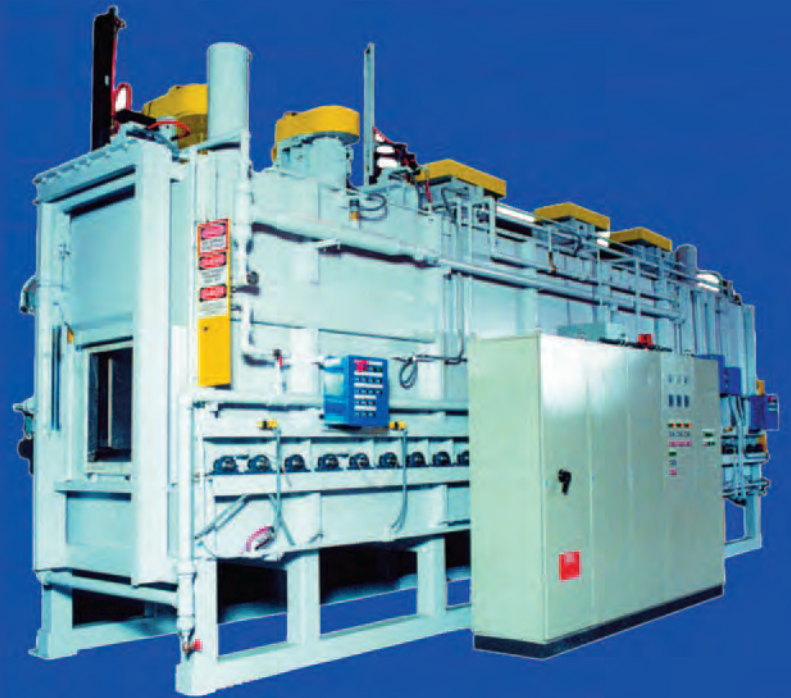




Consolidated Engineering Company
Innovation + Experience



Thermal Processing Equipment



For 50 years, CEC has been building its reputation as an innovative leader in quality heat processing equipment. To substantiate this claim to our customers, suppliers, employees and the general public, CEC's design, production and distribution operations have been certified to the ISO 9001 International Quality System Standard.

CEC equipment encompasses the very latest in heat processing technology to help our customers compete more effectively and efficiently. To date, CEC has over 3,400

installations worldwide serving the automotive, aluminum, aerospace, chemical, copper, foundry, metalworking and various other industries, 75% of which are from repeat customers.

With a comprehensive background in innovative heat processing technologies and over 100 U.S. and foreign patents, CEC can help turn any heat processing challenge around by lowering labor costs through increased automation, efficient process control and reduced energy consumption, while improving and maintaining consistent product quality. Furthermore, CEC provides its own field services and parts department to keep down time to a minimum, should a problem ever occur.

The bottom line is that CEC is turning our customer's problem processes into profitable ones with both standard and innovative solutions to improve the profitability of their operations. www.cec-intl.com

SMALL BATCH FURNACES

CEC offers a wide selection of small batch furnaces from 12 cu. ft. to over 300 cu. ft. in temperatures ranging from 1000°F to 2500°F. Direct gas-fired, radiant tube and electric heating systems are offered to economically meet heat treating parameters and atmosphere requirements.



1a. Steel treatment batch furnace with transfer car and temper furnace. Furnace features tight uniformity and roller rail convergence.



1b. In/out Roller Hearth furnace, operating up to 1550°F, is used for the heat treatment of titanium plate and bars.



2a. This three-chamber furnace is used for ingot pre-heating prior to charging into melting furnaces to reduce melt rates and increase safety and efficiency.

LARGE BATCH FURNACES

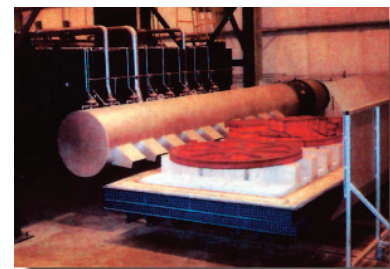
CEC batch furnaces provide customers with improved cost efficiency, maximum production and precision control. Uses cover a variety of applications, such as annealing, normalizing, stress relieving, homogenizing, pre-heating and re-heating. Typical loading arrangements that can be provided are roller hearth, roller rails, mobile furnace and car. Single and multiple chamber units provide maximum output and process flexibility.



