AUSTRALIAN FLEXIBLE PAVEMENT ASSOCIATION

IBEF Technical Exchange Session Summary

Anna D'Angelo

Étienne le Bouteiller

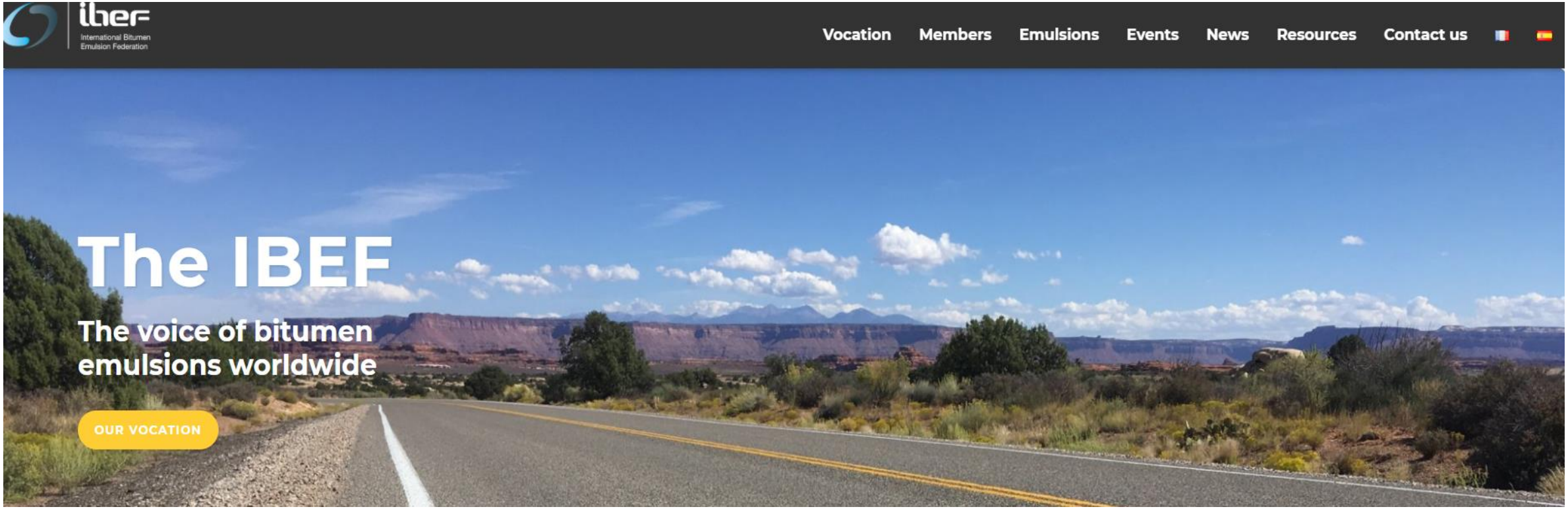
31 March 2021

Plan for today

Welcome and introduction	Anna D'Angelo
Result of the 2017 – 2019 worldwide survey about the use of bitumen emulsion	Étienne le Bouteiller
Overview of latest developments on technologies and products	Anna D'Angelo
Technologies & products implemented in France	Étienne le Bouteiller
Q&A	

Étienne le Bouteiller

IBEF Senior Advisor



http://www.ibef.net/

Étienne le Bouteiller
IBEF Senior Advisor

RESULTS OF THE 2017 – 2019 WORLWIDE SURVEY

Trend worldwide

- Reduction of environmental impact
- Specialised equipment for spraying emulsion
- New generation emulsion
  - premium emulsion
  - thixotropic emulsion

