Long Life Surfaces for Busy Roads

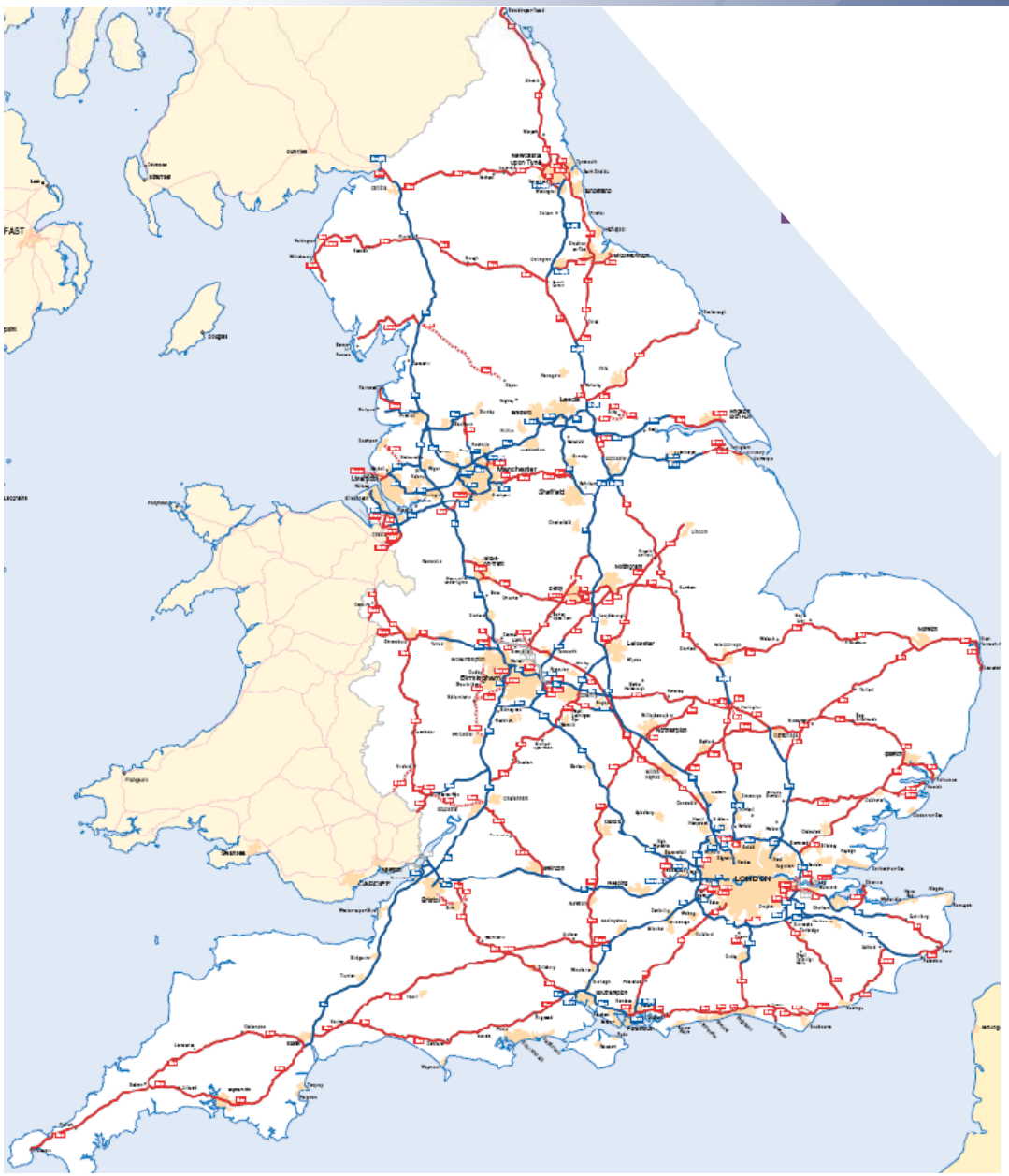
Epoxy Asphalt

Construction Issues

Objectives of the proposed field trials

Wyn Lloyd

UK Highways Agency



HIGHWAYS AGENCY

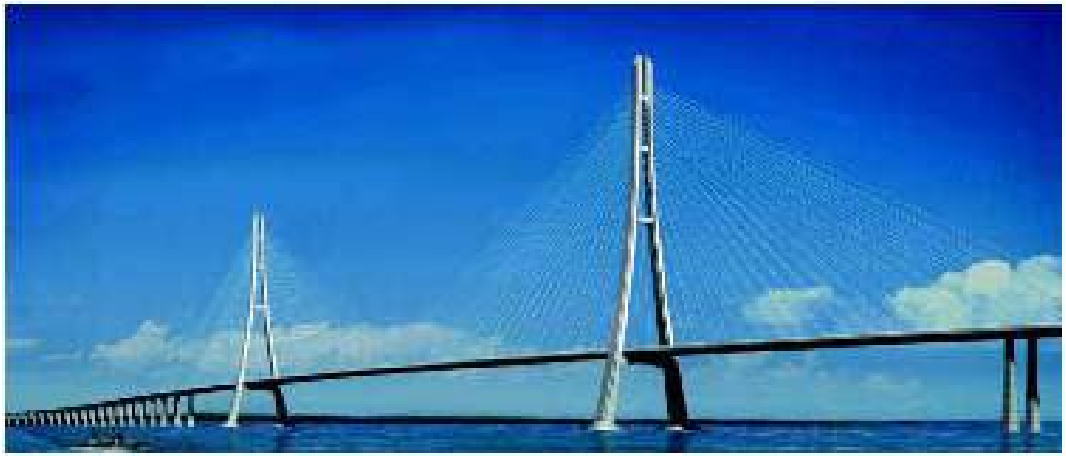
- 7,100 km
- 130 Billion Vehicle km
- 1/3 all UK traffic
- 2/3 all UK road freight
- 170,000 - 200,000 AADT

Epoxy Asphalt Surfacing

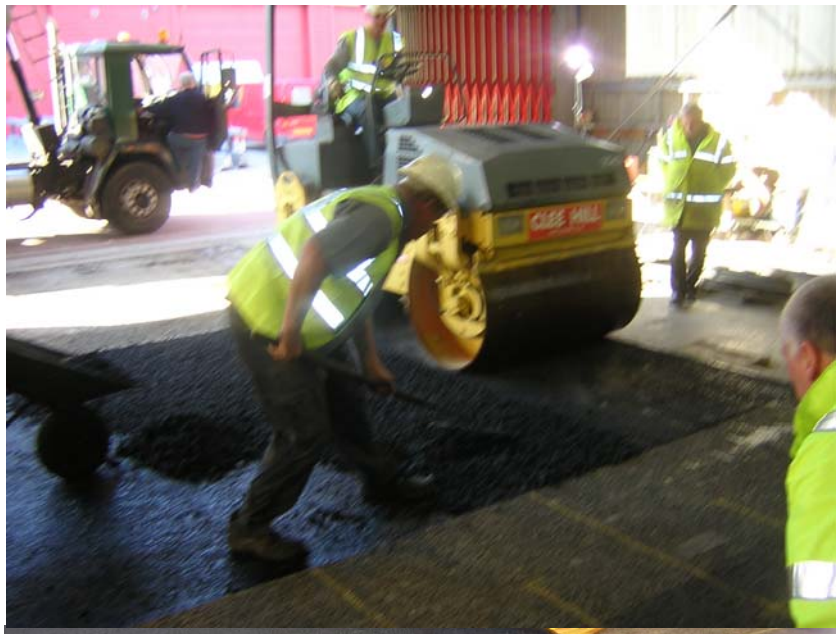
- Epoxy Asphalt is not new
- It has been used for many years as a road surface on stiff bridge decking.
- It was used on The San Remo Hayward Bridge in San Francisco in 1967

- and is still meeting performance requirements, after 40 years of service.

- Epoxy Asphalt has recently been used extensively for bridge deck applications in China. The recent Nanjing Bridge used 40,000 m^2



