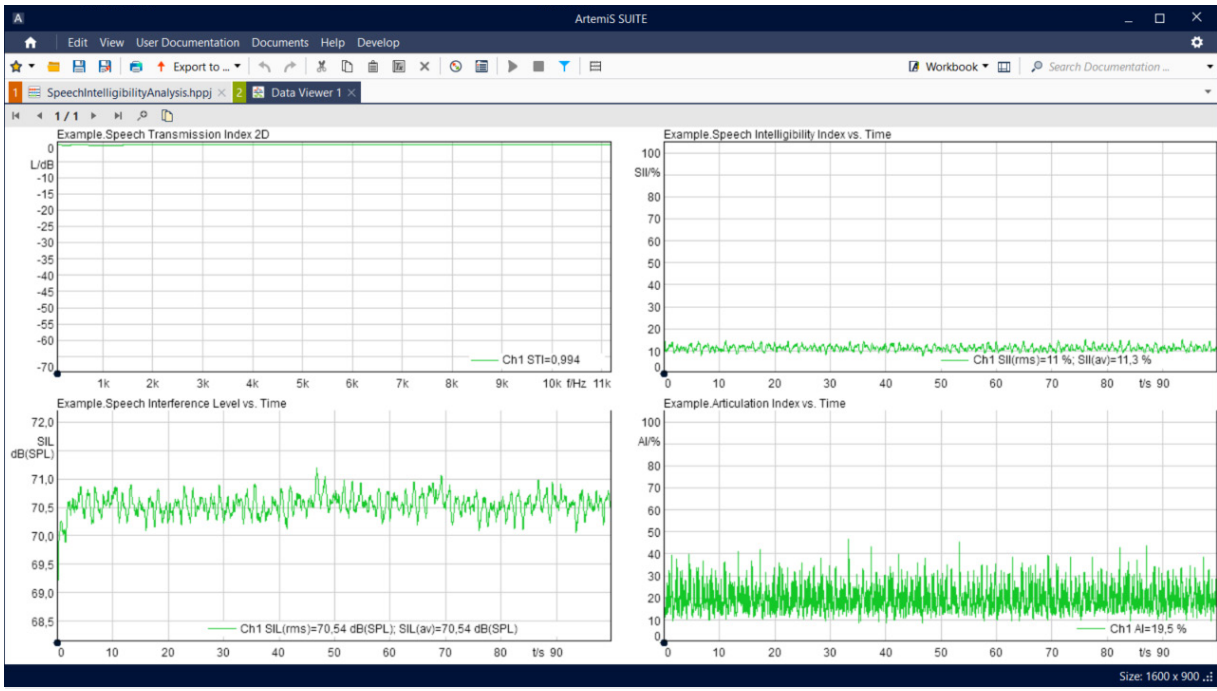
HEAD acoustics

DATA SHEET



ArtemiS SUITE
Signal Processing

Code 51106

ASP 106 Speech Intelligibility Analysis

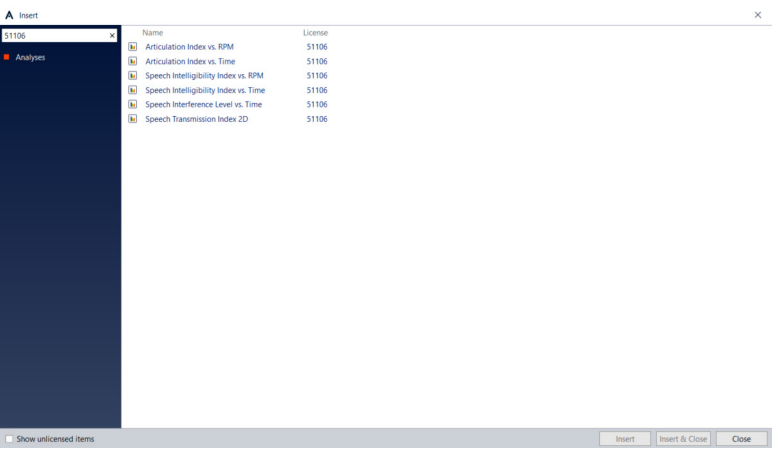
Speech Intelligibility Analysis of ArtemiS SUITE provides analyses to determine the intelligibility of speech and how much noises affect the speech intelligibility.

