

SPRAY INJECTION PATCHING (SIP)

1. SIP is a specialized repair process that combines hot asphalt emulsion and crushed aggregate using forced air. (There will be a demo or 2 this week featuring the SIP process). It is an exceptional repair method for potholes, shoulder work, alligatored areas, depressions, utility cuts and any other type of repair that would use traditional asphalt. This type of repair can be used on concrete as well.

2. Do I have a problem?

In researching this topic I found out that one researcher estimated that there are over 50 million potholes on US roads. It is a huge problem. They ruin tires, break suspension components, and cause parts to fail in the steering system and damage alloy wheels. Potholes usually begin to develop during the winter months due to freeze-thaw cycles. Therefore patching must be done on short notice or on an emergency basis during the winter months when cold temperatures are predominant.

3. What are your alternatives? All of these methods are or have been used.

A. Throw and Go - Repair technique for cold-mix patching materials in which material is shoveled into the pothole, with no prior preparation of the pothole, until it is filled. Compaction of the patch is left to passing traffic, while the maintenance crew moves on to the next location.

B. Throw and Roll- Repair technique for cold-mix patching materials in which material is shoveled into the pothole, until it is filled, the material truck tires are used to compact the patch.

C. Semi-Permanent- Repair technique for potholes in asphalt-surfaced pavements. This maintenance activity includes removing water and debris from the pothole before placing the repair material. Once the pothole has been cleaned, the edges of the distress are straightened using a pavement saw, jack hammer, milling machine or similar equipment. After the edges have been straightened and are in sound pavement, the cold mix is placed.

The patch is compacted with a single-drum vibratory-plate compactor.

vibratory roller or a

D. Edge-Seal

4. Is there a more effective method?

A. Yes

5. Spray Injection Patching

6. Equipment has evolved to a 1 or 2 man unit that is operator friendly.

7. SHRP (Strategic Highway Research Program)

As part of the research done by the SHRP in the late 1980's and early 1990's, an effort was made to determine the most effective and economical patching methods. In 1993, SHRP published Innovative Materials Development and Testing. Part of this study was devoted to pothole repair. A total of 1,250 pothole patches were placed at 8 test sites in the U.S. and Canada using different proprietary, state specified and local cold-mix patching materials. Several installation techniques were used to determine an optimum combination of materials and procedures for improving the cost-effectiveness of patching operations.

8. SHRP Results

Two conclusions of the SHRP study were that high-quality cold mix materials and the spray injection method should be used for winter time pothole repair. The cost of continually patching the same holes with poor quality materials could be offset by paying more for high quality material that offered a longer service life. The findings of the SHRP research project were that the spray injection patch service life was better than with the other patching methods tested in the study.

9. Lower percentage of patch failures

It was learned that pothole patching during the winter using the spray injection patching method was more successful than the cold mix patching that is normally used in cold weather. There is a potential for significant savings with the spray injection method.

10. The positives of the spray injection method are:

A. Longevity of repairs

B. Cost effectiveness of repairs

C. Safety- Less equipment and fewer personnel exposed to traffic.

D. Effectiveness during winter conditions.

11. There are 3 types of Spray Injection Patchers.

A. A trailer mounted unit. The operator has all of the controls that he needs to operate the equipment standing on the road surface. This unit requires a dump truck to feed the aggregate to the hopper on the SI Patcher.

12. The 2 man unit is a truck mounted unit.

A. One person drives the truck and the other operates the equipment while standing on the road surface.

13. Then there is a 1 man unit.

A. The operator uses a joy stick to work a boom set up on the front of the cab. This is a one person, one truck patching operation. With the exception of the traffic control, the patching operation is controlled from the truck cab. This reduces the traffic hazards, safety risks, and liability that are associated with other patching methods. Note that you do need a well trained operator for the one man equipment.

14. The Spray Injection Process is done in **(4) steps.**

15. First – Clean the pothole. The operator applies a blast of air to remove loose rock, debris and any water from the area to be patched.

16. Second –Use the nozzle located at the end of the hose to apply a tack coat of emulsion to the distressed area. Go out several inches beyond the distressed area to seal micro fractures to keep water out.

17. Third– Open the gate that allows rock, aggregate to pass through the equipment. The rock is coated as the rock exits the hose. The emulsion binds to the rock to create a permanent patch.

18. Fourth– The operator then turns off a valve to stop the emulsion spray and applies a top coat of dry aggregate to the surface of the patch.

After these steps, the patch is ready for traffic without any compaction. It compacts from the bottom up with this method. Some cities do roll the patch in one pass. Using a static roller vs a vibratory roller.

19. Spray Injection has many capabilities. Skin patching of depressed areas, utility cuts, alligatored areas, shoulder work, and any area you would typically use asphalt.

20. Patching over alligatored areas does give your road some more life. Typically you would use a ½” or a 3/8” for an alligatored area. You can use up to a ½”, ¾” or 1” for shoulder repairs. It goes a little faster for greater productivity for this area with larger rock. Also, the cleaner the rock, the less emulsion you will use.

21. Will Spray Injection Patching save your city or county money? YES! Cost of materials, emulsion and aggregate offers a cost savings per ton compared to a ton of hot or cold mix.

22. A. Cost of materials emulsion and aggregate offer a cost/savings per ton compared to a ton of Hot or Cold mix.

B. Labor Savings–Fewer people to do the work.

C. You don't have to redo the same areas that you patched correctly the first time.

23. This is a sample of the savings.

SIP vs Cold mix for a county in Ohio.

24. This is a cost comparison of SI Patching vs cold patch.

In this example they saved over \$12K

25. SI Patching was compared to cut and redo (remove).

In this example they saved \$8800.00

26.

27. If you combine the savings on 2 separate ways of patching vs the SI Patching method,

They saved over \$21K

28. Numerous counties purchase their own emulsion tanks; typically you are looking at tanks from 3000 to 10,000 gallons. They don't have to make as many trips to get product.

Other reasons are that this boosts productivity.

Bulk purchases cost less per gallon.

You can then emulsion for other projects.

29. This shows a typical gravity feed tank.