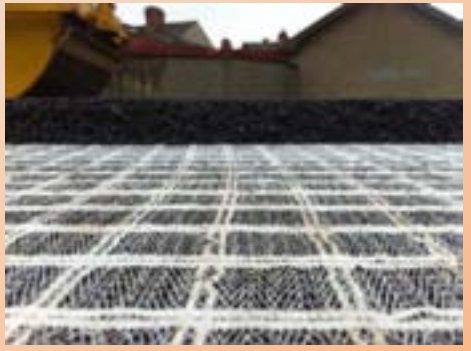
Road Surface Treatments Association

# Geosynthetics and Steel Meshes

# Draft Code of Practice

**David Shercliff – Committee Member**
TenCate Polyfelt



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# Context

- Maintenance backlog
- Further budget reduction and increasing input costs
- Challenge from Government account for billed cost and depreciated billed cost – asset value management – whole life costs - roads should last longer
- Extreme winter conditions causing serious damage
- Increasing traffic levels
- Diminishing technical expertise
- We need well maintained roads to protect public safety and help the economy to grow
- The industry has a big part to play in helping to overcome these difficulties

# Why do we need Code of Practice?

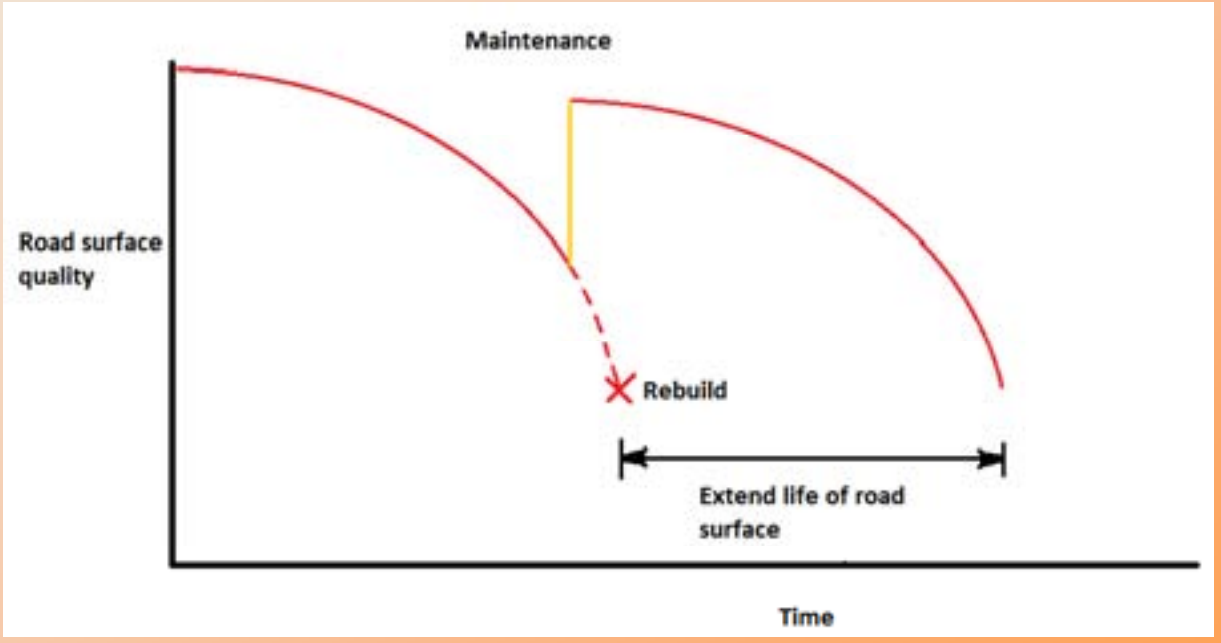
- To enable all industry stakeholders to recognise what best practice looks like
- To raise the profile of our industry demonstrating our commitment to quality and having a well trained and qualified workforce
- To provide a hub of information providing essential industry guidance on the use of interlayers covering; product selection, design and installation
- To provide essential advice on how to plan, procure and execute each job to manage risk
- Build client confidence in end product performance and durability and help overcome negative sentiment where it exists
- **It will principally advise client bodies and contractors on the key measures that should be taken to ensure work is undertaken successfully**

