

ELIMINATE COLD JOINTS **PERMANENTLY**



EZ Street Polymer-Modified Asphalt



Cold Joints | Richard Hoare

Throughout the history of asphalt pavement surfacing, and in spite of the technological advancements for industry and products, there remains a singular issue that has proven to be difficult or virtually impossible to eliminate.

Cold joints.

No matter how surfacing projects are planned or how hot asphalt is installed, cold joints are always present in the pavement. Traditional paving always plans for the joints to be placed under the centre or lane lines generally in an area that is away from the wheel tracks. Inevitably though, cold joints can't be eliminated and can appear in corners, widenings and interchanges.

It is common knowledge that barring any deeper pavement failures the first place an asphalt surface will begin to fail is at the cold / paver joints. Cold joints are an inherent weak area of the pavement surface. A cold joint is created when asphalt paved in the first paver pass has cooled to a temperature (probably below approximately 50C). The adjoining paver pass will install asphalt at its normal hot temperature but the temperature difference between the two mats / paver runs is such that the two surfaces will not bind cohesively together but will instead butt up against each other.

Cold joints will commonly create a density differential between the two un-joined mats. Compaction of the unsupported edge is difficult as the rollers tend to squash out the mix and thin out the depth of the lift. Due to this the edges tend to receive less compaction than the rest of the pavement surface. Once the adjoining mat has been paved the rollers are able to provide full joint compaction. In this situation, at least half of the asphalt has dropped in temperature to a point where optimum densities are now unable to be obtained.

Through the life of the pavement surface, the first area to require maintenance expenditure is the cold joint. Joint issues can arise as soon as a few months after installation (usually over a Northern winter) or may remain intact for a number of years. The one constant is that the joints will inevitably require maintenance expenditure over the life of the surface. In the worst case scenario, the full pavement may have to be resurfaced years earlier



than programmed, causing significant adjustments to the programmed expenditure.

Water entering the pavement is the single most significant factor in pavement failures. The cold joint is effectively an unbound joint in the asphalt mat. This unbound joint will inevitably act as a point of water ingress into the pavement. The water ingress may also be exacerbated by small lips on the edge of the mats / joints due to the inconsistent compactions of the paver runs. The water will cause the breakdown of pavement at all depths (sub-base, sub-grade as well as the base course). Other than the creation of stable pavements and wear surfaces, the majority of pavement designs, construction, drainage and maintenance are based on keeping the water out and away from the pavement.

In more Northern geographical and mountainous areas, as well as anywhere that the temperatures drop to and below freezing (0C / 32F), frost heaving from water or moisture in the pavement can cause rapid and dramatic deterioration and failure to the pavement and surface. Creation of cold joints in this type of environment has a much higher risk of pavement failure, maintenance expenditure or re-surfacing.

The construction of a cold joint leaves an area of inconsistent compaction in the pavement. The edge of the initial mat can be subject to future cracking due to the development of a higher amount of air voids which is directly related to incomplete or ineffective compaction. Pavement compression due to trafficking over these areas can lead to longitudinal cracking and general “alligator cracking”. As soon as cold joint unravelling or cracking (longitudinal as well as alligator) occurs, the maintenance expenditures begin to climb.



Construction Mitigation of Cold Joints

The Asphalt industry has developed numerous techniques designed to mitigate the effects of the cold joints both as part of the construction as well as part of the compaction process.

Some of these techniques include:

- Manual shaping of the unconfined edge
- Hand raking of the joint area
- Overlapped paver runs to cross / cover the colder edge
- Milling / grinding out the asphalt edge to take the pavement back to an area of full compaction.
- Creating a taper wedge on the edge to help transfer the joint

Technology advancements, such as an asphalt roller with a disc attached to the drum to keep the

unconfined edge relatively rigid and to create the “wedged edge” during the compaction process.

Outside of the construction process, numerous other techniques have been used to mitigate the effects and the damage the cold joints create through the life of the pavement. These include:

- Sealing of the crack to mitigate water ingress. (This may take place at the time of or soon after time of construction)
- Crack sealing may also take place numerous times through the life of the surface as the negative effect of the cold joints increase due to deterioration.
- Milling (grind and pave) of the cold joint will remove the section of under compacted asphalt or remove a deteriorated and worn cold joint edge. But it will inevitably create two joints where only one previously existed.
- Patching / pothole repairs. Once the pavement is at this stage the costs for maintenance and the risk of fast deterioration are at hand – it is time to replace the surface.
- The only successful mitigation technique used by the industry is to utilize multiple pavers working parallel to each other in an offset pattern. This technique will create a single mat but not many paving projects or operations are open to this due to the project size, availability of equipment or most importantly the availability of the roads and lanes to be able to perform this process.

