

Sealzall - Automated High Production Crack Sealing

Outcome — A field deployable crack sealing machine capable of high production automated longitudinal sealing and manual in-lane crack sealing operations.

Benefit — Increases both the cost effectiveness and safety of highway pavement sealing operations.

AHMCT researchers are leading the way in the development of high tech automated longitudinal crack sealing machines (ALCS) which have been field proven by Caltrans maintenance crews to reduce the costs, increase safety and dramatically increase the production rate of highway crack sealing operations. The newest generation ALCS machine have extended capabilities and are no longer limited to longitudinal only crack sealing operations. Our current machine, called the Sealzall has been developed with a multi-purpose heated hose and manual wand assembly to enable this equipment to be quickly configured for any type of crack sealing operation on the highway.

Longitudinal Sealing Operations

The Sealzall is a fully self-contained vehicle designed to dispense polymer modified hot applied sealants from an on-board 400 gal oil jacketed kettle. The machine is ideally suited to seal joint cracks between PCC slabs as well as transitions between PCC slabs and AC shoulders when configured for longitudinal operation. These types of cracks allow for sealing at a continuous speed up to 5 mph which contributes to the resulting high production rates consistently achieved by this operation. Since longitudinal cracks typically represent the largest share of highway cracks sealed, high production longitudinal sealing can play a significant role in reducing the miles of open pavement cracks which leads to premature pavement deterioration. Utilizing the Sealzall enables smaller crews to effectively seal an expanded range of highway cracks which are otherwise unrealistic to address by hand operations. Kettle operation and sealant application are semi-automated from inside the truck cab, enabling the Sealzall to operate in moving lane closures, or from the shoulder adjacent to live traffic lanes. An integrated no-tack spray system ensures that following traffic doesn't track-up the freshly applied sealant.

In-lane Manual Sealing Operations

The Sealzall has a front mounted 20 foot heated hose and wand assembly which is used in common for recirculation, longitudinal and manual sealant operations. This makes conversion between configurations and attaching tooling a quick and simple task. Conducting in-lane manual sealing operations in a standard lane closure with the Sealzall machine provides additional worker safety benefits compared to



Figure 1 – Sealzall, Longitudinal Sealing Configuration

a conventional manual operation. The Sealzall truck backs in the lane closure providing the highway-based crew with additional protection from traffic. Backing also provides the driver/operator a direct view of the crew on foot and allows a supporting attenuator truck to maintain the optimum separation distance from the operation, since it now is moving in a direction away from the fresh sealant and not directly over it as in the typical manual operation.



Figure 2 – Sealzall, In-Lane Sealing Configuration

Transfer Tank Trailer

High production crack sealing requires an equal ability to produce hot sealant at high production rates. The Transfer Tank was developed to test an innovative new hot sealant transfer approach that could potentially provide a virtually continuous hot sealant supply to support high production sealing operations. Past ALCS machines were hampered by their ability to melt blocks of sealant on the highway limiting production rates. The 600-gallon sealant transfer tank trailer functions as a hot sealant resupply reservoir for the Sealzall application truck. Sealant is brought out on the highway hot and ready to be applied. A flexible large diameter oil heated transfer hose provides the means to quickly transfer hot sealant to the Sealzall tank. The trailer tank capacity is far greater than the Sealzall tank, so hot sealant remains after transferring to accelerate the trailer kettle recovery time. Ideally the transfer trailer could make multiple transfers per day.



Figure 3 – Transfer Tank Trailer

Crack Cleaning

The Sealzall Machine was designed to support a wide array of crack cleaning tools. A high capacity rotary screw air compressor has been incorporated onto the Sealzall to provide for continuous air blast cleaning of crack debris. Crack cleaning operations can be controlled from inside the cab in moving operations, or handled manually for in-lane sealing operations. For longitudinal sealing operations, an air blast nozzle dusts the crack clean just ahead of the sealing shoe to ensure optimum sealant adhesion. A crack saw is under further development to efficiently remove stubborn crack vegetation.

LCSM Cost & Safety Benefit

An earlier version Longitudinal Crack Sealing Machine was deployed to Caltrans Maintenance crews and was utilized extensively on the highway. The District 11,

Chula Vista Travelway Crew has reported the following cost data comparing use of the LCSM vs. Hand Applied Operation.

Distance Compared: 32 miles along Interstate-5

	LCSM	Hand Applied
Number of employees	3	4
Average miles per day	3.5	0.8
Work days	9	40
Bare rate cost	\$4,017	\$23,820
Closures	NO	YES
Employees on foot	NO	YES

Figure 4 – Cost Comparison Data 10/02/03

- LCSM - In 17 days, 62 miles of AC/PCC joint line was sealed on Routes 5, 52, and 125.
- Hand Applied Method - The same amount of miles sealed would have required 77.5 days, 78 lane closures, and 465 hours of exposure of employees on foot to traffic.

Injuries possibly avoided by using the LCSM:

- There have been a total of 76 injuries in the last 10 years associated with rubber crack sealing.
- 27 employee injuries resulted from applying rubberized product on foot.
- 12 employee injuries resulted from loading material.
- 39 employee injuries reported that were not related to just rubberized crack sealing.

Current Status

The Sealzall machine is progressing through field testing and refinement.

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