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ATEB

Technical Association of Bitumen Emulsions – SPAIN

www.ateb.es

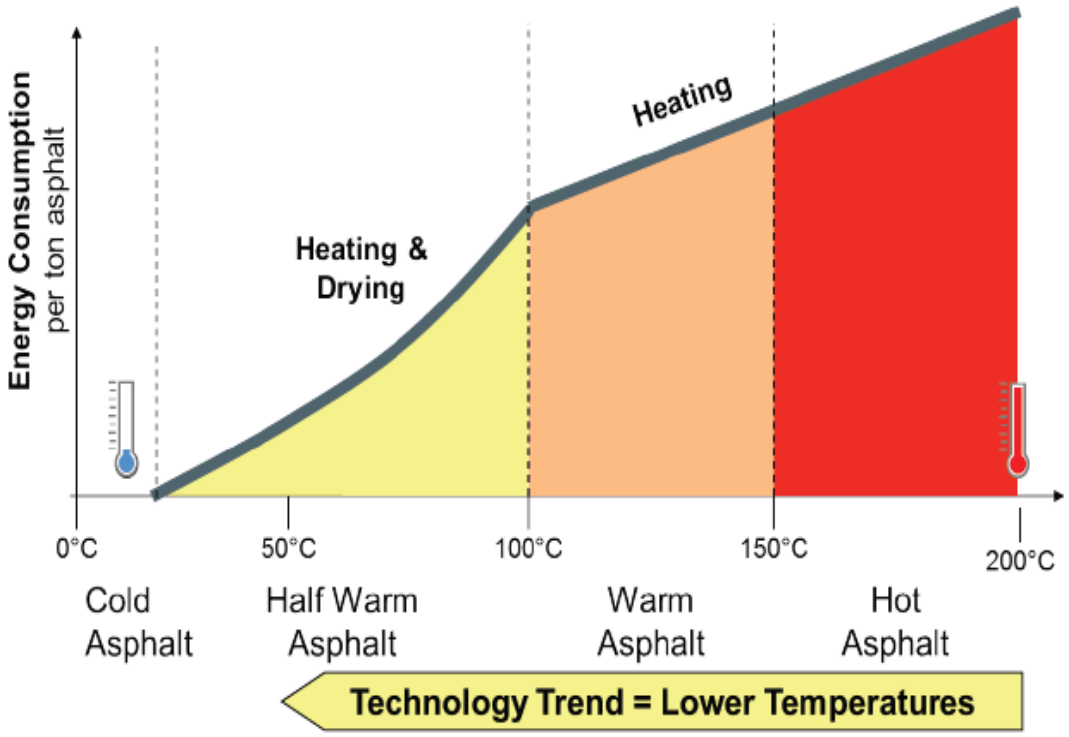
Half warm mix asphalt

ATEB

Warm Mix Asphalt (WMA): Produced at temperature between 100°C – 150°C

Half Warm Asphalt: produced between approximately 80 °C and roughly 100 °C in a normal asphalt plant using bitumen emulsion and warm aggregate

EAPA – European Asphalt Pavement Association



ATEB

Where to use Half Warm Asphalt

- Rehabilitation and new work construction
- Wearing and binder courses for medium and low traffic roads

RAP can be used up to 100%

Laying temperature

- 40°C for open graded asphalt
- 60°C for other asphalt

Asfalto, 2014. Mezclas templadas con reutilizacion del RAP.

ATEB

Emulsion type

- Medium breaking cationic bituminous emulsion for cold open grade mixes
- Slow breaking cationic bituminous emulsion for close-graded warm mixes

Emulsion must provide

- 100% coating with no binder run off,
- resistance to thermal shock
- high initial cohesion and active and passive adhesion
- workability

ATEB

Half warm mixes - Production

- Special plants for HMA
- Adapted standard asphalt plant for HMA production
  - Independent system for emulsion
  - Vapor extractor in the mixer
  - Avoid rap stickiness
  - Specific system for Rap incorporation that depends on the % of RAP

