Long Life Pavement Marking Research Trial (Cold Applied Plastic)

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Innovation / Technology

• The trial compares CAP material to 2 typical road pavement marking materials for
  1. Long lines (water borne paint)
  2. Symbols & transverse (thermoplastic)
     – Turn arrows
  3. Does not include roll-on CAP product (*Degadur*)
Innovation / Technology

Machine laying long lines

Micro grip tester
Measures skid resistance
Innovation / Technology

Machine laying ‘structured dot profile’, wider edgeline

Brighter lines head lights
Design wet weather benefits
Expected outcomes

Assumptions suggests CAP is more expensive to apply

• Longer life
  1. Skid resistance
  2. Retro-reflectivity
  3. Minimise the cost of the road asset, WOLCC

• Less disruption to public
  Less Workers on the road

• Wet weather benefits
• Sustainable, Cost Savings
Key Stakeholders

- Main Roads Western Australia
  - Central & Northern Regions (CNR)
  - Infrastructure Delivery (IDD)
  - Materials Laboratory (MEB)
  - Metro & Southern Regions (MSR)
  - Road & Traffic Engineering (RTE)
  - Strategy & Communications

- Australian road authorities
- Industry – Curtin University, Suppliers, Contractors
- Roadmarking Industry Association of Australia RIAA
- Austroads
Innovation / Technology

- The decision to use new technology and a new line pattern has been made
- Our hypothesis CAP will have a benefit and we are testing this hypothesis
- There is a need for independent and rigorous evaluation of road marking products
Overview of trial

• Mitchell Freeway Extension, $236 million
• 6 years long life pavement marking trial
• Around 74 km long line & 6,200 RRPMs
• 17 tonnes CAP
• Dot pattern (a comparison to water borne and thermoplastic)
• First Australian large scale usage of this product
• Vendor claims promising – CAP product and machinery
Overview of trial site Mitchell Freeway

- Film segment ava. – freeway water borne marking
Expected benefits - The Detail

• Whole of Life Cost tool for maintenance managers
• Retroreflectivity and Skid Resistance
  – Brighter wider lines freeway standard
  – Higher retro reflectivity and wet weather benefits
• Add CAP longitudinal line marking to the pavement marking specification
• Best design:
  – 100% B-HR glass bead (raised performance)
  – 70:30 glass bead mix B-HR & D-HR
• Validate Micro Grip tester to British Pendulum
• Greater safety
Benefits to sustainability - Public

- Swapped the current approved water borne paint & thermoplastic markings with Cold Applied Plastic (CAP) markings.

- However, the benefits for sustainability include reduction in carbon footprint, materials use, reduced safety risk to both workers and travelling public and reduced traffic disruption.
Project Driver – Senior management

• Valuable information for Road Authority Pavement Marking Group
• Scientific approach reporting evidence
• Analyse field performance of road pavement markings
• Knowledge sharing research
• Whole of Life Cost case study
Trial Results – June 2017 Mitchell Freeway

- 1st hand experience lead to a re-scope
- Contractor halted works over quality
- Product supplier expressed a lack of confidence in product
- Queensland dot trial did not produce expected retro results
- The timelines were too tight to proceed without a level of risk we weren’t comfortable with
- Identified learnings in co-operation without we wouldn’t have learnt what we have, and would continue to be subject to “reports”
Trial Results - Mitchell Freeway CAP
Trial Results

CAP material results:

*Skid resistance*: pass

*Retro*: twice current IL
Trial findings

• We haven’t been able to test CAP to assess claimed performance
• Revised plan for testing
• Timelines to update industry with results

• Key:
  – Innovation and Research involves doing new things, which introduces risk
  – Manage the risk and re-scope innovation projects
  – There are setbacks along the way
Trial findings – Working Group

- Communication: contract vs research obligations
- Failure
- Draw out what’s important
  - Contractor & supplier knowledge GAP
- Move forward with discussion
- Availability of technology, wider opportunity to learn
- Availability of skilled operators
- Identify project team champions early
Trial findings: Whole of life cost CAP vs water

- Goal “to minimise the Whole of Life Cost of the Road Asset”
- Whole of Life Cost example
- NPV, BCR
- Tool to rank treatments
- Fund & construct only the best treatment
Trial findings: Whole of life cost CAP vs water

Simulated Cost Model for Freeway Extension

Option 2: Break-even point with CAP refurb at 7 years
Loss using water & thermo

Option 1: Break-even point with no CAP refurb

Using CAP, opportunity gain from 5.7 years
Trial findings: Whole of life cost CAP vs water

Option 2: Break-even point with CAP refurb at 7 years

Option 1: Break-even point with no CAP refurb

Using CAP, opportunity gain from 5.7 years

Option 2: total saving
$27,000 Year 8
$65,000 Year 9
Trial findings: Whole of life cost CAP vs water

Initial Construction:
Supply of Materials; Application of Coating

Service Life and Maintenance:
Cleaning & maintenance of coatings

Decommissioning: Salvage value
Asset Management decisions

• Working group focus elements for actions and activities
• Intervention Levels
  1. Design road treatment
  2. Consistency
  3. Asset management in maintenance hierarchy
  4. Road operators removal of old lines
  5. Refurbishment of pavement marking
• Business model for innovation
Trial finding - Business Model

• Business model for innovation
  1. Guidance in taking innovation to operations
  2. Asset condition data owner (digital)
  3. Asset owner (physical)
  4. Project owner
  5. Responsibility shared
  6. High level support – position services
  7. Monitoring, effective maintenance, selection
  8. Support to road service levels
Test equipment

• Impacts on community to better manage and maintain our assets.
• More discussion in report
Phase 1 re-scope site
Phase 2 re-scope site: Orrong Rd & Kurnall Rd
Essentials

• Trials are complicated and messy projects

• ‘Especially the really interesting ones’

• Open transparency
  – succeed, genuine knowledge gain
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