

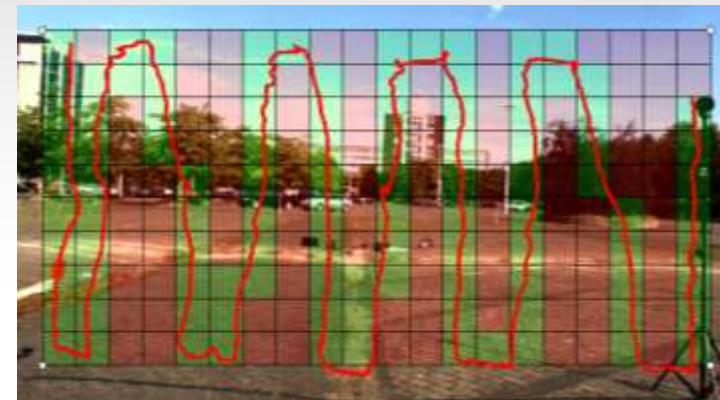
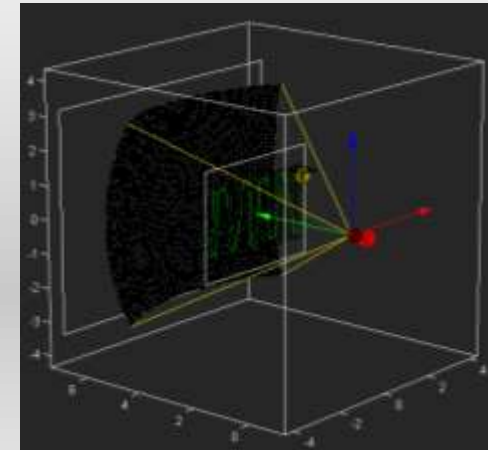
VPA

FAR FIELD SOUND SOURCE LOCALIZATION (BAMFORMING) BASED ON SCAN AND PAINT MEASUREMENT TECHNIQUE.

MAIN FEATURES

Scan and paint VPA is the extension of the traditional software into beamforming algorithms, extending its usability into far field.

- Physical array construction
- Data recording
- Video and audio synchronizing
- Virtual array construction
- Beamforming technique selection
- Apply beamforming algorithm
- Data exporting



HW setup

- Select frontend
- Activate sensors
- Arrange channels

Create array

- Set quality parameters:
 - Number of transducers
 - Define array directivity
- Set reference position

Measurement setup

- Set distances and sizes of:
 - Measured plane
 - Measured plane to measured object
 - Camera-measurement plane

