the ISO 9001 series of Quality Systems Standards.

Since Solar entered the industrial gas turbine business in 1960 with the *Saturn*® turbine, Solar's fleet has grown to more than 12,300 units worldwide. These units have logged more than 1.2 billion hours in 93 countries in some of the toughest, most challenging arctic, desert, tropical and offshore environments. This unparalleled experience gives testimony to the mature design and wide user acceptance of Solar's products.

Solar's compact, lightweight and durable gas turbines offer the highest thermal efficiencies in their power classes. Other advantages include ease of transport and installation, long life, high performance, availability and reliability. Units in the *Centaur*®, *Mercury*™, *Taurus*™, *Mars*® and *Titan*™ gas turbine families are available with Solar's pollution prevention *SoLoNOx*™ dry low emissions combustion system. As of June 2006, customers had ordered or installed more than 1,470 gas turbines with *SoLoNOx* , and those units



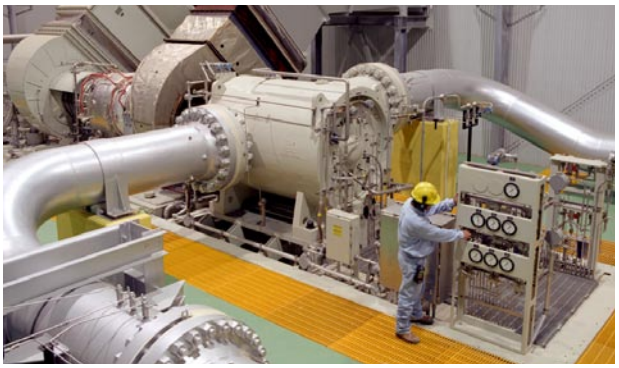
already have logged approximately 35 million operating hours. Solar's experience with dry, lean-premixed combustion technology, designed to meet low emissions regulations, is unmatched by any other company in the gas turbine industry.



Package Specifications

COMPRESSOR SETS

Solar manufactures gas turbine-driven compressor sets ranging from 1185 to 22 365 kW (1590 to 30,000 hp). These units are designed for applications in the oil and gas industry, such as transmission, natural gas gathering, storage/withdrawal, gas lift and export sales gas. *Solar*® compressor sets are fully assembled and tested at the factory so they can be installed quickly. Their compact size, lightweight, low maintenance requirements and dependability have led to widespread use throughout the world, particularly at remote and offshore facilities.



Titan Compressor Set with C65 Compressor

CENTRIFUGAL COMPRESSORS

Solar also manufactures a broad range of rugged centrifugal compressors designed specifically to match the operating speeds of Solar's turbines. These units incorporate many API 617 features, providing high reliability and availability. They include modularized components for maximum simplicity, interchangeability, operational flexibility and field restaging.

Compressor Set Specifications

Gas Turbine Model	Nominal Output, kW	Nominal Output, hp	Thermal Efficiency, %	Length, m	Length, ft-in.	Width, m	Width, ft-in.	Height, m	Height, ft-in.	Weight, kg	Weight, lb
Saturn 20	1185	1590	24.5	7.0	23' 0"	1.9	6' 4"	2.1	6' 11"	11 340	25,000
Centaur 40	3500	4700	27.9	8.9	29' 3"	2.4	8' 0"	2.7	8' 11"	24 950	55,000
Centaur 50	4570	6130	29.9	8.9	29' 3"	2.4	8' 0"	2.7	8' 11"	27 220	60,000
Taurus 60	5740	7700	31.9	8.9	29' 3"	2.4	8' 0"	2.7	8' 11"	29 480	65,000
Taurus 70	7690	10,310	34.8	11.0	36' 0"	2.7	8' 11"	3.2	10' 6"	34 020	75,000
Mars 90	9860	13,220	33.1	8.6	29' 6"	2.8	9' 2"	3.6	11' 8"	63 500	140,000
Mars 100	11 190	15,000	33.9	8.6	29' 6"	2.8	9' 2"	3.6	11' 8"	63 500	140,000
Titan 130	15 290	20,500	35.7	9.8	32' 0"	3.2	10' 5"	3.1	10' 3"	77 110	170,000
Titan 250	22 365	30,000	40.0	9.8	32' 0"	3.4	11' 0"	4.6	15' 0"	89 440	197,000

At ISO conditions: 15°C (59°F), sea level, 60% relative humidity, zero inlet or exhaust duct losses. Natural gas fuel. Single-body compressor skid.

