## $\textbf{SPRINGERNATURE}\ Link$

Login

**∑** Menu

**Q** Search

় Cart

Home > Recent Trends in Transportation Infrastructure, Volume 1 > Conference paper

## Suitability of Rejuvenator Addition Method for Hot Mix Asphalt Recycling

| Conference paper | First Online: 22 July 2023

| pp 127–136 | Cite this conference paper



Recent Trends in Transportation

Infrastructure, Volume 1

(TIPCE 2022)

Ankit Sharma 🔀, Gondaimei Ransinchung Rongmei Naga & Praveen Kumar

Part of the book series: Lecture Notes in Civil Engineering ((LNCE, volume 354))

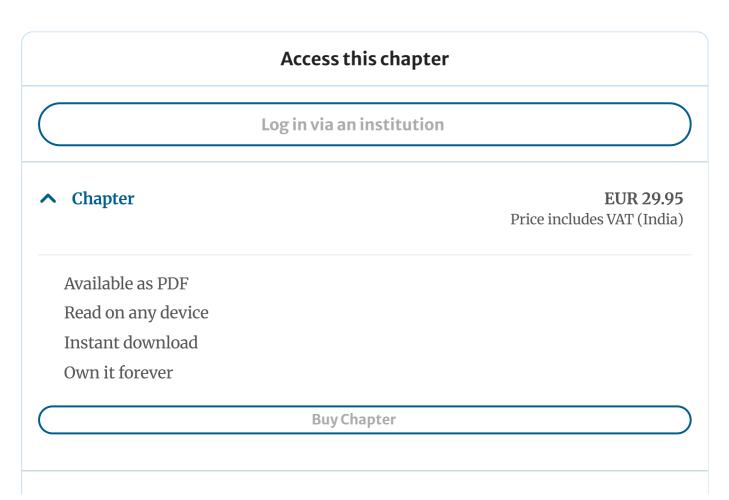
Included in the following conference series: <u>International Conference on Transportation Infrastructure Projects : Conception to</u> Execution

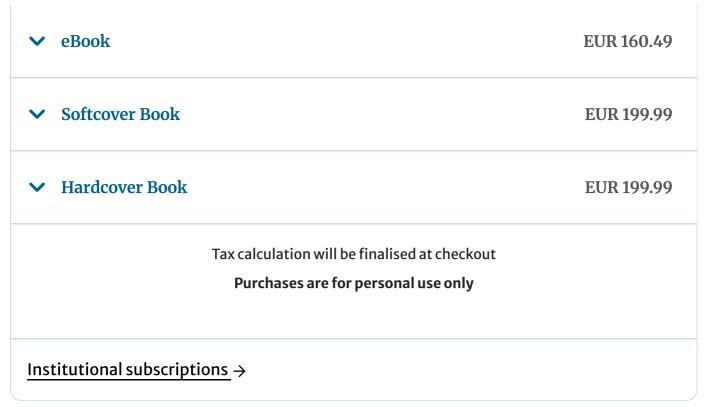
**137** Accesses

## Abstract

In India, recycling of the reclaimed asphalt pavement (RAP) material has increased noticeably during the last decade. Several issues like active RAP binder in the RAP material are yet to be resolved. Moreover, the method of rejuvenator addition in the hot recycled mix is an open topic to debate. In the hot in-place and hot in-plant recycling processes, a rejuvenator is added to the RAP material. Also, some hot in-plant units/batch plants add a rejuvenator in the bitumen tank, which (soft binder) is later mixed with RAP and virgin aggregates in the pug mill mixer. In the present study, the suitability of the rejuvenator addition method has been evaluated through an experimental study. The two mixing methods were analyzed. In the first method (*soft binder*), the rejuvenator was blended with the base binder and mixed with the virgin aggregates and the RAP material. In the second method (*rejuvenated RAP*), the rejuvenator was directly added to the warm RAP material and conditioned. Then, the rejuvenated RAP was mixed with the base binder and the virgin aggregates. The experimental campaign includes indirect tensile strength (ITS), Marshall stability (MS), tensile strength ratio (TSR), Marshall quotient (MQ), and an analysis of the volumetric parameters, viz., percent air voids (Va, %), voids in mineral aggregates (VMA), etc. The results indicated that the MS, ITS, and TSR have improved by shifting to the *rejuvenated RAP* method from the *soft blend* method. As statistically proved, it can be concluded that the *rejuvenated RAP* method is better than the soft binder method.

