“Technological Solutions for Carbon-foot print reduction in asphalt mixtures”

Tebaldi-Romeo

Environmental sustainability is a major concern in road infrastructures, which contribute significantly to global warming due to the high consumption of energy for their construction, the use of raw materials, and the generation of a large amount of waste. In recent decades, many efforts have been devoted to increasing the use of waste materials in pavement construction while not compromising the qualities of the pavements themselves, responding to the request of the European Commission to promote the use of cleaner materials and sustainable technologies to extend the life cycle of pavements. For these reasons, the market has been driven to explore new products that provide resistance and durability with technically feasible solutions while minimizing the impact on the environment.

The most widely used recycling material in the field of road pavement is Recycled Asphalt Pavement (RAP), for the production of new asphalt. Unfortunately, due to technological and scientific limitations, the amount of RAP reuse in asphalt mixes is often limited to low percentages (20-30%). It is therefore essential to successfully find solutions that can significantly increase the amounts of RAP to be reused not only in the deeper layers of the pavement but also in the more superficial ones (binder and wearing course). Moreover, more recently, the concept of recycling has been moving toward a focus on reusing waste materials, otherwise destined for landfill, such as waste glass, steel slag, tires, and waste polyester.

The Research Project aims at exploring the following key points:

- Use of recycling additives with specific characteristics that allow the reactivation of the aged asphalt binder in the RAP and enable the reuse of high amounts of recycled mix without compromising the performance
- Reuse of by-products that would otherwise be destined for landfill; particularly plastics and waste products from steel production (steel slag and ladle dust)
- Evaluation of the service life of pavements made with high percentages of recycled material, comparisons with traditional pavements, and identification of solutions that can increase their service life
- Evaluation of environmental impacts over the full life cycle of the recycling products (Life Cycle Analysis) considering: material production, design, construction, use, maintenance and rehabilitation.