# Benefits of Interlayers

- Maintenance cost reduction. Extending road surface life up to 4 times over conventional surfacing
- Reduction in asphalt thickness, in some circumstances, saving on raw material cost
- Prevents surface water ingress – avoiding freeze/thaw effects
- Environmental impact associated with longer maintenance intervals.
- Reduced hidden costs to businesses and the general public through delays caused by road closure and traffic restrictions

# Comparative Costs and Life

| Type | Main Application | £ / $m^2$ | Expected Life years | Average Cost life index £/m2 per yr |
|---|---|---|---|---|
| 50mm Asphalt overlay | Rural, Urban roads | 8-10 | 5 | 1.8 |
| 50mm Asphalt overlay plus appropriate interlayer | Rural, Urban roads | 15 | 15 | 1.0 |




Also consider

- Traffic control costs
- Disruption costs
- Planning costs
- Mobilisation costs

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# Empirical evidence of success

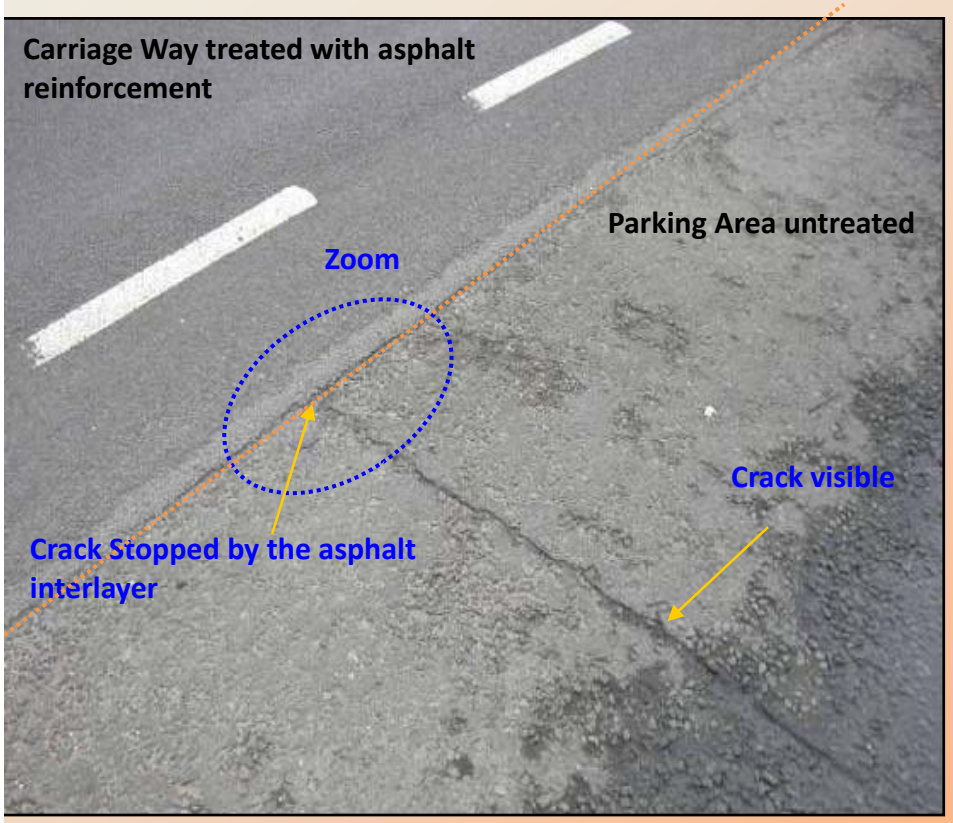


Photo taken in 2008, 5 years after installation


Zoomed area showing prevention of cracking

# History

- 25 years of product development by individual manufacturers
  - Over 150 years worth of combined experience within RSTA members
- Manufacturers individually invested a great deal in developing own brands – protecting their research and development costs – now common themes emerging in design methods – need to address external barriers to the use of interlayers
- Pavement cracking recognised as a major issue
- Most Local authorities tried the using interlayers - with very mixed success – some rejecting – uncoordinated review of problem
  - Poor installation and supervision
  - Poor assessment of existing site conditions – wrong solution
- Europe moving ahead with many lessons learned
  - 100M sqm in Europe and 5M sqm used in UK
  - Used on highways schemes in Europe
  - Standards , codes of practice and test methods being developed

# UK v Europe


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# Forming of the committee
# Aims & Objectives

