

Sustainable Roads.

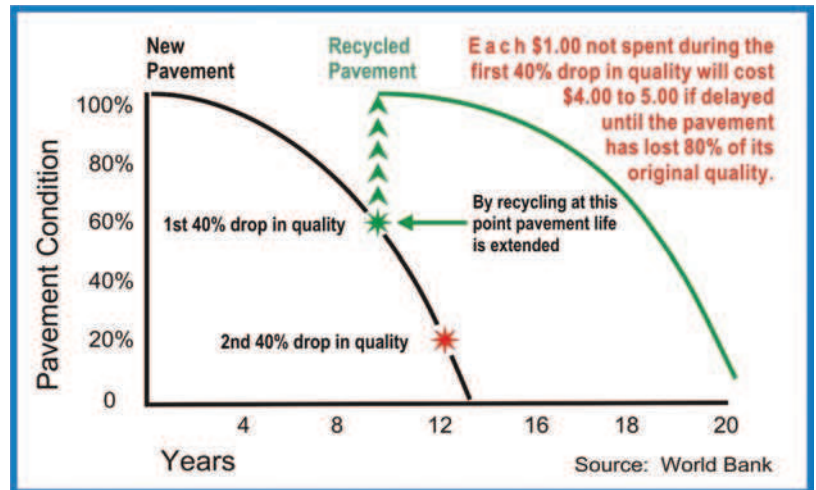


A World-Class Solution for Asphalt Pavement Rehabilitation

Meeting the Challenge

There are over 15 million kilometers of paved roads and highways worldwide, and every year several hundred thousand kilometers of them require major rehabilitation. Governments and local authorities worldwide are spending an estimated US \$100 billion annually in an attempt to keep their roadways functional and safe. However, due to inadequate transportation budgets and the high cost of conventional rehabilitation, the global backlog of deteriorated roadways is significant.

Deteriorated pavements are characterized by poor ride quality and physical distress, such as cracking, rutting and ravelling. Pavement deterioration is greatly influenced by harsh climatic conditions, high traffic volume and excess loads, as well as by road construction and maintenance quality. As the graphic shows, the deterioration of asphalt pavements will accelerate after several years of service, but timely rehabilitation, such as resurfacing or recycling, can restore pavement quality and extend a roadway's life span. World Bank studies have shown that the recycling of asphalt pavements is particularly cost-effective when it is performed before pavement deterioration becomes extreme.



The surface layer (wearing course) of asphalt pavements is made of bitumen (asphalt binder), which is a petroleum by-product, and mineral aggregate, which is a mixture of high-quality rock and sand. In many regions of the world these materials are in short supply, making them more costly. For decades, pavement managers have tried various recycling methods in order to make the best use of the aggregate and bitumen present in deteriorated asphalt pavements. One of the more promising methods is hot in-place recycling, for which a variety of equipment has been manufactured. Processes used in earlier equipment had a number of shortcomings, but they have been largely overcome by the recent development of several innovative features. These features have been successfully incorporated into Martec's AR2000 Super Recycler, which is now ready to meet the challenge of realizing the full environmental, technical and economical benefits of hot in-place asphalt recycling.

The AR2000 Super Recycler and the patented Martec Process are setting new standards for hot in-place asphalt recycling around the world.



The AR2000 Super Recycler is state-of-the-art in realizing the full environmental, technical and economical benefits of hot in-place asphalt recycling.



Traditional Pavement Resurfacing Method

A traditional method for the resurfacing of deteriorated asphalt pavements is the application of new hot-mix asphalt overlays, with or without the prior cold milling and removal of existing surface materials. Overlays are typically placed across the surface of the entire roadway, including shoulders. This conventional treatment uses large quantities of natural resources such as bitumen and high-quality aggregate materials. The process of overlaying asphalt pavements is not only wasteful and expensive, it is also time-consuming, disruptive to traffic and potentially dangerous to motorists.

Hot In-Place Asphalt Recycling

Hot in-place asphalt recycling is a process for rehabilitating deteriorated asphalt pavements. The operation is performed entirely on site by an equipment train and begins by applying heat to soften the wearing course of the pavement. The asphalt material, which is loosened and removed by milling devices, is mixed together with or without the addition of rejuvenator. This mixture is then spread along the roadway and compacted to complete the recycling process. While this basic method of 100% recycling can be quite effective, certain remix options may sometimes be necessary, such as the addition of admix or aggregate materials for structural correction and upgrading.

Hot in-place asphalt recycling effectively addresses the classic symptoms of deteriorated pavement:

- Cracks are interrupted and filled.
- Aggregate stripped of bitumen is remixed and recoated.
- Ruts and holes are filled, shoves and bumps are leveled.
- Drainage and crowns are re-established.
- Flexibility is restored by chemically rejuvenating the aged and brittle pavement.
- Aggregate gradation and asphalt content may be modified.
- Highway safety is enhanced through improved skid resistance.



