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Solution/Product Name: [Lhoist Mineral Slurry](#)

**Describe how the proposed solution addresses the following** (250 word maximum for each response):

1. What is the expected timeline to develop and commercialize the solution if it is not currently available?

The solution was tested at **laboratory** scale and on a **small private road** section in Belgium, Europe. Scaling up the solution to measure durability and performances requires a careful evaluation of the skid resistance in different conditions. We have data but we may need additional data points for confirmation.

The product used is currently available at large scale, it derives from an already commercialized product used for other applications. The method of application is based on truck spreading and is also already well developed for other applications and may only need some minor adaptations.

2. What surface and air temperature reductions resulting from the roadway solution, daytime and nighttime, have you identified?

On a road-section test realized in Belgium, for an average daily ambient temperature of 77°F and a maximum of 93°F, surface temperature reduction of up to 20°F at daytime and 4°F at nighttime have been measured. However, Belgium summer climate is not the most relevant to precisely characterize our product performances. We consider that the results obtained here are limited and we expect better results in more severe conditions.

3. How simply can the solution be integrated into existing roadway management and maintenance operations?

The integration is simple. As a special mineral slurry, it requires a 15-minute homogenization by mechanical mixing once a day. A mechanical cleaning of the road is recommended before applying the slurry on the asphalt pavement. Application is carried out with a truck equipped with spreading nozzles. The optimal frequency of application is yet to be determined, we expect it be once or twice a year.

4. What is the global warming potential associated with manufacturing the roadway solution in production and use phase?

For the manufacturing phase, the global warming potential is distributed between:

- the energetic impact of the mineral slurry manufacturing process (extraction and processing), and the water supply, which depend on local characteristics,

- and the fixed part of CO<sub>2</sub> released during the process which represents from 1550 lbs./ton to 1850 lbs./ton of product.

During the use phase, the installation of the product does not require the use of particularly impactful methods.

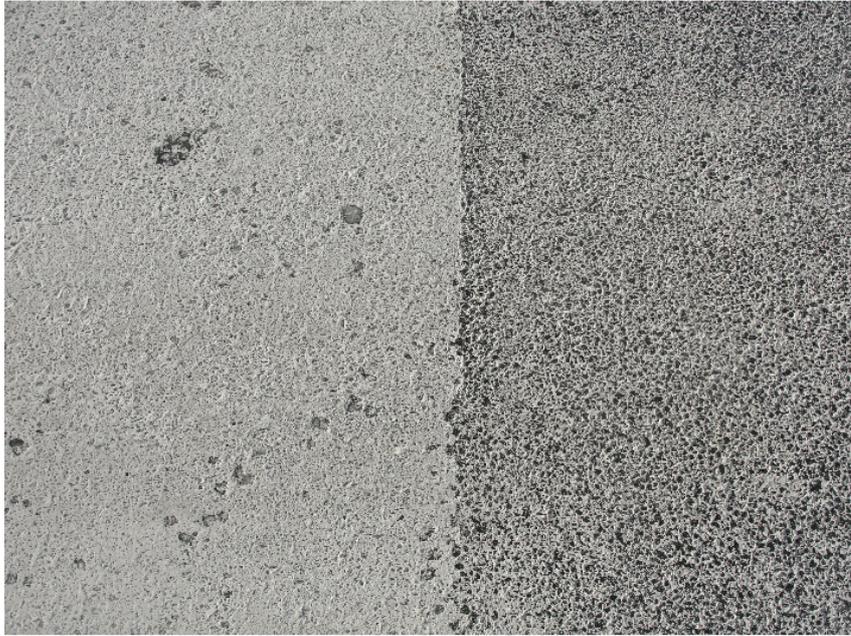
The aforementioned information is true for one application of the product.

5. Add any additional information for the proposed solution. Attach photos, videos or links to materials demonstrating application, installed condition, and relevant characteristics of the solution such as product material safety data sheets.

Below are pictures of the test in Belgium taken 1 week after application.



