INVENTIONS & INNOVATION

Success Story

HIGH-EFFICIENCY DEHUMIDIFIER

Benefits

- Improves indoor air quality
- Increases dehumidifying capacity of air conditioning equipment
- Helps control the growth of mold, mildew, fungus, and dust mites
- Eliminates the need for reheat or desiccant systems
- Operates with no mechanical or electrical input
- Has saved 100 billion Btu in 2000 from 3000 units
- Has saved 981 billion Btu and more than $8 million in energy costs cumulatively through 2000

Applications

This technology can be used for space cooling and dehumidifying for industrial, commercial, institutional, and residential buildings as well as agricultural and industrial process dehumidifying and drying.

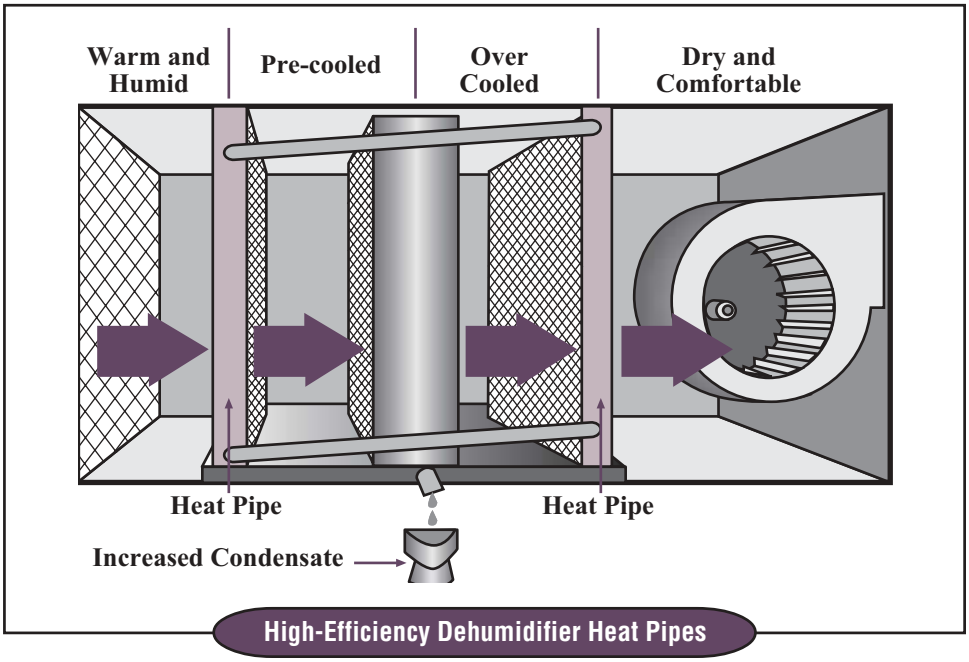
"The DOE's Inventions and Innovation Program is a perfect example of the many benefits we all gain when private industry and government work cooperatively for the common good. DOE's assistance was very instrumental in getting this new technology to market and into numerous OEM products where it has saved milllions of dollars in energy costs.'

– Khanh Dinh,
President

Reducing Humidity and Saving Energy

Humidity control for material processing, space conditioning of habitable buildings, and industrial drying consumes significant quantities of energy, predominantly electrical energy. Two popular methods for reducing humidity are either to oversize air conditioners to over-cool the air and remove moisture and then reheat the air before circulating it, or to use a desiccant system to capture moisture in one area and release it in another by applying heat. Both reheating the air and drying the desiccant require mechanical or electrical inputs and are energy-intensive.

Heat pipe technology eliminates the need for reheat or desiccant systems and increases the dehumidifying capacity of an air conditioner by as much as 91%. The technology uses about 50% less energy than electric reheat systems and about 25% less energy than other types of reheat. Reducing humidity improves health conditions such as arthritis and helps prevent the growth of mold, mildew, fungus, and dust mites – all common allergens. The technology can help cure "sick building" problems with conditioned fresh air and, as a result, can improve worker productivity.



High-Efficiency Dehumidifier Heat Pipes

Technology Description

Heat Pipe Technology, Inc. (HPT), located in Gainesville, Florida, was founded in 1983 to develop a new technology invented by Khanh Dinh – the use of heat pipes to increase dehumidification and save energy. Under a technology transfer contract with the NASA Kennedy Space Center, Dinh's research group has perfected and adapted a revolutionary heat pipe design to increase the dehumidification capacity of air conditioning systems.

The HPT system can fit any air conditioning system. One section absorbs heat from the return air before it reaches the cooling coil, lowering the operating temperature of the evaporator coil and increasing moisture removal 50% to 100%. The heat absorbed by the pipes located in the warm return air is transferred to the second section to reheat the cold supply air for humidity control. Lower-humidity indoor air feels more comfortable, so cooling temperature thermostat settings can be higher to save more energy. Typically each 1°F rise in the thermostat setting reduces electricity costs by 7%.

Economic Success and Market Potential

Through a grant from the U.S. Department of Energy's Inventions and Innovation Program, HPT has publicized and commercialized its heat pipe technology. Successful applications include storage facilities (warehouses, chemical storage, paper products); the food industries (supermarkets, restaurants, food-processing plants); public and commercial buildings; health facilities (hospitals, clinics, laboratories, fitness centers); indoor pools and spas; and schools, libraries, archives, museums, and other commercial and residential buildings.

From 1998 through 2000 annual sales in heat pipes averaged over $3 million. HPT has licensed this new technology to major manufacturers including Mitsubishi in Japan, General Electric in the United States, S&P Coils in England, and Teco in Taiwan.

HPT has rapidly developed into a multi-million dollar company and has succeeded in deploying the technology worldwide with about 40 patents. The dehumidifier heat pipe technology developed with the support of NASA and the DOE is now recognized worldwide and its market has expanded to most parts of the world, including Europe and Asia. Currently, HPT is planning to expand the use of its technology within the United States and to export to areas with limited energy resources.

The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and to conduct early development. Ideas that have significant energy-savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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