FÉDÉRATION INTERNATIONALE DE MOTOCYCLISME

FIM SOUND CONTROL

The new FIM method - " 2 metre Max "

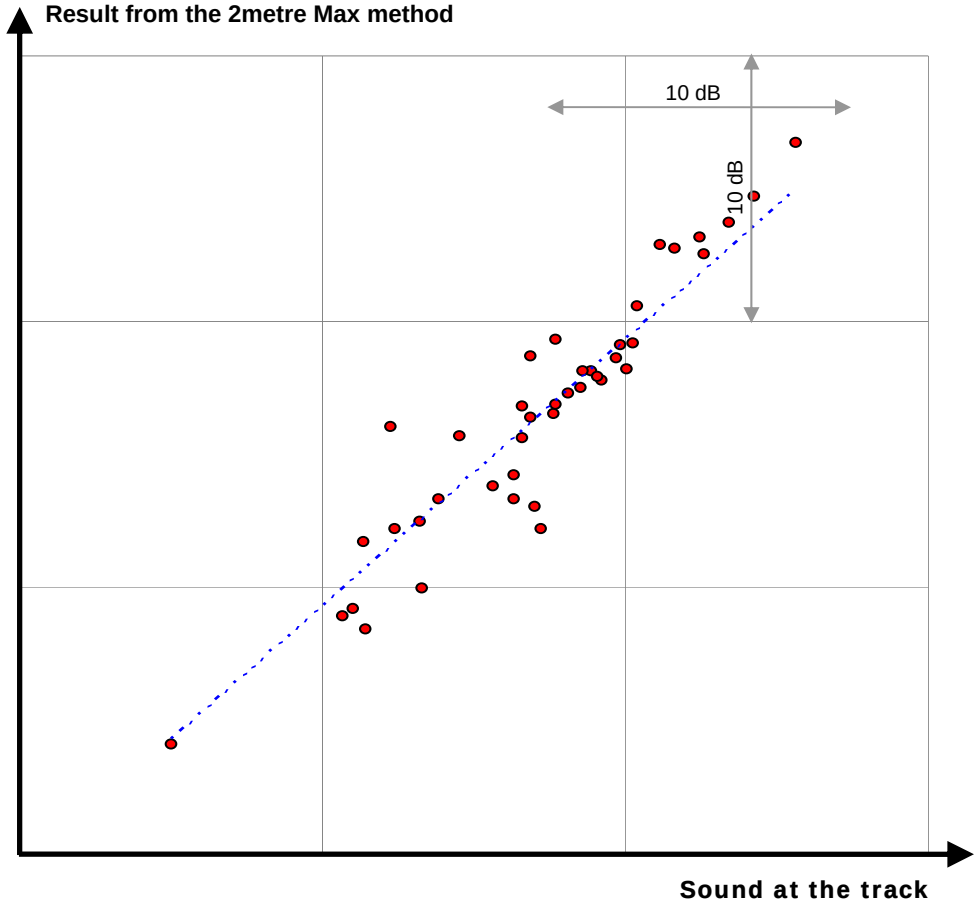
December 2008

1. Requirements for the new method

Apart from being easy to perform and to understand, an essential requirement for a new control method is that a certain change of the sound at the technical control should correspond to an equal change of the sound at the track. With reference to the graph below, this means that the red dots should gather around a straight line with a slope of 1.0 (or 1 to 1 ratio), meaning that a sound reduction of, for example 3 dB at the control, corresponds to a sound level reduction of 3 dB at the track. The '2metre Max' control method as described below meets this requirement.

