Croatian asphalt association

Warm Mix Asphalt

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Cerema
Direction technique
Infrastructures de transport et matériaux

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Highway Engineer

In charge of methodology of road design and road maintenance in Cerema and IDRRIM

In the past, he worked as a project manager for new roads, later as manager in charge of a road network maintenance.

Member and French talking secretary of D1 Committee “Infrastructure Asset Management” in World Road Association

Cerema

Centre d'études et d'expertise sur les risques, l'environnement, la mobilité et l'aménagement

State public agency created on 1st of January 2014.

Cerema means: Centre for studies and expertise on risks, environment, mobility and urban and country planning.

What’s about SETRA?

SETRA (Technical Center for Highways and Motorways) was integrated into Cerema.

The missions of Cerema

To promote and facilitate territory management methods including environmental, economic and social factors.

To support public and private entities in the transition towards a low carbon-economy, environmentally friendly and saving resources.

To support the state and regional stakeholders, in terms of engineering and technical expertise.

The missions of Cerema

To assist the public actors in managing their transport infrastructure assets.

To reinforce the capacity of local authorities to face up to the risks which their territories and populations are subjected to.

To promote at territorial, national, European and international level the state of art.

Multiple intervention methods

Evaluation of public policies

Expertise and engineering

Innovation and research

Share of knowledge

Standardization and certification

Territorial establishments

Some figures

3 100 employees

220 national and international experts

250 M€ budget

29 sites in France

66 national expertise hubs

33 associated research teams

17 departments/laboratories

4 specialized test centres

Centre for Safety, Environment and Asset Management(CSEP)

Pascal Rossigny, Head of a Department which covers the following topics:

- Geometric design of roads and highways
- Earthworks, roads drainage, pavement
- Safety equipment
- Environment
- Maintenance of infrastructures.

Downloadable technical guides

http://www.infra-transports-materiaux.cerema.fr/technical-guides-r781.html

Guides translated into English

Use of standards for hot mixes

Hot remixing

Continuous hot mix production

Valorization of local materials

Technical guide

The use of standards for hot mixes

The Institute of Roads, Streets and Infrastructure for Mobility (IDRRIM) brings together all public and private entities in the field of mobility, infrastructure and urban areas: government, local authorities, network operators, technical services , private engineering firms, companies, suppliers, schools, training centers and research organizations.

IDRRIM

The Public-private association IDRRIM, was created on 19th of January 2010 at the initiative of the Ministry of Ecology, Sustainable Development and Energy, the Assembly of Departments of France, the engineering firms federation Syntec and the National Federation of Public Works companies.

Two goals:
- to connect the community of public and private entities active in the field of mobility infrastructure and urban spaces, establishing a new partnership.
- to develop infrastructure assets toward sustainable design and management, and better optimization of their use

The Methodology Committee

The "Methodology" committee is dedicated to formulate a shared vision of state of the art.

Specifically, the committee is responsible for drafting methodological or technical guides, completing regulatory documents or standards about road design and road maintenance.

Chairman of the Methodology Committee: Pascal Rossigny

Guidelines

Surface characteristics: Evenness, Friction

Warm mix asphalt

Information note on asbestos

How to use new standards

Information of results of research operations

Examples of contractual technical documents

Guidelines
« under construction »

- Surface dressing
- Slurry seal
- Hot mix asphalt
- Cold mix asphalt
- Manual for low traffic roads design
- Guide for pavement reparation
- Guide for medium and high rate recycling.

GEPUR: Guide for local road asset management

TRACC: database of Road Techniques Adapted to Climate Change

Improvement of techniques following the winter damage.

Warm asphalt asphalts

Hot mixes

Type of bitumen	Temperature of coating
70/100 – 50/70	Between 140°C and 160°C
35/50	Between 150°C and 170°C
10/20 – 15/25 – 20/30	Between 160°C and 180°C

With methods that we will develop in next slides, you can produce and lay down the asphalt concrete at lower temperatures.