Gas Compressor Specifications

Compressor Model	No. of Stages	Pressure kPa	Rating psi	Maximum Flow m^3/min	Maximum Flow ft^3/min	Minimum Flow m^3/min	Minimum Flow ft^3/min	Maximum Total Head kJ/kg_m	Maximum Total Head $ft\text{-}lb_f/lb_m$
Multi-Stage Compressors									
C16	1-10	20 700	3000	50	1800	5	150	215	72,000
C16 series/parallel	2-6	10 350	1500	45/90	1600/3200	5	150	129/64	43,000/21,500
C33	1-12	15 510	2250	270	9500	25	800	325	108,000
C33 series/parallel	2/8	8280	1200	230/460	8200/16,300	25	800	280/140	94,000/47,000
C40	2/4/6	17 240	2500	255	9000	25	800	255	85,000
C50	1-5	10 350	1500	565	20,000	65	2200	285	95,000
C51	1-8	20 700	3000	425	15,000	30	1000	300	100,000
Pipeline Compressors									
C40	1-2	11 040	1600	270	9500	35	1200	95	32,000
C45	1-3	12 410	1850	370	13,000	80	2800	160	54,000
C65	1-2	11 040	1600	565	20,000	100	3500	90	30,000
C85	1-2	11 040	1600	1275	45,000	230	8000	95	32,000

Package Specifications

Solar Centrifugal Gas Compressors

The gas compressors have from 1 to 12 stages to handle flows from 5 to 1275 m^3/min (150 to 45,000 ft^3/min) and discharge pressures to 20 700 kPa (3000 psi). They may be driven, either directly or through a gearbox, by Solar's gas turbines or by electric motors. With two or three compressors mounted in tandem, the package can provide pressure ratios up to 40:1.

Mars Gas Turbine Mechanical-Drive Package

MECHANICAL-DRIVE PACKAGES

Solar manufactures gas turbine mechanical-drive packages ranging from 1185 to 22 365 kW (1590 to 30,000 hp). These two-shaft units are completely factory packaged and tested to drive a variety of centrifugal and reciprocating compressors for air, process and refrigeration applications. They also drive pumps for waterflooding, and transportation of crude oil and other liquid products. To facilitate the driver/driven equipment interface, Solar offers single-source responsibility for a complete package when Solar supplies the driven equipment. Solar can provide the packaging expertise required when the driven equipment is supplied by others.

Mechanical-Drive Specifications

Gas Turbine Model	Nominal Output, kW	Nominal Output, hp	Thermal Efficiency, %	Length, m	Length, ft-in.	Width, m	Width, ft-in.	Height, m	Height, ft-in.	Weight, kg	Weight, lb
Saturn 20	1185	1590	24.5	4.0	13' 2"	1.8	5' 10"	2.2	7' 5"	4540	10,000
Centaur 40	3500	4700	27.9	5.6	18' 3"	2.4	8' 0"	2.7	8' 11"	12 700	28,000
Centaur 50	4570	6130	29.9	5.6	18' 3"	2.4	8' 0"	2.7	8' 11"	14 970	33,000
Taurus 60	5740	7700	31.9	5.6	18' 3"	2.4	8' 0"	2.7	8' 11"	15 880	35,000
Taurus 70	7690	10,310	34.8	7.3	24' 0"	2.7	9' 0"	3.6	10' 10"	20 410	45,000
Mars 90	9860	13,220	33.1	9.0	29' 6"	2.8	9' 2"	3.6	11' 8"	27 220	60,000
Mars 100	11 185	15,000	33.9	9.0	29' 6"	2.8	9' 2"	3.6	11' 8"	27 220	60,000
Titan130	15 290	20,500	35.7	9.8	32' 0"	3.0	10' 0"	3.1	10' 3"	34 020	75,000
Titan 250	22 365	30,000	40.0	9.8	32' 0"	3.4	11' 0"	4.6	15' 0"	56 300	124,000

