









6. Some fibers had high tensile strengths than bituminous mixes that indicates that they may be able to strengthen bituminous mixtures' cohesive and tensile properties.

Based on these conclusions, it is recommended that fiber be used as a sustainable additives component in the creation of asphalt mixtures. But more research needs to be done on this project. It would be wonderful to investigate the impact of fibers on the resistance of asphalt mixtures to rutting, fatigue cracking, and moisture-induced damage.

## References

- [1] V. M. Milind and Dr. K. N. Kadam "A Comparative study on rigid and flexible pavement: a review", IOSR Journal of Mechanical and Civil Engineering, vol. 13, no. 3, pp. 84-88, May- Jun. 2016.
- [2] S. M. Nuha, H. A. Asim, R. K. Mohamed and A. Mahrez "A review on using crumb rubber in reinforcement of asphalt pavement ", The Scientific World Journal, vol. 2014, Article ID 214612, 21 pages, Abbrev. 30 January 2014.
- [3] V. Astha, Dr. O. Netula and K. Faraz "A review on comparative study of natural fiber modified bitumen and conventional modified bitumen ", Journal of Huazhong University of Science and Technology, vol. 50, issue. 3. May, 2021.
- [4] Y. A. Nura, B. N. Madzlan, H. S. Muslich, U. Aliyu and M. S. Saeed "Performance evaluation of waste palm oil fiber reinforced stone matrix asphalt mixtures using traditional and sequential mixing processes," Case Studies in Construction Materials, vol. 15, no. 14 November 2021.
- [5] D. B. Herve, B. Hassan, C. Roche and A. C. Pronk "Fatigue of bituminous mixtures," Article in Materials and Structures, April 2004.
- [6] E. Ahmed, H. Mahdi and K. Kandil "Utilization of Fiber Modified Stone Matrix Asphalt (SMA) Mixes in Egypt", Al-Azhar University Civil Engineering Research Magazine, 2020.
- [7] A. Mahrez, M. R. Karim and H. Y. Katman "Fatigue and deformation properties of glass fiber reinforced bituminous mixes", Journal of the Eastern Asia Society for Transportation Studies, vol. 6, pp. 997-1007. January 2005.
- [8] A.A. Md. Maniruzzaman, A. W. Hamad, A. M. Maleka and M. Elsergany "Rheological properties of cellulose oil palm fiber (COPF) modified 80-100 asphalt binder", Journal of Advanced Research in Applied Mechanics, vol. 7, no. 1, pp. 21-30. 2015.
- [9] N. Kiran and A. Ravitheja "Characteristics of stone matrix asphalt by using natural fibers as additives", Materials Today: Proceedings, vol. 19, Part 2, pp 397-402, 19 August 2019.
- [10] T. Ramit and S. Jaspreet "Study of performance of bituminous concrete with addition of coir/coconut fiber", International Journal of Mechanical Engineering and Technology (IJMET), vol. 8, no. 7, July 2017, pp. 1793-1799.
- [11] A. Zaltuom, M. Muftah and A. Akhmira, "Studying the Effect of Adding the Natural Fibers on Properties of Bituminous Mixtures,"
- [12] M. E. Eisa, M. B. Basiouny and D. I. Daloob "Effect of adding glass fiber on the properties of asphalt mix," International Journal of Pavement Research and Technology, vol. 14, no. 5, pp. 403-409, Abbrev.30 September, 2020.
- [13] S. N. Pasha, Dr. M. Madhuri "Investigation of modified bitumen using glass fibre in bituminous concrete," International Journal of Advance Research and Innovative Ideas in Education, vol. 3, no. 6, pp. 298-311, 2017.
- [14] S. Y. Matar "Studying the effect of adding glass fiber on the mechanical properties of asphalt mixtures," Master of Science in Infrastructure Management- Civil Engineering, The Islamic University-Gaza, February 2017.
- [15] N. F. A. Musa, M. Y. Aman, Z. Shahadan, M. N. M. Taher, Z. Noanai "Utilization of synthetic reinforced fiber in asphalt concrete - a review ," International Journal of Civil Engineering and Technology (IJCIET), vol. 10, 05 May 2019, pp. 678-694. Access online on 15 June 2022.
- [16] Y. A. Nura, B. N. Madzlan, H. S. Muslich, U. Aliyu and M. S. Saeed "Performance evaluation of waste palm oil fiber reinforced stone matrix asphalt mixtures using traditional and sequential mixing processes," Case Studies in Construction Materials, vol. 15, no. 14 November 2021.
- [17] National Cooperative Highway Research Program "Fiber Additives in Asphalt Mixtures," Washington, D.C 2015 <https://nap.nationalacademies.org/catalog/22191/fiber-additives-in-asphalt-mixtures>.