

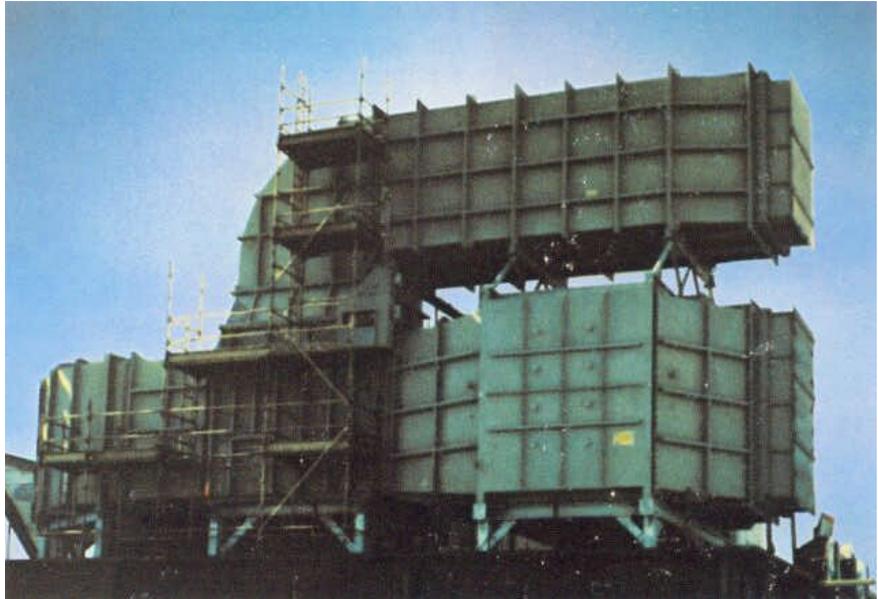
WASTE HEAT

BROACH 

The G. C. Broach Company, known worldwide as a manufacturer of direct fired process furnaces and air preheat systems, has also led the way in waste heat recovery equipment since 1960.

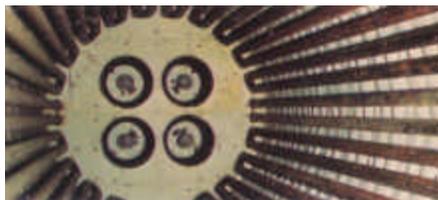
Broach designs the entire system, starting at the source of the exhaust or flue gas stream, furnishing all duct work and bypass stacks, gas flow control, burners, and the heat absorption unit. The heat absorption unit may be convection only, convection only with auxiliary firing, or a radiant/convection design, with or without natural draft operational capability at full or partial load, depending on the requirements of each waste heat application.

Many years of experience and dedication are invested in the design and manufacture of dependable, high quality waste heat recovery units, covering the entire range of capabilities from the largest to the smallest. Our own manufacturing facilities allow for complete control over all jobs and projects without depending on outside suppliers or fabricators. This, coupled with strict ASME and AWS quality control programs, ensures that each waste heat recovery unit meets the highest standards of craftsmanship, performance and dependability. From design and fabrication to actual start-up, The G. C. Broach Company is dedicated to serving the needs and requirements of its customers by producing the finest waste heat recovery equipment available.



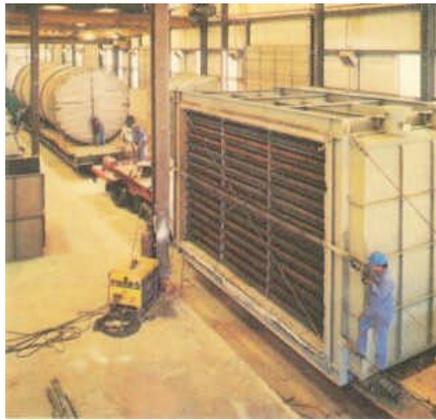
Assembly at a West Coast staging area for one of four waste heat units in heat medium service recovering 94.5M² BTU each from the exhaust gas produced by Frame 5 G.E.

Turbines. Temperature and load control is accomplished by modulating the exhaust gas across a 10 foot square diverter damper to the bypass duct around the heat absorption coil.





The G. C. Broach Company is the largest waste heat recovery equipment manufacturer in the world with a 176,000 square foot facility located on a 20 acre site served by three private rail spurs. Two warehouses consisting of 92,000 square feet accommodate our stock for fabrication. This ensures that materials are on time and ready for installation into the units when required.



