QC - Spectrogram 3D Limits (3DL) S63

Option for SPL task of the KLIPPEL ANALYZER SYSTEM (Document Revision 1.3)

PRELIMINARY SPECIFICATION

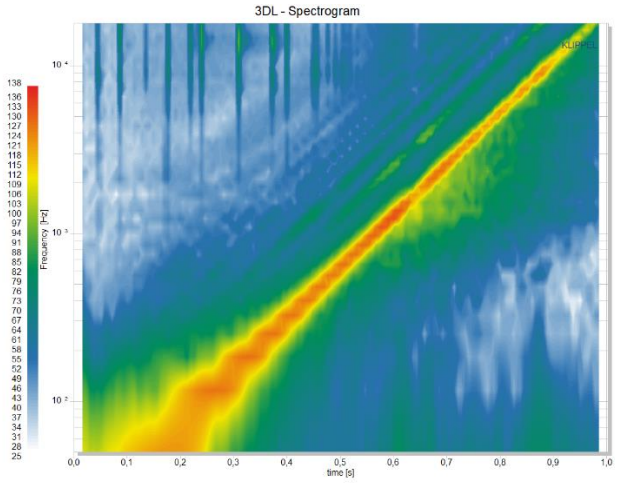
This specification is preliminary and is subject to change.

FEATURES

- Time-Frequency analysis
- Easy limit setting

BENEFITS

- Fingerprint of defects (as Rub&Buzz)
- Sensitive Rub&Buzz detection
- Optimize Rub&Buzz filter settings
- Detect excitation and spectral position of limit violation



DESCRIPTION

The Spectrogram 3D Limits is an Add-On module for the SPL Task of the Klippel QC-Software. It performs a time/frequency analysis with a high time resolution by applying a filter bank based on an auditory model. The analysis is performed parallel to the data acquisition to avoid any performance impairment.

The resulting spectrograms make possible to identify the spectral fingerprint of a defect and the excitation frequency that activates it. The exceedance plot reveals the position of limit violation in the time-frequency plot. To reduce the complexity of that plot, projections of the exceedance are presented.