2c. An atmosphere coil and foil annealing and homogenizing furnace with a 60,000 pound capacity is charged using a transversing charge manipulator.



2b. Two-position mobile aluminum coil annealer. System includes two load pads, each containing fourteen coils of aluminum wire.



2d. This gas fired car bottom furnace features a unique cover-lifting system to provide quick load turnaround for stress relief and annealing operations using two load cars.

ATMOSPHERE BATCH SYSTEMS

Atmosphere batch systems deliver the highest production available, consistent quality and predictable/repetitive results, while performing a large variety of metallurgical processes.



3a. Complete Flexcase model 364832 line with IQ Furnace, Vacuum washer, Tempering Furnace, Charge car and supervisory control system



3b. Two FC-424842 furnaces are used for annealing cycles at 2050°F with internal top atmosphere cooling chambers.



3c. This line consists of an atmosphere hardening furnace with water quench, tempering furnace and 50,000 lb. traversing load manipulator.

PIT FURNACES

Pit furnaces handle long parts or very heavy loads that require overhead handling equipment. Standard pit furnace designs can be easily modified to accommodate your specific requirements. Retorts can be provided for bright annealing, brazing, gas nitriding and other processes requiring tight atmosphere control. Furnaces are available in operating temperatures of up to 2200°F. CEC also offers four standard pit nitriding furnaces.

TIP-UP FURNACES

Tip-up furnaces eliminate door leakage by allowing the entire furnace to hinge. Tip-up furnaces can handle large payloads and a variety of processes including hardening, tempering, annealing and normalizing. Tip-up furnaces can be built in a number of configurations - square, round or rectangular - to handle special shapes, load sizes, etc.



3d. This gas-fired pit furnace is used for annealing, stress relief and tempering applications with $\pm 10^{\circ}\text{F}$ temperature uniformity.

BATCH EQUIPMENT

SOLUTION HEAT TREATING FURNACES



CEC solution heat treating equipment is tailored to meet individual requirements for castings, forgings, aircraft parts, sheet and tubing products. Drop-bottom, in-out and straight through roller hearth equipment designs provide each customer with economical throughput. Heating systems can be provided in electric, gas or indirect gas heating.

4a. These standard DBS-200 drop-bottom furnaces provide versatile processing of 6,500 lb. payloads. A single quench and transfer car serves both units.



4b. Mobile quick quench tower furnace for solution heat treatment of 32' extrusions is complete with an in-floor glycol quench system and load area.

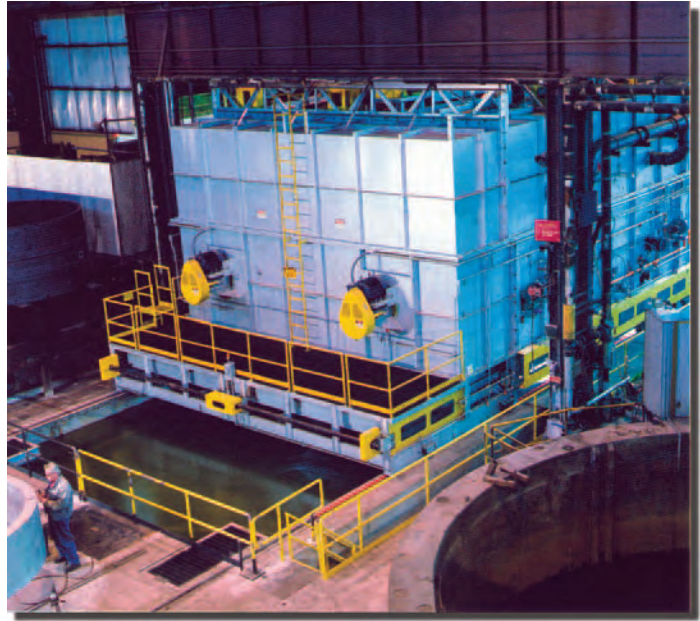


4c. This drop-bottom furnace processing 16' extrusions is complete with a mobile transfer car and poly (alkylene) glycol quench system.

BATCH EQUIPMENT



5a. A standard gas fired DBS-80 used for solution heat treating aluminum impact forgings.



5b. A mobile gantry drop bottom furnace for solution heat treatment of 20,000 lb. aluminum forged aerospace rings.