- Whole of UK industry represented suppliers and installers
- To gather best practice in UK & Europe
- To give a coherent consistent and united guidance
- To address problems found and correct misinformation
- Produce DRAFT document early (over 9 month period)
- Hear the comments of the client at an early stage – Launch of draft today and submission to ADEPT and HA
- Aims to provide guidance on products available and identify key aspects affecting their use and provides evidence of performance

# Aims

- Installation - Commitment to having a well trained and qualified workforce towards Sector 13

- Product quality - Provide advice on products/Materials

- Advice on Product Selection/Design
- **CODE OF PRACTICE**

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# UK suppliers and installers represented on committee

## 1 ACKNOWLEDGEMENTS

This document has been produced by the RSTA Sub-Committee for Geosynthetics & Steel Meshes.

| | |
|---|---|
| Howard J. Cooke - Asphalt Reinforcement Services Ltd – Sub-Committee Chairman | Supplier/Installer |
| Richard Bennett - Maccaferri Ltd | Manufacturer |
| Richard Carr - ABG Ltd | Supplier/Installer |
| Ian Fraser - Tensar International Ltd | Manufacturer |
| Tom Foster - Foster Contracting Ltd | Installer |
| John Greenhalgh - Bekaert Ltd | Supplier/Installer |
| Howard Robinson - Road Surface Treatments Association | |
| David Shercliff - Tencate Geosynthetics (UK) Ltd | Manufacturer |
| Graham Thomson - Huesker Ltd | Manufacturer |

