**AICPR- Technical committee D2 – Work group D2.4 : Innovation management**

**Case study: Very thin asphalt concrete 0/6 (BBTM) in France**

**What?** Innovation description

Very Thin Asphalt Concretes (VTAC) 0/6 are high skid resistance asphalt concretes for surface course. They are defined by a curve with a 2/4 gap grading. They have high and lasting surface properties.

***Why ?*** How was born this innovation, which/what was the need?

VTAC 0/6, like VTAC 0/10, has really good sealing and skid resistance properties. Tanks to these properties and their low thickness, VTAC are a cheap alternative to solve surface issues by limiting extra height.

However, beyond common properties of VTAC, 0/6 product met a particular need: reduce the noise level for urban roads. A 0/6 grading permits to reduce rolling noise by comparison with 0/10 grading. A good skid resistance is reached by the means of an acceptable macro texture due to the 2/4 gap grading and a high micro texture due to the aggregates chosen for the mix.

***How ?*** How did the innovation merge?

VTAC 0/6 development in France started in the early 1980s at the same time as VTAC 0/10. Companies step by step developed VTAC 0/6 thanks to some Technical Agreements released with the cooperation of the Setra (Technical studies service of Roads and Highways which is a State department).

These Technical Agreements include a product's presentation, characterization tests results and an objective opinion from a committee of professionals, based upon a performance monitoring of the first sections layed on site.

VTAC 0/6, low noise level asphalts with long life skid resistance, grew on easily in France. Moreover, the product's surface aspect is appreciated for urban sites.

***Plan and progress:*** innovation's evaluation and spreading

Innovation was born after a request to decrease urban rolling noise in the early 1980s and it reached this goal successfully. At this time, the issue was about the possibility to develop this product on high speed roads. Results of braking force coefficient on a layer of VTAC 0/6 in 1984 on highway have been published in RGRA (monthly magazine presenting French road techniques actuality) in 1987. BFC values are as follow:

| BFC measures | 80 km/h | 100 km/h | 129 km/h |
|---|---|---|---|
| December 1984 | - | 0.35 | 0.27 |
| June 1985 | 0.45 | 0.42 | 0.41 |

This highlights that this product is adapted to highway use.

VTAC 0/10 and 0/6 were treated in the first VTAC standard's revision (NF P 98-137). This standard was replaced by the XP P 98-137 in 2001 and by the NF EN 13108-2 in 2006.

In 1997, a note about VTAC has been published by Pavement's Techniques Committee. It assess the VTAC 0/6 performances during 10 years for the oldest techniques and 3 to 5 years for the most recent ones.

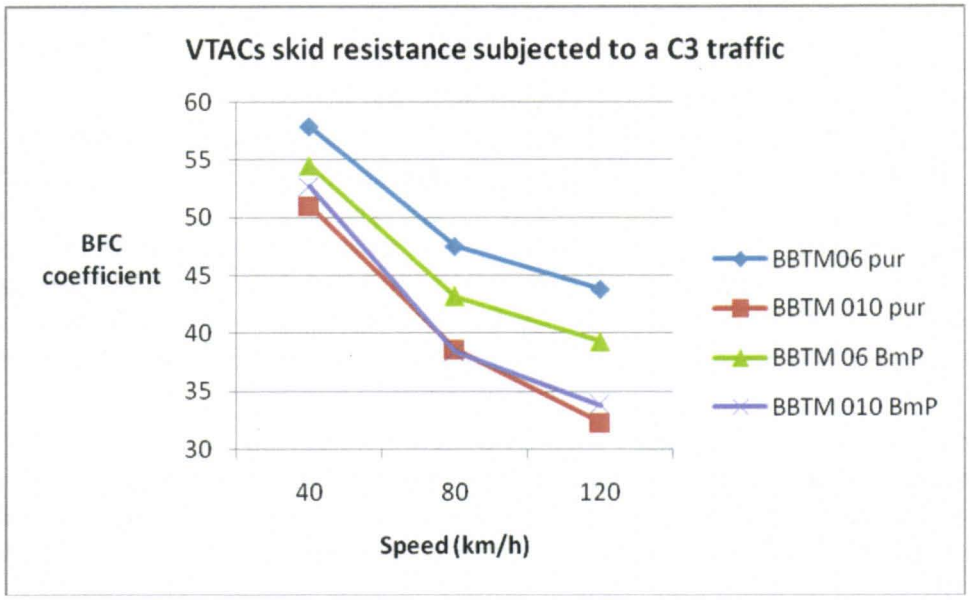
5 to 10% of VTAC executions are VTAC 0/6. Macro texture and noise results are here after:

- 0/6 macro texture is smaller than 0/10, but VTAC 0/6 still have a bigger macro texture than other classical products (20% to 40% more compared to thin asphalt concretes and semi coarse asphalt concretes).

- Rolling noise is measured at 90 km/h. VTAC 0/6 are measured at 74 dB(A), which is 4 dB(A) less than VTAC 0/10.

The note concludes to a "good and long life homogeneity aspect" and defines these asphalts as a "low noise level" product.

In 2001, RGRA published an article about skid resistance's performance of French surface courses. Inside was a skid resistance comparison between different VTAC (grading and bitumen) after a high traffic level C3 (300 trucks per day during 9 years).




Whatever the bitumen, VTAC 0/6 have a better braking force coefficient than VTAC 0/10. This difference is remarkable at 120 km/h: $BFC_{VTAC\ 0/6\ pure}$= 43.8 and $BFC_{VTAC\ 0/10\ pure}$ = 32.3.
These results confirm the 0/6 grading interest compared to 0/10 for high speed road sections and durability of skid resistance properties.

***Success :***
Ten Years after first sites, more than 110 millions m² of VTAC have been laid on the French national road network.
Today, VTAC are the more common product used on French road network. They represent 41% of highway wearing course and 46% of national roads, according to national data base of skid resistance CARAT from LCPC.

***Lessons learned :*** learning from the innovation
Originally experimented to decrease the rolling noise, VTAC 0/6 became a common technique thanks to a performance monitoring showing a high and lasting skid resistance level. Use limits of the product are the high braking areas.

***Impact :*** innovation's impact on the specifications
Between the first and the last VTAC standard, specifications on void content have been changed. The NF-EN 13108-2 describes two VTAC 0/6 classes : Class 1 (12 to 19%) and class 2 (20 to 25%) whereas the NF P 98-137 stipulated the following specifications : Class 1 (6 to 17%) and Class 2 (18 to 25%).