Sound power testing for ISO certification

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Introduction

Sound power is an acoustic metric that represents the total noise or acoustic power generated by a specific machine or tool. It corresponds to an intrinsic acoustic property of the equipment itself and is not influenced by the environment the equipment is operating in. Sound power values can be used to compare different machines and products in an absolute way, to do competitive benchmarking or to validate the impact of design modifications on a product's acoustic profile. The sound power metric also forms the basis for compliance testing with respect to the ISO-based standards and legislations for product noise certification. The European directive for noise emission (2000/14/EC) for example, applies to broad range of outdoor equipment and forces manufacturers to conduct an ISO based sound power measurements to label their equipment (noise marking) or to comply with maximum values (noise limiting). Failing to meet the standard does not only represent a competitive disadvantage, it simply prohibits manufacturers from selling their equipment on the European market.

Industries and applications concerned

Following industries are concerned with sound power testing:

- Outdoor equipment
- Hand held power tools
- Off-road vehicles
- Office equipment
- White goods

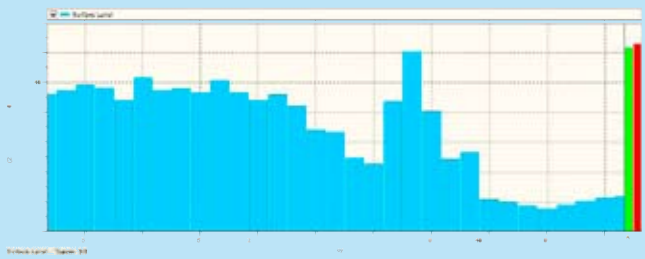
Following products are concerned with sound power testing:

- Products concerned for noise marking:
  - ➔ Cranes, generators, compressors, dozers, lawnmowers, ...
- Products concerned for noise limiting:
  - ➔ Chain saws, concrete mixers, hedge trimmers, hydraulic hammers, drill rigs, shredders, drill rigs, cooling equipment, ...
- Office equipment
  - ➔ Printers, discs, scanners, power supplies, CD/DVD drives, PC's, facsimile machines, displays, projectors, ...

Measurement approach

The LMS Test.Xpress system guides the user through the different steps of the ISO sound power setup and covers the full process from measurement to reporting. The following step-by-step procedure is available:

- General setup
  - ➔ Selection of specific ISO standard
  - ➔ Selection of bandwidth, measurement time, octave mode and weighting
  - ➔ K2 environmental correction values
  - ➔ Environmental pressure and temperature
- Measurement grid
  - ➔ spherical, rectangular, cylinder, full sphere
  - ➔ definition of bystander and operator positions
- Calibration
  - ➔ Manual entry or via sensor database
  - ➔ Calibration routine with auto detection of signal
- Background noise measurement
- Tones/Impulsiveness
  - ➔ Indication if discrete tones are present
  - ➔ Indication if the sound is impulsive or not
  - ➔ Directivity Indicates the variations between the different measurement positions
- Sound power measurement
  - ➔ Tabular results for each microphone on SPL, K1 and K2 corrections, directivity
  - ➔ Overall sound power level and detailed results per octave band
  - ➔ Overall status indication (OK/NOK) according to the ISO standards
- ISO report
  - ➔ Standard ISO report with all necessary parameters, ready to print for certification
  - ➔ Can be customized by the end user without any programming



A-weighted 1/3rd octave with overall level indication (linear and A-weighted)

The LMS Test.Xpress solution for sound power testing

The LMS Test.Xpress system consists of a measurement front-end (LMS SCADAS Mobile SCM01 or SCM05) and the LMS Test.Xpress Sound Power based on Sound Pressure software which offers a dedicated user interface with integrated MS Office reporting supporting the different ISO based measurements standards for both free-field and reverberant acoustic environments:

- ISO3741 (reverberant rooms)
- ISO3744 (free field)
- ISO3745 (precision method)
- ISO3746 (survey method)
- ISO15744 for non-electrical hand held power tools
- ISO7779, ECMA-74 for IT and telecommunication equipment
- ISO9296, ECMA-109 for computer and business equipment

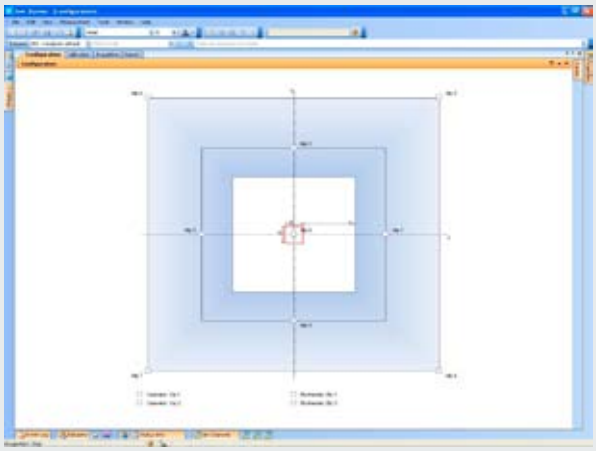
The whole process from the initial setup, selection of parameters down to the final ISO report is embedded in a dedicated, workflow-based user interface. Critical parameter setting are password locked to avoid errors during the actual measurement. The straightforward user interface simplifies the measurement process and guides non-expert or occasional users step-by-step towards the final ISO report. Using the Test.Xpress software, more experienced users can unlock all parameters, define extra measurement channels, change the default ISO setup and reports and process the parallel recorded time data in more detail to find the root cause for failing to meet limit values.

The LMS Test.Xpress system is based on the scalable LMS SCADAS Mobile data acquisition hardware, which can be configured to measure all microphone positions and extra channels in one single run. This dramatically reduces the total setup and measurement time, and increases the quality and consistency of the measured data.

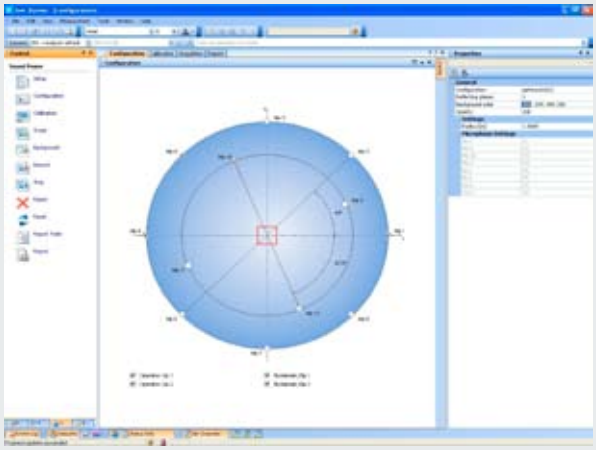
Supported standards for sound power testing

The LMS Test.Xpress system supports the following Sound power standards (pressure method):

ISO3741	Reverberation rooms
ISO3744	Engineering method in free field over reflecting plane
ISO3745	Precision method in anechoic and hemi-anechoic rooms
ISO3746	Survey method over reflecting plane
ISO15744	Non-electrical hand held power tools
ISO7779/ECMA-74	IT and telecommunications equipment
ISO9296/ECMA-109	Computer and business equipment
EC/2000/14	European directive based on ISO3744



Geometry based selection of the microphone positions (rectangular measurement grid)



Geometry based selection of the microphone positions (spherical measurement grid)

Toolbar operation guides the user through the different steps in the ISO sound power measurement

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LMS is focused on the mission critical performance attributes in key manufacturing industries, including structural integrity, system dynamics, handling, safety, reliability, comfort and sound quality. Through our technology, people and over 25 years of experience, LMS has become the partner of choice for most of the leading discrete manufacturing companies worldwide.

LMS is certified to ISO9001:2000 quality standards and operates through a network of more than 30 subsidiaries in key locations around the world.

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