



CASE STUDY IN SOFTWARE APPLICATION

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PRESENTATION OVERVIEW

- Background Information
- Subject Software
- Sample Calculations:
 - 7 scenarios exploring
 - Ground absorption
 - Barriers
 - Object handling
 - reflection
- Overall Discussion
- Closing

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BACKGROUND INFORMATION

- Generally regulators require ISO 9613-2
- ISO 9613-2 interpretation;
- Potential user error.

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SOFTWARE 1

- Datakustik CadnaA:
 - Popular in Ontario
 - ISO 9613-2
 - Customizable calculation settings
 - Modelling performed by Aercoustics Engineering

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SOFTWARE 2

- Softnoise (Bruel and Kjaer), Predictor
 - Not currently as common in Ontario
 - ISO 9613-2
 - Minimal deviation from ISO 9613 allowed

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SCENARIO OVERVIEWS

- 7 simple scenarios focused on 4 calculation aspects
- Meteorological correction turned off
- CADNA settings at default
- Predictor settings at default
- Matching temp. and humidity settings
- All scenarios use a source with sound power of 100 dBA at 500 Hz

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SCENARIO 1


- Source and receiver on a flat reflecting plane
 - Source/receiver distance 100 m and both at 4.5 m height
 - Ground absorption using the general method
 - Ground absorption coefficient set to zero, or fully reflective

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SCENARIO 1- PLAN AND CROSS SECTION



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SCENARIO 1 RESULTS

- Predictor Result: 51.8 dBA
- Cadna Result: 51.8 dBA
- Discussion:
 - Results are similar
 - 9613-2 equations are well defined

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SCENARIO 2

- Simple source and receiver on a flat plane
 - Source/receiver distance 100 m and both at 4.5 m height
 - Ground absorption using the general method
 - Ground absorption coefficient set to one, or fully Absorptive

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SCENARIO 2 RESULTS

- Predictor Result: 48.8 dBA
- Cadna Result: 48.8 dBA
- Discussion:
 - Results are identical
 - 9613-2 equations are well defined

