

Asphalt Recycling Technology

Prepared By
Civil Engineer
Abdullah S. Salh

Intoduction

In-depth recycling is a method implemented worldwide for the rehabilitation of damaged road pavements. One of the major benefits of the method is that the material of a distressed road pavement is simultaneously recycled in-place and mixed with a stabilizing agent, enabling the road pavement to be strengthened without the need to import expensive aggregate. Other benefits include a short construction period, significantly reduced road closures, and improvements relating to safety. These advantages contribute to significantly lower unit costs for road rehabilitation, in comparison with other rehabilitation methods [1]. In addition, environmental issues related to the reuse of road materials increase the advantages of this technology.

Asphalt concrete (commonly called asphalt, blacktop, or pavement , or bitumen macadam, or rolled .Asphalt mixture is a composite material commonly used to surface roads, parking lots, airports, and the core of embankment dams. Asphalt mixtures have been used in pavement construction since the beginning of the twentieth century.[3] It consists of mineral aggregate bound together with asphalt, laid in layers, and compacted. The process was refined and enhanced by Belgian-American inventor Edward De Smedt.

The terms asphalt (or asphaltic) concrete, bituminous asphalt concrete, and bituminous mixture are typically used only in engineering and construction documents, which define concrete as any composite material composed of mineral aggregate adhered with a binder. The abbreviation, AC, is sometimes used for asphalt concrete but can also denote asphalt content or asphalt cement, referring to the liquid asphalt portion of the composite material.



Fig1. [Asphalt batch mix plant](#)



Fig.2 . A machine laying asphalt concrete, fed from a dump truck

Asphalt Recycling

Asphalt concrete is a recyclable material that can be reclaimed and reused both on-site and in asphalt plants.[22] The most common recycled component in asphalt concrete is reclaimed asphalt pavement (RAP). RAP is recycled at a greater rate than any other material in the United States.[23] Asphalt concrete mixes may also contain reclaimed asphalt shingles (RAS). Research has demonstrated that RAP and RAS can replace the need for up to 100% of the virgin aggregate and asphalt binder in a mix, but this percentage is typically lower due to regulatory requirements and performance concerns. In 2019, new asphalt pavement mixtures produced in the United States contained, on average, 21.1% RAP.



Fig3.Chunks of Reclaimed Asphalt Pavement (RAP) are deposited for recycling.

Recycling methods

1-Asphalt Plant Recycling method:

Recycled asphalt components may be reclaimed and transported to an asphalt plant for processing and use in new pavements, or the entire recycling process may be conducted in-place. While in-place recycling typically occurs on roadways and is specific to RAP, recycling in asphalt plants may utilize RAP. In 2019, an estimated 97.0 million tons of RAP and 1.1 million tons of were accepted by asphalt plants in the United States.

RAP is typically received by plants after being milled on-site, but pavements may also be ripped out in larger sections and crushed in the plant. RAP millings are typically stockpiled at plants before being incorporated into new asphalt mixes. Prior to mixing, stockpiled millings may be dried and any that have agglomerated in storage may have to be crushed.

RAP may be received by asphalt plants as post-manufacturer waste directly from factories, or they may be received as post-consumer waste at the end of their service life. Processing of RAP includes grinding the shingles and sieving the grinds to remove oversized particles. The grinds may also be screened with a magnetic sieve to remove nails and other metal debris. The ground RAS is then dried, and the asphalt cement binder can be extracted.[25] For further information on RAS processing, performance, and associated health and safety concerns, see Asphalt Shingles.

2-In-place recycling methods:

In-place recycling methods allow roadways to be rehabilitated by reclaiming the existing pavement, remixing, and repaving on-site. In-place recycling techniques include rubblizing, hot in-place recycling, cold in-place recycling, and full-depth reclamation.[22][26] For further information on in-place methods, see Road Surface.



Fig.4. A road being resurfaced

RECYCLING BY THE NUMBERS (IN UNITED STATE)

2.3 Million Metric Tons The amount of CO₂e spared from the atmosphere in 2020 through the use of reclaimed asphalt pavement (RAP) in new mixtures

87.0 Million Tons The amount of reclaimed asphalt pavement (RAP) recycled into new mixes in 2020

93% The percentage of asphalt mixture reclaimed from old asphalt pavements and put back to use in new pavements in 2020

586,000 Tons The amount of recycled asphalt shingles (RAS) put to use into asphalt mixes in 2020

24 Million Barrels The amount of virgin asphalt binder that was replaced by recycled binder from RAP and RAS in 2020

finally

We conclude that bitumen recycling has many benefits such as environmental protection and reducing road costs, so the Kurdistan Regional Government should seriously think about promoting bitumen recycling and encourage contractors to establish bitumen recycling plants To carry out our road maintenance work at low cost.

References:

- Material-Related Aspects of Asphalt Recycling—State-of-the-Art [Robert Karlsson](#) and [Ulf Isacsson](#)
- Chapter 9 Asphalt technology by James J 2020
- Atotally Recycled mix Asphalt By Juel Jesus 2006
- Reclaimed Asphalt Pavement By Elseifi, Mostafa 2007

Prepared by : Civil Engineer (Abdullah S. Salh)