

## Python - Automated Hot Asphalt Pothole Repair

**Outcome** — Provide Caltrans Maintenance with the most advanced and productive automated pothole patching machines customized to meet Caltrans specific operational requirements ensuring ease of use and maximum cost efficiency.

**Benefit** — Increases both the speed and quality of filling potholes with fast semi-permanent patches. Machine automation makes rolling highway closure patching operations possible which provides unparalleled worker safety and lessens the impact on traffic congestion.

*Two Caltrans workers have been killed recently while attempting to patch highway potholes. In an immediate response to mitigate this hazard, Caltrans Divisions of Maintenance and Research and Innovation supported an AHMCT research effort to deploy innovative equipment to Caltrans Maintenance crews to dramatically reduce worker exposure when conducting highway patching operations.*

### Conventional Highway Pothole Patching

Potholes in pavements typically emerge sporadically in or adjacent to live traffic lanes on highways. Potholes seldom occur in concentrated areas and their general disbursement makes the scheduling of safe traffic lane closures to perform urgent patches very impractical. Instead maintenance crews often rely on short traffic breaks, with or without CHP assistance, to perform quick repairs. This style of repair often consists of a worker scrambling out on the travelway during a brief traffic break, casting a lump of cold patch asphalt into the void and retreating after compacting the repair material a couple of times with a shovel or boot. Having workers on foot exposed to traffic in or adjacent to traffic is always potentially hazardous, but the nature of pothole patching operations makes this task even more risky.

### Automated Highway Pothole Patching

The Python Pothole Patcher (PHP) is currently the only commercially available machine that automates the traditional hot asphalt patching process: 1) air jet blast pothole clean, 2) tack oil spray, 3) hot asphalt fill, 4) roller compaction of patch. The quality of the resulting patch can range from long term to permanent which is far superior to cold mix temporary patches. The entire patching operation is controlled by a single operator/driver in the vehicle cab with a direct view of the patching head. Using the Python patching operation, all Caltrans workers associated with the operation remain in vehicles protected from any direct highway traffic exposure.



*Python Automated Hot Asphalt Patching*

### Rolling Closure Patching Operation

The Python hot asphalt patch can be applied very quickly enabling Caltrans to perform pothole patching in rolling traffic lane closure operations on main-line highways. Standard Caltrans moving highway traffic closure procedures apply with attenuator and signboard trucks trailing the Python to divert live traffic



*Python Rolling Patching Operation - Interstate 280*

around the patching operation. Rolling traffic closure operation also enables the Python to patch multiple lanes in a single pass and patch across ramps with the California Highway Patrol (CHP) momentarily holding traffic.

### Python Highway Deployment Trial

The Python PHP was deployed to several Caltrans District 4 Maintenance facilities including Foster City, San Jose and Gilroy on a trial basis. District 4 (D4) provided 2 dedicated operators responsible for vehicle operation and simple preventative maintenance task. Dedicated operators received classroom instruction and extensive hands on training on vehicle operation, cleaning and basic service. The PHP was used for roadway maintenance operations patching pot holes and edge drain voids on AC and PCC roadways, shoulders and transitions. A typical deployment utilizes a rolling closure which included two shadow trucks and a CHP cruiser (MAZEEP). Rolling closures allowed maintenance crews to safely travel at highway speeds from pot hole to pot hole minimally impacting traffic patterns.

### PHP Production & Safety Benefit

The PHP provides unparalleled pot hole patching productivity. A skilled operator can quickly load up to 5 tons of hot mix asphalt into the PHP’s heated hopper from a local batch plant. Patching operations are completed via remote control from the safety of the PHP’s cab. 5 tons of AC can be dispensed and compacted into roadway pot holes or edge drain in a couple of hours. Safe pot hole patching productivity is enhanced by the ability of the Python to travel at highway speeds and utilize a rolling closure, accomplishing unprecedented pothole patching productivity. The quality and longevity of most patches is superior to current patching methods and cold patch solutions. Most patches can be completed in less than 60 seconds without the need for maintenance personnel to dodge traffic or for crews to take a lane. Additional patching attachments developed specifically for longitudinal voids like edge drain simplify the rolling patch process.



Python Real-time Web Based Performance Logging

#### Sample Python Deployment Summary

Date:	5-22-2013
Start time:	8:30 AM
Performed by:	D4 Maintenance; San Jose, CA
Roadways:	Hwys 87, 237, I-680 and I-880
Patches:	Potholes & longitudinal voids on PCC and AC pavements
Supervisor:	Paul Salaiz
Operator:	Jorge Martinez
Batch Plant:	Reed and Graham
Total hot mix loaded:	4.5 tons (9,000 lbs.)
Total hot mix used:	100%
Total time patching:	2 hours
Filled patches:	75 potholes & 7 long. voids
Road closure type:	Rolling; 3 shadow trucks
CHP present:	2 cruisers (MAZEEP)
Hot mix dumped:	0 lbs.
IMMS work orders:	3042693, 3042698

#### For Additional Information

- Arvern Lofton (916) 227-5834 alofton@dot.ca.gov  
Caltrans Project Manager
- Steve Velinsky (530) 752-4166 savelinsky@ucdavis.edu  
Principal Investigator
- Victor Reveles (530) 752-3965 vreveles@ucdavis.edu  
Primary Contact

Visit us at [www.ahmct.ucdavis.edu](http://www.ahmct.ucdavis.edu)

*This document is disseminated in the interest of information exchange. The contents do not necessarily reflect the official views or policies of the AHMCT Research Center, the University of California, the State of California, or the Federal Highway Administration. This document does not constitute a standard, specification, regulation, or imply endorsement of the conclusions or recommendations. (rev. January 2014)*