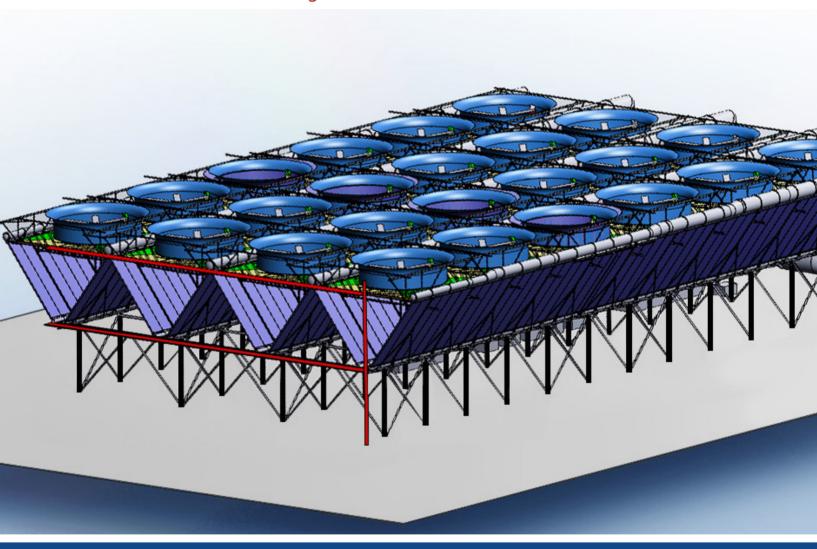


## HI-MAX and HI-KOOL Air-Cooled Condensers

A Transformative Air-Cooling Technology from Holtec International to End Reliance on Large Quantities of Cooling Water to Reject Waste Heat While Reducing Construction and Maintenance Costs



# A Generation Ahead By Design™

Serving the Energy Industry with Advanced Power Generation Technologies since 1986

Holtec International is a privately held energy technology company with operation centers in Florida, New Jersey, Ohio and Pennsylvania in the U.S., and globally in Brazil, Dubai, India, South Africa, Spain, U.K. and Ukraine. Holtec is a major supplier of special-purpose pressure vessels and critical-service heat exchange equipment such as air-cooled condensers, steam generators, feedwater heaters, water-cooled condensers and more. Virtually all products produced by the Company are built in its three large manufacturing plants in the U.S. and one in India. Holtec's custom fabrication capabilities include ASME code welding, friction stir welding, hybrid laser arc welding, robotic welding, plate cutting and rolling, and replacement bundles. Holtec holds the following certifications: NQA-1, ISO 9001, ASME Section III, ASME Section VIII, ASME N and NPT, N3, U, R and NR Stamps.

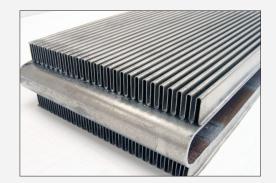
Holtec has also played a preeminent role since the 1980s in expanding nuclear plants' wet spent fuel storage capacity at over 110 reactor units in the U.S. and abroad. Dry storage and transport of nuclear fuel is another area in which Holtec is recognized as the foremost innovator and industry leader with a dominant market share and an active market presence at over 115 reactor units around the globe.

## Holtec's Technology Leadership

Holtec is making a radical upgrade of air-cooled condenser (ACC) design methods by using proven, rigorous technologies to root out emerging ACC operational problems that are typically present in cyclical, load-following power plants. Holtec's skilled and experienced engineers utilize Computational Fluid Dynamics to predict thermal-hydraulic performance, Finite Element Analysis to study fatigue effects, and Dynamic Structural Analysis to define the effects of wind loading and earthquakes on ACCs. Holtec's use of these state-of-the-art tools make Holtec's ACC systems the industry's only ACCs whose reliability and operability are rigorously validated by the same tools used to design Holtec's used nuclear fuel storage product line. The result is a design that underlies Holtec's technology leadership in the age of designing reliable ACC systems for use in demanding global water-challenged environments.

### Holtec's HI-MAX and HI-KOOL Technology

Holtec's HI-MAX ACC system (Holtec International MAXimum reliability ACC) is characterized by a stainless steel obround tube, using strength-bonded aluminum fins to achieve maximum service life and condensate purity. The obround stainless steel tube is integrated into a fully modularized structure for ease of erection. Holtec has developed the HI-KOOL ACC, an induced draft system, to complement the HI-MAX. HI-KOOL incorporates the HI-MAX technology using carbon steel tubes with self-supporting reproducible modules that can be erected either on or off-site to reduce fabrication and installation costs, while providing complete access for scheduled maintenance by the Client.



