TERNZ
TRANSPORT RESEARCH

Review of Materials Testing

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Overview

- Current NZ practice for testing and approving materials
- Testing options
- International approaches
- Review of testing practices
- Conclusions

Current NZ Practice

- Two specifications:
  - M07:2009 for paints
  - M20:2003 for long life materials
- Approved materials list appended to each specification

Basic Requirements

- On-road performance tests
- Laboratory performance tests
- Application properties
- Quality control tests
- Environmental requirements

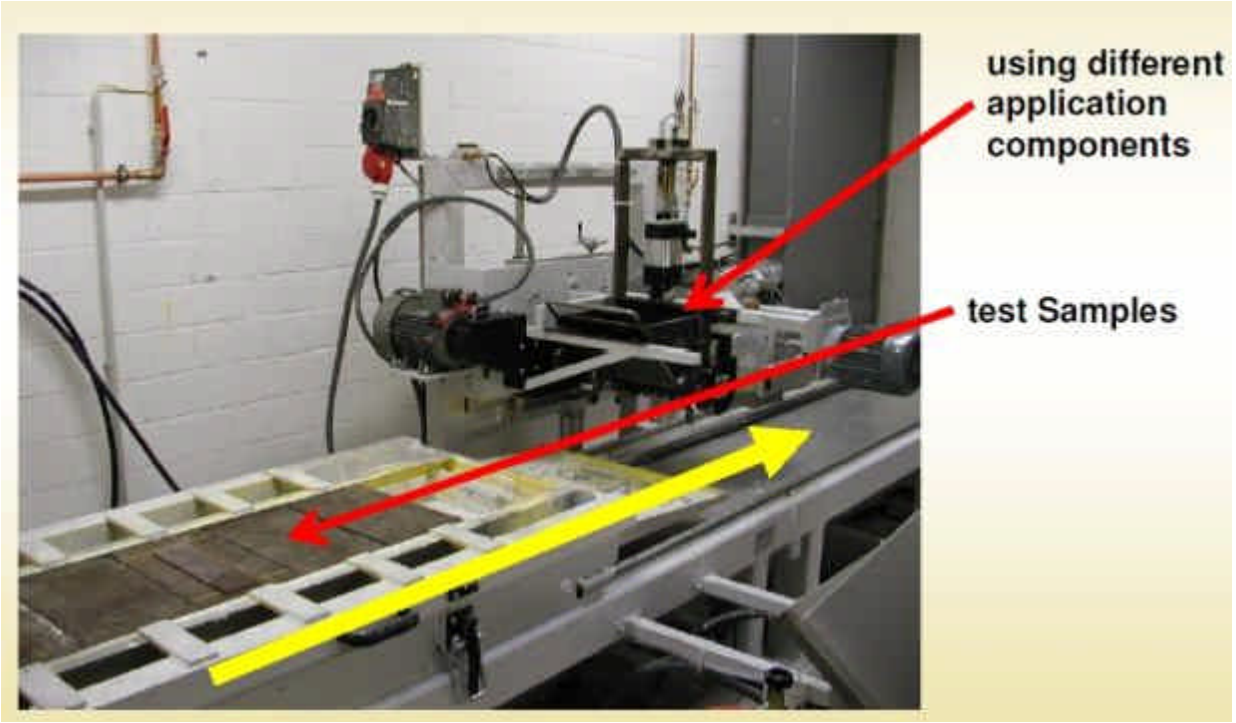
Testing Options

- Quality control is fundamental
- Lots of international standards
  - 5+ in Australia
  - 14 European
  - 19 ASTM
- European include wear simulator testing as an alternative to on-road

BASt Wear Simulator

BASt Wear Simulator – Test Samples

BASt Wear Simulator – Line Applicator



Taber Abraser

Australia

- National scheme for approval of paints and coatings (APAS)
- APAS specifications typically refer to national standards
- For pavement marking each State has its own requirements