Hot in-place asphalt recycling is proven to be the superior choice over traditional pavement resurfacing methods.

Evolving Technology

Earlier generations of hot in-place asphalt recycling equipment used either open-flame heaters or high-intensity infrared heaters, both of which were propane-fueled. These heating systems tend to overheat and damage the asphalt binder, causing smoke and other undesirable emissions. Attempts to avoid such difficulties by applying less heat, often result in aggregate fracturing during the milling stage. Whether the asphalt pavement is over-heated or under-heated, the result is a recycled product that is likely to be of substandard quality. Other common shortcomings include slower operating speeds and hazards associated with the use of highly combustible propane fuel. Many of these earlier shortcomings have now been resolved. When projects are selected by proper pre-engineering and performed under quality control and with commitment to quality assurance, hot in-place recycling can produce asphalt pavements that are equal or superior to pavements rehabilitated with overlays of new hot-mix asphalt.



Recycled hot-mix asphalt pavements generally perform equal to or better than conventional hot-mix asphalt pavements.

Fundamental Benefits

Some fundamental benefits of hot in-place asphalt recycling include the following:

- Substantial savings in cost and time are achieved while protecting the environment.
- Non-renewable resources, such as bitumen and aggregate materials, are conserved.
- Single-lane repair is possible and traffic disruption is minimized.
- Greater motorist safety is assured because dangerous, uneven surfaces are avoided and there are no slippery, oiled surfaces.
- Existing pavement geometrics are preserved, which is particularly important at curbs, manhole covers and bridge underpasses.

AR2000 Super Recycler

Martec's AR2000 Super Recycler is a self-propelled equipment train consisting of one or two identical Preheaters, a Preheater/Miller and a Postheater/Dryer/Mixer. In addition to these main units a conventional paver, a rubber-tired roller and vibratory roller are typically used for laydown and compaction. For faster operating speed additional Preheaters may be added.

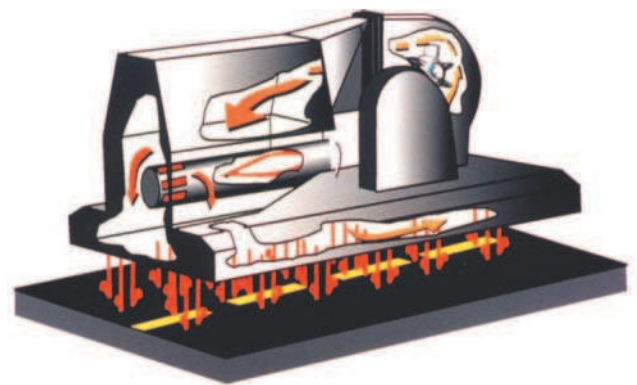


How it Works

The AR2000 Super Recycler implements the Martec Process for hot in-place recycling of asphalt pavements, which gives it a superior performance. This process is done in the following stages: Preheating, Hot Milling, Pavement Quality Improvement, Post-Heating, Drying and Mixing and followed by conventional Laydown and Compaction. Two of the unique and patented features of the Martec Process are the combined forced hot-air with low-level radiant heating and the post-heating, drying and mixing processes.

Preheating

The Preheater unit incorporates a patented heating system, which gently heats and softens the deteriorated asphalt pavement. This pre-heating is achieved by the combination of forced hot-air with low-level radiant heat. Air is heated to about 700°C in a diesel-fuelled combustion chamber. Jets of high-velocity hot-air are blown onto the pavement through thousands of small holes in a heating plenum. The combination of forced hot-air with the low-level radiant heat generated by the heating plenum effectively results in uniform and controlled heating of the wearing course of the asphalt pavement. Used hot-air is vacuumed for reheating, which minimizes heat loss and reduces fuel consumption. This innovative heating system is incorporated into all main units of the AR2000 Super Recycler.



Heating System
Forced Hot-Air with Low-Level Radiant Heat

Hot Milling

The Preheater/Miller applies additional heat, which enables its three milling drums to easily loosen and remove the softened deteriorated asphalt pavement without breaking the aggregate. An automated depth-control feature permits asphalt removal to precise depths in one pass and the milling drums can be adjusted to handle working widths ranging from 3.2 to 4.0 meters.

AR2000 Super Recycler Common Working Configuration

Preheater



Preheater



Preheater/Miller

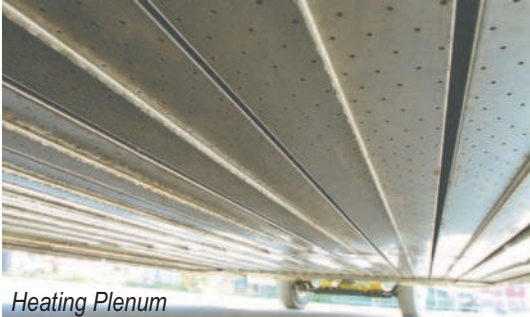




Preheating

Pavement Quality Improvement

In order to meet client specification for final pavement quality, corrective materials such as rejuvenator, which improves asphalt binder properties, and admix or aggregate material that are used for structural correction and upgrading, can be added to the reclaimed asphalt pavement (RAP). Any combination of these corrective materials can be added as required, with their volume and rate of addition being precisely monitored and controlled by an on-board electronic system.



