



Datasheet V2.0

Scan & Paint 3D SETUP

SP3D-PA-UR-SCT2

SCAN & PAINT 3D SETUP

3D Sound vectors on a 3D model in a matter of minutes

3D stationary sound source localization and characterization.

The 3D Scan & Paint tracking system determines the 3D position and orientation of a USP probe by means of infrared light, which illuminates markers fixed on a known reference device. The system can be used in normal working conditions without the need to alter existing light conditions. Thanks to this optical tracking solution the position and orientation of the probe is determined with an accuracy down to a few millimeters. The combination of this positioning device with a 3D intensity probe, makes the task of 3D sound field visualization very straight forward. The Scan & Paint 3D software, included in MicroflowN Velo software platform, allows for real time visualization of the 3D intensity distribution around the

measured sound source. Moreover, the software provides many analysis functionalities to plot intensity, sound power, and sound pressure, as well as cross calculations between the acquired data channels. The measured data is represented as a 3D color coded vector field, wrapped around the measured object. Planar 2D visualizations are also possible.

3D sound field description along with the appearing phenomena are often not straightforward to interpret. For this reason Scan & Paint 3D has many tools to help trace the origins of the data. Signal playback and filtering, or manual noise source removal (aiming to visualize possibly masked noise sources) will help you to make the most out a measurement

I. SCAN & PAINT 3D

WORKING PROCEDURE

MATCH THE REAL AND DIGITAL DATA

The measured object is represented by a 3D digital model. The probe position is determined by means of the infrared tracking system. However, those two elements need to be correlated in the software by defining the relationship, in terms of a common coordinate system, between the probe, the camera and the measured object. This is done by following two easy steps in the process named "Find camera location".

ACQUIRE AND REVIEW BASIC FEATURES

Once all hardware is ready to be used, and the common coordinate system is defined, the measurement can be started. The software allows the definition of a basic measurement grid, within which the data would be averaged. The sole purpose of this operation is to create a frame work for the real time representation of the measured data. This feature allows visualizing the data while recording, making it possible for the user to focus on specific areas around the measured object. Thanks to this feature the user can concentrate his efforts on areas with higher noise contributions, or simply monitor the progress of a scan.

ANALYZE DATA

All acquired measurements can be combined at this point, and the analysis area, as well the spatial and frequency resolution can be fixed for a specific project. Information is visualized as 3D and 2D interpolated maps of the sections of interest defined by the user. All results, captures and spectrograms of intensity, velocity, pressure and sound power can be, saved and exported for proper reporting.

FILTER DATA FOR OPTIMUM INFORMATION UNDERSTATING

For proper understanding of the 3D noise field and measurement process, several visualization, listening and data comparison aids are implemented within the software.

- Audio play back per point: this tool allows listening to all audio data, defined per channel, which was used to calculate the final result plotted at given analysis point. This tool proves very useful for detection of "bad data" such as: instabilities in the noise field, recording anomalies, accidental probe hits.
- Analysis point deletion: this tool allows for masking (information is not actually deleted from data set) of certain analysis positions. This feature is very useful for an in-depth analysis of secondary noise sources, as it allows to remove parts of the plotted vector field and rescale the visualization assuming that the removed sections were never there.
- Results Multiview: The Multiview function will allow you to compare entire 3D vector fields or planar 2D maps with other visualizations. This feature is very useful to compare the noise performance of a given device, before and after applying a certain noise treatment. The Multiview function is not limited to just one project, vector fields from other projects can be compared with any other visualization obtained with Scan & Paint 3D.

TOTAL SOUND POWER CALCULATION

All, intensity and position information is acquired in real time. To obtain the total radiated sound power is only necessary to create a closed volume around the measured device to ensure the proper description. Several quality control parameters such a % of completion are set to ensure that the estimation of the sound power level is correct.

II. COMPATIBLE PROBES

Probe type	Diameter	Maximum level range		Temperature range
		Pressure	Velocity	
USP regular	12.7 mm	110 dB	135 dB	-17 to 63