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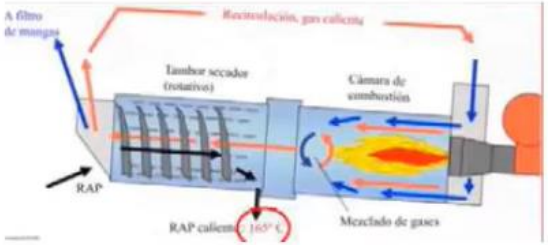
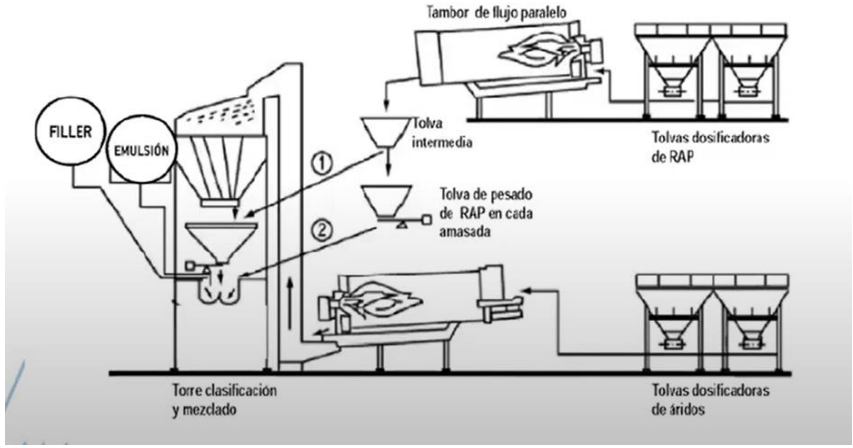
Production Plant

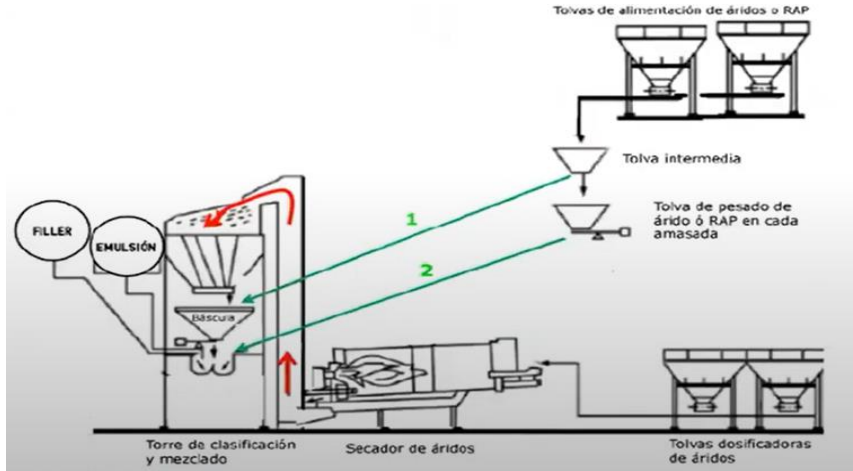


Backflow with gases chamber

- **Direct method** - can reach 100% RAP
  a) heat RAP in adapted barrel- in parallel flow or backflow with gases chamber
  b) double barrel dryer - dry the RAP in the barrel and then add to the mixer



- **Indirect method** – 60% RAP max
  - heat the RAP by heat transfer by overheating the aggregate



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Benefits

- Reduced environmental impact
- Moderate ageing of residual bitumen of the emulsion during manufacture
- Improvement for workers' safety