Heating Plenum

Post-Heating, Drying and Mixing

In the Postheater/Dryer/Mixer, RAP is continuously mixed and exposed to the combination of hot-air and low-level radiant heat. The post-heating, drying and mixing process ensures thorough and uniform heating of the RAP and any corrective materials as well as the newly exposed surface of the underlying layer of the pavement, while also providing a final opportunity to remove excess moisture.



Preheating and Hot Milling

Pugmill Mixing

The RAP and any corrective materials, which have reached the desired temperature, are picked up from the pavement surface by a slat conveyor and transferred to the 200 tons per hour twin-shaft pugmill. Quality of the final product is ensured when the RAP and any added materials are thoroughly mixed in this high-capacity pugmill.

Laydown and Compaction

From the pugmill the fully mixed material is transferred to the hopper of a conventional paver for laydown. Compaction is handled by conventional rubber-tired and vibratory rollers.



Hot Milling



Pugmill Mixing

The AR2000 Super Recycler has been designed and manufactured to operate virtually emission free.



Pavement Quality Improvement



Laydown

Hot in-place asphalt recycling can now be safely performed anywhere in the world.



Post-Heating, Drying and Mixing



Compaction

Admix Truck

Postheater/Dryer/Mixer

Paver

Rubber-Tired Roller

Vibratory Roller



Major Advantages of AR2000 Super Recycler

Savings in Cost and Time

Hot in-place asphalt recycling with the AR2000 Super Recycler offers potential savings of up to 35% in cost and 50% in time compared to traditional pavement resurfacing methods.

Environment-Friendly

The AR2000 Super Recycler has been designed and manufactured to operate virtually emission free.

Production Rate

When recycling to depths of 50 millimeters, the daily production rate varies from 4000 to 10000 square meters in a 10 hour shift, depending on road and weather conditions and the equipment train configuration.

Patented Heating System

The patented combined forced hot-air with low-level radiant heating system is capable of uniform and controlled heating of the asphalt pavement wearing course. This enables the AR2000 Super Recycler to recycle all asphalt pavement types such as SMA, polymer modified, porous or OGFC, and Superpave.

Patented Post-Heating, Drying and Mixing System

The patented post-heating, drying and mixing system eliminates temperature differentials existing in RAP and added materials, increases the temperature of the mixture, and at the same time removes residual moisture, which is normally present in deteriorated asphalt pavements and has negative effects on the quality of recycled asphalt.

Superior Bonding

By properly heating pavement edges and the newly exposed surface of the underlying layer of the pavement, hot-welded joints between existing and new paving materials are created during compaction.

Addition of Corrective Materials

Any combination of various corrective materials such as rejuvenator, which improves asphalt binder properties, and admix or aggregate material used for structural correction or upgrading can be added to the RAP as required to meet client specifications.

Diesel-Fuel Capability

For its heating system the AR2000 Super Recycler uses diesel fuel, which is readily available worldwide. This eliminates the need for liquefied gas, such as propane. Hot in-place asphalt recycling can now be safely performed anywhere in the world.

Fuel Efficiency

The AR2000 Super Recycler heating system minimizes heat loss by vacuuming used hot-air for reheating, saving up to 50% in energy costs compared to earlier generations of hot in-place recycling equipment, which use open flame or high-intensity infrared systems.

Easy Mobilization

The main units of the AR2000 Super Recycler can be easily connected to tractor trucks and towed at normal highway speeds between job sites.



AR2000 at work in Italy



AR2000 at work in Canada



AR2000 at work in U.S.A.



AR2000 at work in Japan



AR2000 at work in Costa Rica



AR2000 at work in U.S.A.

Corporate Profile

Martec Recycling Corporation is a Canadian company with headquarters in Vancouver, British Columbia.

Martec has responded to the growing global demand for an economical, environment-friendly and technically sound road rehabilitation technology by developing and manufacturing a new generation of world class equipment for hot in-place recycling of asphalt pavements. Martec offers its international customers several options for using its technology, from sales to leasing and joint ventures. Martec invites major national companies with solid experience in road construction and rehabilitation to build strategic partnerships worldwide.



The AR2000 Super Recycler is manufactured to withstand the stresses of daily operation and the high-speed transport of equipment from project to project.

Martec Recycling Corporation establishes strategic relationships and joint ventures worldwide with experienced partners in road construction and rehabilitation.



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