New South Wales

- Extensive set of specifications including test procedures
- Generally these refer to Australian standards
- Materials have to be certified and field tests using transverse lines are required
- Long life materials also require Taber abrasion test
- Test conditions are not identical to New Zealand's
- Solvent-borne paints require special approval (even though included in specifications)

Queensland, ACT and Tasmania

- Approaches are all similar but not identical
- Relatively simple specifications that refer to Australian Standards and/or APAS approval for paints and thermoplastics
- Some variations in requirements for CAP
- Requirements include field trials using transverse lines
- Solvent-borne paints are not used

South Australia

- Specification includes waterborne paints, thermoplastics and CAP
- Refers to Australian standards for requirements
- Requires in-service testing or documented history of performance
- Test periods are relatively long
- Field trials can provide additional information

North America

- NTPEP – national testing programme
- States set their own requirements
- California
  - has its own testing laboratory and required samples from every batch
  - Lab tests include weathering and abrasion
  - No field testing requirement except for solvent-borne paint but solvent-borne paints are not used

North America cont'd

- Oregon
  - Detailed specifications
  - Require field testing in Oregon but will give conditional approval beforehand
  - Require long-life and high performance products to be manufacturer-guaranteed. Installation requires manufacturer-certified installers
  - Solvent-borne paints not used

North America cont'd

- Texas
  - Specifications for water-borne paint and thermoplastics
  - Epoxy and CAP used but no specs appear to exist
  - No solvent-borne paint used
  - No field trails required but specs include abrasion and weathering tests
  - Right to take samples and test for compliance

Europe

- 14 European standards for pavement marking materials
- Europe tries to have common standards and mutual recognition
- Some difficulties because requirements vary regionally
- Addressed by having different levels for each of the requirements

Europe – cont'd

- Standards provide for wear simulator tests instead of field testing but individual countries do not necessarily allow for it
- Road testing standard includes transverse lines and/or longitudinal (broken) lines (i.e. different from New Zealand)

South Africa

- Materials required to be certified by SABS
- South African standards exist for paints but not for other materials
- It appears that European standards are used for these.
- There does not appear to be a field testing requirement

Review – Quality Control

- Fundamental – no point in having requirements if we can't ensure that the materials being used are the same as those that were tested
- Other jurisdictions have systems for checking, such as APAS or sampling and testing
- Independent checking is desirable

Review – Laboratory Tests

- Laboratory testing requirements in most jurisdictions are similar but not identical
- Differences in test procedures and in pass/fail criteria even between Australia and NZ
- Many jurisdictions require testing to be undertaken by accredited laboratories

Review – Durability Tests

- Many jurisdictions use field tests with transverse lines
- These have been found unreliable in New Zealand
- Typically used to test for minimum acceptable performance
- In-service testing reduces variability by taking many more measurements
- In-service protocols could be used for in-service monitoring. Could be used to rate materials

Review – Durability Tests cont'd

- Some jurisdictions use lab tests only
- Germany and Spain have introduced wear simulator testing as an alternative
- Advantages:
  - Better control of test conditions
  - Faster turnaround
  - No disruption to traffic
  - Much safer for experimenters

Conclusions

- Current NZ specifications need some tidying up. M20, in particular, is out-of-date.
- Quality control testing is fundamental and oversight should be strengthened
- Laboratory test requirements in international standards should be compared with those in NZ. Where standards are comparable or superior, they should be recognised and materials should not need retesting

Conclusions – cont'd

- Testing agencies should be accredited to internationally recognised standards e.g. IANZ
- Field testing using transverse lines should no longer be used for approving materials.
- Conditional approval could be given on the basis of lab tests – could include durability-related tests such as abrasion and weathering
- Full approval should be subject to satisfactory performance during in-service monitoring

Conclusions – cont'd

- Wear simulator testing could be considered as an alternative path from conditional to full approval but further investigation is needed to ensure that performance on chipseal can be simulated
- In-service monitoring should also be applied to currently approved materials so that performance is well-understood and material selection uses most cost-effective option