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SABITA

Southern African Bitumen Association

www.sabita.co.za

Latest Developments

SABITA

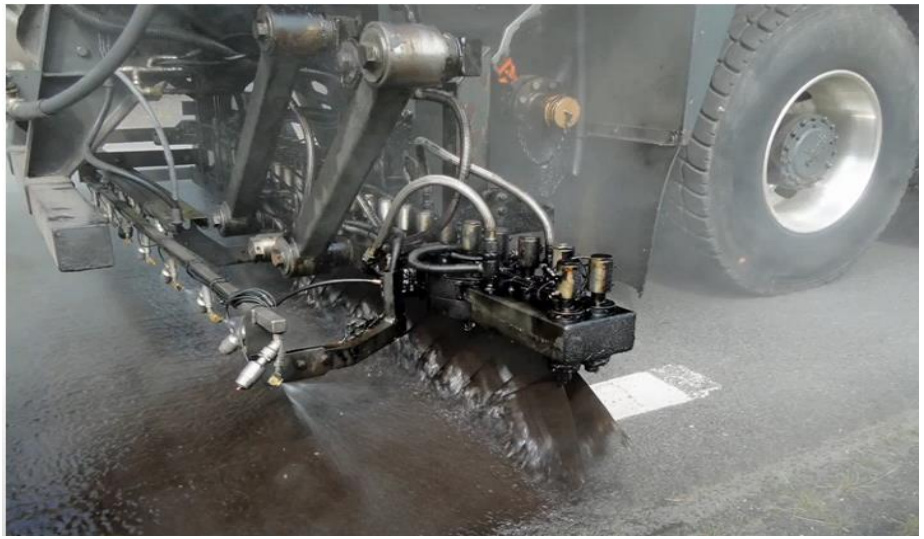
Latest Development

- Reduction of the use of cutters
- Equipment to speed up emulsion curing
- Bond coats and Prime coats
- PME

SABITA

Equipment

- Double spray bar system for application of rapid setting emulsion for spray sealing



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Trackless Bond coats

Advantages of new bond coats:

- accommodate construction traffic shortly after application
- good adhesion to concrete substrates
- improved compaction of asphalt layers because of the rapid setting characteristics of the bond coat

Prime coats

- Emulsion increasingly popular to replace hot cutback binder
- Ultimate to produce emulsion completely solvent free

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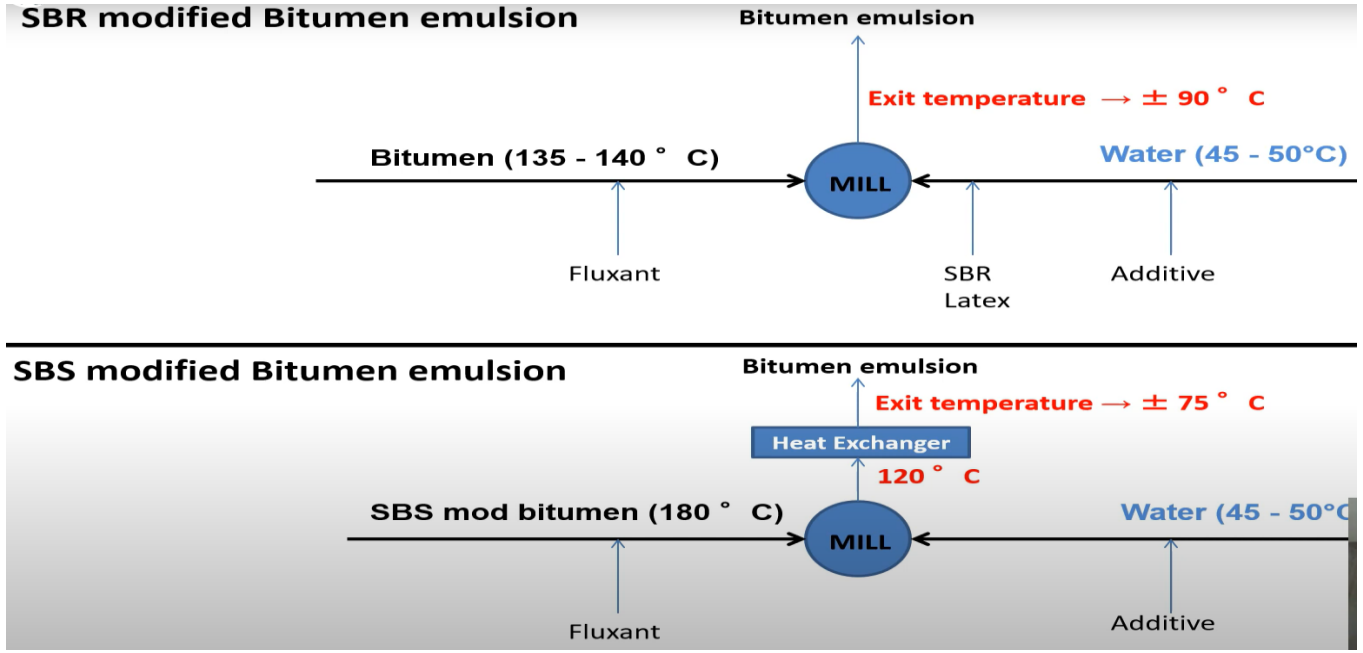
PME

