

Innovative Initiatives of Italian Railway State Group for Sustainable Mobility

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Introduction

Ferrovie dello Stato Italiane Group (FS) is one of the founders of the Italian National Centre for Sustainable Mobility (MOST), involving eight Sister Companies of the Group specialized in different transport systems. The main purpose of the MOST is to bring together 25 Principal Italian Universities and 24 big Companies leaders in the mobility, to work together developing innovative solutions for a sustainable mobility.

Analysis

The current Projects carried out by FS will be presented, emphasizing objects, critical aspects and expected advantages. Among the others, the “Tuss” Project aims to demonstrate a combined car-sharing, ride-sharing, last miles service to/from transport Hubs to measure its effectiveness in attracting users from other unsustainable transport modes using electric and connected vehicles and partly automated, combining sharing and pooling. The Project “DARIM” aims to demonstrate that using Beyond Visual Line of Sight (BVLOS) drones in the inspection of railways lines to cover big distance at high speed. The detection of obstacles on track is currently possible using several alternative systems but the challenge we are facing with another Project, is to transfer in real time the information to a train early enough to allow him to activate the braking systems and bring it to a stop.

Conclusions

FS is involved in the MOST in many Research Projects for Railways. For the success of every innovative initiative is crucial an adequate communication of the positive environmental results, a collaborative context between Universities and Private Research Centres, the accessibility to the new transport applications for all social levels of the community and finally the emphasis on safety issues.



Figure 1. Regional Train in Italy.

Carbon footprint and possibilities of using recycled plastics in railway structures

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Introduction

In railway transport, the biggest contributors to greenhouse gas emissions are the materials used for infrastructure construction and maintenance. Materials with very high carbon footprint, such as concrete and steel, have typically been widely used. This presentation focuses to find out the possibility to use materials with smaller carbon footprint in railway structures. One of the potential materials from this perspective could be recycled plastic.

Analysis

Sleepers were selected as a potential target for recycled plastic. Recycled plastic fractions to be examined are currently recycled by incineration, ABS plastic from electrical and electronic waste and the pulping reject of liquid packaging board. The adequacy of the mechanical properties of selected materials for use in railway sleepers was examined through laboratory tests. Tensile and bending tests were performed in the laboratory with universal testing machine on test samples injection molded from recycled fractions. In addition, softening temperatures of the materials were measured with Vicat and HDT tests. Based on the recycling flows of materials studied, in Finland approximately 15,3 km of track could be constructed from an annual recycling volume of ABS plastic contained in electrical and electronic waste and approximately 19,3 km of track from the annual recycling volume of the pulping reject. Based on the results of the mechanical tests, it can be concluded that among the tested materials, ABS plastic recycled from electrical and electronic waste would clearly be a more potential alternative to be used in railway structures than the liquid packaging board pulping reject.

Conclusions

As a result of the work, it was found that the carbon footprint of railway structure could be reduced by using recycled plastics in sleepers. The reduction of the carbon footprint is significantly affected by the fact that the recycled plastic material already has one life cycle behind it and after the sleeper life cycle, the material can be recycled again, resulting in lower net emissions than with materials traditionally used in railway structures.

References

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