Pont de Normandie, France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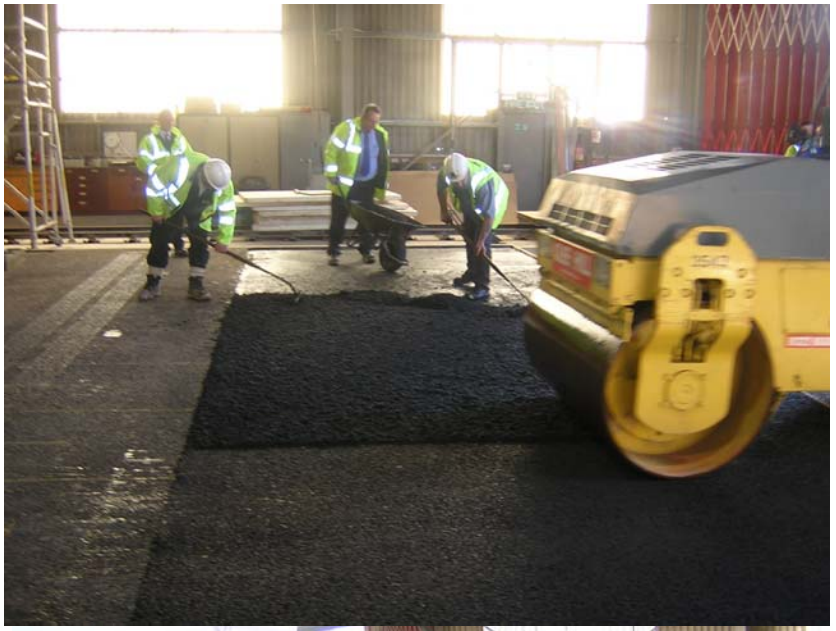

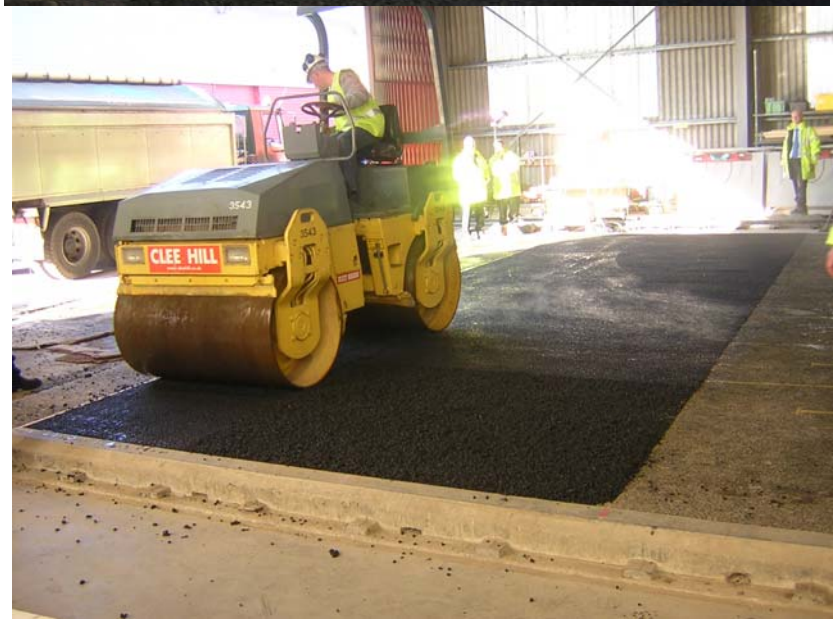
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Summary

- Type of epoxy
- Mixing Plant
- Aggregates
- Times
- Temperature
- Health and Safety
- Recycling
- Objectives

Epoxy Asphalt
Construction Issues

Substrate

- Maintenance technique
- Existing pavement to be in good condition
  - Stiffness
  - Crack free
- Long Life pavements
  - ELLPAG
- Drainage

Construction Issues

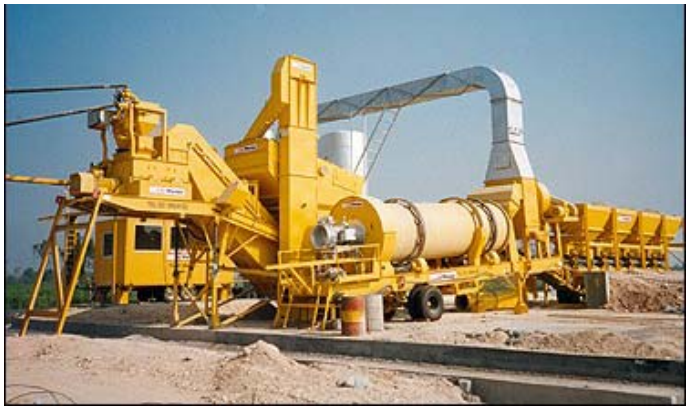
Types of epoxy

- Acid based
- Amine based
- Amino based
  - with or without catalyst

Construction Issues

Mixing Plant

- Production experience to date has almost exclusively been with a batch plant that gives good control of mixing time
- Some alterations to the mixing plants may be necessary
- Accurate metering and in-line blending
- Drum plants may be OK
- The risk of construction failures and damage to plant is greater than with conventional bitumen



