

# **APPLICATIONS OF SCRAP TIRE RUBBER IN ASPHALTIC MATERIALS: STATE-OF-THE-ART ASSESSMENT**

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## **ABSTRACT**

Currently, due to insufficient utilization of scrap tires, large volumes of these tires are either landfilled, stockpiled, or destroyed (i.e. burned) in an environmentally unfriendly fashion. Stockpiling not only occupies valuable space, causes loss in resources, and waste of energy, but also results in health hazards and creates ideal conditions for breeding mosquitoes and rodents. Based on analysis of potential applications of scrap tires, it was concluded that the best use for scrap tires is in application as an ingredient of asphaltic paving materials and other construction materials. This report primarily presents information on uses of discarded tires in construction of asphaltic concrete pavements. In general, two processes, wet and dry, are used in manufacture of asphaltic paving materials incorporating scrap tires. Prior to their use, scrap tire rubber is ground to a particulate form which is known as Crumb Rubber Modifier (CRM). In the wet process, CRM is blended with asphalt-cement to produce a modified asphalt-rubber (AR) binder. The resulting binder is used in the same manner as the conventional asphalt. Two technologies that use wet processes are the McDonald (batch) technology and the continuous technology. In the case of dry processes, CRM is mixed with the aggregate prior to inclusion of asphalt-cement to the resultant mixture. The two most common technologies that involve the use of dry processes are the PlusRide technology and the generic technology (TAK System). In general, rubberized pavements are expected to outperform conventional asphaltic pavements. However, available field performance data are limited to substantiate this trend. More research is needed to compare the performance of rubberized systems with conventional materials and to establish design specifications for rubberized materials for paving and other applications. Installation cost of CRM rubberized pavements are 50-100% higher than that for unmodified asphaltic materials. In order to recover this increased initial cost, service life of rubberized systems has to increase by 50-100% over conventional asphaltic mixtures. This is yet to be established for many of the CRM containing paving materials. Economic analyses has revealed that the dry processes are more economical than the wet processes. At the present time, the cost of the rubberized material produced by the generic ("dry") system is minimum among all the technologies available. Additionally, this involves asphalt mixing process very much similar to that used for conventional materials. Therefore, this system appears to have the best outlook for its widespread commercial applications. However, limited published data are available on this system. Thus, more research data must be developed and published for widespread use in order to derive both economical and technical advantages. The data obtained from such investigations can be utilized in establishing optimum mixture proportions for such generic systems.