# Table of available interlayers

| Supplier | Product | Form | Material | | Coating | | Backing | Roll size: (m) | Grid aperture size (mm) | ISO 9001 | ISO 14001 | CE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Grid | Textile | Grid | Textile | | | | | | |
| ABG | Rotaflex 830 (Cidex) | Composite | Glass Fibre | PET Non woven | Polymer | None | | 2.05 x 100 | 33 x 30 | x | | x |
| | Rotaflex 838 (Cidex) | Composite | Glass Fibre | PET Non woven | Polymer | None | | 2.05 x 80 | 33 x 33 | x | | x |
| | Rotaflex 840 | Composite | Glass Fibre | PET Non woven | Polymer | None | | 2.05 x 50 | 30 x 18 | x | | x |
| | Rotaflex 830SL (Cidex) | Composite | Glass Fibre | PET Non woven | Polymer | None | | 2.05 x 75 | 33 x 30 | x | | x |
| | Rotaflex 838SL(Cidex) | Composite | Glass Fibre | PET Non woven | Polymer | None | | 2.05 x 70 | 33 x 33 | x | | x |
| ARS | GlasGrid 8550 | Grid | Glass Fibre | | Polymer | | Self Adhesive | 1.5 x 150 | 25 x 25 | x | | x |
| | GlasGrid 8501 | Grid | Glass Fibre | | Polymer | | Self Adhesive | 1.5 x 100 | 12.5 X 12.5 | x | | x |
| | GlasGrid 8511 | Grid | Glass Fibre | | Polymer | | Self Adhesive | 1.5 x 100 | 25 x 25 | x | | x |
| | GlasGrid 8502 | Grid | Glass Fibre | | Polymer | | Self Adhesive | 1.5 x 60 | 12.5 X 12.5 | x | | x |
| | GlasGrid 8512 | Grid | Glass Fibre | | Polymer | | Self Adhesive | 1.5 x 60 | 25 x 25 | x | | x |
| | GlasGrid CG50 | Composite | Glass Fibre | PP Non woven | Polymer | None | Self Adhesive | 1.5 x 95 | 25 x 25 | x | | x |
| | GlasGrid CG100 | Composite | Glass Fibre | PP Non woven | Polymer | None | Self Adhesive | 1.5 x 60 | 25 x 25 | x | | x |
| | GlasGrid CG200 | Composite | Glass Fibre | PP Non woven | Polymer | None | Self Adhesive | 1.5 x 60 | 25 x 25 | x | | x |
| | GlasGrid TF 8501 | Grid | Glass Fibre | | Polymer | | Self Adhesive | 1.5 x 100 | 12.5 X 12.5 | x | | x |
| | GlasGrid TF 8511 | Grid | Glass Fibre | | Polymer | | Self Adhesive | 1.5 x 100 | 25 x 25 | x | | x |
| | GlasPave 25 | Composite | Glass Fibre | PET Non woven | Polymer | None | | * | n/a | x | | x |
| | GlasPave 50 | Composite | Glass Fibre | PET Non woven | Polymer | None | | * | n/a | x | | x |
| | GridSeal | Grid | Glass Fibre | | Polymer | | | 1.5 x 100 | 25 x 25 | x | | x |
| Huesker | HaTelit C 40/17 | Composite | PET | PP Non woven | Bitumen | Bitumen | | 5 x 150* | 40 x 40 | x | x | x |
| | HaTelit XP 50 | Composite | PVA | PP Non woven | Bitumen | Bitumen | | 5 x 150* | 40 x 40 | x | x | x |
| Maccaferri | MacGrid AR5.7 | Grid | GlassFibre | | Polymer | | | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR5A.7 | Grid | GlassFibre | | Polymer | | Self Adhesive | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR5G.7 | Composite | GlassFibre | Non woven | Polymer | Polymer | | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR10.7 | Grid | GlassFibre | | Polymer | | | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR10A.7 | Grid | GlassFibre | | Polymer | | Self Adhesive | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR10G.7 | Composite | GlassFibre | Non woven | Polymer | Polymer | | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR12.7 | Grid | GlassFibre | | Polymer | | | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR12A.7 | Grid | GlassFibre | | Polymer | | Self Adhesive | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR12G.7 | Composite | GlassFibre | Non woven | Polymer | Polymer | | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR20.7 | Grid | GlassFibre | | Polymer | | | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR20A.7 | Grid | GlassFibre | | Polymer | | Self Adhesive | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR20G.7 | Composite | GlassFibre | Non woven | Polymer | Polymer | | 2.2 x 100* | 25 x 25 | x | | x |
| | MacGrid AR5.2 | Grid | PET | | Polymer | | | 2.2 x 100* | 30 x 30 | x | | x |
| | MacGrid AR5G.2 | Composite | PET | Non woven | Polymer | Polymer | | 2.2 x 100* | Various | x | | x |
| | MacGrid AR10G.2 | Composite | PET | Non woven | Polymer | Polymer | | 2.2 x 100* | Various | x | | x |
| | Roadmesh L | Grid | Steel | | | | | 2/3/4 x 25/50 | 8 x 10 | x | | x |
| | Roadmesh LB2 | Grid | Steel | | | | | 2/3/4 x 25/50 | 8 x 10 | x | | x |
| | Roadmesh LB | Grid | Steel | | | | | 2/3/4 x 25/50 | 8 x 10 | x | | x |
| | Roadmesh S | Grid | Steel | | | | | 2/3/4 x 25/50 | 8 x 10 | x | | x |
| TenCate | PGM ID | Textile | | PP Non woven | | None | | 1.9 x 150 * | n/a | x | | x |
| | PGM-G50 ID | Composite | Glass Fibre | PP Non woven | Polymer | None | | 1.9 x 100 * | 40 x 40 | x | | x |
| | PGM-G100 ID | Composite | Glass Fibre | PP Non woven | Polymer | None | | 1.9 x 100 * | 40 x 40 | x | | x |
| | PGM-G200 ID | Composite | Glass Fibre | PP Non woven | Polymer | None | | 1.9 x 75 * | 40 x 40 | x | | x |
| Tensar | AR1 | Grid | PP | | None | | | 3.8 x 50 | 65 x 65 | x | x | x |
| | AR-G | Composite | PP | PP Non woven | None | None | | 3.8 x 50 | 65 x 65 | x | x | x |
| | Glasstex P50 | Composite | Glass Fibre | PP Non woven | Polymer | None | | 2.0 x 100 * | 40 x 40 | x | x | x |
| | Glasstex P100 | Composite | Glass Fibre | PP Non woven | Polymer | None | | 2.0 x 100 * | 40 x 40 | x | x | x |
| | Glasstex P200 | Composite | Glass Fibre | PP Non woven | Polymer | None | | 2.0 x 100 * | 40 x 40 | x | x | x |

# What is in the draft code?

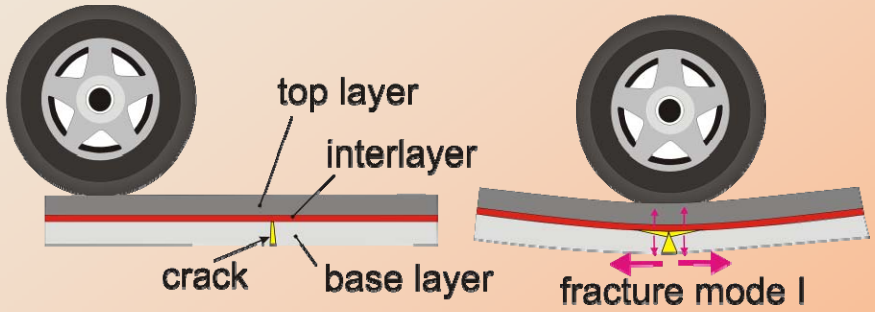
Draft RSTA Code of Practice for Inhibiting Cracking in Bituminous Bound Layers Using Geosynthetics and Steel Mesh