It is the warm mix asphalt

The issue is to get the good workability

The different methods of lowering the temperature

Three large groups:

- the additivation;
- the use of foamed bitumen;
- the introduction in 2 times of components and foaming bitumen

Additivations

Liquid additives

Waxes

Additivation by liquid additives

Liquid additives allow to improve the coating by reducing surface tension at the interface binder/aggregate.

The amount of liquid additive incorporated in the bituminous mixture represents usually 0.2 to 0.5% of the mass of bitumen.

Additivation by waxes

Wax reduces the viscosity of the bitumen and then you can coat the material at a lower temperature.

The amount of wax incorporated in the bituminous mixture is usually 1 to 2% of the mass of bitumen.

These waxes solidify at temperatures in the range of 90 to 100 ° C, then you have very few time to implement surface layer.

Bitumen suppliers offer special ready-for-use binders.

Usage of foamed bitumen

Bitumen is expanded to foam by introducing water. This expansion allows to coat materials at a lower temperature.
An additive in water phase is sometimes used to improve the coating of components by the foam.
The amount of water included in the mixture is usually 2 to 4% of the mass of bitumen.

Introduction in 2 times of components and foaming bitumen

Introduction of wet materials

In plant, at the moment of mixing, you put wet materials (wet sand).

Foaming and expansion of the bitumen; then it is easier to coat the aggregates.

This method requires to get the good water content of the sand. Addition of water may be necesary.

The amount of incorporated water (natural moisture and added water) to the bituminous mixture is usually between 1 and 2% of the mass of granulates materials, or between 15 and 40% of the mass of bitumen.

Introduction of two bitumens

You introduce different grade bitumen in the mixer.

The introduction of a first bitumen with low viscosity allows a first aggregate coating at lower temperatures.

The intoduction of a second bitumen with a harder grade, possibly in the form of foam, provides the desired mixture.

Adaptation of asphalt plants

Dosing system of additives and / or water

Adjustment of the burners

Treatment of water vapor

Application

Coating

Workability of asphalt is different

Take care of temperature of coating

To warm the table of finisher

To modify the table height

Adjustment of the compaction facility

Caution with bonding layers and seals

Difficult manual application

Incentive

Convention of a voluntary commitment signed in 2009 by:

SYNTEC-INGÉNIERIE

The commitments of this agreement

Preserving the non-renewable resources

Preserving biodiversity and natural environments

Reduce greenhouse gas emissions

Reduce water consumption at earthworks sites

Increase the environmental performance of companies and on road.

The incentives

Convention of voluntary commitment: warm mix asphalt

Other criteria for tender selection than price, in particular environmental criteria

Energy balance, eco-comparison, SEVE

Environmental raiting

Environmental rating can be attributed to the following indicators (not exhaustive):

- temperatures of manufacture and / or implementation of asphalt;
- indicators chosen in an eco-comparator tool: energy consumption, emission of greenhouse gases, etc.

Environnemental benefit

(from supplying raw materials to coating)

Reduction of manufacture temperature	**30°C**
Reduction of energy consumption	5 to 8 %
Reduction of greenhouse gas emission	5 to 8 % except with certain additives
Reduction of burner's consumption	25%

Working condition benefit

To improve working conditions: less heat, less emissions of fume PAHs (Polycyclic Aromatic Hydrocarbons)

A test got to show decrease of factor 3 of concentrations of PAHs when the manufacturing temperature decreases from 170 ° C to 130 ° C.