➔ **The '2metre Max' Method reflects the real sound levels experienced around the track**

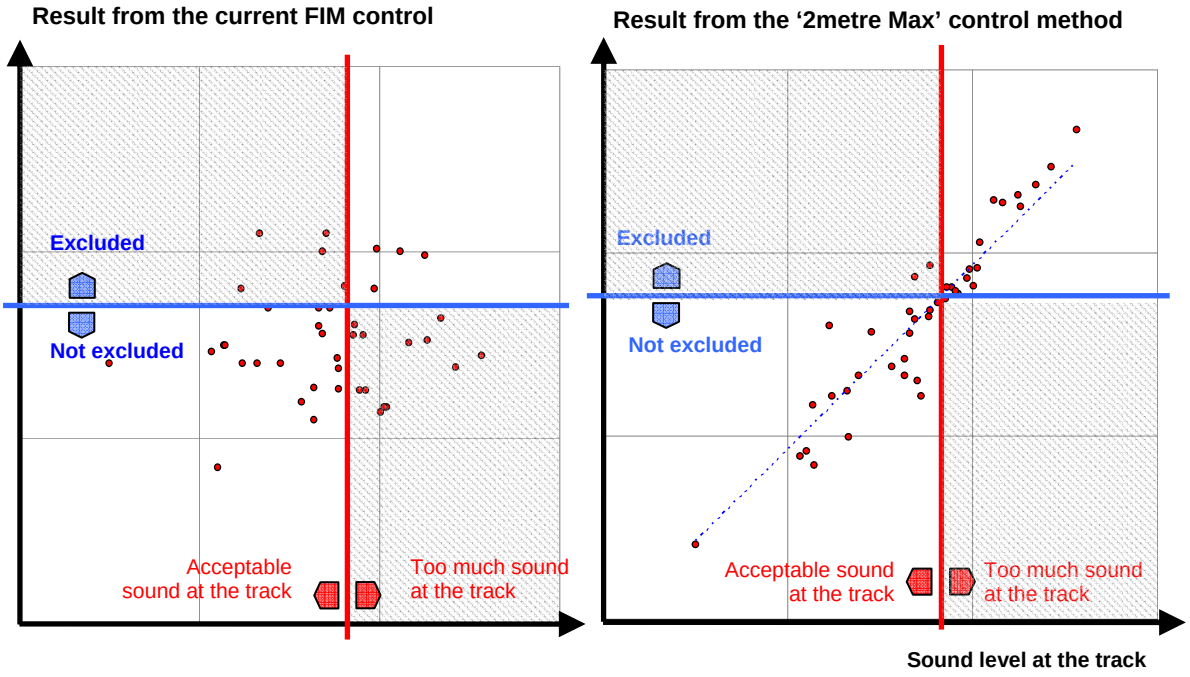
In addition to the current FIM measurement method, measurements were made on the 40 MX and Enduro motorcycles and all the '2metre Max' measurements were made on the same motorcycles. When data from trackside recordings (passing-by) are exchanged by data obtained from the 2metreMax control method, the graph below looks like this:



The red dots gather rather nicely around the broken blue line, which has a slope of 1.0 (45°). Because of uncertainties of different kinds there will always be a certain spread around the line, but due to the distinct slope, the spread is of minor importance as shown on the following page.

2. Improved quality of the sound control

One way to ascertain the quality of a control method could be by looking at the amount of “unfair assessments”. In this context, an unfair assessment would be if a motorcycle with acceptable sound at the track is excluded (unfair to the driver) or, in not excluding a motorcycle with unacceptable sound at the track (unfair to people in the surrounding area).
The amount of unfair assessments using the current FIM method and the ‘2metre Max’ method is illustrated in the graphs below. The graphs show the principle only, and the limit between acceptable and unacceptable sound and show that the corresponding limit for exclusion are randomly chosen when using the FIM method.