CONTENTS

# Types of failure considered

- Reflective cracking
- Fatigue cracking
- Differential settlement (often prevalent in road widening schemes)
- Thermal cracking

# Functions




- Reinforcement at low strain – the ability of the material to bind the asphaltic layer together to prevent crack propagation in either direction, spanning the potential crack
- Stress absorption – the ability of the material to act as a composite with the asphalt to absorb transient stress in all directions
- Prevention of water penetration into lower layers and the avoidance of associated problems due to freeze/thaw effects and the need for lower drainage to remove subsurface water

# Section 3 – Site Conditions & Assessment

CONTENTS

# 3 Assessment

- Record details of the current crack locations and severity:-
  - Number & length of cracks >5 mm with spalling and bifurcation
  - Number and length of cracks <5mm wide
  - Location of cracks (e.g. in wheeltracks or everywhere)
  - Photographs are obviously very useful (e.g. 1m from road surface)
- Other criteria:
  - Traffic characteristics (number, type of vehicles, speed) specific for the jobsite need to be taken into account
  - Existing road construction
  - Location of service trenches
  - Identify probable existing cracking mechanism (eg thermal)
  - If relevant, the temperature variations in time (day/night, season)
  - The pavement and soil properties
  - Drainage and groundwater information

# 3 Performance and limitations

- Identify correct cracking mechanism i.e. Reflective or fatigue cracking.
- Set acceptable level of cracking over a specific time e.g 10% cracking in 10yrs
- Record traffic characteristics (number, type of vehicles, speed)
- Temperature variations in time (day/night, season).
- Pavement and soil properties relevant for the jobsite should be recorded.
- For maintenance , the existing condition of the pavement must form part or the design and crack mapping.

# Section 5 - Determining the Solution

# 5 Design considerations & Failure Modes

## Design considerations

Flexible Composite Pavements – construction/expansion joints, settlement and rocking of slabs – vertical shear

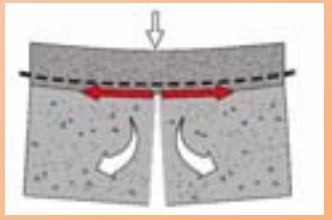
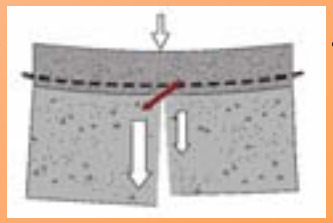
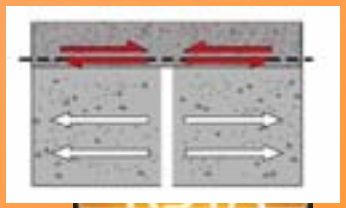
CBM/Lean Mix Road Base – surface break up and can act independent of roadway

Flexible Pavements – alligator cracking and rutting if weak foundations

Sett paved carriageways – delaminating and cracking

## & Failure Modes

Reflective cracking

– bending  shear  thermal 

# Geosynthetics & Steel Meshes Potential Sites!

Thermal movement

Utility Trenches

Expansion Joints

Underlying Setts

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# 5 Design Procedures

Take account of observations on site and identify correct crack mechanism

The mechanical and durability characteristics of the steel mesh/geosynthetic (stiffness/strength) & interaction with asphalt admixtures & SAMI layers