Whole of Life costs of Cold Joints

The cost of cold joints in an asphalt surface starts adding up from the time the asphalt comes out of the back of the paver. Even the simplest of construction mitigation processes is still an added cost to the surface. Once long term maintenance costs increase, the overall expenditure can climb very quickly. Crack-sealing or grind and pave have the potential to cost thousands of dollars, and pothole repairs are pretty much pouring money into the pavement with no return to the asset owner. In the worst case scenario, a full pavement may be removed and re-laid a number of years ahead of its potential useful life. This is where the \$millions start generating.

In the end, every pavement situation and its location will generate different costs ranging from pennies through to serious dollars. With cold joints it is unavoidable.



WHAT IF THERE WAS A WAY TO ELIMINATE COLD JOINTS COMPLETELY WITHOUT THE USE OF MULTIPLE PAVERS?

Whole of life expenditure, maintenance expenditure and most importantly the integrity of the pavement will benefit. If cold joints could be eliminated it would be an industry saviour.

Many millions of dollars could be saved on whole of life maintenance expenditures.

NOW THERE IS A PRODUCT THAT WILL ELIMINATE COLD JOINTS FOREVER!

EZ STREET ASPHALT *ELIMINATES* COLD JOINTS

EZ Street Asphalt is a polymer modified asphalt that installs exactly the same as regular asphalt but will not create any cold joints in the paved surface no matter how many paver runs are installed. EZ Street Asphalt is designed with strengths and stabilities matching the same performance of regular asphalt and in numerous cases outperforming it. It is made in advance of the paving project, installed cold and in any weather condition. As a cold asphalt, EZ Street can be paved as a regular asphalt with

normal paving and compaction equipment but eliminates all of the issues related to using a hot product. There are no time constraints with the compaction. 100% of optimum densities will be achieved as EZ Street Asphalt remains completely manageable through the compaction process. Regular asphalt uses temperature to harden and cure. As the temperature of the product drops the asphalt will get harder. Once asphalt is cold then any additional compaction is virtually impossible. If you have not obtained the required compactions and densities it is too late. EZ Street Asphalt on the other hand is a compaction based material. Temperature plays no part in the curing process. Compaction can take place well after it has been paved.

The cold aspect of EZ Street Asphalt allows for the paver joints to merge and bond together to form a single wide mat. For example a project with three paver runs will traditionally create two cold joints in the surface. Three paver runs with EZ Street Asphalt will leave no joints at all in the surface.





In addition to the cold joint elimination, EZ Street Asphalt also provides for a number of other benefits to the paving process as well as the finished surface. These are:

- **No material wastage**

Being cold, 100% of EZ Street Asphalt stockpile is usable for paving. No material needs to be dumped at the end of the day as can be notorious with “cold unused” regular asphalt.

- **Weather and temperature are not a factor**

EZ Street Asphalt has hydrophobic properties. This means that it is not affected by water. EZ Street can be installed in almost any weather condition or temperature without any deterioration or detriment to the end result as is found when regular asphalt is installed in the wet or colder temperatures. EZ Street Asphalt has been paved successfully in temperatures down to -10C and in pouring rain. Both of these extremes are conditions that regular asphalt could not be installed, and more importantly, should not be installed.

- **Crack resistance**

The EZ Street Asphalt paved surface will always remain slightly flexible throughout the life of the pavement. The product itself will remain slightly active through its life which will enable it to move fractionally with the movement of the traffic and the road

structure itself. This movement does not lead to rutting or permanent deformation in the material but does result in the pavement being able to resist some reflective cracking and will also self-heal for any cracks that do appear.

- **Surface Conditions**

EZ Street Asphalt is an open graded material which will provide some of the traditional benefits that open graded asphalt (OGA) will provide with the addition of other benefits. EZ Street’s open graded and homogenous surface will provide better skid resistance and will be dryer in wet weather (the polymer in EZ Street Asphalt will shed water away as opposed to draining as a regular OGA will do). The surface will also be quieter than regular OGA. The polymers allow for vibration absorption which will remain permanently in the surface.