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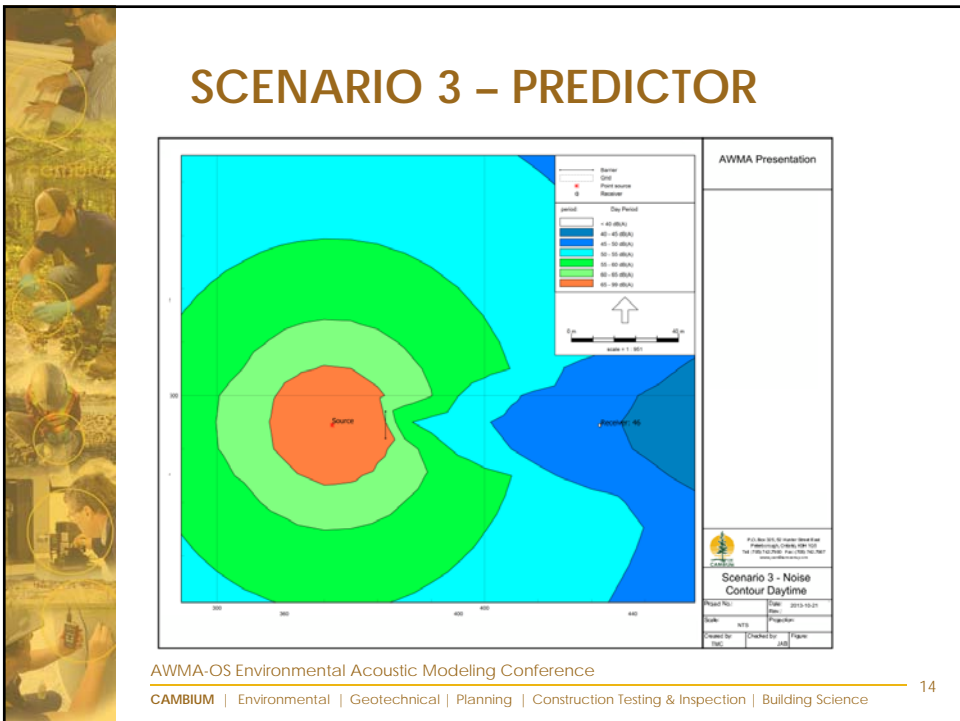
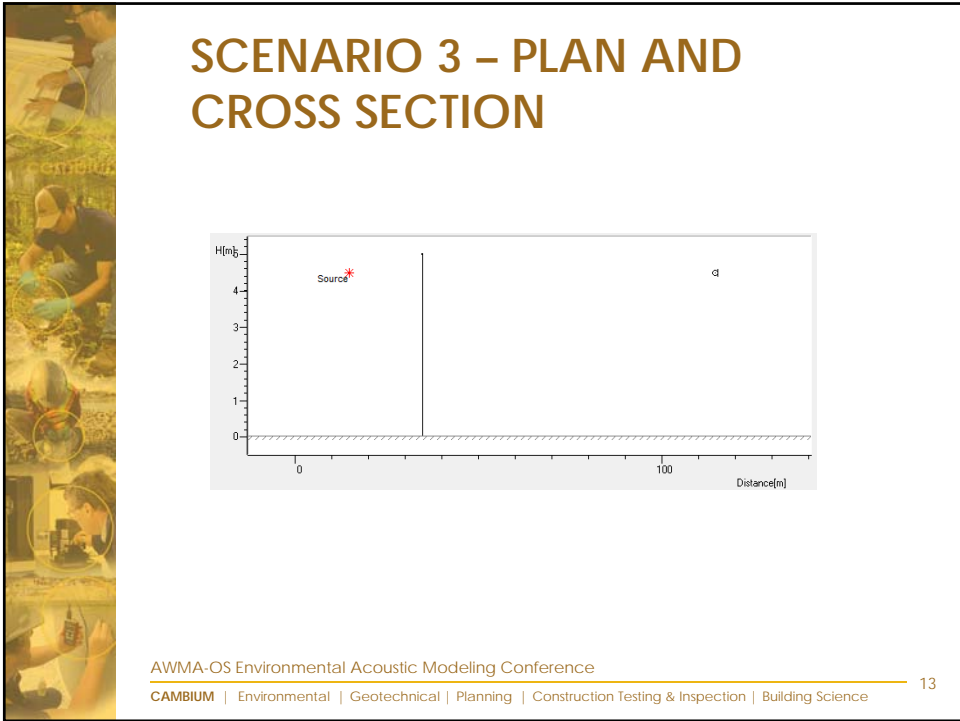


