Winter Maintenance Operators’ and Managers’ Opinions and Perceptions of Fatigue

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Project Overview

• Winter maintenance operator susceptibility to fatigue
  – Schedule
  – Shifts
  – Operating conditions
  – Responsibilities

• Goal:
  – Cost-effective recommendations
    • Work and rest schedules
    • Contributing factors
    • Countermeasures
Questionnaire Overview

• Two parallel questionnaires
  – Managers
  – Operators

• Assessed
  – Hours, equipment, refusal to work, breaks, awareness, medical issues, fatigue management
Summary of Results

- 1,043 winter maintenance operators
- 453 maintenance managers
- 24 participating states
Demographics

- **Age**
  - 45-65 years old

- **Experience**
  - More than 15 years

- **Employer**
  - State DOTs

- **Shift length**
  - 12 hours

- **Maximum hours**
  - More than 15 hours
Prevalence of Fatigue

![Graph showing prevalence of fatigue among managers and operators. The graph plots the percent of responses against participant responses. The x-axis represents different response levels: Never, Rarely, Sometimes, Most of the times, Always. The y-axis represents the percent of responses ranging from 0% to 80%. The graph indicates that managers and operators have similar prevalence rates, with a peak at 'Sometimes.']
Impact of Fatigue

![Impact of Fatigue graph]

Percent of Responses

- No Impact
- A minimal impact
- Moderate impact
- A significant impact

Managers
Operators
Contributing Factors

<table>
<thead>
<tr>
<th>Sources of Fatigue (1 = Not Important; 5 = Extremely Important)</th>
<th>Operators (n; σ)</th>
<th>Managers (n; σ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Seat</td>
<td>4.17 (1,023; 1.01)</td>
<td>3.95 (449; 0.90)</td>
</tr>
<tr>
<td>Light from headlamps</td>
<td>4.08 (1,018; 1.13)</td>
<td>4.08 (448; 1.01)</td>
</tr>
<tr>
<td>Night time operations</td>
<td>4.03 (1,026; 1.14)</td>
<td>4.28 (450; 0.89)</td>
</tr>
<tr>
<td>Heavy traffic</td>
<td>3.89 (1,016; 1.16)</td>
<td>4.00 (449; 1.02)</td>
</tr>
<tr>
<td>Too much noise</td>
<td>3.58 (1,005; 1.20)</td>
<td>3.25 (444; 1.07)</td>
</tr>
<tr>
<td>Vibration</td>
<td>3.30 (1,004; 1.22)</td>
<td>3.05 (444; 1.04)</td>
</tr>
<tr>
<td>Too much technology inside the truck</td>
<td>2.86 (1,015; 1.33)</td>
<td>3.08 (449; 1.14)</td>
</tr>
<tr>
<td>Too little technology inside the truck</td>
<td>2.69 (994; 1.29)</td>
<td>2.40 (441; 1.12)</td>
</tr>
</tbody>
</table>
Countermeasures: Moving Around

![Graph showing percent of responses by operator and manager use and effectiveness]

- Operator Use
- Operator Effectiveness
- Manager Use
- Manager Effectiveness

**Percent of Responses**

- Never/Not Effective
- Rarely/Slightly Effective
- Sometimes/Sometimes Effective
- Most of the Time/Effective
- Always/Very Effective

**Participant Response**
Countermeasures: Nap

![Graph showing percent of responses for various participant responses regarding operator and manager use and effectiveness.](image)
Countermeasures: Continuing to Drive

![Graph showing operator and manager use and effectiveness over different types of responses.]

Legend:
- Operator Use (solid black line)
- Operator Effectiveness (dashed black line)
- Manager Use (gray line)
- Manager Effectiveness (dotted gray line)

Responses:
- Never/Not Effective
- Rarely/Slightly Effective
- Sometimes/Sometimes Effective
- Most of the Time/Effective
- Always/Very Effective

Percent of Responses vs. Participant Response
Drivers’ Suggestions

- Importance of Personal Accountability: 54%
- Fatigue Training: 11%
- More Breaks: 11%
- Power Naps During Long Shifts: 9%
- Better/More Sleeping Quarters: 7%
- Provide Food: 4%
- Don't Cut Corners/Take shortcuts: 4%
Final Recommendations

- Use of breaks/naps
- Operator fatigue reporting
- Increased vehicle maintenance
- Investigate winter emergency shift start/end times (including shift length)
- Offer shift options
- Involvement in decision making process
- Increase personal interactions
- Maximize off duty rest
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