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CONTENT

1 Overview

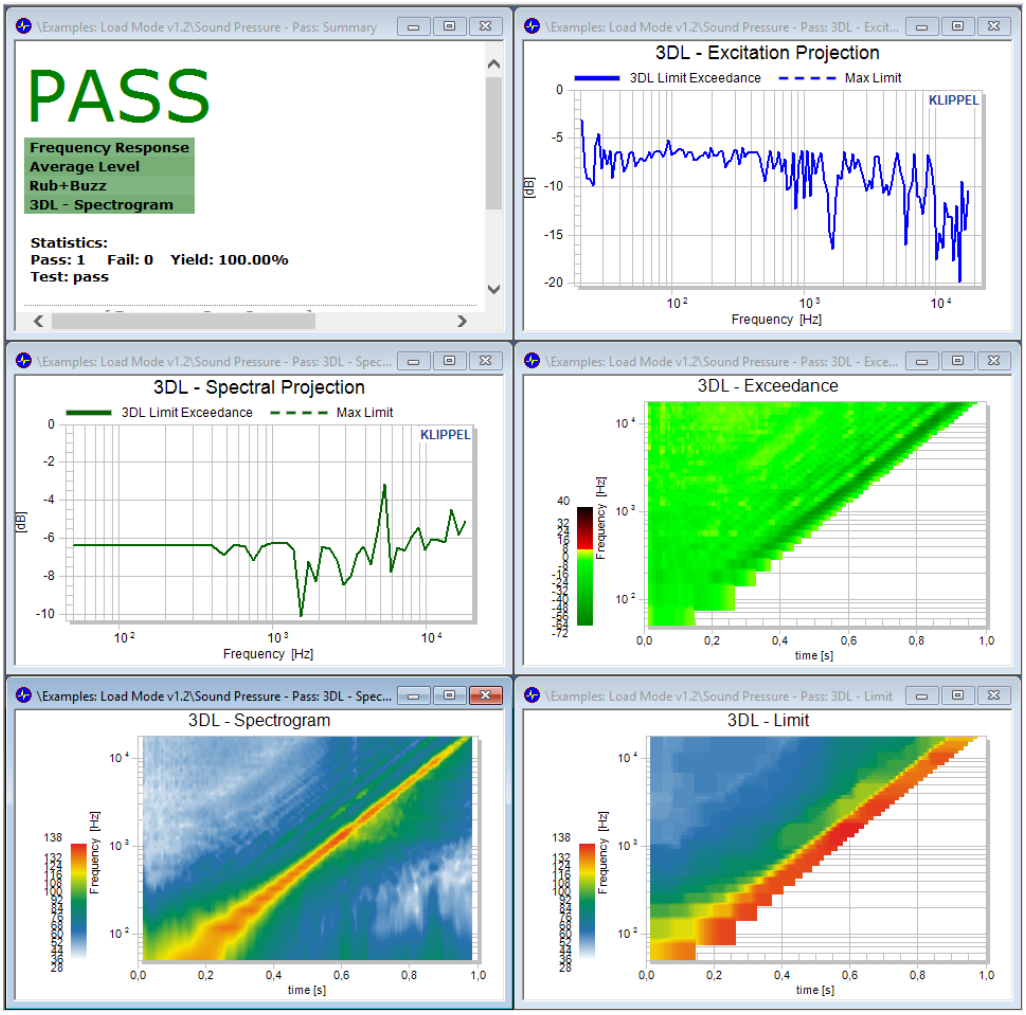
1.1 Principle

The Spectrogram 3D Limits is designed to offer valuable information to identify and characterize defects during the End Of Line (EOL) testing, using spectrograms in addition to 2D curves to evaluate if the device under test (DUT) is a defective unit.

The spectrogram is obtained by filtering the microphone signal using an auditory filter bank based. The limits are calculated based on the maximum level measured at each spectrogram point of all reference units. The measurement verdict is obtained from the difference of measured DUT to the limit. The positions of positive differences in the time-frequency plot reveal the defect's fingerprints.