The HI-KOOL system incorporates numerous design enhancements that reduce manufacturing and assembly times at the site. These improvements produce savings throughout the life cycle of the product from component manufacturing through maintenance in the field. Using the latest computational analysis models, Holtec's ACC technologies are truly a product of the 21st century. The computer models that form the basis of Holtec's technologies predict the system's performance under extremely hot and extremely cold ambient conditions with high reliability. The standardized HI-MAX and HI-KOOL designs accrue many significant benefits, namely:

- Higher steam side carrying capacity for improved performance
- Smaller ACC plot area saves valuable space
- Ability to use stainless steel or carbon steel tubes for added reliability



### Parallel Condensing

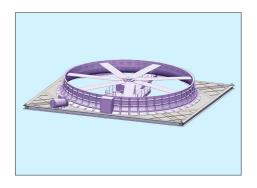




As its name implies, parallel condensing refers to condensing the turbine exhaust steam in a water-cooled (wet) condenser and ACC in parallel. Holtec's water-cooled condenser expertise is well known; Holtec has supplied over 120 wet condensers over the past three decades to power plants around the world, garnering an enviable record of performance and reliability. Holtec's expertise in both dry and wet condensing technology enables the Company to provide dual, parallel condensing solutions that optimize the use of the site's increasingly scarce cooling water supply. Benefits of Holtec's parallel condensing system include:

- Improved performance in comparison to an all dry system under high ambient conditions
- Significantly reduced capital costs compared to all dry systems
- Significant water savings over an all-wet system
- Elimination of cooling tower plumes in winter weather

#### Standardization

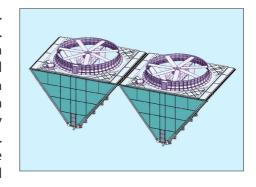


Holtec's HI-MAX and HI-KOOL are the industry's first standardized ACCs designed to meet any site requirements without extensive custom engineering. The pre-engineered, standard cell can be designed to meet the performance specification and erection strategy at any site. The result is an efficient design process that is fully endorsed by the Company's Quality Assurance Program. The benefits of standardization include:

- Reduced construction lead-times
- Flexibility in the field during construction
- Shorter overall project schedule

## Modularization

Holtec's standard cell is designed with the total installed cost in mind. Modularization can reduce construction time and cost by as much as 40%. Traditionally, ACCs are erected in a stick built fashion, where field construction costs can exceed the cost of the equipment. Holtec's engineers have reduced the number of pieces shipped to site by optimizing the modular ACC erection sequence. For instance, Holtec's engineers have reduced the fan deck from thirty pieces to four pieces shipped to site. On-site work that is normally performed at elevations as high as 130 feet, can now be completed at grade. Since assembly at elevation is limited by the reach and lifting capacity of the site's crane, an entire fully loaded cell can be assembled at grade and placed on the support structure in a single lift.



#### Our Mission

- To develop technologies that protect public health and safety, and provide the utmost protection to the workers who use the structures, systems and components provided by our Company.
- To maintain our Corporate focus on developing technologies that help protect the environment by producing pollution-free energy.
- To continue to treat every project as a solemn undertaking in which on-time performance and superb quality of goods and services are nonnegotiable requirements.
- To expect unimpeachable integrity from our associates in all of their dealings with Clients, Vendors and Regulatory Agencies governing our products and services.
- To remain committed to fostering a stimulating work environment wherein every company associate has the opportunity to realize his or her professional potential to the maximum extent.
- To remain a learning organization, forever striving for a higher plateau of excellence.

## **Key Facts**

- Holtec is a vertically integrated organization possessing in-house capabilities to design, engineer, analyze, license, fabricate, perform on-site construction, and deploy the products offered by the Company.
- Holtec's engineers have served on numerous ASME Code, HEI and TEMA technical committees to develop the standards that are used today to define design and construction parameters for shell and tube heat exchangers, water-cooled and air-cooled condensers.
- Holtec holds an impeccable safety record with an EMR of 0.86 from NCCI and an OSHA Lost Time Case Rate of 0.51 in 2018.
- Holtec has four manufacturing facilities (three in the U.S. and one in India) covering nearly 1.5 million square feet of manufacturing floor space.
- The Company has a 100 million bonding dollar capacity, a platinum credit rating and a solid record of consistent profitability and steady growth since its founding in 1986.
- The Company has been granted over 100 patents in areas of equipment design, fabrication processes and materials.
- Holtec Manufacturing Division (HMD) in Turtle Creek, Pennsylvania is one of the largest manufacturers of nuclear storage and ASME Code components in the U.S. Additionally, HMD is among America's largest exporters of capital equipment for the nuclear industry.



## Culture of Quality

Since its founding in 1986, Holtec has developed a stringent culture of quality assurance that has helped the Company become America's leading supplier of engineered equipment and systems to the world's nuclear power industry. Holtec's high caliber Quality Assurance Program (NQA-1) operates under approval of the U.S. Nuclear Regulatory Commission (Holtec maintains eight dockets) as well as ASME, ISO-9001, and various other national and international nuclear authorities. Holtec's corporate quality culture permeates the entire organization, from the design center, to the shop floors and to the job site.

Holtec's new fabrication facility in Dahej, India produces HI-MAX and HI-KOOL Air-Cooled Condenser Systems using techniques that ensure the highest levels of quality, performance and cost competitiveness in the global market.

Holtec International is an energy technology company with worldwide presence. Holtec's major operation centers are shown below.

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