



CONCENTRATED SOLAR POWER—CSP
WORLD CLASS HEAT TRANSFER SOLUTIONS

history

■ CENTRAL RECEIVERS

In 1982, TEi Struthers Wells designed and built the first-of-its-kind solar steam generating plant including a central receiver boiler, a steam drum, and the piping and structure system for Enhanced Oil Recovery (EOR) near Bakersfield, California.

TEi Struthers Wells, a pioneer in developing commercial nitrate salt central receivers and steam generating heat exchangers, has a vibrant history of design and manufacturing of high temperature heat transfer systems using HTF, salts, liquid metals, and steam.

■ STEAM GENERATING SYSTEMS

In 1992, TEi Struthers Wells performed an engineering study contract for design and capital cost analysis of a steam generating system for one of the first conceptual 100 MWe commercial nitrate salt central receiver plants including; preheater, steam generator, superheater, reheater, interconnecting piping, pumps, valves, instrumentation, insulation, trace heaters, fired heater and all structural steel.

During the demonstration of molten salt technology in CSP from 1994 to 1999, TEi Struthers Wells supplied the four essential molten salt heat exchangers for the 10-MW Solar II power plant near Barstow, California.

This plant was a significant milestone in the development of large-scale CSP which demonstrated the economic viability of generating dispatchable electricity by using molten salt as an integral thermal storage part of a solar power plant.



SOLAR RECEIVER

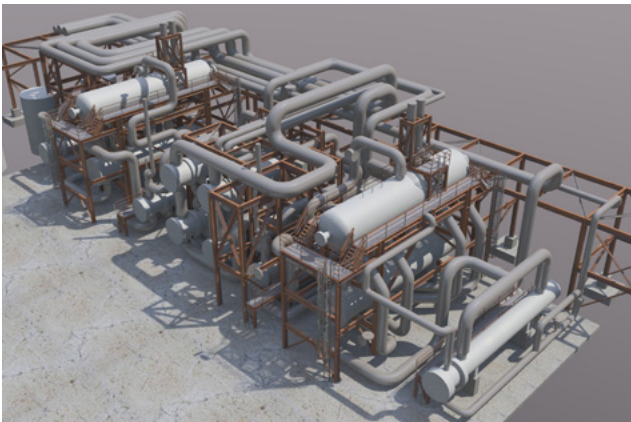
STEAM GENERATION SYSTEM (SGS) HEAT EXCHANGERS

TEi Struthers Wells applies state-of-the-art technology in the design of SGS heat exchangers, providing an optimal thermo-mechanical design approach for the economizer, evaporator, steam drum, superheater and reheater.

The design's unique geometrical features guarantee a trouble-free operation for the heat exchangers that are subject to severe conditions, such as partial loads, offset operation, ramp rates, thermal shocks, etc.

Whether the SGS HX are used in a parabolic trough or molten salt receiver plant for a pure CSP plant or an ISCC (integrated solar combined cycle), TEi Struthers Wells will provide a solution for your needs.

TEi Struthers Wells supplies SGS HX to the most reputable EPC companies in the CSP market, as well as providing technology and support to these and many other companies in the world.



3D MODEL OF A COMPLETE STEAM GENERATION SYSTEM



SGS HEAT EXCHANGERS FOR A 50MW PLANT IN SPAIN



SGS HEAT EXCHANGERS FOR 250 MW CSP PLANT IN CALIFORNIA



MOLTEN SALT TO OIL 350MT HEAT EXCHANGER FOR A 200MW PLANT IN MOROCCO



TUBING PROCESS OF MOLTEN SALT TO OIL HX. 13,382, 19mm OD TUBES.

solutions

OIL TO SALT HEAT EXCHANGERS FOR ENERGY STORAGE

As the industry moves to the use of molten salts for energy storage for the parabolic trough plants, TEi Struthers Wells applies a similar geometric approach in the optimization of the oil to salt heat exchangers. In order to guarantee trouble-free operation, we consider partial loads, offset conditions, ramp rates, thermal shocks, and even the effect of reversing the HTF and salt flows alternating between daytime charge and nighttime discharge mode,

Critical conditions for the initial and daily startups and all operational limits are evaluated and reported to the customer/end user for the protection of the equipment during operation.

State-of-the-art engineering correlations used in the design approach allows TEi Struthers Wells to minimize the size of the heat exchangers, simplifying their handling and transportation.



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ADDITIONAL POWER BLOCK HEAT TRANSFER EQUIPMENT



TRAIN OF FEEDWATER HEATERS

FEEDWATER HEATERS

A world class manufacturer of heat transfer equipment, TEi Struthers Wells has been manufacturing feedwater heaters since the 1930s. Our feedwater heaters have been in successful operation in all types of power plants including co-gen, solar, fossil, and nuclear generation.

TEi Struthers Wells is one of the original founders and remains the most active member of the Heat Exchange Institute (HEI). HEI standards have been globally accepted as the most comprehensive guideline in the heat transfer industry.

TEi Struthers Wells' feedwater heaters meets HEI and TEMA Standards, as well as ASME code. They are also manufactured with specific features to improve the quality, reliability and longevity of our products.

capabilities

STEAM SURFACE CONDENSERS

TEi condensers represent an evolution of advanced technology, offering improved thermal efficiency and advanced mechanical design to reduce forced outages and increase availability.

Our condenser designs can incorporate enhanced deaeration systems, and/or a variety of turbine exhaust options, which can assist in improving plant layouts. We continually address and refine these and other considerations associated with circular designs where space is at a premium.

Other Heat Transfer Equipment

TEi has provided other heat transfer equipment such as Moisture Separators, Hot Oil Fired Heaters and Auxiliary Booster Fired Heaters for CSP plants.



MOISTURE SEPARATION VESSEL FOR A 280MW PLANT IN CALIFORNIA.



HTF FIRED HEATERS FOR A 100MW PLANT IN UAE



SURFACE CONDENSER



A BABCOCK POWER INC. SUBSIDIARY

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Thermal Engineering International (USA) Inc. (TEi), a Babcock Power Inc. company, is a leading supplier of heat transfer technology to the electric power generation and industrial markets. Backed by more than 100 years experience, we offer fully integrated design, engineering, manufacturing, construction, research and development services; including providing superior products.