OVERVIEW

ASP 106 Speech Intelligibility Analysis

Code 51106

Speech Intelligibility Analysis examines how well speech can be understood under certain conditions. Various factors such as the level and quality of the speech signal, the type and level of background noise, etc., can be considered. A standard measurement for the quality of speech intelligibility is the Speech Transmission Index (STI).



KEY FEATURES

ASP 106 provides several analyses:

- Speech Intelligibility Index vs. Time, Speech Intelligibility Index vs. RPM
  - 1/3 octave, octave, critical bands
  - Speech spectrum according to ANSI S3.5-1997: Standard, idealized, user-defined
- Speech Interference Level vs. Time
  - SIL-3, SIL-4, P-SIL: "Preferred SIL"
- Speech Transmission Index 2D
  - IEC 60268-16:2003, IEC 60268-16:2011
  - STITEL, STIPA, RASTI
  - Representation: Modulation Transfer Index, STI vs. channel, MTF, effective SNR, ...
- Articulation Index vs. Time, Articulation Index vs. RPM
  - Extended AI: alternative method for the AI calculation allowing < 0% and > 100% values
  - Determination of the 1/3 octave bands: FFT, filter

The analyses can be used in Pool Projects (require APR 010), Automation Projects (require APR 050), Standardized Test Projects (require APR 220), and Metric Projects (require APR 570)

APPLICATIONS

- Analyzing the intelligibility of speech depending on the background noise

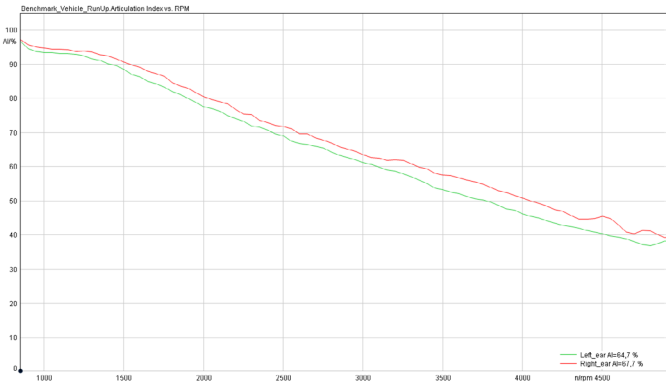
DETAILS

Articulation Index

The analyses Articulation Index represent the intelligibility of speech that, among other things, depends on the level and the frequency of background noise.

For example, the interior noise of a vehicle is the decisive factor for intelligibility between vehicle passengers. Under good conditions the speech area is limited only by available sound pressure (from whispering to shouting) and frequency range (200 Hz to 6300 Hz), but it is further reduced by the vehicle noise spectrum.

The analysis Articulation Index vs. Time calculates the articulation index of an input signal versus the time. The analysis Articulation Index vs. RPM calculates the articulation index of an input signal versus a control channel.



Articulation Index vs. RPM

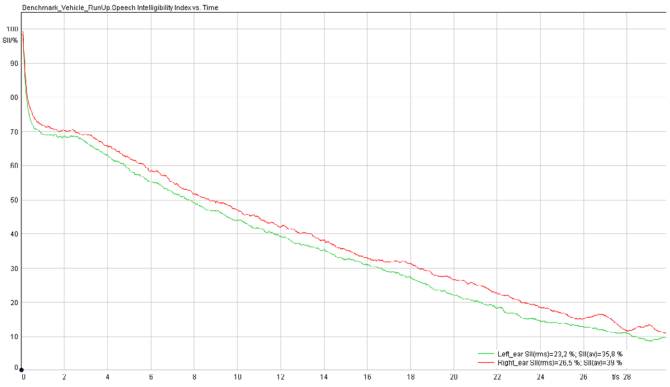
Speech Intelligibility Index

The analysis Speech Intelligibility Index represents how much a sound reduces the speech intelligibility.

