

# USU team's Personnel Vacuum Assisted Climber wins Air Force prize (w/ Video)

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(Phys.org) -- Utah State University engineering undergraduate students have walked off as winners in an Air Force competition asking university teams to deliver systems that can help climbers reach the top of a 90-foot wall. Their wall crawler is designed to help commandos scale tall structures without having to depend on helpers like grappling hooks. The winning device uses vacuum suction to get the wall-climber to the top. The students call their device Personnel Vacuum Assisted Climber, or PVAC.

Air Force pararescue jumpers tested 17 university teams entries on a 90-foot concrete silo in Calamityville, Ohio. They concluded that the Utah system was the best to win the Air Force Research Laboratory's annual Design Challenge.

The Air Force Research Laboratory (AFRL) challenge for 2012 went looking for teams that could deliver ascending devices that could be faster and easier to use than current techniques. The system had to be under 20 pounds. The goal that was set was to get four soldiers up a 90-foot structure in 20 minutes with such a device. The [Air Force](#) gave each team \$20,000 and nine months to develop a solution. The winning device can haul at least 300 pounds.(A team member quoted in the Salt Lake Tribune, though, said calculations showed the ascender able to hold anywhere between 500 to 700 pounds, depending on the altitude.)

"The biggest challenge was to have a big enough pressure differential and a good enough seal to hold them to the wall," said team leader T.J. Morton.

Each ascender is battery-powered and is designed to operate for about 30 minutes. The system involves handheld suction pads, to provide enough suction to get at least 300 pounds over the wall. Tubes attach the battery-powered vacuum in the backpack to the pads worn on the hands, allowing suction to seal the pads, and the person, to the wall.

USU's College of Engineering now has the job of improving the current design. Doing so will secure them a \$100,000 grant. The improvements call for a system that can minimize size, reduce weight, and involve far less noise. The USU team responsible for the Personnel Vacuum Assisted Climber included 15 mechanical and aerospace engineering seniors.

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