- SBS modified emulsion for use in spray sealing applications alternative to SBR emulsion



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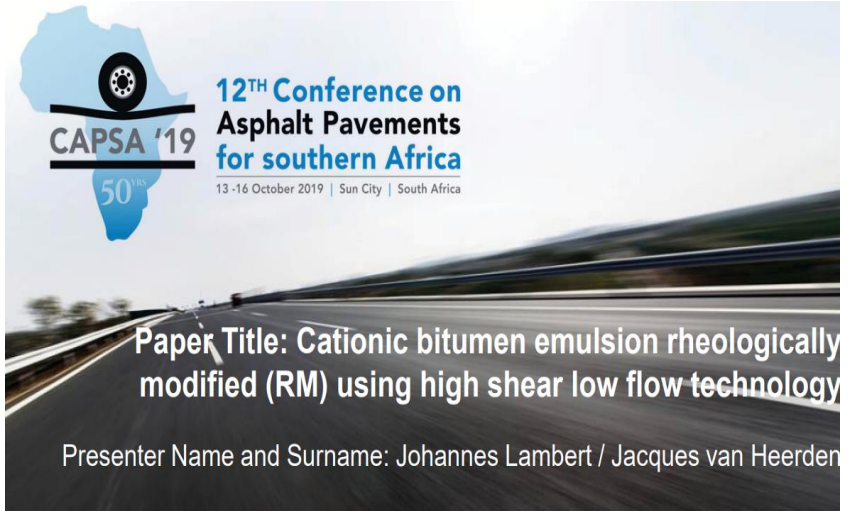
Rheologically modified emulsions

- Cationic rapid setting emulsion with binder content from 60 to 70%
- Shear thinning effect
  - Can be spray against steep inclines with no run off
  - Can be applied at higher application rates than conventional cationic emulsions
- Similar technology in New Zealand



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REA

Road Emulsion Association – UK

www.rea.org.uk

PME in UK market

REA

- Market estimated between 90-100 kT of emulsion per annum and stable over last few years
- Evolution in the types of sealing applied
- Contractors have sought more premium solutions to better guarantee performance

REA

Specification

Highways England led specification documents for application on Strategic Road Network

- “recipe specification”/ “design specifications”

- Performance levels of emulsion binders is based on cohesion (Vialit Cohesion)

- 4 performance levels of emulsion performance:
  - Non modified: peak cohesion 0.5 J/cm^2
  - Intermediate grade: peak cohesion 1 J/cm ^{2}
  - Premium grade: peak cohesion 1.2 J/cm ^{2}
  - Super Premium Grade: peak cohesion 1.4 J/cm ^{2}