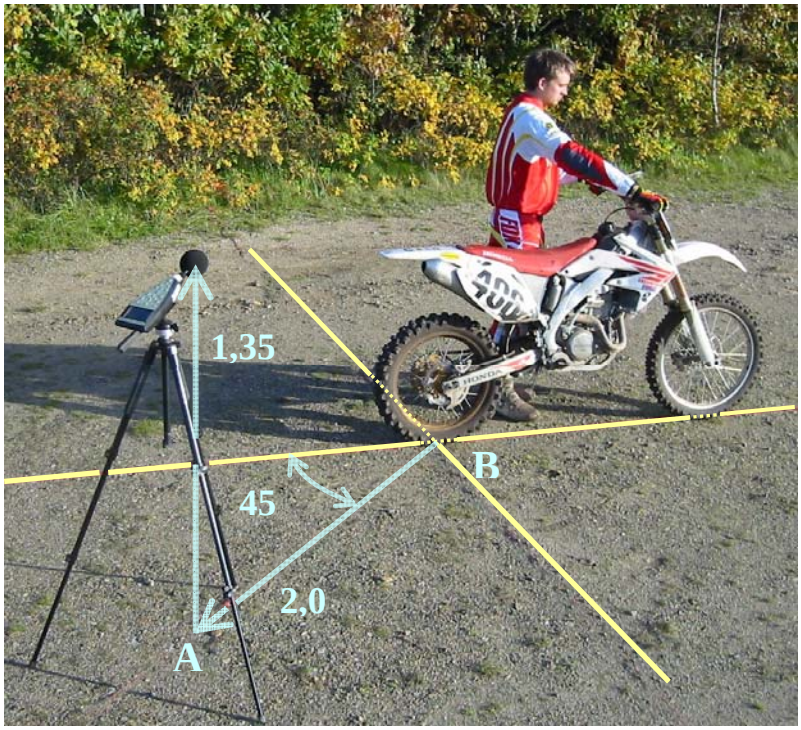
Data points (red dots) lying in the shaded areas represent the unfair assessments. Depending on the exact data points and the chosen sound limits the percentage of unfair assessments is about 40-50% using the current FIM method, while the percentage is only up to about 5% using the ‘2metre Max’ method.

3. How to perform the 2metreMax method

Details on how to perform the 2metreMax sound control are given below. Some details will be subject to change during the clarification and testing of the method in 2009.

3.1. Measuring equipment and measured parameter

- The sound level meter shall be a class 1 or class 2 instrument.
- The sound level meter shall be calibrated before and after a series of control measurements.
- The sound level meter shall be calibrated every 2 years by the manufacturer or a specialized institute.
- The calibrator shall be calibrated every half year by the manufacturer or a specialized institute.
- The parameter measured is the maximum, A-weighted sound pressure level with the time constant FAST, $L_{pAmax,fast}$. The sound level meter shall be set to “max-hold”.



3.2. Test site

- The measurement is made behind the motorcycle at a certain angle to the side of the exhaust. If there are 2 exhaust pipes, the side with the air inlet is chosen. In case of full symmetry either side can be used.
- The surface shall preferably be dry gravel.
- The distance from the motorcycle to sound reflecting buildings and the like shall be at least 10 meters.
- The motorcycle shall be held either by the rider/operator or fixed, in the upright position.
- The driver/operator shall stand beside the motorcycle, on the side of the motorcycle opposite to where the microphone is positioned.

3.3. Geometry (see picture)

- The microphone is placed at a height of 1.35 m (+/- 2 cm) directly above point A on the ground.
- Point A is situated at a distance of 2 m from point B (+/- 2cm), measured horizontally from the point where the rear wheel touches the ground. The line from point A to point B forms an angle of 45° to the longitudinal axis of the motorcycle.
- In the horizontal plane, the microphone shall be directed at point B, where the rear wheel touches the ground. In the vertical plane, the microphone itself shall be oriented horizontally (± 45°).

3.4. How to operate the engine before and during the test

- The engine and exhaust system shall be warmed up before the sound test.
- The mapping of the engine shall be the same as during practices and races.
- The motorcycle/engine shall be running in the neutral gear position.
- During the sound measurement, the engine shall be brought from idle to maximum engine speed (max RPM) by a sudden opening of the throttle (within 1 second), and back to idle by a sudden release of the throttle.