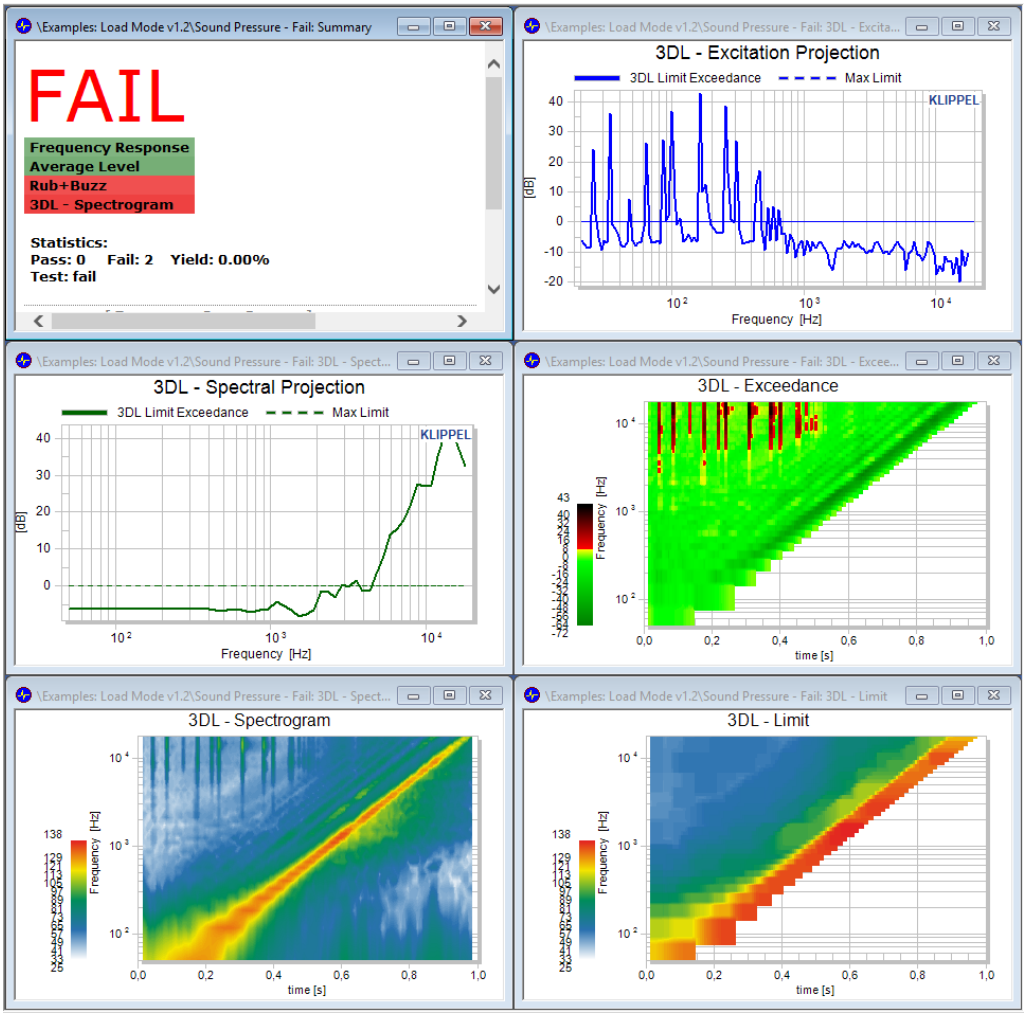
2 Examples

2.1 Example 1 PASS Measurement



Since the measured DUT does not suffer from any defect, the measurement result is "Pass", the exceedance plot and the projections (3DL – Mappings) do not show any positive difference (exceedance) above the limit.

2.2 Example 2 – FAIL Measurement



The measured DUT presents a Rub&Buzz defect, which is detected by the Rub&Buzz measurement of the Klippel System and by the 3DL Spectrogram. Frequency levels of defect are visualized in the 3DL – Exceedance plot, whose projections are shown in the 3DL – Mapping plots.

3 Requirements

3.1 Hardware

- Klippel Hardware System (Production Analyzer (PA) or Klippel Analyzer 3 (KA3))
- Power Amplifier
- Microphone

3.2 Software

- 3DL software license
- QC Standard Software 6.2 or SPL-Task license for R&D application (dB-Lab 210.560)

4 Limitations

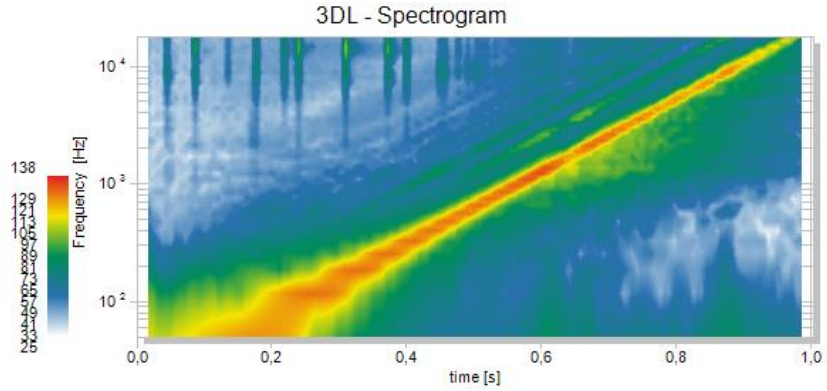
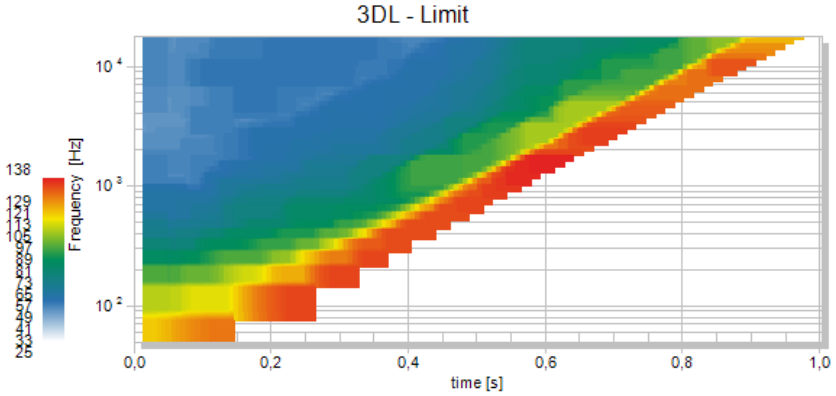
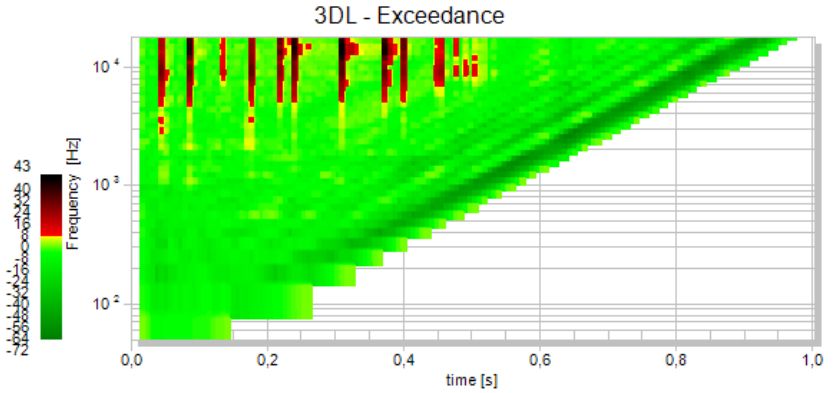
4.1 Acoustical	
	Noise-free measurement conditions (noise detection will be implemented in a future release).