Evolution of the market

1980: Introduction of PME

1990: Introduction of specifications and increase amount of intermediate grade

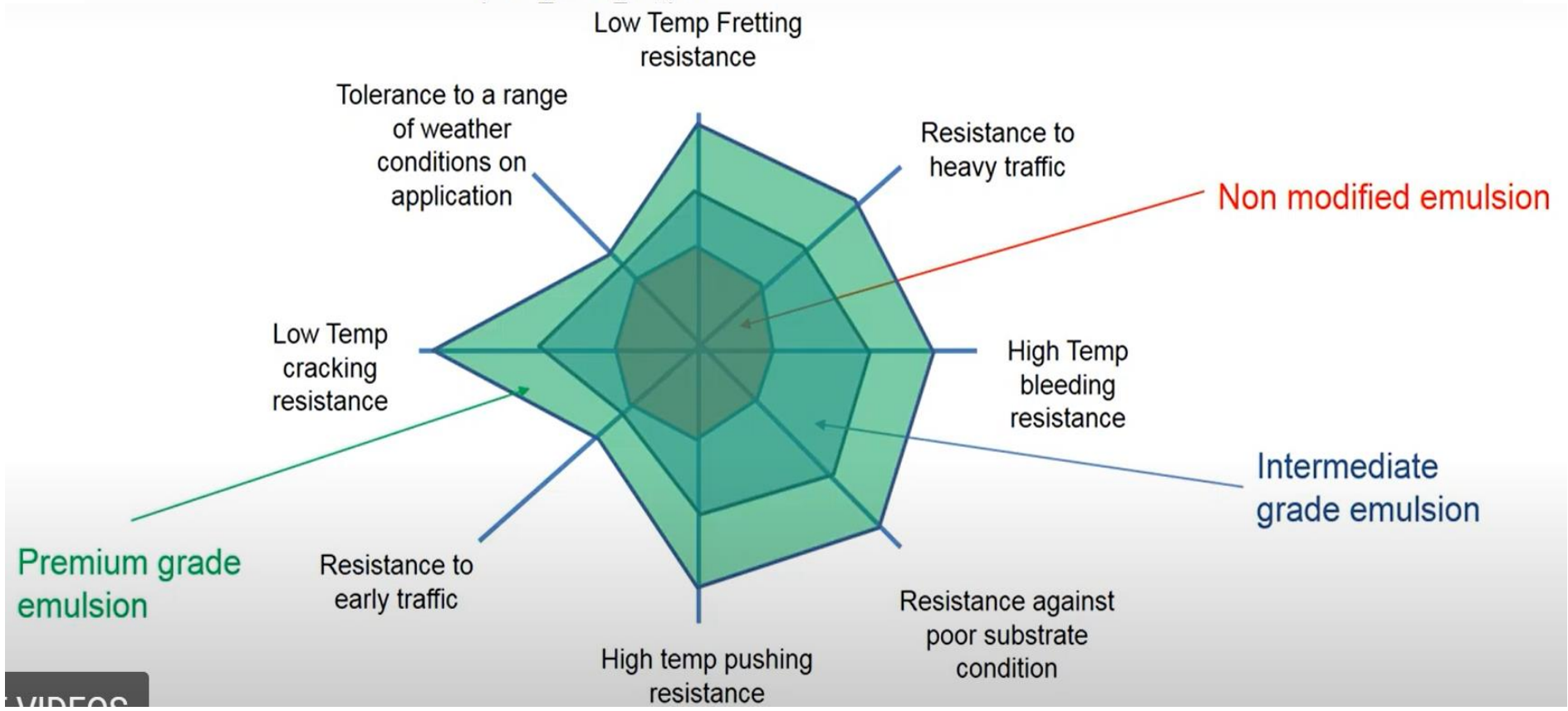
2000: Drop off in non modified Emulsions – urban areas only PME

2010: Shift to premium modified emulsions

2020:

- Non modified emulsion nonexistent in the market
- Premium grade accounts for 50% of the surface dressing
- Super Premium grades in development

Performance Characteristics



REA

Potential future progression

- Progression to smaller nominal chip size
- Increased use of super premium grade – niche area at the moment
- Increased use of secondary aggregate

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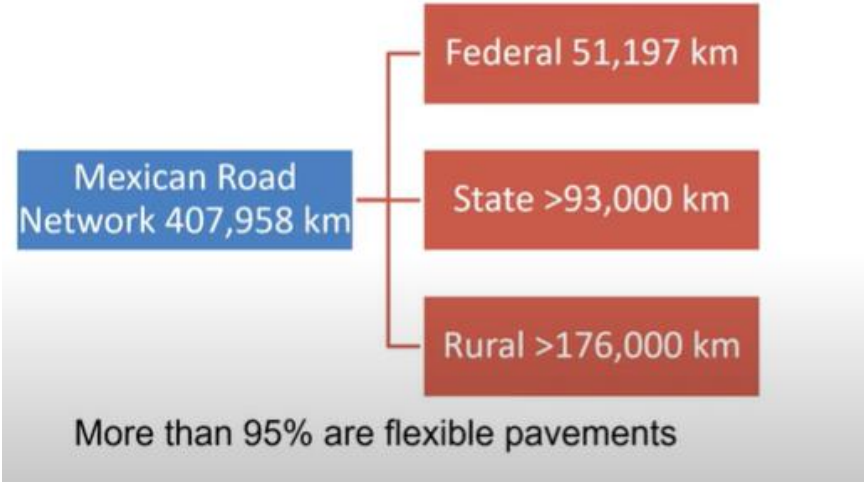
AMAAC

