

Maintenance

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Project Title:
Evaluation of Pothole Patching
Equipment and Processes

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This project evaluated automated pothole patching equipment to reduce operator exposure to oncoming traffic and improve the quality of pothole repairs.

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Automated Pothole Patching Equipment

Reducing worker exposure to direct roadway traffic when patching potholes by using automated equipment

WHAT WAS THE NEED?

Highway potholes typically emerge sporadically and rarely occur in concentrated areas, so scheduling traffic lane closures to make urgent patches is impractical. As a result, maintenance crews rely on traffic breaks to make repairs. Frequently, a maintenance worker quickly approaches the pothole during a brief traffic break and casts a lump of cold patch asphalt into the pothole and retreats after thumping it a couple of times with a shovel or boot. Having workers on foot exposed to traffic is always potentially hazardous, but the nature of pothole patching operations makes this task even more risky.

After two Caltrans maintenance workers were killed while patching highway potholes, Caltrans moved to evaluate and deploy innovative automated equipment to reduce worker exposure when conducting highway patching operations.

Automated patching equipment has been on the market for several years and used nationwide. These self-contained machines remove workers from direct traffic exposure because they can be remotely operated from inside the vehicle cab to patch potholes. The machine dispenses either hot asphalt or an emulsion-based spray patch. While both processes have benefits, using hot asphalt is more traditional and has nearly universal support. The target use of this equipment is main and secondary highways with high-speed traffic, which favors the hot patch approach.

WHAT WAS OUR GOAL?

The goal was to evaluate the effectiveness of automated pothole patching machines to safely assist maintenance crew members in pothole repair operations with reduced direct exposure to highway traffic.



Python pothole repair



WHAT DID WE DO?

In 2009, the Caltrans Maintenance Equipment Training Academy (META) team, in partnership with UC Davis's Advanced Highway Maintenance and Construction Technology (AHMCT) Research Center, reviewed and tested commercially available pothole repair equipment and acquired promising equipment for use by Maintenance staff. The research team, along with Maintenance staff, field-tested the equipment, defining and integrating equipment and process improvements.

The Python Pothole Patcher (PHP) was selected for further review because it was the best match for Caltrans requirements. The PHP automates the traditional hot asphalt patch process with the quality of the resulting patch ranging from long term to permanent, depending primarily on how well the pothole is cleaned prior to patching. To minimize lane closures and traffic disruptions, a patch with sufficient quality can be applied very quickly. If more time is available, the equipment produces a high-quality patch. The machine can be easily configured for different types of patching requirements and is simple to clean.

The PHP was first tested by the District 3 crew in Woodland, California on a two-lane rural highway. The District 3 Sunrise Maintenance crew received limited training in 2009-10. With these initial field tests, design modifications were made to address mechanical issues.

WHAT WAS THE OUTCOME?

During deployment testing, Caltrans Maintenance personnel with the support of the AHMCT research team explored using the PHP to also patch roadway edge drains. AHMCT collaborated with PHP manufacturer engineers to make the necessary hardware and software modifications to allow pothole patching and edge drain patching operations to occur concurrently.

Based on the PHP evaluation, field-testing, and initial deployment results, Caltrans has decided to continue research toward implementing and supporting full-scale deployment of the PHP. The goal is to maximize the benefit of the automated machine to conduct the majority of pothole patching operations, thereby reducing fixed lane closures. In addition, alternative machines, epoxy-based patching materials, and pothole patching processes will be researched to determine the best practices for patching operations.

WHAT IS THE BENEFIT?

Automated pothole patching machines enhance the safety of maintenance workers. Compared to manual processes, the equipment also improves the quality of pothole repairs. Safety enhancement and pothole repair quality improvements not only benefit Caltrans, but they also provide advantages to local municipalities, private companies, other Departments of Transportation, and any other entity involved with pothole repairs.

LEARN MORE

For more information on the PHP machines, including photographs and video recordings of a training session and live deployment, visit:
<http://ahmct.ucdavis.edu/?projects=python-pothole-repair>



*Python hot-asphalt
pothole patch*



*Loading Python with
hot asphalt*