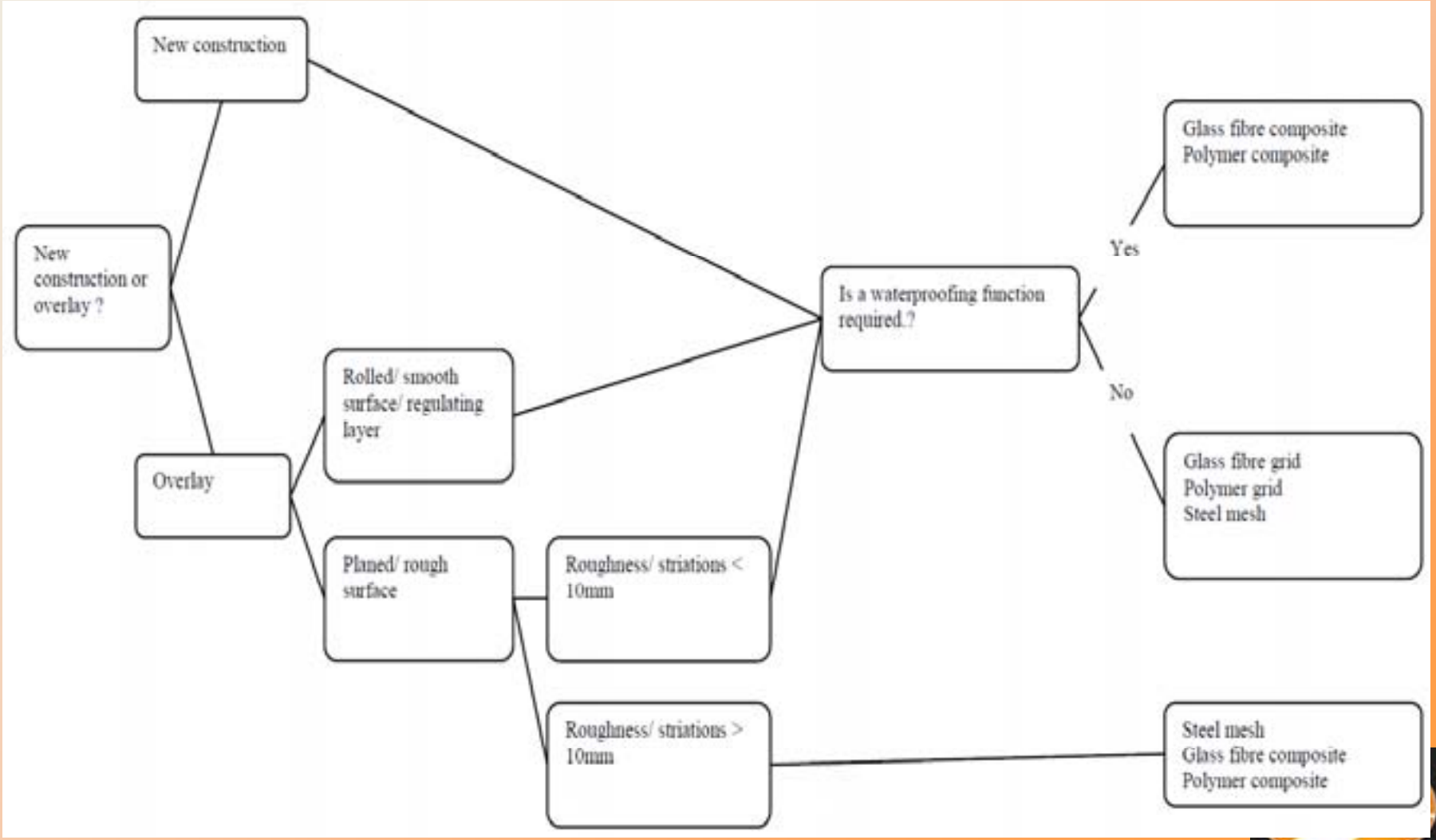
Geosynthetic or Steel mesh should be validated with long term monitoring field data leading to life-cycle costing analysis .

End of its service life removal OR incorporated into recycled materials for reuse in further surfacing work.

