AgileAssets’ Performance Models

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Pavement Preservation
The Importance of Timing
Cost of Delaying Maintenance

**Pavement Age**
- New
- Old

**Pavement Condition**
- Very Good
- Functional Resurface $$$
- Preventive Maintenance $$
- Routine Maintenance $
- Rehabilitation $$$$$$
- Structural Resurface $$$$$
- Very Poor
Cost of Delaying Maintenance

<table>
<thead>
<tr>
<th>Pavement Age</th>
<th>Pavement Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good</td>
<td></td>
</tr>
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<td>Very Poor</td>
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</tbody>
</table>

- Functional Overlay: $125,000/km
- Structural Overlay: $275,000/km
- Reconstruction: $450,000/km
- Surface Treatment: $40,000/km
AgileAssets Pavement Manager

- Very Flexible – Simple or Complex
- Highly Configurable
  - System configured to the way you do business
- Multi-Constraint Optimization
- Robust Reporting Tools
- Integrated with other Assets
“Unlimited” Analysis

- Unlimited Decision Trees
- Unlimited Pavement Types
  - Thick Pavements vs. Thin Pavements
  - High Traffic vs. Low Traffic
  - GABC Base vs. Recycled Base vs. Reclaimed Base
  - Hot Mix w/ Micro-Surfacing vs. No Micro-surfacing
  - Allow for Different Treatments by Classification, Curb/No Curb, etc.
- Unlimited Performance Models
“Unlimited” Analysis

- Unlimited Decision Trees
- Analysis Capabilities are Data-dependent
  
  Available Data will limit what can be analyzed
- Unique Performance Models
Condition vs. Strategy

Routine - Crack Seal (?)

Routine - Patching

Resurface

Reconstruction
Multi-Constraint Analysis

Multiple Year Analysis utilizing:

- Decision Trees
- Performance Models
- Optimization Analysis (Solver)
Network Optimization Approach

Condition → Condition Indices
Decision Trees → Candidate Projects
Performance Models → Future Conditions & Benefits
Integer Optimization → Optimal Work Plan
Performance Models

- Used to Predict Future Performance
  - Long-term Consequence Analysis

- Used to Determine “Benefit” of a Treatment
  - Area Under The Curve
  - Modify w/ Available Factors
    - ADT, ESAL’s, Classifications, Enviro-Friendly Factors, etc.

- Complexity of Models
  - Level of Available Detail
    - Single Condition Index vs. Multiple Indices
Performance Modeling

- Deterministic Models
  - Expert opinion
  - Statistical Analysis

- Markov Chain (Transition Probability Matrix)
  - Although available, it is typically not used

- Dynamic Modeling
  - Models will adjust to latest condition data
Example – State DOT w/ 4 Curves

PCI

Age

Rigid

Flexible
Performance Models

- Equation Builders
  - Internal
    - Pavement Management Software
  - External

Performance Curve

\[ y = -0.02x^3 + 0.04x^2 - 2.4x + 100 \]
Performance Models

- Example: Enter up to 10 Points
  - User-specified Points (PCI vs. AGE)

![Graph showing rehabilitation and reconstruction thresholds]
Decision/Performance Models

- Understand “Reality”
- Fully consider all factors
  - Accurate Ages
  - Pavement Structure
  - Composite Index or an Individual Index
    - If Composite includes IRI
      - Micro or Slurry on a road will affect IRI Index
- Don’t Let Perfect get in the Way of Pretty Good
  - Do you meet your objectives?
Additional Flexibility

- Reset Values (After a Treatment is Applied)
  - Fixed Value
    - Recon: $\text{PCI}_{\text{New}} = 100$
  - Increase by “X”
    - Surface Coat: $\text{PCI}_{\text{New}} = \text{PCI}_{\text{Old}} + 15$
  - Equation
    - Overlay: $\text{PCI}_{\text{New}} = \text{PCI}_{\text{Old}} + 50(\text{PCI}_{\text{Old}} / 100)^{0.85}$

- Curve Families
  - Change Curve after treatment
Summary
Questions?

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