All manufacturing and assembly functions are performed inside our environmentally controlled 84,000 square foot heavy fabrication facility. The G. C. Broach Company facility is unique within the industry. Our fully equipped shop performs, in-house, all ASME pressure parts fabrication, post weld heat treatment, testing, rolling, breaking, shearing, structural fabrication, refractory installation, sandblasting, painting, and all instrumentation, electrical, and fuel train fabrication and assembly. Our facility includes a 440 foot long depressed internal rail bay for inside loading, painting, tie-down, and final assembly for shipment. 100% in-house capability eliminates subcontractors and farm-outs, and gives you one-source responsibility and one-source inspection.



Our process engineering department is a versatile group of professionals with over 130 years combined experience in thermal dynamics, combustion, instrumentation, and practical manufacturing experience. In addition to our process engineers' design knowledge, each has spent numerous hours in the field assisting our clients in start-up, operation, combustion service, and erection. All of our engineers have years of practical, hands on, field experience.

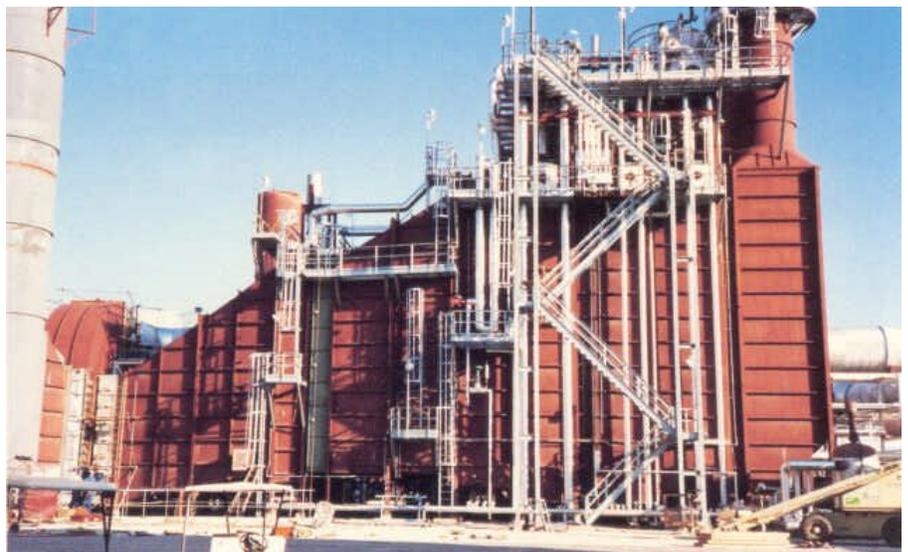
Our engineering staff has the highest level of expertise and experience in the entire industry. We pioneered the firing of heavy and dirty fuel oils in waste heat recovery applications. We also have extensive design and field experience in the firing of fuels containing high percentages of inerts.

The Broach Company has cooperated in the development and the design of many of the burners now being manufactured by leading burner companies.

When our client's inquiry is received, the process engineering department reviews all specifications and develops the most appropriate design that fulfills the specifications. Alternate designs are offered where they prove to be more advantageous to our client. Our process engineers work closely with our sales engineers and clients to maintain open lines of communication between all parties involved. When a purchase order is issued by a client, the engineering department and all other department managers analyze and review the project to ensure that every phase of the job is

correctly and efficiently executed. Revisions to purchase orders and interim changes are closely monitored for execution and compliance through the course of the project. A data processing center is utilized in these functions to keep jobs current at all times.

The engineering, quality control, and customer data control departments supply our customers with current drawings and data throughout the project. Our engineers are available worldwide for assistance in erection, start-up or technical analysis.





Our mechanical group consists of personnel who have devoted the majority of their careers to the design of heat transfer equipment. Each designer is totally familiar with ASME, AISC, and AWS codes. Our designers use modern high speed computer systems in the design of all equipment.



The G. C. Broach Company has expertly combined the necessary components for a complete, in-house heat transfer equipment fabrication facility.

Our plant is fully qualified by ASME, AWS, AISC, and API.

We are qualified to weld all materials ranging from ordinary carbon steel through low alloy, intermediate alloy, stainless steel, and the highest exotic alloys.

Our facilities include plasma cutting equipment for stainless steels and high alloys, standard stick welding machines, heliarc welders, inert gas manual welders, and the latest in fully automatic welding equipment.

We are also qualified in low temperature steels for artic and cryogenic applications.

The entire floor area of our plant is covered by sixteen 50' overhead bridge cranes, up to 15 ton rated capacity, and with 22'-6" under hook.

