LOW TEMPERATURE ASPHALT
1995  Trials in Scandinavia (Shell WAM-Emulsion process)
1995  Trials in Germany (Aspha-min Zeolite)
1997  Trials in Germany (Sasobit wax)
1998  First UK WAM-Emulsion trial by Tilcon
2000  Trials in Scandinavia (Shell WAM-Foam process)
2001  First UK WAM-Foam trial by Lafarge
2004  Trials in Netherlands (Nynas LT Asphalt)
2005  Trials in France – LEA half warm process
2006  Major US visit to Europe triggers great interest and much research
2007  Commercial Warm mix foam systems available in US and Europe
2010  Tarmac / Carbon Trust project
2013  Lafarge Tarmac / Carbon Trust Project Completion
2015  Tarmac
INTERNATIONAL PERSPECTIVE – USA LTA GROWTH

% of total asphalt market

- 2009: 5%
- 2010: 11%
- 2011: 19%
- 2012: 24%
- 2013: 30%
CARBON TRUST PROJECT CONSIDERATIONS

- Health & Safety
- Plant set up investment and running costs
- Recycling capabilities
- Material behaviour / Customer acceptance
- Durability
- Process and Product Consistency
- Aggregate suitability
- Technical benefits
- Carbon footprint evaluation
PUBLISHED PROJECT REPORT PPR666

Specification for Low Temperature Asphalt Mixtures

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Prepared for: Lafarge Tarmac
Project Ref: 11112397

Quality approved:
Cliff Nicholls (Project Manager)

Michael McHale (Technical Referee)
What is Low Temperature Asphalt?
LOW TEMPERATURE ASPHALT - DEFINITIONS

Cold Mix

Half Warm

Warm-Mix

Hot Mix
WARM MIX DELIVERS:

- Same penetration grade as ordered
- Same bitumen content
- Same design parameters
- Same insitu voids criteria

*The only difference from traditional hot mixtures is the lower temperature*
LTA Processes
FOAMED BITUMEN

Diagram depicting the process of foamed bitumen.
WARM MIX ADDITIVES

• Added to direct to plant bitumen line by metered system

• Additives designed to reduce the surface tension of the bitumen allowing coating and compaction at lower temperatures

• Proven selection of additives available and successfully utilised in many parts of the world
LOW TEMPERATURE ASPHALT - DEFINITIONS

0°C Cold Mix
50°C Half Warm
100°C Warm-Mix
150°C Hot Mix
200°C
LTA Products
Low Temperature Asphalt Benefits

- Reduced carbon footprint
- Reduced programme duration/earlier re-opening
- Reduced public disruption
Comparison of cooling rates between Hot and Warm Mix materials

<table>
<thead>
<tr>
<th>Elapsed Time</th>
<th>Av Temperature</th>
<th>Av Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Ac 20 HD 40/60 STANDARD</em></td>
<td><em>Ac 20 HD 40/60 WARM</em></td>
</tr>
<tr>
<td>Prior to rolling</td>
<td>179</td>
<td>140</td>
</tr>
<tr>
<td>5 mins</td>
<td>135</td>
<td>113</td>
</tr>
<tr>
<td>15 mins</td>
<td>127</td>
<td>104</td>
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<td>20 mins</td>
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<td>30 mins</td>
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<td>32</td>
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<tr>
<td>2 hours</td>
<td>43</td>
<td>30</td>
</tr>
<tr>
<td>2.5 hours</td>
<td>39</td>
<td>28</td>
</tr>
<tr>
<td>3.0 hours</td>
<td>35</td>
<td>24</td>
</tr>
</tbody>
</table>
Comparison of cooling rates between Hot and Warm Mix materials
Low Temperature Asphalt Benefits

• Reduced carbon footprint
• Reduced programme duration/earlier re-opening
• Reduced public disruption
• Lower on site costs helping a restricted budget stretch further
• Potential extended pavement life?
<table>
<thead>
<tr>
<th>Binder Grade</th>
<th>Recovered Binder Penetration</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Hot Mix</td>
</tr>
<tr>
<td>40/60 Pen</td>
<td>36 Pen</td>
</tr>
<tr>
<td>70/100 Pen</td>
<td>55 Pen</td>
</tr>
<tr>
<td>100/150 Pen</td>
<td>93 Pen</td>
</tr>
</tbody>
</table>
The Government’s 2025 Construction Strategy Calls For:

- A reduction in both the initial cost of construction and the whole life cost of assets
- A reduction in the overall time from inception to completion for new build and refurbished assets
- A reduction in greenhouse gas emissions in the built environment

LOW TEMPERATURE ASPHALT CAN CONTRIBUTE TO THEM ALL
Manufacturing Cost Savings?
MANUFACTURING COSTS

- Foaming – High installation costs
- WMA – Medium installation costs, fuel saving offset by additive cost.
- The level of demand for low temperature asphalts will determine the level of investment from suppliers
- Random demand = higher manufacturing costs
UK Progress
Keith Gordon, Assistant Director Efficiency & Delivery from the West Midlands Highway Alliance (WMHA), said:

“On the 30th September 2013 the WMHA committed to reduce carbon emissions from the production of road and footway materials by 20% by 2015. It is anticipated that over 200,000 tonnes of low temperature asphalt will be laid by 2015.”

- Walsall currently at 18.2% warm mix.
LTA PROGRESS IN THE UK

- A46 Cossington selected as an HA demonstration site to prove ‘business as usual’ in terms of site operations. – 600 tonnes supplied April 2014.

- The first LTA EME supplied in the UK in October 2014. – 2,300 tonnes to the M180.

- First supplies in Scotland in February 2015 – 3,000 tonnes to Mid Lothian CC.
Current Status

- General enquiry rate increasing / growing interest

- Tarmac currently have 20 plants with supply capability, increasing to 24 by year end – 33% of our national network.

- Willing to increase this number accordingly subject to demand.
What Can The Client Do?

- Insist on compliance with TRL Specification
- Commit to a transparent target (like the WMHA)
- One step at a time? – Warm Mix first step