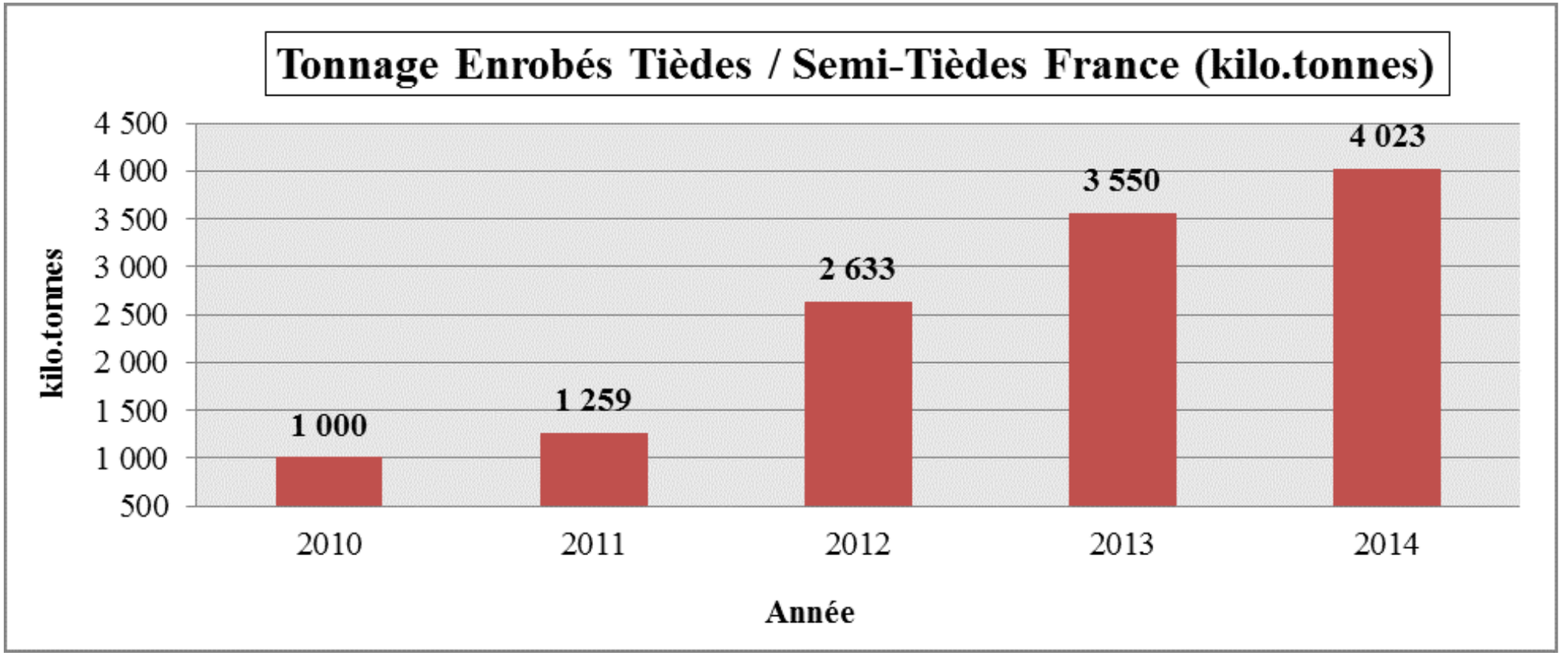
The warm mix in France

Since 2008, the tonnage of warm mix asphalt is increasing.