The structural shop is equipped with one 26', 225 ton press brake, two shears, up to 10'-0" x ?", three pyramid rolls, up to 17'-6" x ½", that gives us the ability to work any size or thickness of plate required for waste heat equipment and heater fabrication, as well as mobile cranes, welding machines, hot saws, and all other equipment necessary for a large, modern fabrication facility. Our pressure parts welding facilities, for coils, piping, and vessels, are qualified under Sections 1, 2, 8, 9, 10 of the ASME and the National Board. We are also registered with the State of Pennsylvania and with the

tube shop meets all ASME and National Board codes and each waste heat recovery unit is fabricated to the requirements of ASME, regardless of whether or not it carries an ASME code plate.

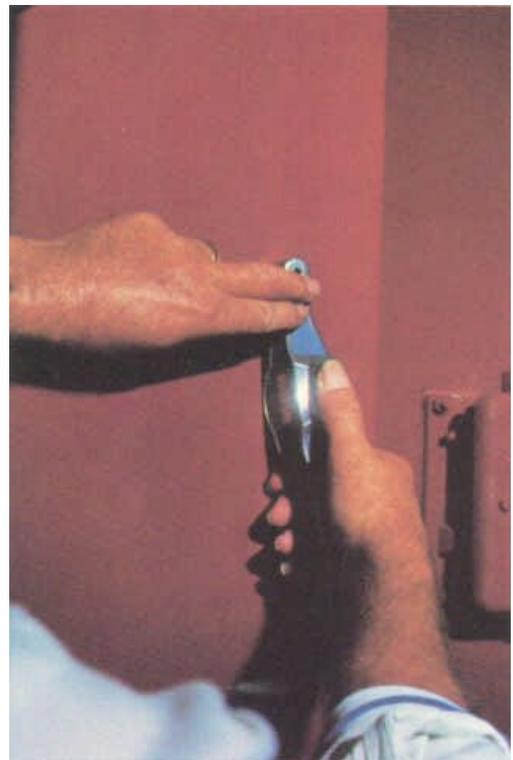
The G. C. Broach Company maintains its own instrumentation and electrical shop, giving us the in-house capability to build instrumentation systems and fuel trains to any class or size.





ASME and AWS quality control is executed by our quality control manager and his quality control group in our plant.

The quality control manager interfaces with the engineering and purchasing departments. When materials are received they are inspected for conformance to their individual codes and chemical analysis. Our full-time inspectors are fully qualified in radiographic film interpretation and all types of nondestructive testing. Our welding procedures and quality control system are up-dated constantly and are audited every two years by ASME and National Board. All welding consumables are inspected to make certain that they conform to their particular requirements. All radiographic films and test results are thoroughly processed and kept on file by our quality control manager.



2,600,000 BTU/Hr.

One of 33 skid mounted fuel production systems, designed and built by Broach. These systems convert natural gas liquids to fuel gas for each of the thirty-three 22,000 HP United Technologies Pratt & Whitney turbine engines

that drive the main crude pumps along Petromin's 48 inch East-West Petroline across Saudi Arabia.

The systems utilize waste heat from the turbine exhaust to vaporize and superheat the NGL, and then process the vapor to

supply fuel gas to each engine at closely controlled conditions of flow, temperature, and pressure.



88,000,000 BTU/Hr.

Each of two all-convection waste heat recovery units in hot oil service recovers 53M² BTU/Hr. from three Ingersol-Rand turbines, with the balance of the heat being obtained from a duct burner installed in the system.



119,000,000 BTU/Hr.

Supplementally fired natural
circulation Heat Recovery Steam
Generator, producing 101,300

Lbs/Hr of 650 PSIG steam at
725°F, complete with drums,
superheater, economizer,
feedwater control station,

