Exploring Changes to Road and Rail Noise Modelling in Ontario

Peter VanDelden
Senior Noise Specialist
RWDI

BEST MANAGED COMPANIES

Outline

- Background
- Needs and Challenges
- Selection
- Proposal
- Discussion and Questions
  - Reaction
  - Implementation

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Background

- Initiated by MTO, MOE, Metrolinx Joint Steering Committee
- Both **road** and **rail** noise models

Road	Rail
Highway	Heavy Rail
Arterial Road	Light Rail Transit
Bus Transit	Subway

Background - Goal

Project Goal:

Best Noise Prediction Model for Ontario

- Study reports for road and rail
- Technical peer review
- Consultation with stakeholders
- Implementation

Background - Definitions

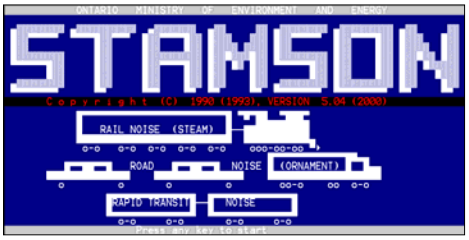
algorithm	One or more calculation descriptions (e.g. equations) that define how a result is obtained
emission algorithm	Source calculation: type, quantity, speed, method of operation
propagation algorithm	Surroundings calculation: distance, topography, obstacles, …

Background - Definitions

model — The package of algorithms that are used to produce results

Includes source algorithms and propagation algorithms

software — A computerized interface that interprets the model



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Needs

- Current emissions data
- Current computing standards
- Usability

- Integration with other models and data
- Visualization

Challenges

- Staying current with changes
  - Source emissions
  - Operating hardware and software
- Ability vs. accessibility
- Remain free from bias

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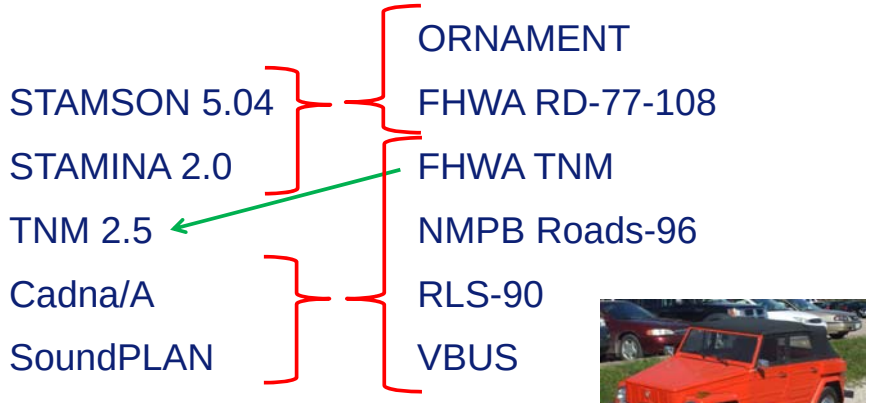
Selection - Method

- Detailed look at models and software
  - Software versus needs
  - Software versus software
  - Model versus model
- Reviewed:
  - Common North American models
  - Selected European models
  - Common North American software

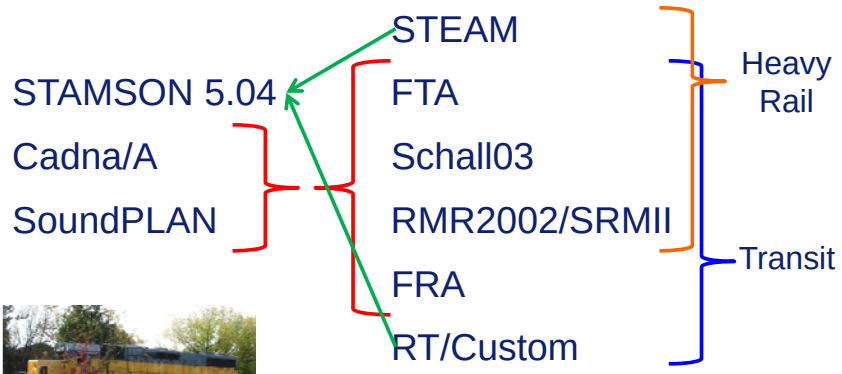
Selection – Road Models

- **Road** noise models and software



Selection – Rail Models

- **Rail** noise models and software



Selection - Method

- Models compared by applying test cases
  - systematic selection of inputs
  - Inputs represent typical applications
- Validation against measurements is not part of this process
  - Comparison with measurements have already been done