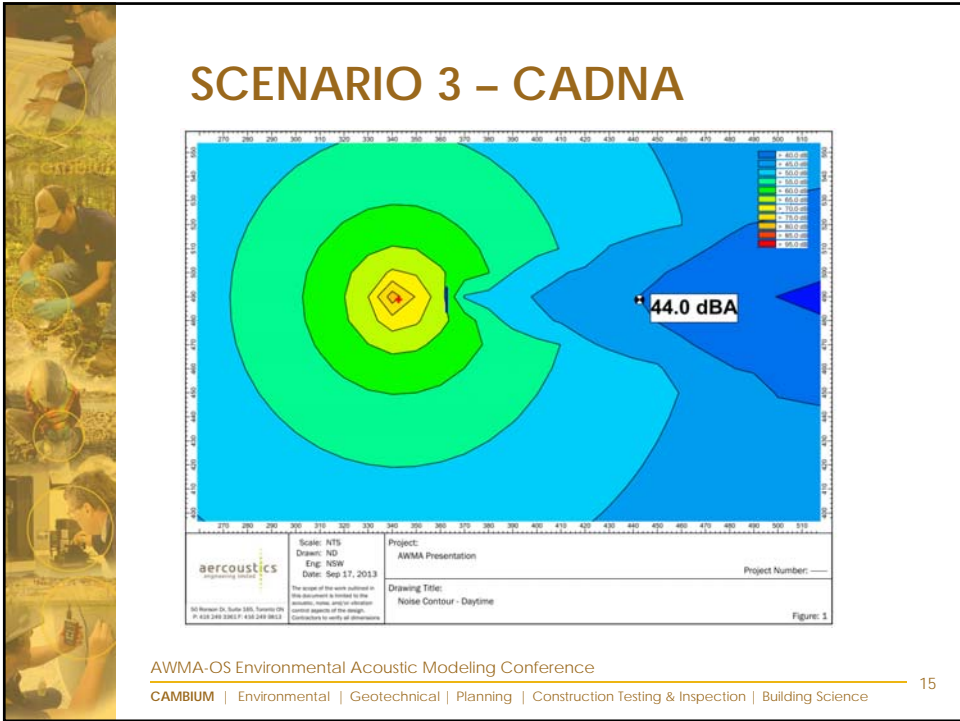
SCENARIO 3

- Identical to Scenario 1 however with the addition of a barrier;
 - Barrier at 20 m from source, 5 meter height and 10 m width
 - Barrier reflection coefficient set to 0.79
 - Cadna's non-ISO barrier settings turned off

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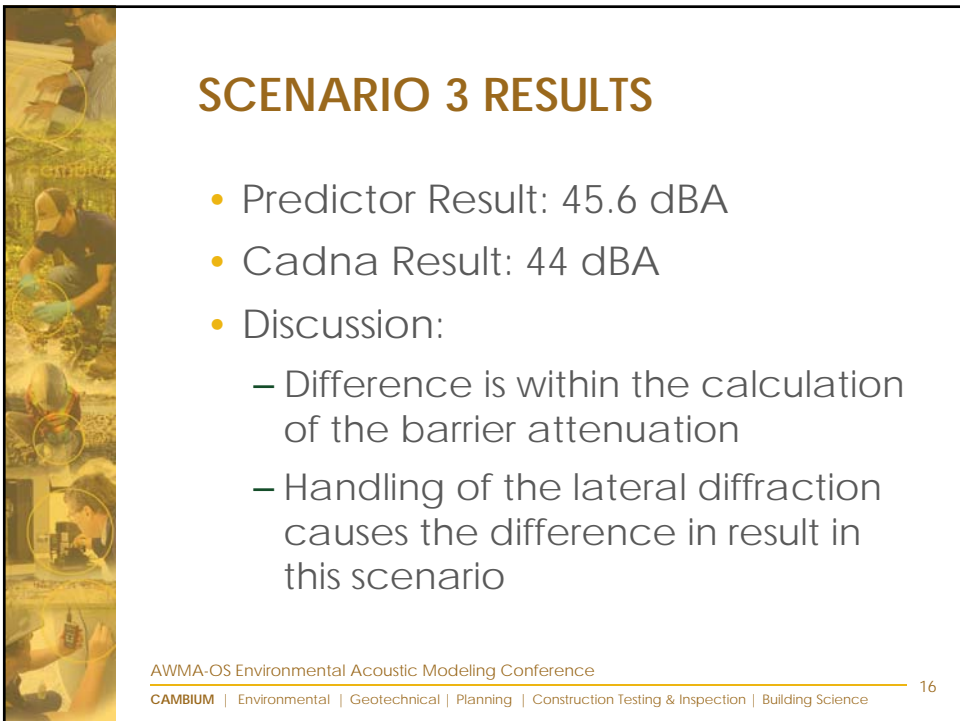
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SCENARIO 3B

- Identical to Scenario 3 however with the addition of a narrower barrier
 - Barrier narrowed until lateral diffraction occurred (4 m length)

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SCENARIO 3B RESULTS

- Predictor Result: 48.5 dBA
- Cadna Result: 48.5 dBA
- Discussion:
 - With lateral diffraction off Cadna obtains 44.0 dBA
 - With barrier approaching infinity Predictor results approaches 44.0 dBA

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SCENARIO 4

- Identical to Scenario 3 except with absorbing ground
 - Barrier at 20 m from source, 5 meter height and 10 m width
 - Barrier reflection coefficient set to 0.79
 - Cadna's non-ISO barrier settings turned off

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SCENARIO 4 RESULTS

- Predictor Result: 44.9 dBA
- Cadna Result: 44.0 dBA
- Discussion:
 - Again the difference in barrier effect calculation is still present
 - Ground attenuation has an effect on Predictor barrier