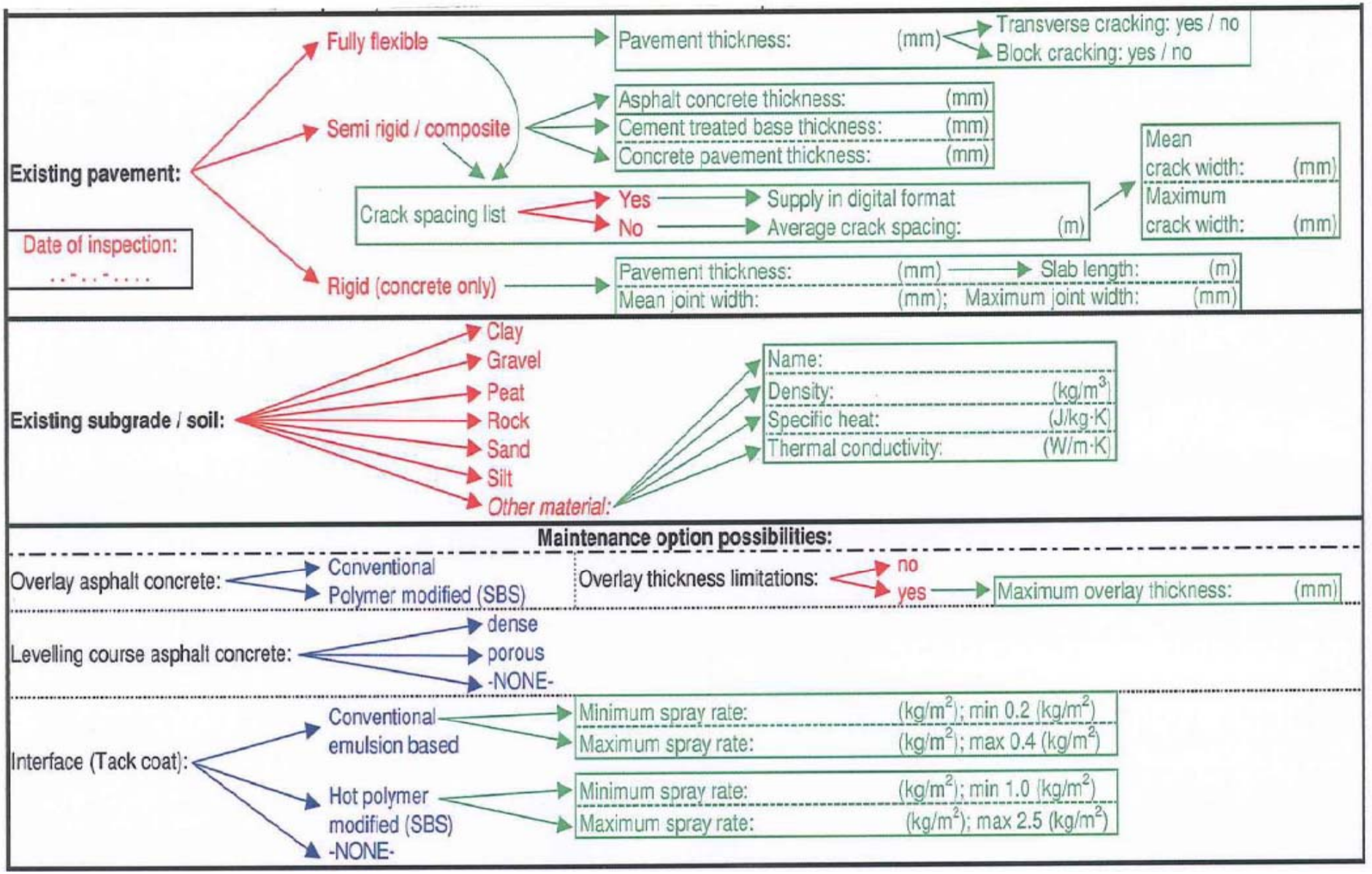
Design specification in line with European Standards and format (eg CEN) and produce sketch of the laying plan of the geosynthetic or steel mesh.

