



## Longtime USACE-USAF partnership uses rapid heating to revolutionize pavement repair technology

**U.S. Army, Engineer Research and Development Center  
U.S. Air Force, Air Force Civil Engineer Center**

Potholes and other small but dangerous areas of pavement damage can now be repaired more quickly, more conveniently and more effectively—even at sub-freezing temperatures—using a technology developed by longtime collaborators within the U.S. Army Corps of Engineers (USACE) and the U.S. Air Force.

Induction Hot Mix Asphalt (iHMA) is the brainchild of scientists from the Geotechnical & Structures Laboratory (GSL) within the USACE's Engineer Research and Development Center (ERDC) and the Air Force Civil Engineer Center (AFCEC). This partnership dates back to the 1940s, when ERDC was tasked with building runways to support bomber aircraft during World War II.

Designed to protect multimillion-dollar Air Force planes and pilots from accidents caused by damaged runways and taxiways, iHMA can also help address the potholes that cost U.S. civilian drivers \$3 billion each year in automobile repairs. It is now being marketed as "Hot Patch on Demand (HOTPOD)" to military and private entities around the world by industry partner necoTech.

Pavement repairs typically involve a two-step process. Non-durable cold mix asphalt is used first as a temporary fix, then factory-sourced hot mix asphalt (which is significantly more resilient but less easy to attain) is applied. In contrast, the iHMA system offers an easy, one-step process with the convenience of cold mix asphalt and the toughness of hot mix, saving both time and cost.

What sets iHMA apart is the use of induction—electromagnetic activation of metallic particles in the asphalt mix—to heat the asphalt, giving it the workability needed for durable repairs.

The iHMA product is produced in small batches and packaged in five-gallon containers, which are heated on demand at the repair site. Once the asphalt material is placed in an induction chamber, the iHMA system heats the mix above 300°F in less than five minutes—90% faster than traditional heating methods.



**Above:** Thanks to iHMA's induction heating method, asphalt repairs can now be made in any weather condition—including freezing or even sub-freezing temperatures.

Testing the iHMA concept in ERDC's F-15E load simulator was critically important. In previous tests, commercial cold patch materials failed after only one to two aircraft passes. The first test of iHMA, however, revealed that within two hours of repair, it could withstand 100 passes with minimal damage.

The team then demonstrated that iHMA could be used in cold temperatures, something that plagues all current repair techniques. On a January day in Vicksburg, Mississippi, iHMA achieved 320°F within five minutes despite the air temperature being a chilly 13°F. In the frigid regions of the Canadian north, iHMA reached the desired temperature in less than four minutes, shocking the local maintenance workers who operate only two months a year because of the harsh environment.

The team relied on connections with multiple organizations to build, test, and transfer iHMA, including DEFENSEWERX, ERDCWERX, Mississippi State University, AFWERX, and the Canadian military. This process resulted in a cooperative research and development agreement (CRADA) and nonexclusive commercial license with clean tech company necoTech, both in 2020. A patent was issued in March 2021. ☺