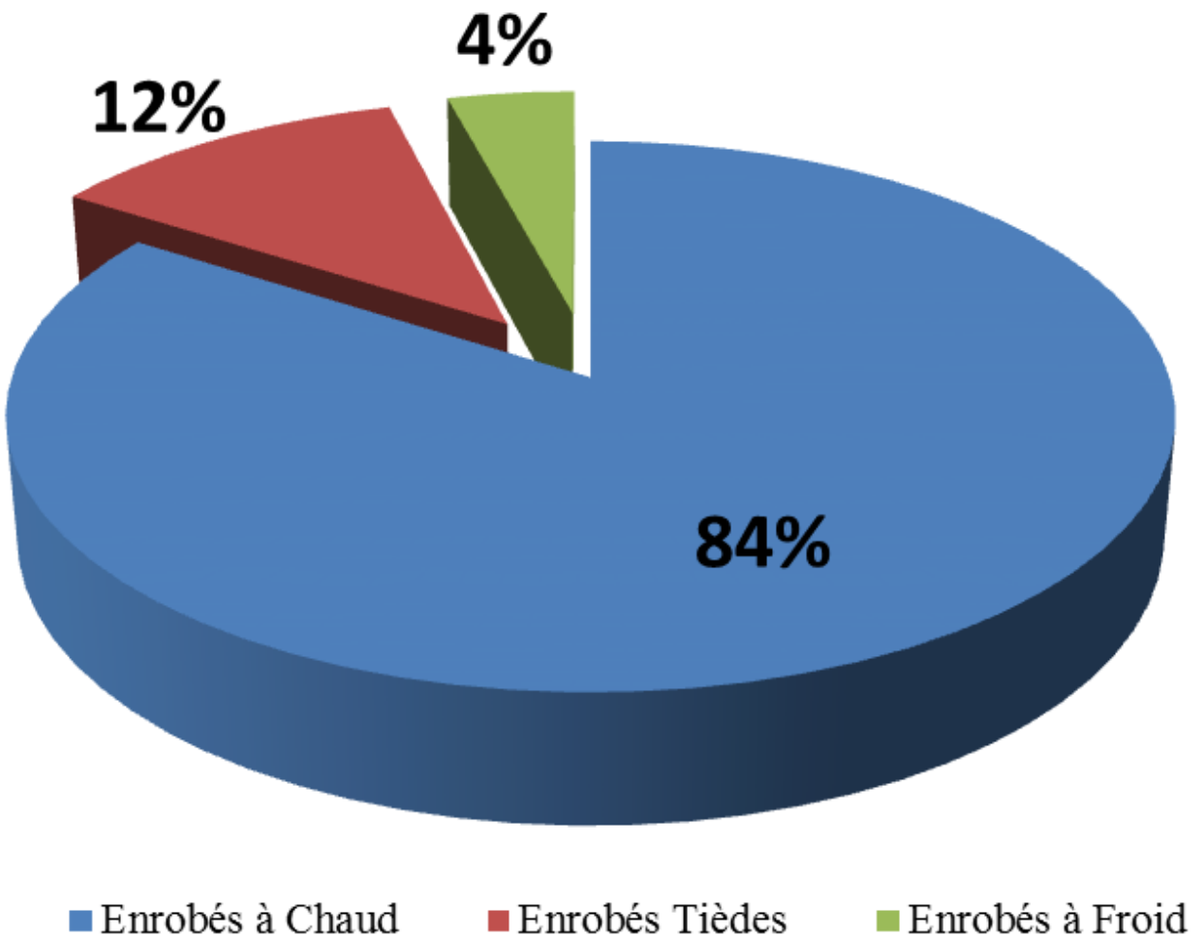
The aim of the Voluntary Commitment Convention for 2012 was to reach a tonnage of 1.5 million tons (500 000 tons in 2009)

This goal was far exceeded with 2.633 million tons in 2012, reaching a production of 4.023 million tons in 2014 .

Evolution of warm mixes



Répartition de la production d'enrobés bitumineux en 2014



Quality, durability

The Cerema provides technical monitoring following the innovations and experiments.

47 sites with 3 techniques described here, have been followed for 9 years.

Quality is similar to hot mix asphalt once the implementation was successful

Report on monitoring the warm mix asphalt

The surface characteristics (macrotexture and adhesion) are identical and develop on the same way.

Only one technique, the first implementation of the sample, presented significant degradation.

But it is no longer used since 2009.

It is important to emphasize that the oldest wearing course is nine years old and we must continue to survey until end of life to know if the lifetime is the same for warm mix asphalt and hot mix asphalt.

Regarding bearing layer (structural layers), we cannot talk yet about lifetime of warm mix asphalt (not enough data).

Following the monitoring report

Note to managers of national roads:
"I encourage you to use temperature reduction processes for wearing courses of your network, taking into account the local possibilities and applying the recommendations presented by the Cerema in its report. "

Conclusion

Advantages:

Environmental benefit

Working condition benefit

Good performance

A guide to describe the state of knowledge and the cautions.

Cerema

IDRRIM

Abaissement de température des mélanges bitumineux

État de l'art et recommandations | Octobre 2015

Collection | Références

Succède aux éditions du Sétra

rema

art et matériaux

Thank you for your attention