## This is a preview of subscription content, <u>log in via an institution</u> [7] to check access.





## References

1. IRC: 120 (2015) Recommended practice for recycling of bituminous pavements, p 72

**Google Scholar** 

2. Zaumanis M, Cavalli MC, Poulikakos LD (2020) Effect of rejuvenator addition location in plant on mechanical and chemical properties of RAP binder. Int J Pavement Eng 21:507–515. https://doi.org/10.1080/10298436.2018.1492133

Article Google Scholar

**3.** Lo Presti D, Jiménez del Barco Carrión A, Airey G, Hajj E (2016) Towards 100% recycling of reclaimed asphalt in road surface courses: binder design methodology and case studies. J Clean Prod 131:43–51. <u>https://doi.org/10.1016/j.jclepro.2016.05.093</u>

Kriz P, Grant DL, Veloza BA, Gale MJ, Blahey AG, Brownie JH, Shirts RD, Maccarrone S (2014) Blending and diffusion of reclaimed asphalt pavement and virgin asphalt binders. Road Mater Pavement Des 15:78–112.
 <a href="https://doi.org/10.1080/14680629.2014.927411">https://doi.org/10.1080/14680629.2014.927411</a>

Article Google Scholar

- 5. West RC, Copeland A (2015) High RAP asphalt pavements Japan practice—lessons learned. Lanham, MD. <u>https://www.asphaltpavement.org/PDFs/EngineeringPubs/IS139\_High\_RAP\_Asphalt\_</u> <u>Pavements\_Japan\_Practice-lr.pdf</u>
- 6. Mashru D (2015) Use of recycled asphalt pavement in asphalt plants—different approaches and pros and cons. NBM&CW, p 1. <u>https://www.nbmcw.com/equipment-machinery/construction-equipments/road-construction-equipment/use-of-recycled-asphalt-pavement-in-asphalt-plants-different-approaches-and-pros-and-cons.html. Accessed 17 Feb 2022</u>
- **7.** MORTH (2015) Specifications for road and bridge works. MORTH, p 906

**Google Scholar** 

- 8. Asphalt Institute (2014) MS-2 asphalt mix design methods, pp 1–197. <u>https://bookstore.asphaltinstitute.org/catalog/book/ms-2-asphalt-mix-design-methods</u>
- **9.** Kamada O (2018) The recycling technology of asphalt pavement in Japan. Pavement Preservation Recycl. Summit. <u>https://www.youtube.com/watch?v=msC9xO7s68E</u>. Accessed 1 Apr 2020
- **10.** Monden T (2014) Quality of RAP mixture in Japan, p 36. <u>https://onedrive.live.com/?</u> authkey=%21AHqoB-

Rhp7ja3WU&cid=10043A6CE6CDF378&id=10043A6CE6CDF378%218763&parId=10 043A6CE6CDF378%2121280&o=OneUp

 Metcalf CT (1959) Use of Marshall stability test in asphalt paving mix design, pp 12– 22. <u>http://onlinepubs.trb.org/Onlinepubs/hrbbulletin/234/234-002.pdf</u>

## **Author information**

#### **Authors and Affiliations**

**Civil Engineering Department, IIT Roorkee, Roorkee, India** Ankit Sharma, Gondaimei Ransinchung Rongmei Naga & Praveen Kumar

Civil Engineering Department, Swami Keshvanand Institute of Technology, Management & Gramothan (SKIT), Jaipur, India Ankit Sharma

#### **Corresponding author**

Correspondence to Ankit Sharma.

## **Editor information**

#### **Editors and Affiliations**

Civil Engineering, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand, India Rajat Rastogi

#### CSIR-Central Road Research Institute, New Delhi, India

G. Bharath

Civil Engineering, Indian Institute of Technology Bombay, Mumbai, Maharashtra, India

Dharamveer Singh

## **Rights and permissions**

# Reprints and permissions Copyright information

© 2023 The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd.

#### About this paper

#### **Cite this paper**

Sharma, A., Rongmei Naga, G.R., Kumar, P. (2023). Suitability of Rejuvenator Addition Method for Hot Mix Asphalt Recycling. In: Rastogi, R., Bharath, G., Singh, D. (eds) Recent Trends in Transportation Infrastructure, Volume 1. TIPCE 2022. Lecture Notes in Civil Engineering, vol 354. Springer, Singapore. https://doi.org/10.1007/978-981-99-3142-2\_11

.RIS ± .ENW ± .BIB ±

DOI	Published	Publisher Name
https://doi.org/10.1007/9	22 July 2023	Springer, Singapore
78-981-99-3142-2_11		
Print ISBN	Online ISBN	eBook Packages
978-981-99-3141-5	978-981-99-3142-2	Engineering
		Engineering (R0)

#### **Publish with us**

Policies and ethics [2]