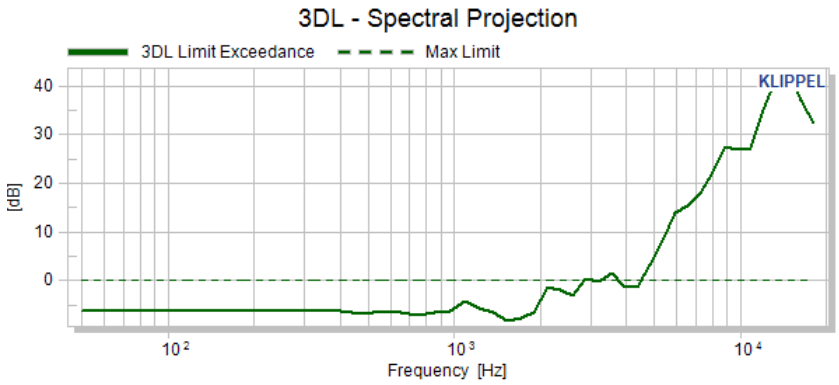
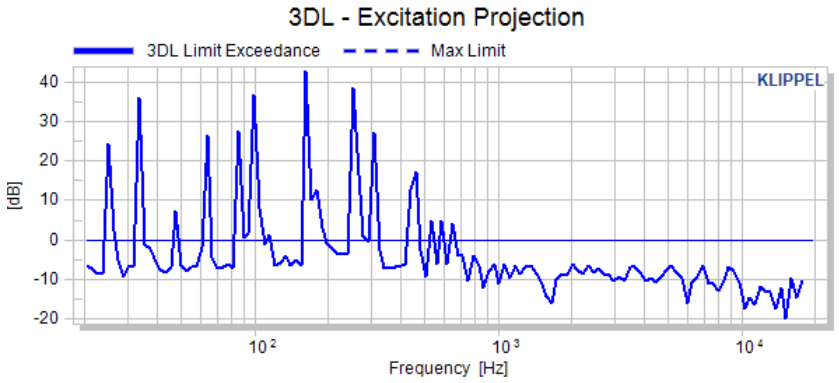
5 Input

Tasks Parameter	
Parameter	**Comment**
Category Measurement	
3DL – Spectrogram	On|Off – Activate the spectrogram analysis.
Category Display	
3DL – Max. value spectrogram	Maximum colormap value of both 3DL – Spectrogram and 3DL – Limit charts. Spectrogram values above this parameter are highlighted in black color.
3DL – Dynamic range spectrogram	Colormap dynamic range of both 3DL – Spectrogram and 3DL – Limit charts. Defined from colormap maximum, spectrogram values out of range are not shown.
3DL – Minimal Value Exceedance	Floor of chart 3DL – Exceedance

Limit Parameter	
Parameter	**Comment**
Category 3D – Frequency Response	
Calculation	• Shift
Shift Mask: Symptom Frequency	Limit definition within the spectral frequency of spectrogram (Y-axis).
Shift Mask: Excitation Frequency	Limit definition within the temporal axis of spectrogram (X-axis), which corresponds to the excitation frequency.
Shift Mask: Harmonic Order	Limit definition according to harmonic order relative to excitation frequency.
Jitter	Horizontal widening for upper limit introduced as a percentage.

6 Output

Windows	
3DL – Spectrogram	Contour plot with last measurement result. If LIMIT MODE, maximal contour of references is shown. 
3DL – Limit	Contour plot showing the calculated absolute limit. 
3DL – Exceedance	Contour plot showing the difference between last measurement and limit. If limit is not reached, measurement verdict is pass and the maximum value is below 0 (from dark green to yellow). For a failed measurement, the areas above 0 are shown from red to black color. Chart floor is defined by display parameter *3DL – Minimal Value Exceedance*. 

3DL – Spectral Projection	Limit curve (line at 0 dB) and projection over symptom frequency referenced to limit (if ≤ 0 verdict PASS). 
3DL – Excitation Projection	Limit curve (line at 0 dB) and projection over stimulus frequency referenced to limit (if ≤ 0 verdict PASS). 

7 References

7.1 Related Modules	QC SPL-Task

Find explanations for symbols at:

http://www.klippel.de/know-how/literature.html

Last updated: June 15, 2020

Designs and specifications are subject to change without notice due to modifications or improvements.