Compliance with Standards and Test Procedures

- Vibration Measurement
- Real Work Conditions
- Bias in estimating Trigger Time
- Purchasing Policy
- Present Day
Complying with Standards and Test Procedures - Vibration Levels

- **1960**
- **EU-Vibration Directive 2002**
- **Computer simulation**
- **Structure analysis**
- **Optimization of AV-elements**
- **AV-system**

- **Comfort range**
- **Complaint level**
- **Health risk**

- **3.6 m/s²**
Complying with Standards and Test Procedures – R & D
Modern Tuning Tools and Methods

- Running mode analysis
- Finite element calculation
- Computer simulation
- Modal analysis
MANUFACTURER’S DECLARE AN UNCERTAINTY FACTOR K.

VARIABLES ARE FOUND BETWEEN TEST HOUSES EVEN UNDER CONTROLLED CONDITIONS.

IN GENERAL FOR OUR PRODUCTS $K = 2.0 \text{m/s}^2$
Complying with Standards and Test Procedures - Real Work Conditions

MS 260
RS RM
13“ 15“ 16“ 18“
SOFTWOOD HARDWOOD
10 DIFFERENT SPECIES of EACH
BRASH, FELL, SNED, CROSS CUT
524,800 permutations
Measured 5 times
34 MODELS = 89,216,000 measurements
Complying with Standards and Test Procedures - FS 480
## Complying with Standards and Test Procedures - Insurance Company Field Measurement

<table>
<thead>
<tr>
<th>Model</th>
<th>Declared Value</th>
<th>Stihl Field Value</th>
<th>Time To EAV</th>
<th>Insurance Field Value</th>
<th>Time To EAV</th>
</tr>
</thead>
<tbody>
<tr>
<td>FS 480</td>
<td>2.3m/s²</td>
<td>3.55m/s²</td>
<td>3hrs 58min</td>
<td>30m/s²</td>
<td>3 mins</td>
</tr>
<tr>
<td>FS 400</td>
<td>2.2m/s²</td>
<td>4.39m/s²</td>
<td>2hrs 36min</td>
<td>20.5m/s²</td>
<td>7 mins</td>
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<tr>
<td>FS 480</td>
<td>2.3m/s²</td>
<td></td>
<td></td>
<td>87.4m/s²</td>
<td>zero</td>
</tr>
</tbody>
</table>
Complying with Standards and Test Procedures - Causes of variation in field measurement
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Complying with Standards and Test Procedures - Causes of Variation in field measurement

Position of accelerometer

Condition of cutting head

Type of material being cut

Operator’s skill

Calibration of test equipment

Serviceability of the machine
Complying with Standards and Test Procedures - Estimating Trigger Time

- Three Observers on site
- Three hours to do vibration measurements
- Estimated One Hour
- Actual Trigger Time – 27 minutes
Complying with Standards and Test Procedures - Logging Actual Trigger Time

Number of tank fills per day – approx 30 minutes/tank

Tachometer
Complying with Standards and Test Procedures - Purchasing Policy

- Only buying machines with a vibration magnitude below 3.0m/s²
- Seeking to eliminate the risk of vibration wherever possible
- Testing machines prior to purchase
Complying with Standards and Test Procedures - Present day
Complying with Standards and Test Procedures - Present day
Complying with Standards and Test Procedures - Glasgow City Council - Measures

- Identify the scale of the problem
- Develop a policy and set standards
- Review and survey existing equipment
- Establish purchasing controls
- Identify time scales for safe operation of tools
- Provide information and training to employees
- Establish a health surveillance programme
- Audit and review the system