At ISO conditions: 15°C (59°F), sea level, 60% relative humidity, zero inlet or exhaust duct losses. Natural gas fuel.

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GENERATOR SETS

Solar manufactures gas turbine-driven generator sets ranging from 1210 to 21 750 kWe. The factory packaged sets have three-phase motor voltage options and meet NEC (Class I, Group D, Div. 2) or CENELEC (Zone 2, Group IIa) electrical equipment requirements. They can be designed for operation in harsh environments. Typical applications include industrial/processing facilities, buildings/institutions and distributed power.
For overall system thermal efficiencies of 70% or more, these units can be applied in cogeneration or combined-cycle configurations where the heat from the turbine exhaust is used to produce steam, preheated combustion air or hot air for drying or heating processes.

Taurus 60 Gas Turbine Generator Set

Generator Set Specifications

Gas Turbine Model	Type Duty	Nominal Output, kWe*	Thermal Efficiency, %	Standard Voltages	Length, m	Length, ft-in.	Width, m	Width, ft-in.	Height, m	Height, ft-in.	Weight, kg	Weight, lb
Saturn 20	Continuous	1210	24.3	240-4160	6.8	22' 6"	1.7	5' 0"	2.1	7' 0"	8980	19,800
Centaur 40	Continuous	3515	27.9	3300-13 800	9.8	32' 0"	2.4	8' 0"	2.6	8' 6"	26 105	57,350
Centaur 50	Continuous	4600	29.3	3300-13 800	9.8	32' 0"	2.4	8' 0"	2.6	8' 6"	27 430	60,470
Mercury 50	Continuous	4600	38.5	3300-13 800	11.1	36' 6"	2.9	9' 8"	3.7	12' 0"	47 735	105,650
Taurus 60	Continuous	5670	30.4	3300-13 800	9.8	32' 0"	2.5	8' 2"	2.9	9' 8"	33 045	72,700
Taurus 65	Continuous	6300	32.9	3300-13 800	9.8	32' 0"	2.5	8' 2"	2.9	9' 8"	33 045	72,700
Taurus 70	Continuous	7520	33.8	4160-13 800	11.3	37' 0"	2.9	9' 7"	2.7	9' 0"	50 314	110,923
Mars 90	Continuous	9450	31.7	3300-13 800	14.5	47' 3"	2.8	9' 2"	3.6	11' 10"	67 570	160,000
Mars 100	Continuous	10 690	32.4	3300-13 800	13.9	45' 6"	2.9	9' 7"	3.6	11' 8"	62 483	137,750
Titan 130	Continuous	15 000	35.2	6600-13 800	14.0	46' 0"	3.3	10' 11"	3.3	10' 10"	73 668	162,409
Titan 250	Continuous	21 750	38.9	6600-13 800	16.6	54' 6"	3.4	11' 0"	4.6	15' 0"	134 545	296,000

At ISO conditions: 15°C (59°F), sea level, 60% relative humidity, zero inlet or exhaust duct losses. Natural gas fuel.

** Measured at the generator terminals.*

SOLUTION PROVIDER

Solar offers a complete solution – from engineering specifications to asset management – for your 1-to-50 MW power needs. Our products are marketed and serviced from 39 locations around the world. We are dedicated to providing quality products and prompt, comprehensive customer support to remain the industy leader for industrial gas turbine power.

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