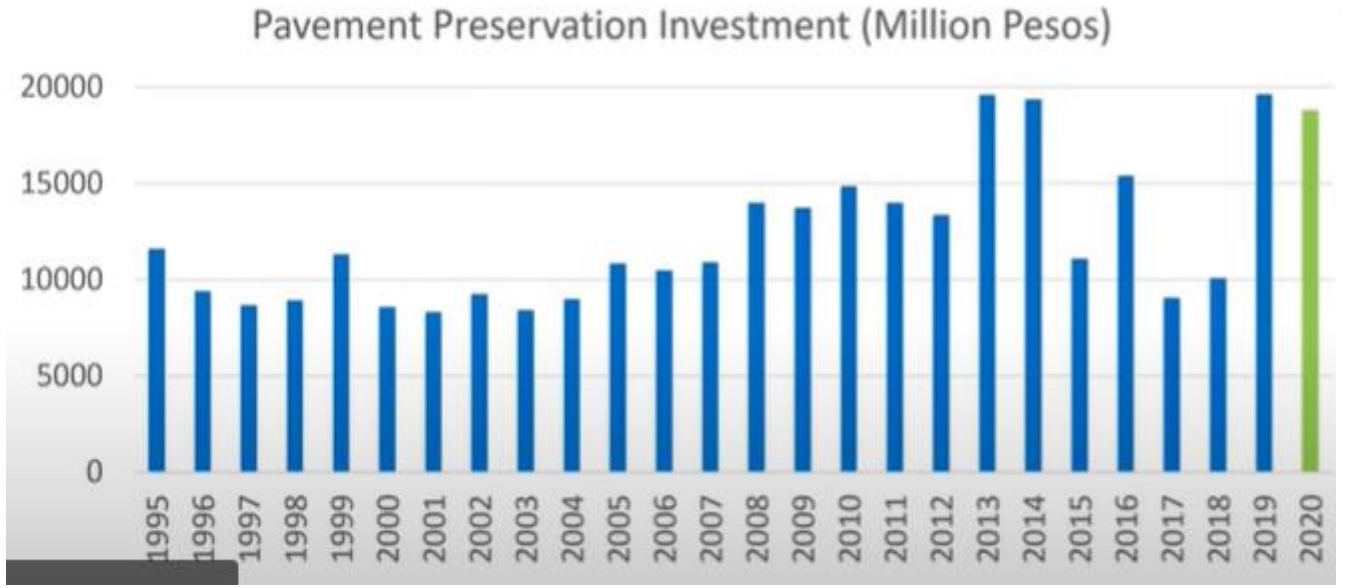
Mexican Asphalt Association

www.amaac.org.mx

Latest improvements

AMAAC


Mexican Road Network 407,958 km
Federal 51,197 km
State >93,000 km
Rural >176,000 km
More than 95% are flexible pavements


Pavement Preservation Investment (Million Pesos)
20000
15000
10000
5000
0
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
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2011
2012
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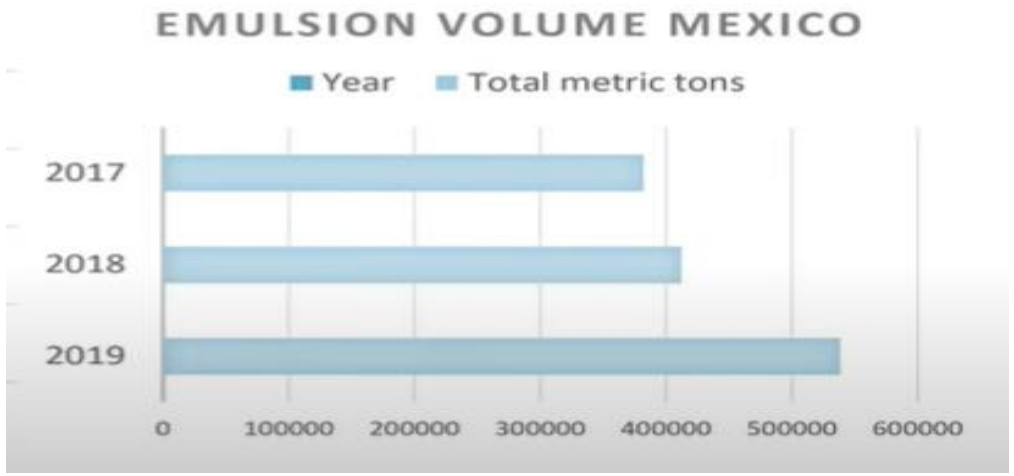
2014
2015
2016
2017
2018
2019
2020


