From Technical Inventions to Profitable Innovations

Sharing a Vision to Create Road Innovations

J.E. Poirier, Colas
Use of renewable materials

**Targets:** replace petroleum/petrochemical/organic chemistry fluxing agents (volatile - fossil fuel resource), by plant-based fluxing agents

- Renewable resource
- Siccative products

⇒ no VOC, gain in terms of material, no bad smell
Road Marking Products
Innovation: neither Invention nor Discovery

- To discover: to bring to light natural phenomenon
- To invent: to find a new way of achieving something
- To innovate: concrete outcome of an idea. It comes to fruition because it satisfies the expressed or latent needs of society.

- A.Y. Portnoff. « Pathways to innovation »
Research and innovation: a neither Direct nor Automatic Relationships

- Innovation without Researchers:
  - Low cost Airlines

- From Knowing How to Knowing What to Do

- Social Change as Opportunity
Figure 1: Fuel consumption and CO₂ emission for the heating of one ton of wet aggregates.
## WMA: Reduced Plant Emissions (%).

**WMA European Practice. D’Angelo and al. 2008**

<table>
<thead>
<tr>
<th>Emission</th>
<th>Norway</th>
<th>Italy</th>
<th>France</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2</td>
<td>31.5</td>
<td>30-40</td>
<td>23</td>
</tr>
<tr>
<td>SO2</td>
<td>NA</td>
<td>35</td>
<td>18</td>
</tr>
<tr>
<td>VOC</td>
<td>NA</td>
<td>50</td>
<td>19</td>
</tr>
<tr>
<td>CO</td>
<td>28.5</td>
<td>10-30</td>
<td>NA</td>
</tr>
<tr>
<td>NOx</td>
<td>61.5</td>
<td>60-70</td>
<td>18</td>
</tr>
<tr>
<td>Dust</td>
<td>54</td>
<td>25-55</td>
<td>NA</td>
</tr>
</tbody>
</table>

NA: Not Available
Warm Mix: Foam Bitumen
WMA: Rheology Additives.

Mixing Time: ~ 45 s

Colas LT Process
WMA: Use of Surfactant

![Graph showing the effect of temperature on viscosity for pure bitumen and with different additive concentrations.](image)

- **Pure bitumen**
- + 0.3% additive
- + 0.5% additive

Juan A. González-León
CECA/ARKEMA France

TRB, 2009
WMA: Use of Surfactant

FIGURE 2 Photographs of several WMA field tests carried out with Cecabase RT® additives: a) Field test with a 60/70 bitumen, b) Field test with RAP.

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CECA/ARKEMA France

TRB, 2009
Conventional hot mix 150°C

Energy savings

ENROBE CHAUD – 160°C

WAM 110°C

ENROBE TIEDE – 120°C
The invention originates in the mastic asphalt business

**Neophalte**
application @ 150-160°C

**Low temperature mastic asphalt**

**Conventional mastic asphalt**
Temperature: 230 to 250°C
Lab equipment for Foaming Process studies
## WAM Production (percent of total asphalt production)

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRANCE</td>
<td>1.3</td>
<td>3-4</td>
</tr>
<tr>
<td>USA</td>
<td>0.5</td>
<td>5(*)</td>
</tr>
</tbody>
</table>

(*) Guess from Colas Inc Figures
Look at mee!
You see what kind of mix you ‘ll design tomorrow ??

Thanks to the imagination of the stakeholders, there is still space for innovation in the road business.