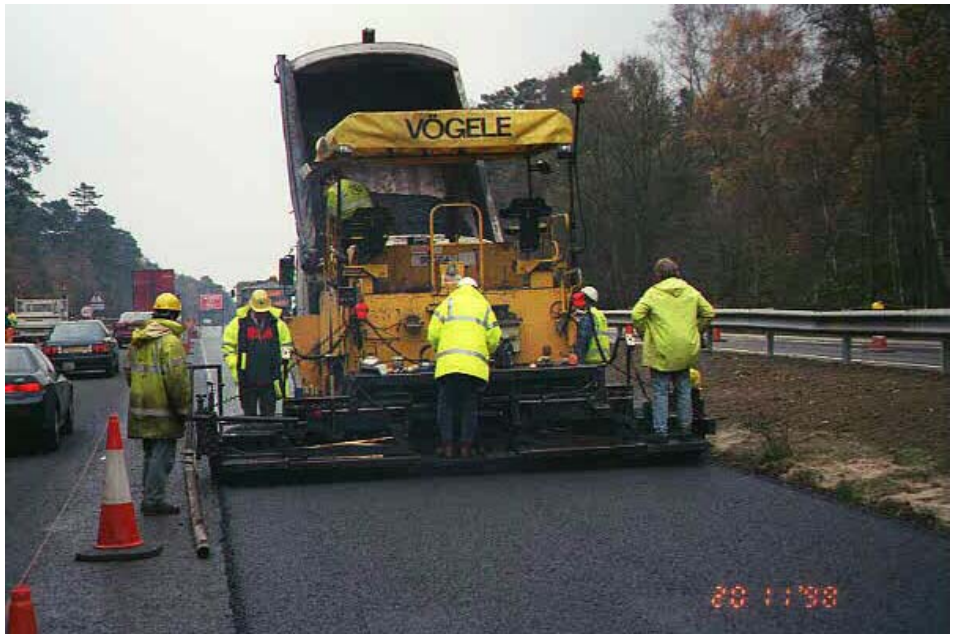
Construction Issues

Mixing plant

Improved plant control

- Ferromagnetic Tagging
- Monitoring of binder viscosity
- Automatic belt sampling
- Automatic asphalt content
- Automatic mix temperature monitoring
- Automatic binder content monitoring

Construction Issues



- Good control
  - Plant
  - Time
  - Temperature
- Conventional transport
- Conventional pavers
- Conventional compaction plant

Construction Issues

Advantages

- Low temperature
- Early trafficking

- Stiffer, with greater load spreading ability
- More resistant to rutting
- More resistant to low temperature cracking
- More resistant to surface abrasion from tyre action,
- More resistant to fatigue cracking
- Less susceptible to water induced damage
- More resistant to oxidative degradation

Construction Issues

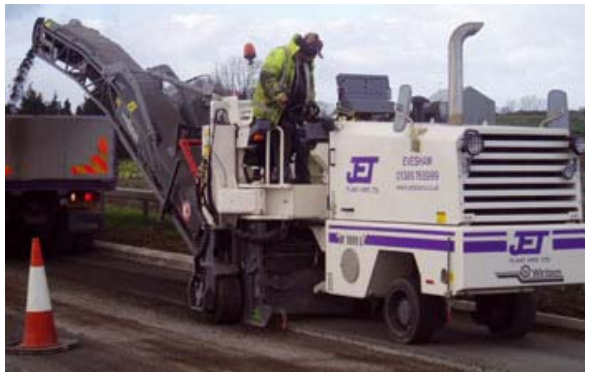
Health and Safety

- Materials handling
- Protective Clothing
- Regulations in different countries
- REACH (for EU Countries)

Construction Issues

Recycling

- Little experience
- Aggregate
- Emissions
- Leachates



Epoxy Asphalt Phase 3 Trials

Aims -1

- Performance: Lab to site
- Manageable & safe handling procedures
- Construction methods including substrate
- To study variations in performance under loading patterns
- To consider variations related to aggregates
- To study noise properties
- Consideration of repair techniques
- Consideration of recycling
- Gain experience, increase comfort levels

