CONCRETE PAVEMENTS / CHALLENGES
Current (and Future) Industry Issues

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Overview

• Context
• Inputs and impacts
• Concrete performance & processes
• Looking ahead
CONTEXT
Network & Construction
Key facts

- First modern concrete pavement: **1975**
- Current area of concrete pavement (NSW): **23,000,000 m²**
- Proportion of network rigid: **1%** (carrying **30%** of total freight)
- Annual maintenance: **$10M rigid** ($500M for other)
- New concrete pavement: **200 lane km** per year
- Average age: **25 years**
- Type and location:
“Nation Building”

- A peak of $6 Billion to be spent annually - the “Project Wave”
INPUTS

Key Issues
Coarse Aggregates

- Lower quality in lower layers – needs push
- Recycling of pavements – potential for RCA in Concrete
Manufactured Sand

- Safety focus – sand is the difference between “safe” and “unsafe”
- The legitimate heir to “Sand”
- Idealised materials vs production reality
- Sensitivity of concrete to production variability
- Workability …
Workability
Consequences
Cement

- Issues driving high early shrinkage – MA / fineness - distractions
- Imported cements – reliability/stability of the clinker source
- Get inside the client’s head - “Systematic process”
- Substitution – get ATIC/RMS involved early
Flyash

- Fly ash supply is as uncertain as ever – stations make electricity not ash
- Potential for lower quality fly ash in concrete
- Specifiers are actively looking for alternatives (opportunity for GGBFS?)
Recycled Concrete Aggregate (RCA)

- **Potential applications** for RCA in Australia
  - Granular fills, drainage layers, pipe bedding and pavement layers
  - Aggregate in general and paving concrete
  - *Vastly different in quality*

- **Sources**
  - Urban recycling facilities
  - Site-won pavements

- **Recycling status**
  - 93% of concrete
Future considerations: RCA in concrete

• Great potential for recycled coarse and fine aggregate in paving:
  • Lower quality aggregates in base
    – For example – two lift (90% of volume) for renewable surfacing (skid resistance)
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• Supply
  • Even at 20% substitution, there is insufficient material
  • Concrete plants (project) may not have the capacity for additional feeds

• Cost
  • High demand for RCA  cost outweighs value
  • DoTs are likely to require strict regimes for testing
PERFORMANCE
And processes
Shrinkage

- Move the conversation to **total** shrinkage
- Role of curing in crack prevention
- Influence of manufactured sands
CRCP Cracking
CRCP Cracking
Joint seals
Resurfacing

• Diamond grinding is great but …

• Is that our only resurfacing option?
LOOKING FORWARD
Infrastructure delivery trends
Future opportunities

- The concrete network is largely complete
  - The Hume Hwy Duplication
  - The Pacific Highway Upgrade (by 2020)
- After 2020, concrete roads will enter rehabilitation/maintenance
  - ‘End of life’ is approaching for various projects
- Concrete is at a disadvantage considering road user demands
- Two recent rehabilitation projects designed by Arcadis considered:
  - Flexible overlays
  - Rigid overlays
  - Crack-and-seat
  - Rubblisation
  - Dowel bar retrofit
  - Rebuilding (pavement)
  - Applications for RCA
- There is still plenty of scope for innovation
Thank you

ROADS AND HIGHWAYS

• Urban, arterial and regional road design
• Design of bridges and other complex structures
• Motorway and freeway design
• Bus priority projects
• Junction improvements
• Traffic engineering and planning
• Intelligent transport systems
• Independent Verifier services
• Contract administration
• Materials technology

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