The analysis on the one hand depends on the level and the frequency of the background noise and on the other hand it depends on the speech spectrum itself. As an indication for how much a noise impacts the speech intelligibility the Speech Intelligibility Index is calculated according to ANSI S3.5-1997 “Methods for Calculation of the Speech Intelligibility Index”.

The calculation method uses two spectra: The noise spectrum and the speech spectrum. The details of the calculation depend on the method selected in the properties (based on octaves, 1/3 octaves, or critical bands) and may be looked up in ANSI 3.5-1997.

The analysis Speech Intelligibility Index vs. Time calculates the intelligibility of speech of an input signal versus the time. The Speech Intelligibility Index vs. RPM calculates the intelligibility of speech of an input signal versus a control channel.



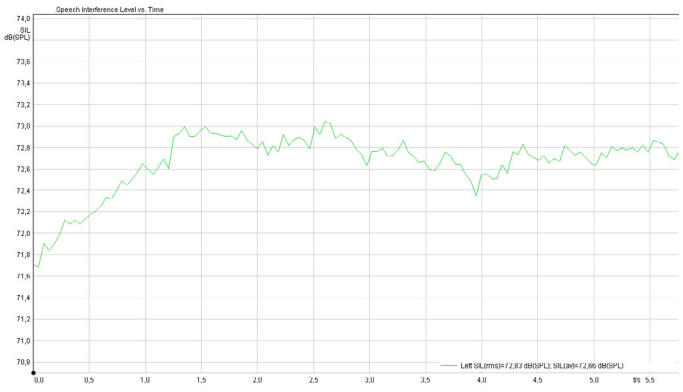
Speech Intelligibility Index vs. Time

Speech Interference Level vs. Time

The analysis Speech Interference Level (SIL) is used for the quantification of the speech intelligibility interference caused by a disturbing noise.

For the calculation of the SIL, multiple octave levels in the frequency bands considered to be relevant for speech intelligibility are averaged. The most commonly used methods for this are:

- SIL-3: Average of octave levels at 1 kHz, 2 kHz, and 4 kHz
- SIL-4: Average of octave levels at 500 Hz, 1 kHz, 2 kHz, and 4 kHz
- P-SIL: "Preferred SIL", average of octave levels at 500 Hz, 1 kHz, and 2 kHz

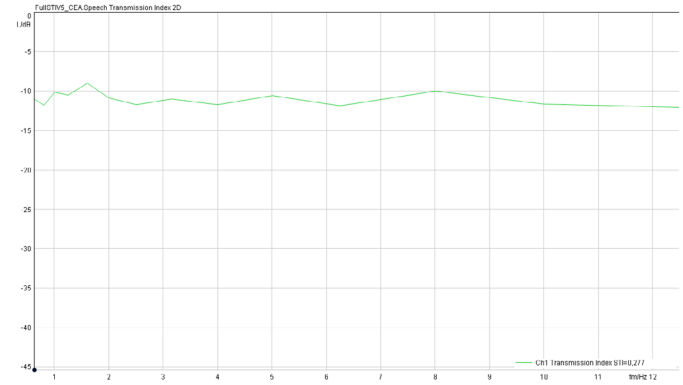


Speech Interference Level vs. Time

Speech Transmission Index 2D

The analysis Speech Transmission Index 2D (STI) is used to measure speech transmission systems. For the calculation of the Speech Transmission Index 2D the degrees of modulation of the intensity envelope of signals are determined. The measurement takes into account the frequency range of speech (125 Hz to 8 kHz) as well as the typical modulation frequencies appearing in speech (0.63 Hz to 12.5 Hz).

For the calculation of the Speech Transmission Index 2D, the analysis provides the methods STITEL, STIPA, and RASTI as well as the standards IEC 60268-16:2003 and IEC 60268-16:2011 (RASTI is not recommended for usage anymore in the version of IEC 60268-16 from 2011).



Speech Transmission Index 2D

Required: APR Framework (Code 50000)

and/or: HEAD System Integration and Extension (ASX) programming interfaces

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