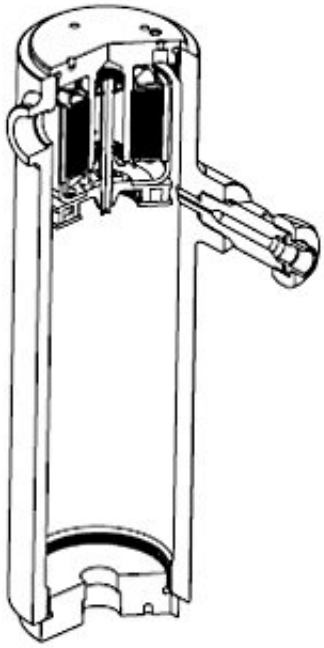
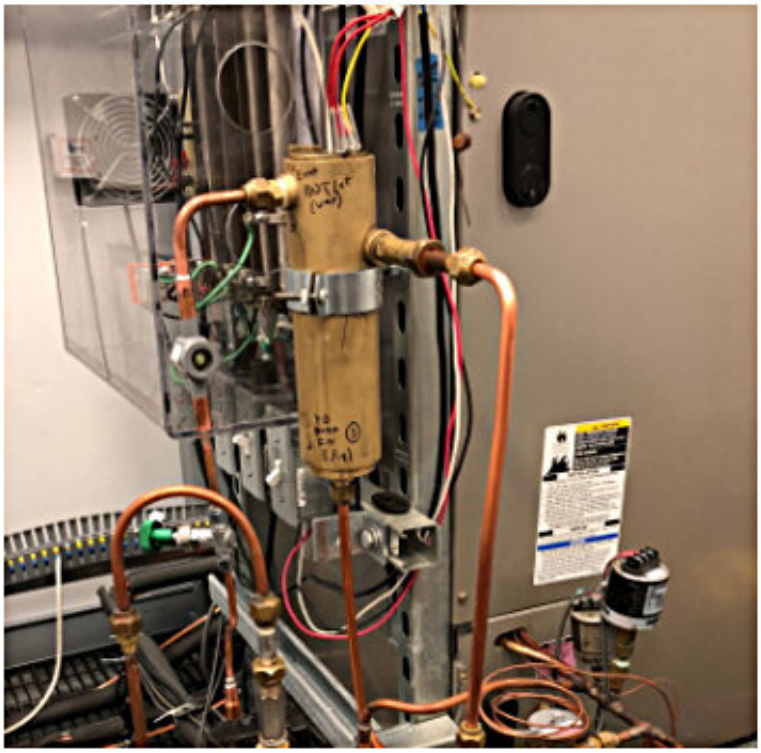
Turbomachine expander offers efficient, safe strategy for heating, cooling

February 25 2020, by Chris Adam





Purdue University researchers created a turbomachine expander that offers an efficient and safe strategy for heating and cooling. Credit: Riley Barta/Purdue University

A new device to help homeowners cut electricity bills could also provide more efficient and safer cooling options for companies and vehicles.

Purdue University researchers developed their device to decrease energy consumption of the vapor-compression heat pump cycle, which is commonly used in homes, businesses and vehicles for cooling and heating.

The team created a novel turbomachine expander that helps harvest previously wasted energy used in the process of moving the air from high to low pressure. The device can be used as a control agent within an existing heat pump. The team's work is presented in the *International Journal of Refrigeration*.

"Our solution packs a two-fold punch in that it's more efficient but still just as safe as conventional vapor-compression heat pump cycle operations," said Riley Barta, a graduate research assistant in Purdue's College of Engineering. "We created a device that's the best of both worlds with a fixed nozzle and variable options for phase separation that allow a much broader range of applications than are possible with more conventional approaches."

The other members of the Purdue team are Eckhard Groll, the Reilly Professor of Mechanical Engineering and director of the Office of Professional Practice, and David Ziviani, a research assistant professor of engineering.

"Not only does our device help cut down wasted energy, which helps reduce electricity costs and improve efficiency, but it works across a range of ambient conditions," Barta said. "Our expander and control method ensure the safe operation of the heat pump system."

The Purdue device can be used with any common heating and cooling systems found in homes, vehicles and industrial buildings.

The innovators are working with the Purdue Research Foundation Office

of Technology Commercialization to patent the technology.

Provided by Purdue University