BATCH OVENS

CEC has over 60 standard walk-in and cabinet shelf oven models in temperature ranges of 350°F, 500°F, 650°F and 850°F. Loading can be accomplished by truck, rack, car, straight-through trolley and shelf designs. Each oven is provided to match your requirements at an economical cost, while insuring top operating performance and reliability.



5d. This electrically heated oven with vertical lift door and uni-flow air recirculation system is used for aging forged aluminum parts.



5c. Three steam-heated ovens with chamber dimensions of 14' wide x 16' long x 8' high undergo testing prior to shipping.

CONTINUOUS HEAT TREATING SYSTEMS

CONTINUOUS HEAT TREATING SYSTEMS

CEC designs and manufactures complete continuous heat treating systems for both ferrous and non-ferrous applications including roller hearth, pusher and walking beam designs for castings, forgings, plate, bar and tube products. Typical heat treatments include annealing, solution heat treating, normalizing, brazing, hardening and tempering.



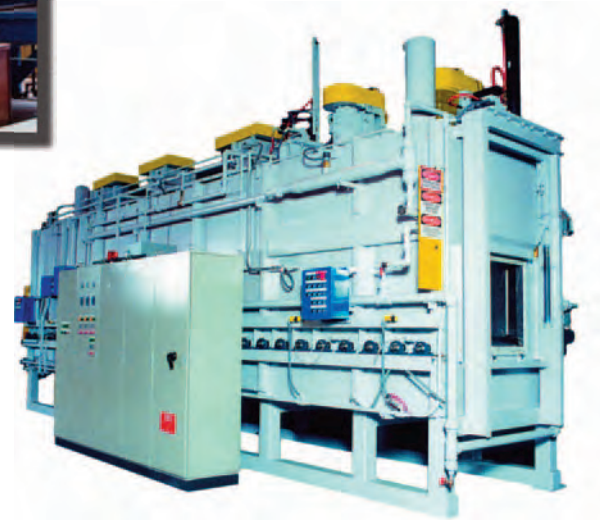
6a. Two roller hearth T-6 solution heat treating furnaces, with age hardening ovens, each produce 150 cast aluminum wheels per hour.



6b. Complete heat treat facility with harden, quench and temper, normalize and slow cool capabilities for production of 25,000 lb. per hour of crankshaft and suspension forgings.



7a. This roller hearth furnace operating at 2200°F and processing 20,000 lb. loads uses a unique water-cooled roll design.



7c. Roller hearth atmosphere tempering furnace with integral atmosphere cooling zone shown after pre-test prior to shipment.



7b. Two roller hearth T-6 systems processing 68 V-6 engine blocks per hour. Heat treating process is T-6 with air quench option. Line 1 has option of either air or water quench.



7d. Normalizing Roller Hearth furnace operating at temperatures of up to 1650°F, used for normalizing of plates and heads for pressurized railway cars.

CONTINUOUS HEAT TREATING SYSTEMS



8a. Continuous T-6 heat treatment of forged aluminum automotive components with gantry stacker and with process data acquisition and retrieval.



8b. Continuous roller hearth T-6 heat treatment for automotive critical components.



8c. Two 3,000 lb. per hour atmosphere annealing lines with product cooling to 160°F.

CONVEYOR FURNACES

CEC offers a wide range of standard continuous production furnaces to match individual production requirements with economical operation. CEC's continuous production furnaces have been provided in temperature ranges up to 2150°F to perform all kinds of heat processing applications - austenitizing, annealing, hardening, carburizing and more.

MESH BELT FURNACES

To provide continuous heat treating with oil, polymer or molten salt quenchants, CEC has developed a standard line of mesh belt furnaces. Capacities vary from 250 to 3,000 pounds per hour for carburizing, carbonitriding and neutral hardening. Loading equipment, in-line washers and continuous tempering furnaces can be provided to form a complete line.



8d. This in-line mesh belt furnace features a driven roller hearth belt support system and rotary quench conveyor for processing bearing components.

CONTINUOUS HEAT TREATING SYSTEMS

CONVEYOR OVENS

CEC offers a wide range of standard continuous production ovens to match individual production requirements with economical operation. CEC's continuous production ovens have been provided in temperature ranges from 150°F to 1250°F to perform all kinds of heat processing applications - curing, drying, paint baking, pre-heating, heat treating and more.