*SPL ref:
20 e-5 Pa

*PVL ref:
50 nm/s

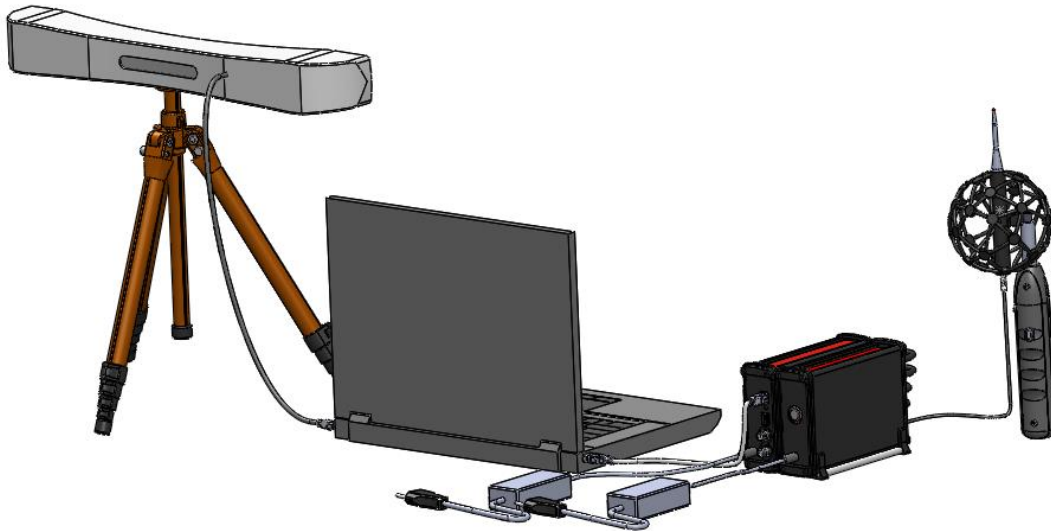
More specifications can be found on the probe datasheets.

III. COMPATIBLE FRONTENDS

Frontend	Nr. Channels	Max Fs (KHz)	Bits	IEPE	
 <p>Scout422</p>	<p>Input</p> <p>4 analog inputs 1 tachometer input 1 trigger input</p>	<p>Output</p> <p>1 amplified output 1 analog output</p>	52	24	Yes
 <p>DIC24</p>	24 input, expandable	350 Hz to 50 kHz	24 bits	yes	

IV. CONFIGURATIONS & CONNECTIONS

Standard system configuration:



V. SYSTEM COMPONENTS

SENSOR	1x USP Regular (Serial: UR-xxx)
CONDITIONER	1x MFPA-4
FRONTEND	1x Scout V2
3D TRACKER	1x PST-IRIS camera
ACCESSORIES	
Tripod	1x
Remote handle	1x
Remote handle dongle	1x
Track object (Sphere)	1x
Pointer	1x
Feet	1x (for Scout and MFPA)
CABLES	
Probe-Conditioner	1x CAB-LEMO-2.5-77
Scout-MFPA	4x BNC
Scout-PC	1x USB cable (white)
Camera-PC	1x USB cable (black)
POWER SUPPLIES	
MFPA	1x19V
Scout	1x19V
PST-IRIS	1x 9V
FILES	
Calibration report	1x printed and USB (...:\Calibration*Serial.pdf)
Orientation report	1x printed and USB (...:\Calibration\calibUSP\CalibrationOrientationTemplate.pdf)
Product manual	1x USB (...:\Software\Microflown SW)
Track object file	1x USB (...:*Serial.psm)
PELICAN CASE	1x

VI. ACCESSORIES

- **BATTERY PACK:** New PowerGorilla battery pack is made compatible with S&P3D equipment, in order to make it more portable.
- **OUTDOOR WINDCAP:** The Microflown 1/2 inch Outdoor windcap is specially developed for performing measurements under severe wind conditions. The windcap minimizes the influence of the DC flow from the measured signals in both, pressure and velocity channels.

Please consult our sales department (info@microflown.com) for suitable accessories for your measurement setup.

VII. F.A.Q

WHAT ARE THE FREQUENCY LIMITS FOR SOURCE LOCALIZATION?

40Hz – 10 KHz

WHAT IS THE FREQUENCY RANGE VALID TO MEASURE INTENSITY / VELOCITY / PRESSURE IN THE NEAR FIELD?

- Particle velocity: 40-10.000 Hz
- Intensity and sound power: 400-10.000 Hz
- Pressure: 40- 10.000 Hz

WHAT IS THE FREQUENCY RESOLUTION OF THE METHOD AND WHAT DOES IT DEPEND ON?

It depends on:

- Number of FFT points selected for the analyses.
- Length of the time series. The analyzing procedure is based on Grid method. With a bigger grid size the statistical performance is improved as a more data is averaged for a single location.

Down to few Hertz

WHAT IS THE SPATIAL RESOLUTION OF THE METHOD AND WHAT DOES IT DEPEND ON?

Depends on:

- Grid size for grid method.

Results:

- Down to 3 mm up to several cm

WHAT IS THE DISTANCE BETWEEN SURFACE AND PROBE?

The selection of this parameter depends on what is the expected output of the measurement, and different distances can be combined as the positioning is performed within a 3D space.

- 1-5 cm for source localization (maximum SNR).
- 5-10 cm for sound intensity (reactivity error).
- Any distance for radiation estimation

WHAT IS THE MAXIMUM DISTANCE CAMERA- TRACKING OBJECT?

Depends on the camera and tracker combination. For the standard Scan & Paint 3D setup around 2.5 m depending on the measurement environment (lighting conditions).

WHAT ARE THE REQUIRED LIGHTING CONDITIONS?