Consider design process in Appendix D, talk to member manufacturers

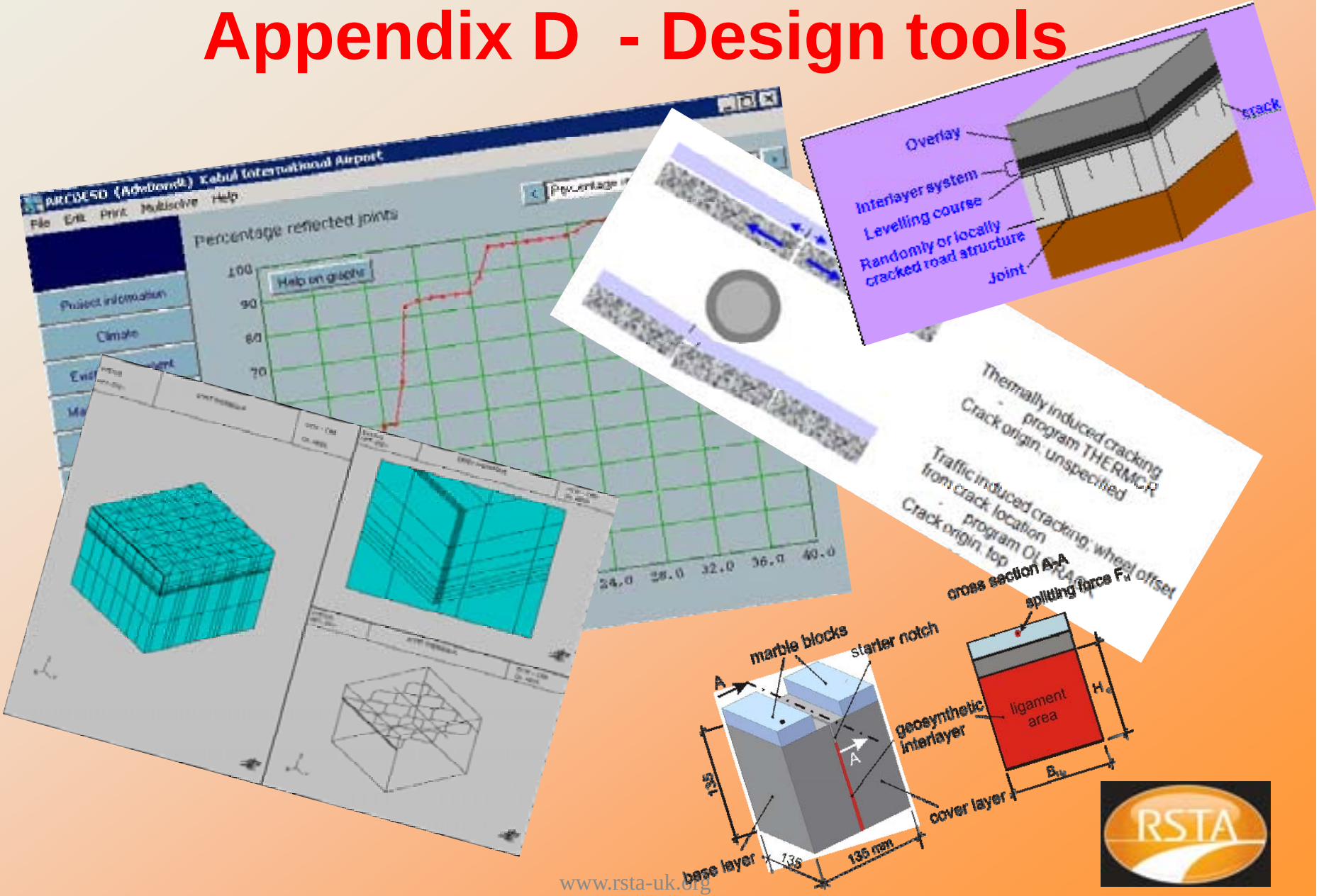
# 5 System & Material Selection



# 5 Design input sheet



# Appendix D - Design tools



# 5 Interlayer as a SAMI layer

- Stress absorbing layer where a flexible paving fabric becomes a composite with a bitumen layer to assist with absorption of vertical vibrations and stresses
- Can be used by itself of with a reinforcing grid
- Can be used under surface dressing
- Optimum thickness to absorb movement balanced agaisnt cost of fabric and absorbed bitumen

# Geosynthetics & Steel Meshes Code Features

- Only addresses reflective cracking, not other failure modes
- Different products
  - Rolled Products in Grid form (polymer, glass, steel mesh)
  - Non-woven geotextiles (polymer and glass)
  - Composite and non-woven (both glass and polymer)
- Effectiveness depends on site condition – selection is key
- Design – no single procedure covers all conditions
- Installation is critical – use experienced contractors with a well trained workforce and the correct equipment
- Surface preparation, bond coats and asphalt thickness is critical
- Aims to provide guidance on products available and identify key aspects affecting their use and provides evidence of performance

# Conclusions

- The COP is a milestone in the development of the use of Interlayers in UK
- Following the advice in the COP will significantly reduce your risk and give better value for your road schemes
- Once you have assessed your road go to the contact list on RSTA website for members – innovative new materials being developed
- The COP is the industry engaging with the client – looking for feedback – ADEPT and HA
- Taking account of views to gain best practice in the industry
  - ADEPT - Local Authority Guidance Notes
  - HA – Interim Advice Note
- Following feedback aim to publish Summer 2011 as National guidance document endorsed by ADEPT

# Thanks for your attention!

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