Applying Science to an Unsealed Road Network

Neil Bennett
Road Asset Manager
Fulton Hogan
“Requiring the **manual dexterity** of a pianist, the **accuracy** of a marksman and the **finesse** of a ballet dancer (and the **eye** of a hawk combined with the **limbs** of an octopus)
Unsealed Roads

- Over 83,000km of Local Authority managed roads.
- More than 31,500km unsealed (38%).
- Very limited funds available for seal extension and almost no NZ Transport Agency financial assistance.
- Significant generator of public complaints.
Workshop Topics since 2003 include:

- Motivating sensible unsealed road maintenance practices.
- Innovation on a shoe string – alternative metals for unsealed roads.
- Logging trucks on local roads – is forestry really having an unreasonable impact?
- Good practices and techniques to ensure better surfaces and drainage on unsealed roads.
- Reducing metal usage and grading frequency by continuous compaction of unsealed roads with grader attached rollers.
- Improved design method for aggregate surfaced roads.
- Gravel road maintenance – USA best practice.
- Waste AC to rehab unsealed road.
- Gravel loss monitoring project.
- Assessing the effectiveness of unsealed road key performance measures
- Optimising gravel road maintenance strategies
- And many many more…………..
Ashburton District

Few Facts

- Bounded by Southern Alps, Ocean, Rakaia River and Rangitata River.
- Area: 617,500 hectares.
- Population: approx 33,000.
- Total road length 2,643km
- Unsealed 1,157km
- 53% of rural road sealed
- 4th largest local authority network in NZ
- I was born there
Unsealed Improvement Projects

- From 2000/2001 Council focus on heavily trafficked roads.
- Deferral of seal extensions in favour of unsealed area wide pavement treatment.
- Initial programme completed 2006 but due to increased loads and dairy conversions programme has increased.

The current strategy for pavement renewal on the more important unsealed roads is based on granular overlays. It includes reshaping, upgrading pavement drainage, followed by placing a 150 mm layer of AP40 then a wearing course layer of 70 mm clay or lime bound AP20 material.

These roads are prioritised by traffic volume and maintenance costs. The strategy addresses the deterioration of unsealed pavements and roads that are of poor construction.
2014-15 Projects

Methodology

- Improve drainage – upgrade swales install soak pits.
- Improve shape of existing road – importing material if insufficient cross-fall.
- Any failed areas undercut and filled with AP65.
- Two types of blends used – Clay (25-30%) or Lime (50-60%)
- AP20 spread first then blended material
- Mixed with grader (clay harder to work with)
- Both susceptible to moisture
- Blending in windrow delivered consistency
- Finished wearing course cross-fall minimum 5% maximum 6%
- Seal extension at both ends on some sites
2014-15 Projects
2014-15 Projects
Roadroid

- Cell Phone app developed in Sweden.
- Output from phones motion sensors is an estimated International Roughness Index (IRI) score
- Roadroid produces results with the following information:
  - Date and Time Stamp
  - GPS position
  - Speed
  - Altitude
  - Roughness (IRI)
Upper Downs Road

- Full road prepared for lime rock blend but budget constraints meant half completed in normal AP20 maintenance metal.
Upper Downs Road

Lime rock blend after 42 days

... after 70 days

... after 264 days
Upper Downs Road

January Drought

Days

% Good

AP20  Lime rock
Upper Downs Road

Upper Downs Rd Compacted AP20 section

% Good

% Poor

Maintenance Intervention

% good, % satisfactory, % unsatisfactory, % poor
Roadroid Analysis

(X,Y, IRI) 620029.012, 6782994.850, 3,5

Analyse 100 vibrations -> 1 value per second
### Roadroid Analysis

#### Import History List

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<th>Unit Name</th>
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#### Operations and measurement details

- Show measurement start- and endpoint in Google Maps
- (You must allow popups in web browser)
- [Generate Shape File](#)
- [Generate KML file](#)
- [Zoom to measurement area on map](#)
- Select aggregation length (meters)

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**Measurement end time**
6/28/2016 12:40:42 PM

**Import Status**
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**Road Id**
Simpsons from manorai

**Description**
OK
Roadroid Analysis

Evaluation
Simple calculation of condition bands on either individual roads or a whole network
Roadroid Analysis

Roadroid can take automatic photos at pre set intervals and view on PC

www.fultonhogan.com
Roadroid Analysis

Data exported to Excel for plotting
Accuracy Comparison

Waikato Roadroid testing compared with Opus NAASRA testing
Southland District have fully adopted including using in Fonterra tanker (screen shot from TV One news)
Industry Adoption

Central Otago DC – Footpaths and Kiwirail – Testing tracks
Upper Downs Road now

Lime rock blend after 711 days

Some gravel loss leading to rutting and minor scour but no maintenance for 711 days

www.fultonnogan.com
Upper Downs Road now

AP20 section is now worse despite repairs
Roadroid Development

New Version
Currently beta testing updated software that enables video capture while undertaking roughness surveys
Technology

Continually evolving
Smart phones smarter
Phones cheaper and faster
Can replace expensive current technology
Technology is the future

YOU ARE CRUISING ALONG, AND THEN TECHNOLOGY CHANGES. YOU HAVE TO ADAPT.

Marc Andreessen