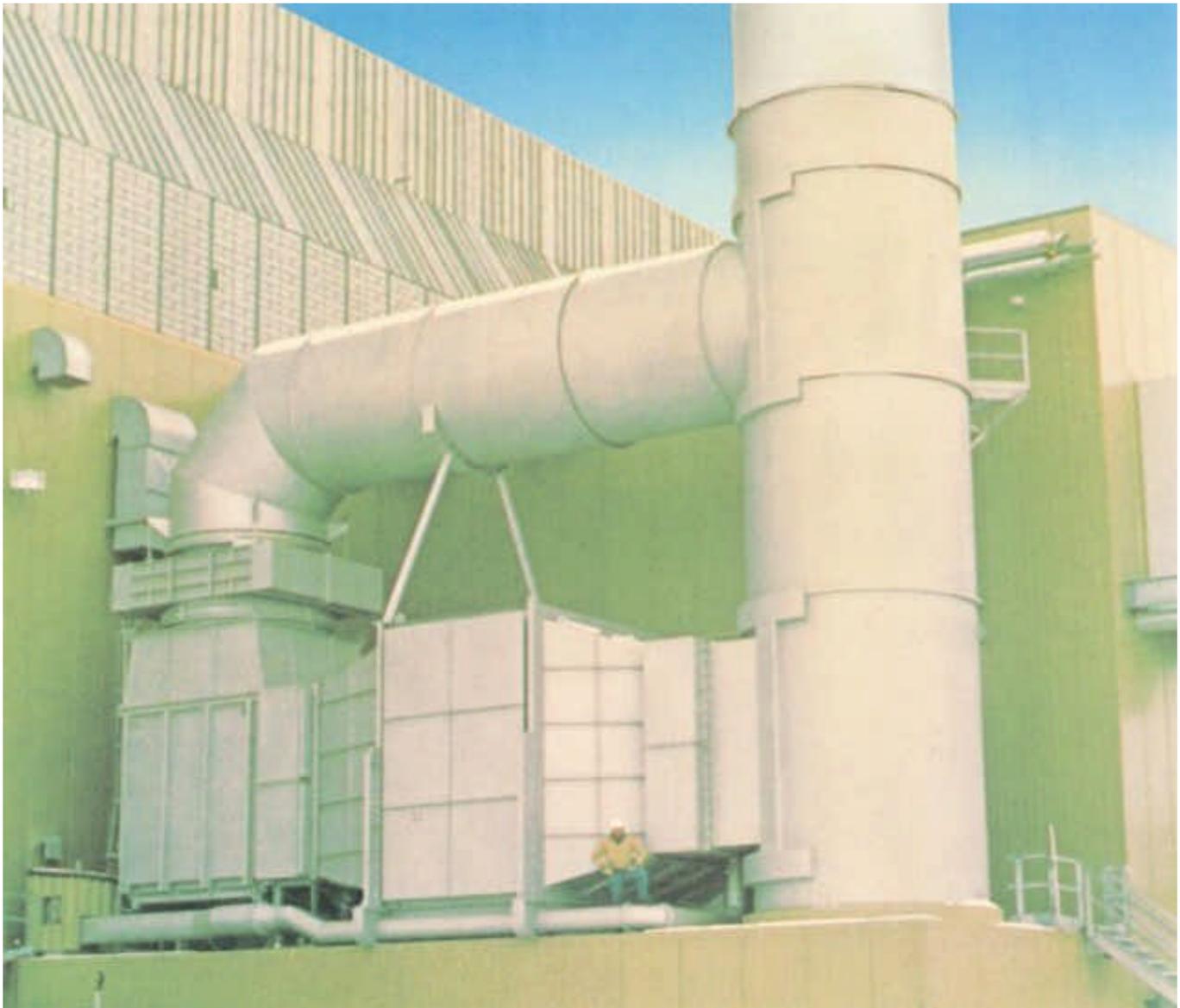
diverter dampers and bypass
stack, and complete control
system, utilizing exhaust gas
from a GE-LM2500 engine.



114,000,000 BTU/Hr.

Six of these all-convection units are in service in low pressure gas separation modules on the North Slope. Three sets of louver

dampers are provided for modulation and isolation. The fluid charge is Triethylene Glycol water mixture. The turbines are Frame 5 G.E.



125,400,000 BTU/Hr.

Radiant/Convection process furnace, recovering 84M² BTU/Hr. from the exhaust of one John Brown Frame 5 engine. The exhaust gas is refired with our proprietary TEG burner, which has a 20 year track record of unblemished service. With

exhaust gas flowing, the bulk of the duty is absorbed in the convection section, with little contribution from the radiant section. Alternately, the unit will develop full rated capacity on natural draft, with no exhaust

gas flowing, in which case the bulk of the duty is absorbed in the radiant section.



195,000,000 BTU/Hr.

Heat medium heater designed to recover 54 M² BTU/Hr. from the exhaust gas of two Ingersoll-Rand turbines. The heater utilizes the exhaust gas as preheated

combustion air to 16 specially designed burners. All ductwork, bypass stacks, and exhaust gas flow controls were designed and furnished by Broach.





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Lithographed in U.S.A.

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