EMULSION VOLUME MEXICO
Year
Total metric tons
2017
2018
2019
0
100000
200000
300000
400000
500000
600000

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Sprayseal with PME – Benefits

- Faster curing
- Improve aggregate retention, bleeding reduction
- Extend the application of the treatment to higher volume traffic roads
- Longer service life

AMAAC

Solventless emulsion for prime and dust control

New developed emulsifier has allowed emulsion to penetrate and bind the granular surface without the need of solvents

Tack coat

- PME with syncronised equipment
- Trackless with standard paver

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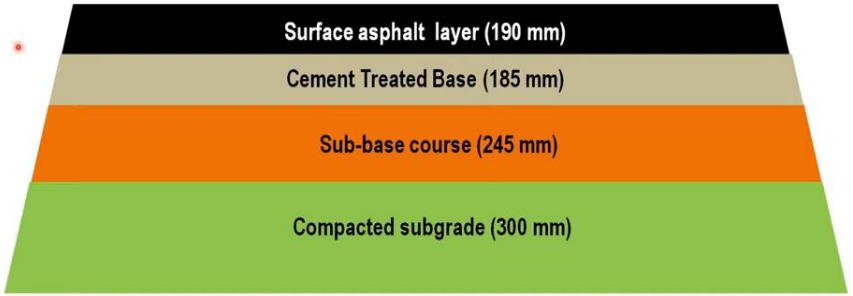
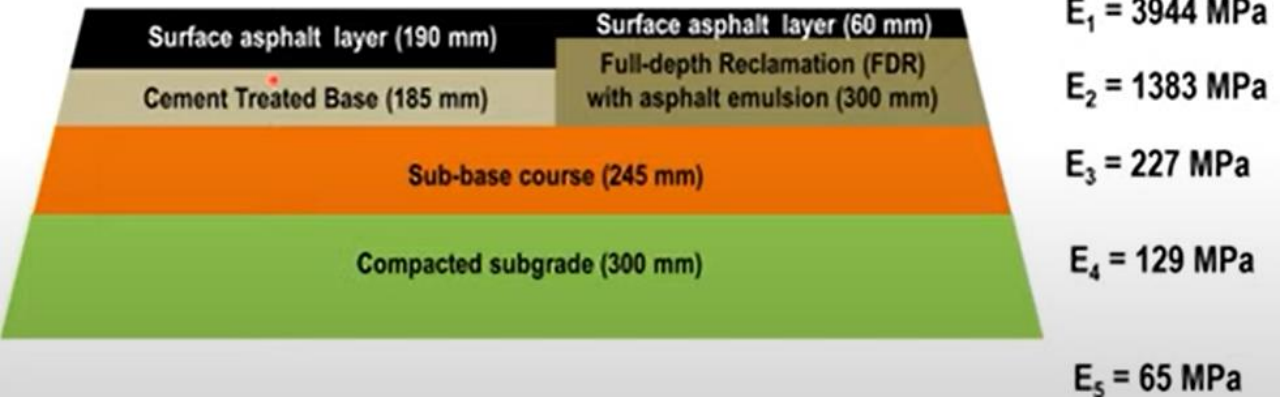
Rehabilitation - Full Depth Reclamation



Highway: Maravatío-Zapotlanejo
Km 190+000 –km 202+206
AADT: 3,974

Remaining life = 3 years

Elastic modulus layers pavement	Remaining life
Backcalculation	13 years



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Scrub seal

Other presentations

- Update of the safety guide for binder plants
- The uncertain future of refineries: impact on road industry
- Design and performance of fog seals
- Polish emulsion market

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