CATRA
Canadian Association of Tire Recycling Agencies

END USE DEFINITIONS PROJECT

RUBBER MODIFIED ASPHALT (RMA)

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INTRODUCTION

Have you ever wondered what happens to your old tires? Recycling agencies in each Canadian province and territory ensure tires are recycled safely and responsibly. In 2018, over 487,000 tonnes of Canada's end-of-life tires (ELTs) were diverted from landfills and made into environmentally responsible products such as Rubber Modified Asphalt (RMA).

Recycling tires to make RMA has been around for many years and offers excellent performance with environmental and cost benefits. RMA has several uses, including in public roads / highways, community sidewalks, bike pathways, commercial parking lots, and residential driveways. It is important to consider sustainability – specifically, recycling – when designing roads throughout Canada. RMA gives old tires a new use by incorporating them into asphalt, creating value from a waste that might otherwise go into landfills.

WHAT IS RUBBERIZED ASPHALT?

RMA is an alternative to traditional road pavement material. It is produced by mixing crumb rubber – the granules that result from grinding up whole scrap tires from automobiles, trucks, and buses – with conventional asphalt. Rubber modification of asphalt concrete is prepared by one of two methods:

- Dry Process: The addition of crumb rubber as aggerate during mixing.
- Wet Process: The addition of crumb rubber to the asphalt binder before mixing.

The mix is then compacted and incorporated into various asphalt pavement surfaces, with approximately 2,000 scrap tires used for every two-inch lane-mile of rubberized paving.

USE OF RMA

RMA was first used as a pavement material in Phoenix, Arizona in the 1960s and has since continued to advance throughout the United States: extensively in California, Arizona, Florida, and Texas. California's latest Department of Transportation report (2018) confirmed that about half the roads built with asphalt used just over 35,000 tonnes of crumb rubber to build RMA pavements in the state.

RMA was introduced in Canada in the early 2000s and has been primarily tested in Alberta, British Columbia, Ontario, and Saskatchewan. In Canada, the performance of past test sections has not been considered as successful as in the United States. This, along with some errors made in the testing stages, has resulted in limited advances in Canada's use of RMA beyond the testing stages. However, under the right construction practices such as accurate mix design, and with appropriate training for contractors and municipalities, RMA should show similar performance to that of the United States.

ADVANTAGES / DISADVANTAGES OF RMA

The increasing density of road traffic is putting a greater demand on the performance of pavements. Some of this stress on roads can be alleviated by the application of RMA. The addition of ELT rubber has shown to improve the durability of roads as they are more crack, rut, and skid resistant compared to conventional asphalt. RMA has several other benefits including reduced pavement maintenance costs due to improved performance, reduced pavement thickness, reduced traffic noise, and smoother roads. RMA is also recognized as a sustainable product – recycling ELTs to generate new products like RMA is an excellent way of reusing readily available materials in place of new pavement materials.

While there are a many advantages to RMA, there are also some disadvantages that limit its use. Although RMA lowers cycle costs of pavements by reducing maintenance costs, the initial cost of this new application is higher than traditional asphalt. Also, due to the normalization of traditional asphalt, many government transportation departments prefer to continue using old materials and methods instead of new application processes.

In 2005, Saskatchewan's first RMA project successfully built just over 20 lane-kms of pavement. There were no major issues, however, there were some construction challenges along the way. For example, the trucks supplying the RMA were insufficient in delivering the product at the intended temperature, which is an important part of the process. To ensure the RMA mixture was consistent, the contractors needed additional heating storage units on-site. The province practiced good quality control in terms of the mix design and construction to overcome the challenges of RMA. The success of the first project led to the construction of the nine more RMA projects from 2007-2009.

One of the biggest challenges to using RMA in Canada is the cold climate. For instance, Alberta built three test sections in three different geographic regions: Fort McMurray, Edmonton, and Lethbridge. Fort McMurray, the furthest north of the three locations, did not perform as well as Edmonton or Lethbridge because of the colder climate. With accurate construction, application and climate-specific mixtures, however, RMA has proven to withstand colder areas. For example, engineers have developed a RMA mixture that has proven to resist the colder climates in Sweden and Norway, and in states such as Alaska, Massachusetts and New Jersey.

ADVANCES IN RMA

Several advances in RMA over recent years, including improved equipment and technology, have decreased the initial construction costs of RMA. For example, good paving practices, such as using temperature-controlled asphalt mixture equipment, allow for the successful placement and compaction of RMA. Many local testing labs also have properly maintained equipment operated by well-trained workforces for quality assurance for pavements. In California, the effective performance of RMA has lowered its cost due to the high demand for this pavement. It is a cost-effective pavement of choice for the state, and contractors and government transportation departments trust the product.

FURTHER RESEARCH

RMA is a fairly new application in Canada and is still being tested throughout the country for potential use on Canadian roads. Researchers at the University of Waterloo have also been working on the effects of low temperatures on pavements and the option of using recycled rubber for improved pavement performance in Canada.

CONCLUSION

Using crumb rubber from recycled tires in asphalt is a smart solution for a sustainable future. RMA offers several benefits, including lowered maintenance costs, reduced pavement thickness, lower traffic noise, and the diversion of old tires from landfills. The obstacles to RMA could be easily offset with proper mix design and following good construction practices to achieve optimum results. If future pilot projects demonstrate better performance than conventional asphalt, RMA would be well-positioned as another significant option for Canada's ELTs.

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