Epoxy Asphalt Phase 3 Trials

Aims -2

- Timing, temperatures and transport
- Testing of locally available materials
- Determining performance of Epoxy materials with different chemical formulations
- Testing of several asphalt base courses in various climatic regions to evaluate thermal and moisture effects on the composite pavement
- Testing of several PCC base courses in various climatic regions to evaluate the propensity for crack propagation and de-bonding

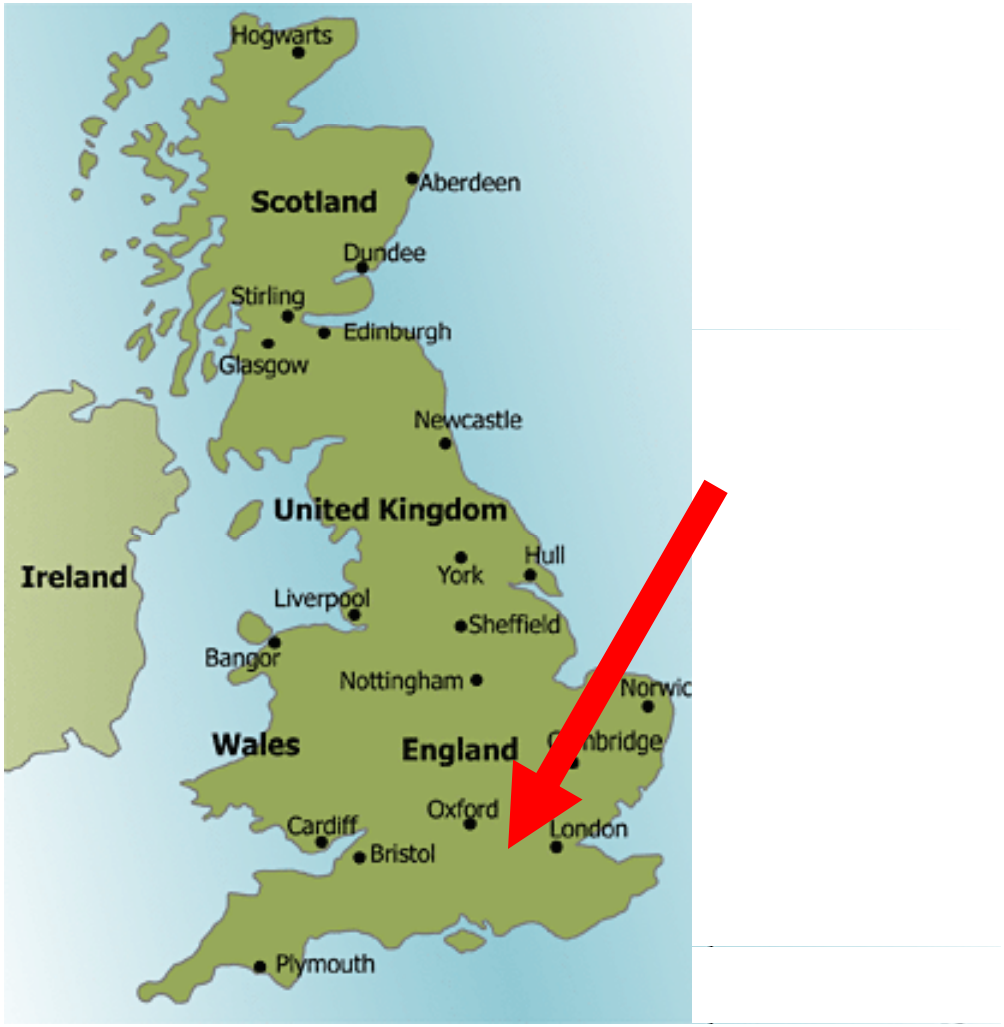
Before trials

- *Mixture trials* Aggregates and binder blends
- *Curing and construction time*. Further studies required before trials to optimise the curing profile with the desired rate of reaction for the local conditions (curing, transport, laying etc).
- *Curing period.* It is important to establish when after the initial blending of the epoxy asphalt the reaction is complete.

Future research

- Aggregates
  - Long lasting
- Recycling
- Timing
  - Not over-cured
- Health and Safety
- Temperature
  - Balance required
- Long-term behaviour modelling
  - Aging
  - Traffic loading

In the UK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