Beamformer

- Select beamforming technique
- Set projection plane

Capture

- Real time view and signal control
- Acquisition and storing

Analyze data

- Analyze project
- Export project file data

Process

- Generate a project file and manage project data
- Basic exporting options

Report



DATA ACQUISITION

- 3 channels needed: PU main sensor + 1 reference pressure

Probe	out	DAQ channel
srer, PU Probe	P	3
3, PU Probe		
ffff, PU Probe		

- Edit probe
- Edit tag
- Change probe
- Add probe above
- Remove probe

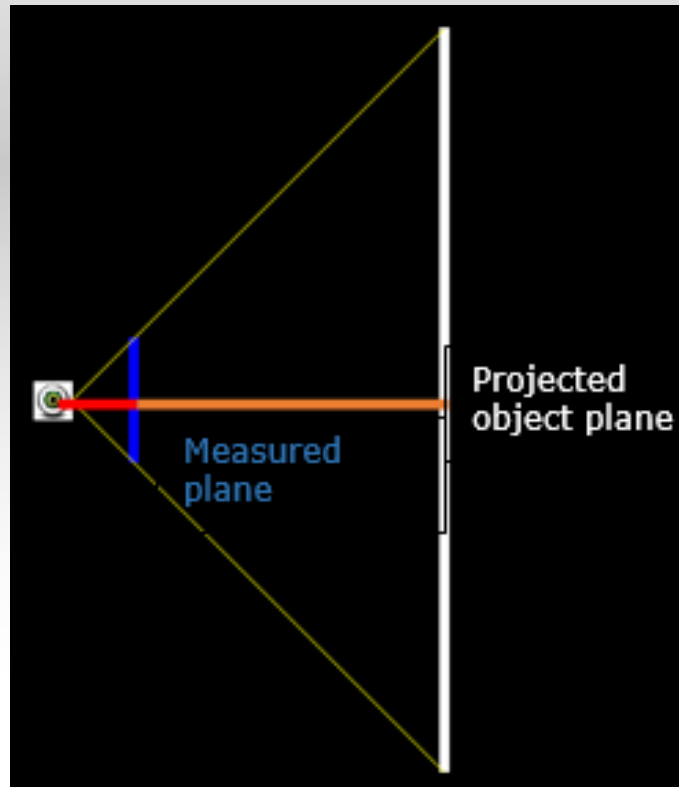
Probe database

Edit Add: Microphon... Remove



MEASUREMENT SETUP

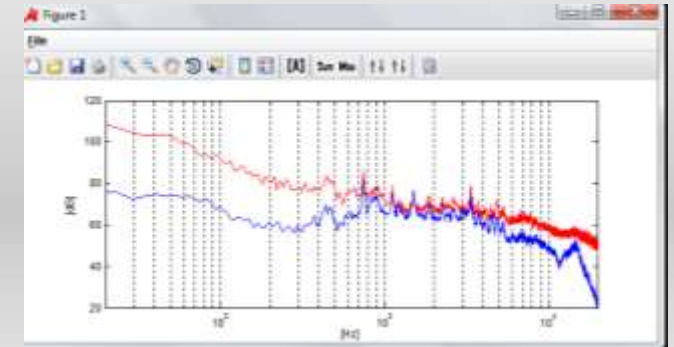
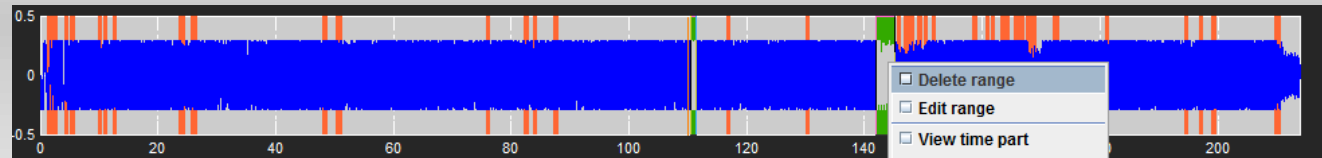
- Measurement setup geometry definition:
- This information is needed to compute the phase difference between each virtual array



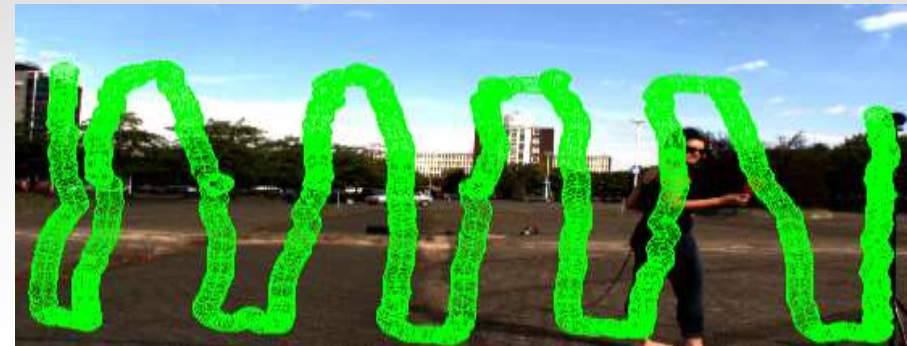
PROCESS DATA

- Allows generating a project file and manage project data:

- Delete from the recorded time signal sections where information is:
 - Not sufficiently stationary
 - The signal is incorrectly acquired



- Synchronize the video and audio
- Basic signal analysis
- Basic export functionality



CREATE ARRAY

- **Virtual Phased Array setting:**

- Array size: limiting factor in the lower frequency range.
- “Block width” : affects the number of available transducers. If the grid cell is small, for higher frequencies, spatial aliasing could occur.
- Wavelength per axis: Constrains the lower frequency range.
- Usable array frequency range

- **VPA quality control:**

- Minimum time length: only cell positions with representative time signals are taken into account for further analysis.
- Minimum coherence with Pref: checks the linear dependency between the reference static sensor and virtual transducers.
- Reference sensor allocation
- Frequency analysis parameters

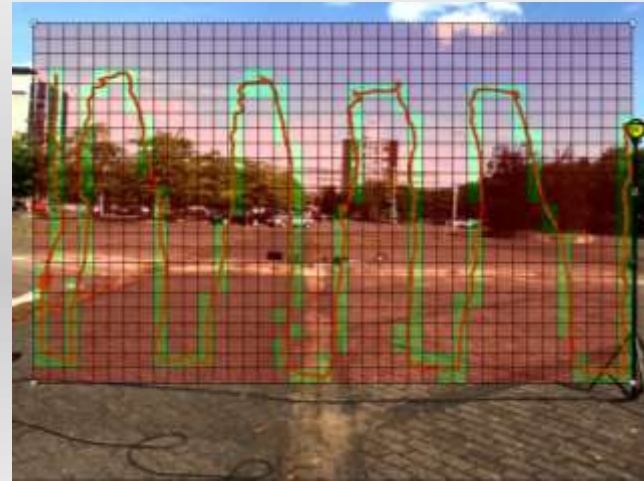


Minimum time length	0.34
Minimum Coherence	0.5

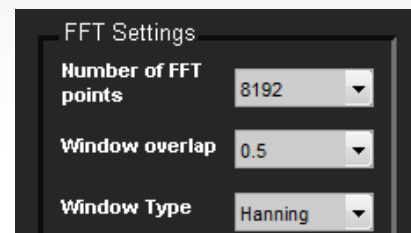


CREATE ARRAY

- Reference sensor allocation: the reference sensor position needs to be set, specially for near field analyses, in order to be able to calculate the distances noise source-each virtual sensor and reference sensor for phase relations



- Frequency analysis parameters: FFT parameters



BEAMFORMER

- **Select a beamforming technique:**

- **Far field** beamforming: unknown problem geometry, therefore limited processing stage, source strength is assessed by the product of the received signal, and the radiation pattern of the array.
- **Near field** beamforming: whole geometry is defined. Noise source under investigation needs to be known beforehand. Actual radiation can be estimated.

- **Set projection settings:**

- Choose sound source **projection plane**: Spherical” or “Plane” projection depending on actual measurement scenario.
- Set beamformer **geometry**: inserted in the “measurement” setup tab
- Set measurement points density: The more points are used, the better the estimation, but also the heavier Calculations
- Beamformer settings **Check**: camera aperture angle as confirm parameter.



ANALYZE DATA

- Select beamforming algorithm

Common beam forming/sum and delay

- Simple
- Robust
- Resolution limited by the array geometry
- Easy usage
- Fast computation
- One reference sensor needed
- Low dynamic range

ISCA (under extra License activation)

- Medium usage difficulty
- Medium-long computing time
- Enhances dynamic range and beamformer accuracy

- Limit calculated frequency range: boost analysis speed
- Display results
- Export results