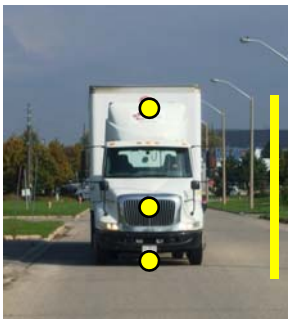
Selection - Models

- Models vary in complexity of each part
  - Source characterization
  - Ground effects
  - Barriers

- Models are therefore not easy to directly compare
- The application of test cases is the most effective comparison

Selection - Models

- Example comparison of source modelling



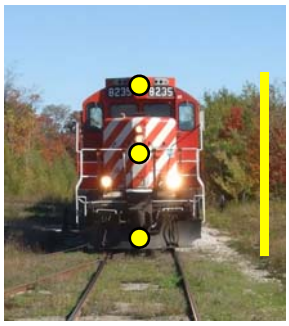
exhaust
aerodynamic
engine
tire-road

TNM

STAMSON

Selection - Models

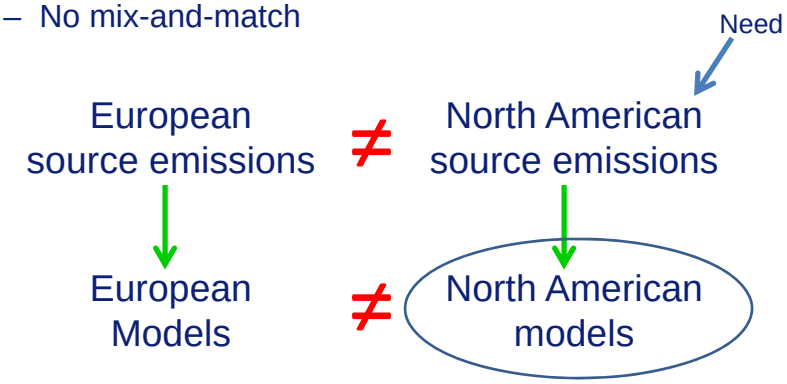
- Example comparison of source modelling



exhaust
aerodynamic
engine
wheel-rail

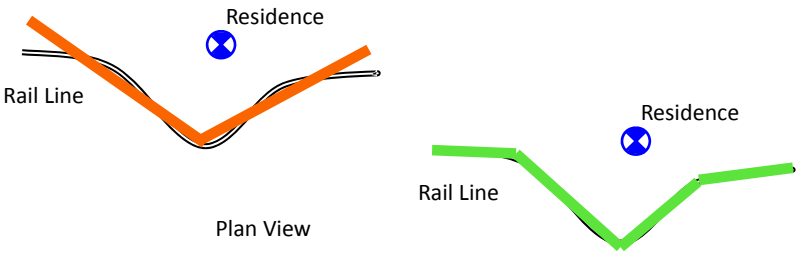
Selection

- Looked at emissions and propagation algorithms separately
  - No mix-and-match



Selection - Software

- Software interprets the model
  - Strong definition provides less interpretation
    - e.g. division of segments, definition of terrain



- Interpretation results in output variance

Selection - Software

- Software ability is limited by processing power
  - Faster computation
  - Graphical presentation

STAMSON	Cadna/A & SoundPLAN
point-to-point only	grid calculations
no visualization	3-D representations

Selection - Software

- Current software is functionally comparable
- Software continues to develop
  - Market demand
  - Competition
  - Allows for algorithm currency
- Software manufacturers provide impetus for model improvement

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Proposal - Algorithms

Source	Model
Road	TNM
Heavy Rail	FRA
Rail Transit	FTA

- TNM starting with version 2.6
- FTA whistle for Rail Transit
- FRA whistle software for Heavy Rail

Proposal - Software

- Conditional use of software packages:
  - Test cases
  - Specified tolerance in results
  - Manufacturer demonstrates compliance
  - Settings used for compliance are published as a user guide
- Result: Freedom of software choice

Proposal - Considerations

- Internationally recognized algorithms and software
- Consistent with future FHWA practice
- Some local implementation guidance may be needed

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Your feedback is requested

- Please provide feedback:
  - As part of this discussion
  - On feedback forms
  - In person afterwards
  - By email to: peter.vandelden@rwdi.com

THANK YOU

Peter VanDelden
Senior Noise Specialist
Peter.VanDelden@rwdi.com