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SCENARIO 4B

- Identical to Scenario 3B except with absorbing ground
 - 4 m length barrier

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SCENARIO 4B RESULTS

- Predictor Result: 46.8 dBA
- Cadna Result: 46.8 dBA
- Discussion:
 - Barrier calculations are identical

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SCENARIO 5

- Same as Scenario 1 except with a barrier abutting a building at 20 metres from the source
 - Barrier will be 5 metres tall and 10 metres long, perpendicular to source/receiver line of sight
 - Building will be 5 metres tall, and 10 m X 10 m abutting the barrier
 - The line of sight will pass through the barrier 1 m from the building (offset)

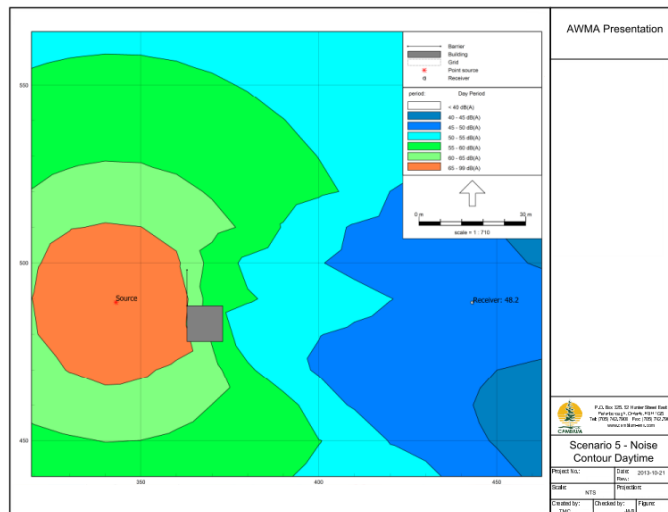
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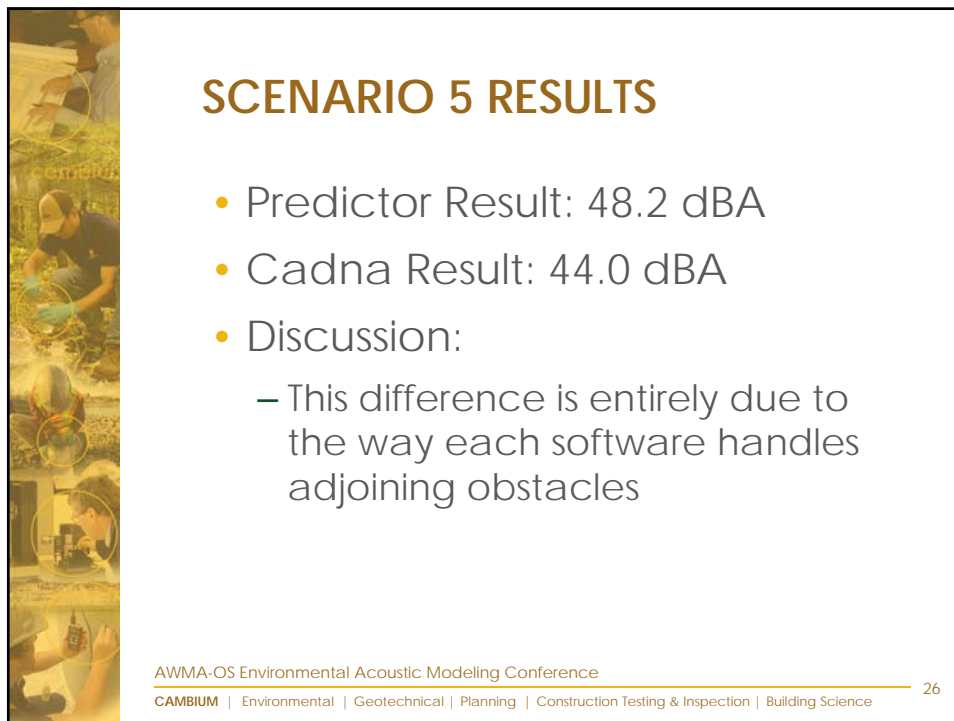
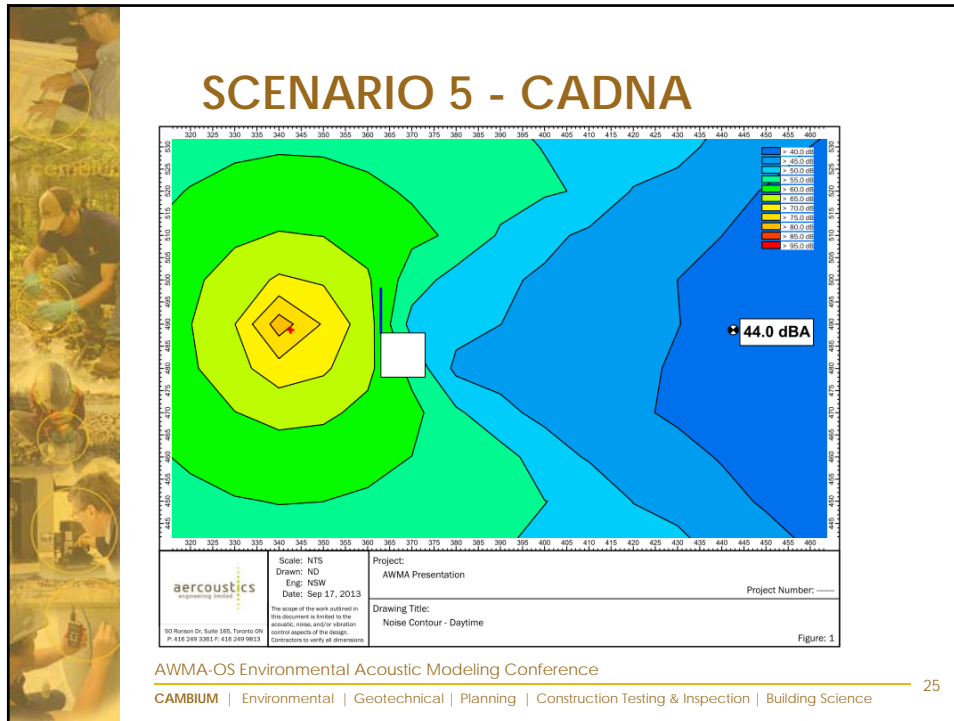
SCENARIO 5 - PREDICTOR




