

Warm mix asphalt

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Warm mix asphalt (WMA) is not a hot mix asphalt (HMA), it's just warm mix! The WMA production temperature typically ranges from 100 to 140°C, whereas for HMA it ranges between 150 and 170°C [1]. The concept of WMA evolved around the year 2000 in Europe and Australia [2,6], and by the year 2004 it attracted considerable attention of the highway engineering community [7,8].

The WMA has certain distinct advantages over HMA. Some of them can be mentioned as follows [7,8]:

- As the temperature level is relatively low, air-pollution caused due to emission and fumes is less. Also, the aging of asphalt binder during the heating process (called as short-term aging) is controlled considerably.
- Less energy is spent while manufacturing.
- Temperature drop during mix transportation is no longer a concern. The construction season expands and the haul distance increases.
- Compacting effort is less so as to achieve a specified compaction level.

The manufacture of WMA is simple and does not require any major modification to the hot-mix plant system. Various ingredients used in the WMA preparation are patented products [3,8], and the respective manufacturing processes are different. Some of these processes can be mentioned as follows:

- In one type of manufacturing process, fine powder is added which releases (upon heating) its hydration-bound water and generates foaming effect to the asphalt binder. The lubricating action keeps the mix workable at temperature range of 130-140°C [3,5].
- Another suggested way of WMA production involves a two-stage process. In the first stage, a specially manufactured soft asphalt binder is used which covers the aggregate surface at 100-120°C. In the second stage, harder grade of asphalt binder is added in powder, foam or, emulsion form to these precoated aggregates. The final mixture can be compacted at temperature as low as 80-90°C [1,3].
- In another process, organic additives are mixed with asphalt binder, which melt at about 100°C and these chemically change the viscosity-temperature behaviour of asphalt binder. The mix remains workable at temperature as low as 90°C [3,5].

Warm asphalt technology seems to be quite promising. It consumes 30% less energy, reduces carbon dioxide emission by 30%, and reduces dust emission by 50-60% compared to hot mix asphalt [4]. This technology does not involve any major modification to the mixing plant and the construction procedure. Further research is needed so as to validate the expected field performance of such a mix, specially, with

reference to mix compactibility, rate of gain of structural strength after construction (i.e. curing), rutting potential, moisture sensitivity etc [3,8].

References

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