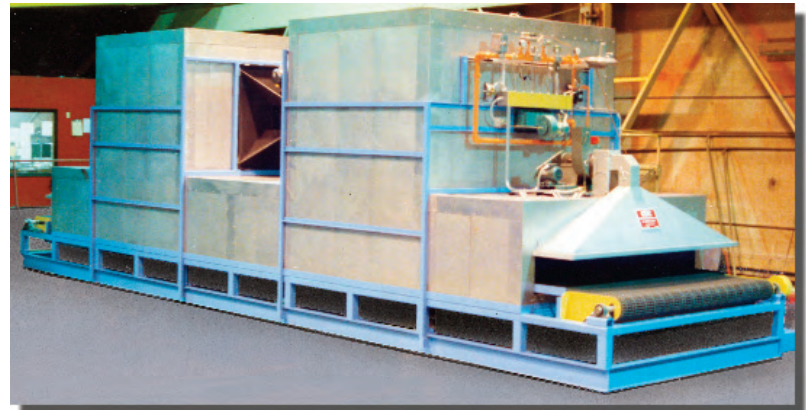


9b. An annealing furnace used for aluminum blanks, features a non-marring roller hearth. Furnace and forced air cooler features powered roller hearth conveyor.



9a. A continuous 5,000 pound per hour oven with quick cool section for coating fasteners.

9c. This two-zone gas-fired conveyor oven is used for continuous aging of various aluminum castings.



THERMAL OXIDIZING EQUIPMENT

CEC supplies thermal oxidizing systems to meet the most demanding environmental laws, while providing increased efficiency through advanced heat recovery and preheat systems. CEC offers 6 standard units ranging from 1,000 to 25,000 SCFM and can provide custom solutions for larger volumes up to 50,000 SCFM.



10a. This automated basket and tray return system allows a single operator to feed and operate this T6 system.



10b. A gantry robot with pop-up conveyor provides automatic loading of poured casting packages onto the work tray.

MATERIAL HANDLING EQUIPMENT

CEC has an extensive background in designing and providing automated systems for loading, unloading and transferring workloads within environments of extreme-duty heat treating equipment. Robotics, roller conveyor systems, manipulators and charging cars are typical examples of equipment CEC supplies to increase production efficiency while reducing manpower requirements.



10c. This 50,000 lb. manipulator serves to load, unload and quench within a tip-up furnace line.

REPLACEMENT PARTS & SERVICE

CEC parts and service personnel provide personal service and attention to the details of our customer's requirements, thereby helping to ensure long-term proper operation of CEC equipment. CEC offers numerous parts such as fans, radiant tubes, rolls, baskets and a full inventory of in-stock components for all CEC equipment.



Industries & Customers Served

Aluminum

Alcan Aluminum
ALCOA
Alumax Aluminum
Cressona Aluminum
Kaiser Aluminum
Southwire

Automotive

BMW
Daihatsu
Fiat
Ford Motor Company
General Motors
Honda Motor Company
Mazda
Mercedes-Benz
Suzuki

Aerospace

Boeing
Gates-Lear Jet
Gulfstream
Martin-Marietta
McDonnell-Douglas
B.F. Goodrich Aerospace
Hamilton Standard
Shenyang Aerospace

Appliance

General Electric
Magic Chef
Maytag
RCA
Toshiba
Westinghouse

Electrical & Electronics

AT&T
General Electric
GTE
Westinghouse

Ceramics & Glass

Guardian
Kohler
3M
Gerber Products
Vesuvius

Chemical & Plastics

BASF
Celanese
Kimberly-Clark
Phillips Fibers
Union Carbide

Copper

Elkhart
Southwire
Brush Wellman

Composites & Fiberglass

Burlington Glass Fiber
Certain-Teed
Heath-Tecna
Owens-Corning
PPG Industries

Metalworking Industry

Bearing International
Brush Wellman
Fafnir Bearing
Lindberg Heat Treating
Hercules Heat Treating
Ingersoll-Rand Company
Ladish
Pinson Valley
Torrington Company

Foundry

Caterpillar Industries
Citation Corp.
Cosworth
Hayes-Lemmerz
Nemak
Phillips
Reliable
Shenyang Aerospace
Superior Industries
UBE
Dalian

Pharmaceutical / Medical

Baxter-Travenol
Beckton Dickinson
Ciba-Geigy
Edmont Corporation
Johnson & Johnson



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