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SCENARIO 5B

- Same as Scenario 5 except with the building removed, so that only the offset barrier exists
 - Barrier will be 5 metres tall and 10 metres long, perpendicular to source/receiver line of sight
 - The line of sight will pass through the barrier 1 m from the building (offset)

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SCENARIO 5B RESULTS

- Predictor Result: 48.2 dBA
- Cadna Result: 48.4 dBA
- Discussion:
 - Results are similar
 - Illustrates that Predictor did not account for the building

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SCENARIO 6

- Reflections will be the focus of this scenario
 - Building 5 meters behind the source (10 m X 10 m X 5 m)
 - Reflection coefficients will be identical
 - All other conditions will remain the same

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SCENARIO 6 RESULTS

- Predictor Result: 54.0 dBA
- Cadna Result: 54.0 dBA
- Discussion:
 - Results in this case are similar

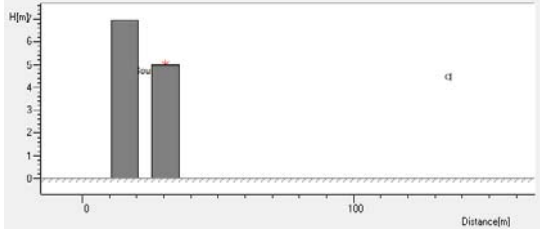
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SCENARIO 7

- Rooftop Reflections Scenario
 - Section View



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SCENARIO 7 RESULTS

- Predictor Result: 45.6dBA
- Cadna Result: 45.5 dBA
- Discussion:
 - Results in this case are similar
 - Full building height reflection is calculated

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OVERALL DISCUSSION

- Generally both softwares are in good agreement
- Predictor appears biased high
- Aside from differences based on user input issues, all differences are within ISO's expected accuracy of +/- 3 dB
- User Beware

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CLOSING

- Personal Opinion
- Special Thanks to Nino Dhimitri and Nicholas Sylvestre-Williams of Aercoustics Engineering.

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QUESTIONS?

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