*Front view of the pilot test road in Belgium.*



*Sufficient roughness of the pavement is maintained after application and curing. Here we can observe the difference in coating between two different asphalts: a recent one with a low porosity and a very low albedo (right) and an older one with a higher surface porosity and a higher albedo (left).*



*Side view of the pilot test road in Belgium.*

**Cost and Installation** (50 word maximum for each response):

1. Can the solution be purchased and installed by in-house department staff (i.e. does not require a licensed installer): **Yes/No**

- If so, does it require special equipment to install it: **Yes/No** If yes, what equipment is needed?

A street cleaning truck and a spreading truck. The spreading truck should have nozzles and side protection equipment to ensure a homogeneous & clean application without side projections.

- If so, what is the cost per square yard for materials: **\$/SY**

Our product price is anticipated to be less than 0.5\$/SY.

2. What is the cost per square yard for material if installed by contractor: **\$/SY**

TBD for USA, depending on the job size and the contractor fees. But we expect that our product application cost would be less than 1\$/SY on top of material supply cost

3. What is the average installation rate: **SY/Day?**

TBD. Example: Spreading truck driving at 6 miles per hour and spreading 2 yards wide. Working for 6 hours:  $\approx$  130,000 SY in a day.

**Use Cases** (250 word maximum for each response)

1. What are the appropriate use cases for the solution (e.g., pavement type, age, condition, climate)? Please provide appropriate case studies, testing, and/or supporting research.

Solution to be used on low albedo surfaces. Preferably asphalt pavements (old or new). The application on concrete roads could be less relevant as those surfaces already have a higher albedo. Solution to be applied in dry conditions. Avoid spreading during rainfall or on wet road.

2. What are the safety, slipperiness, and friction characteristics (e.g. typical Surface Coefficient of Friction)?

Friction tests have been carried out on lab scale and on pilot test sections using a Pendulum Skid Resistance Tester. We found out that the product does not affect the friction characteristics of the pavement on which it is applied due to its thin thickness. We have not identified any asphalt formulations yet that would prevent the use of our solution. Furthermore, a similar product is used as tack coats protection and does not impact the quality of the pavement surface. However, slippery situations at the time of the application need to be further considered and evaluated.

3. What is the curing time including how quickly the road can open to traffic after installation given average temperatures, partly sunny, and non-humid conditions? How does this compare to existing relevant products?

The curing time is more or less equal to the drying time of the water content of the slurry (a few hours). This is yet to be confirmed but the opening to traffic can be done during the same day, provided that the solution has dried (which should be fast in summer application periods).

4. Is it sensitive to placement in cool weather, i.e. 50° F and falling? ~~Yes~~/No

5. Is it sensitive to placement in high humidity or damp conditions? ~~Yes~~/No

Air humidity and wind conditions may impact drying time. Although road humidity is impacting, and the solution should not be applied under rainy conditions or if the road is wet. What is meant by wet here are the conditions when the surface porosity of the pavement is filled with water. If the road is wet but not saturated with water (pores are not filled with water), then spreading the solution may be an option, this has not been tested yet.

6. How long does this treatment typically last under average traffic conditions in years? How does this compare to similar products?

The durability is still under assessment as the coating degrades over time. In any case the product would be a seasonal application product and we expect to demonstrate that one application per year is necessary.

7. Can it be re-applied over itself for renewal? ~~Yes~~/No

There are no contraindications. The product can easily be integrated in maintenance processes and seasonally applied. Like salting roads in winter in cold regions.

8. Is it recommended for heavy traffic conditions like urban arterials? Yes/No

TBD. It is one of the questionings regarding the solution and for which we need a partnership with a community willing to run a test with us. For now, the durability is under evaluation for low to medium traffic conditions.

9. Are standard MUTCD compliant white and yellow markings clearly visible? Yes/No

TBD. While we might have some ideas to comply the pavement marking regulations, this is still something that must be further assessed.