Normal indoor conditions. The system will not work if exposed to direct sun light.

WHAT IS THE SYSTEM PRECISION?

< 0,5 mm Root Mean Square Error (RMSE)

< 1 deg RMSE

WHAT IS THE AREA COVERED BY THE CAMERA?

It depends on the distance camera-object.

The angle of aperture of the stereo camera is: 57 degrees Horizontal and 44 vertical

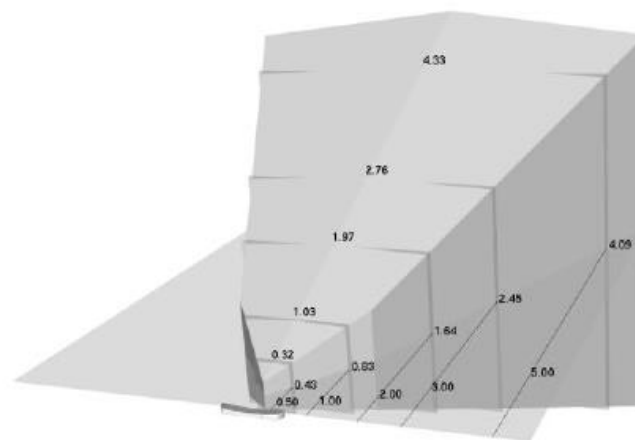


Figure 1. Camera angle of view

WHAT IS THE RECOMMENDED SCANNING SPEED AND HOW DOES IT AFFECT THE RESULTS?

5-10 cm /s

More time spend in a cell/slower speed means lower frequency/better statistic, but also allows to process the result with a higher FFT number or smaller grid size.

WHAT ERRORS CAN OCCUR IN THE RESULT?

- Probe impact: un-expected
- Non-stationary disturbances during a measurement even though the analyze method used averages and removes this effect if slight un-stationaries occur.

- Wrong camera allocation: positioning of the measurement points is distorted due to the wrong camera position with respect to the 3D model. The allocation tool is extensively guided to avoid this problem

WHAT INDICATOR SHOULD BE USED FOR SOUND SOURCE LOCALIZATION?

- If measurements are performed in the very near field, then particle velocity is the best indicator, as velocity is less environment dependent maximizing the SNR in the vicinity of the noise source.
- 3D Intensity contains all information about the propagation.

VIII. USAGE AND PRECAUTIONS



- Do not submerge the electronics in water as this will lead to permanent damage.
- Only use the cables supplied with the kit. Any modifications to these cables or the use of cables of a different brand or type may result in permanent damage to the probes or the rest of the electronics.
- The probes must be powered via a Microflown™ signal conditioner, the new MFPA series or the prior MFSC/ Router. Do not power the sensors with any other device; this might cause permanent damage to the system.
- IRIS camera should always be powered with its own power supply.
- Access exposure to dust/dirt particles could damage the Microflown™ sensor. Do not remove the metal mesh
- It is not recommended to look directly into the tracking system at very close distances (<10 cm). Even though infrared is not visible for humans and the radiation of the Tracker is low.

IX. TECHNICAL SUPPORT

For any problem or doubt with your equipment, please contact Microflown™ Technologies Customer service:

- Mail: cs@microflown.com
- Skype: cs.microflown
- Telephone: +31(0) 88 001 08 11 Monday to Friday, from 9:00 to 17:00 (UTC+1).

X. WARRANTY POLICY, REPAIRS AND REPLACEMENTS

WARRANTY AND REPLACEMENT OR SUBSTITUTION

During the first two years (24 months) the seller offers a warranty on all its products, except for trading items and third party manufactured items. The seller warrants that all products will be free from defects in materials and workmanship for this period of two years. During this two year period, the seller will repair or replace defect products free of charge. Products damaged by accident, abuse, misuse, natural disaster or by any unauthorized disassembly, repair or modification are not covered by this warranty. The incurred transportation costs of returning the products to seller will be borne by the buyer. The logistical cost for returning the products back to the buyer will be borne by the seller. Several products come with a "VOID if seal is broken" sticker, the warranty is void at all times when this sticker is broken.

GRACE PERIOD (YEAR 3 AND 4)

During the third and fourth year the seller offers a grace period. In the grace period the products purchased at an earlier date can be replaced by completely new state of the art products of the same scope of the original purchase. This applies only for the products known as standard probes and signal conditioners. In the first year of the grace period, (year 3) customers have an option to replace their products for 25 % of the actual ex works end-user price. The full freight and packaging charges apply.

In the second year of the grace period, (year4) customers have an option to replace their products for 50 % of the actual ex works end-user price. The full freight and packaging charges apply.

The new products are accompanied by a new warranty. Both the two years warranty and grace period become applicable again from the date of invoice.

REPAIRS OUTSIDE WARRANTY POLICY

Replaced/repared parts come with a six month warranty under the same conditions as the two year warranty.