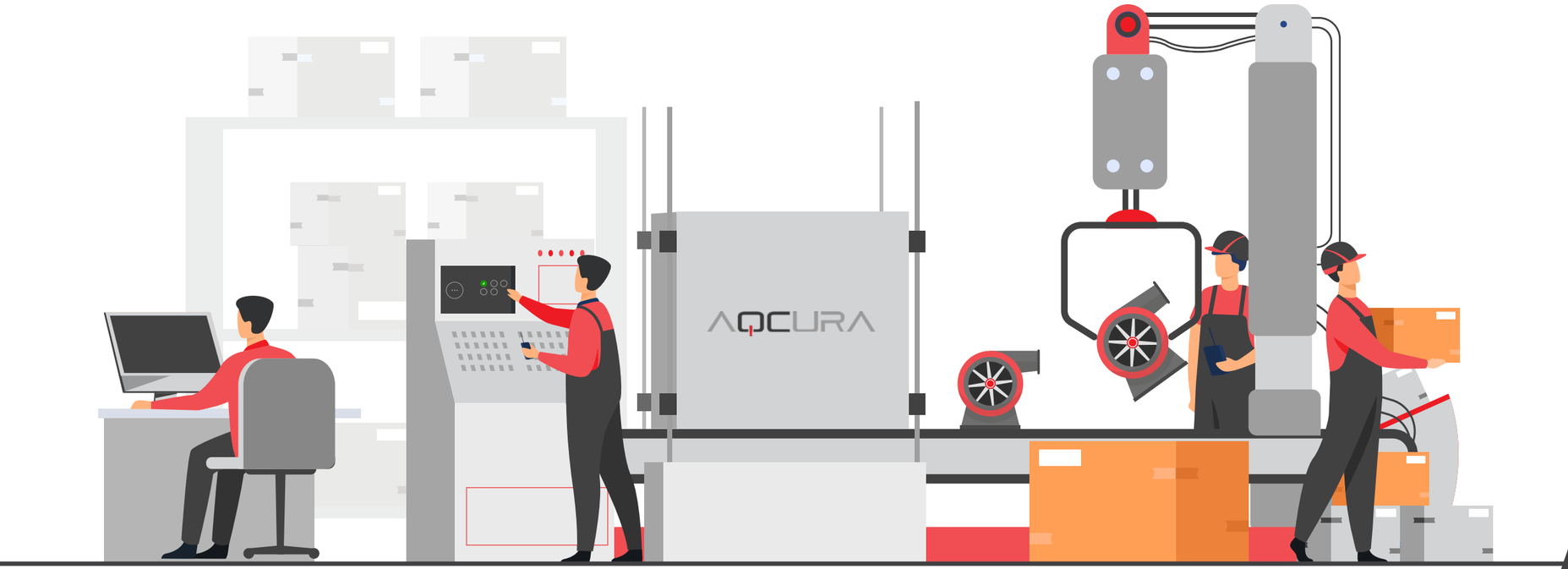
# AQCURA

## Changing the field of end-of-line testing




Product leaflet

MICROFLOWN TECHNOLOGIES

## Microflown Technologies

# CHANGING THE FIELD OF END-OF-LINE TESTING

**Customers are nowadays more critical and demanding than ever before. Hence, to achieve a good perception towards a product, manufactures have an increased focus on quality control and customer service. Subjective testing, meaning a human judgement on good or bad, have been in place for years. However, studies have shown that in many cases subjective testing results in a high inaccuracy. Objective testing delivers significantly higher accuracy. This leading into a desire for manufactures to find suitable tools in the market to support the need of objective testing. The downside many nowadays available objective testing solutions have is that typically they are complex and expensive using robotic test stands.**

Microflown Technologies has 25+ years of experience in acoustic sensor technology and providing unique solutions for vibro-acoustic testing. Ensuring daily used products such as dishwashers or washing machines are silent during operation, increasing our comfort. Core of the company is the so-called Microflown sensor, the first sensor in the world that allows to directly measure particle velocity as a physical quantity. The Microflown sensor already proved its differentiating capabilities in the end-of-line quality control testing. With 5+ years' experience in this market, it was time to take the next step and launch in AQCURA a total hard- & software package for end-of-line quality control testing with the highest accuracy.

## Changing the field of EOL quality control testing

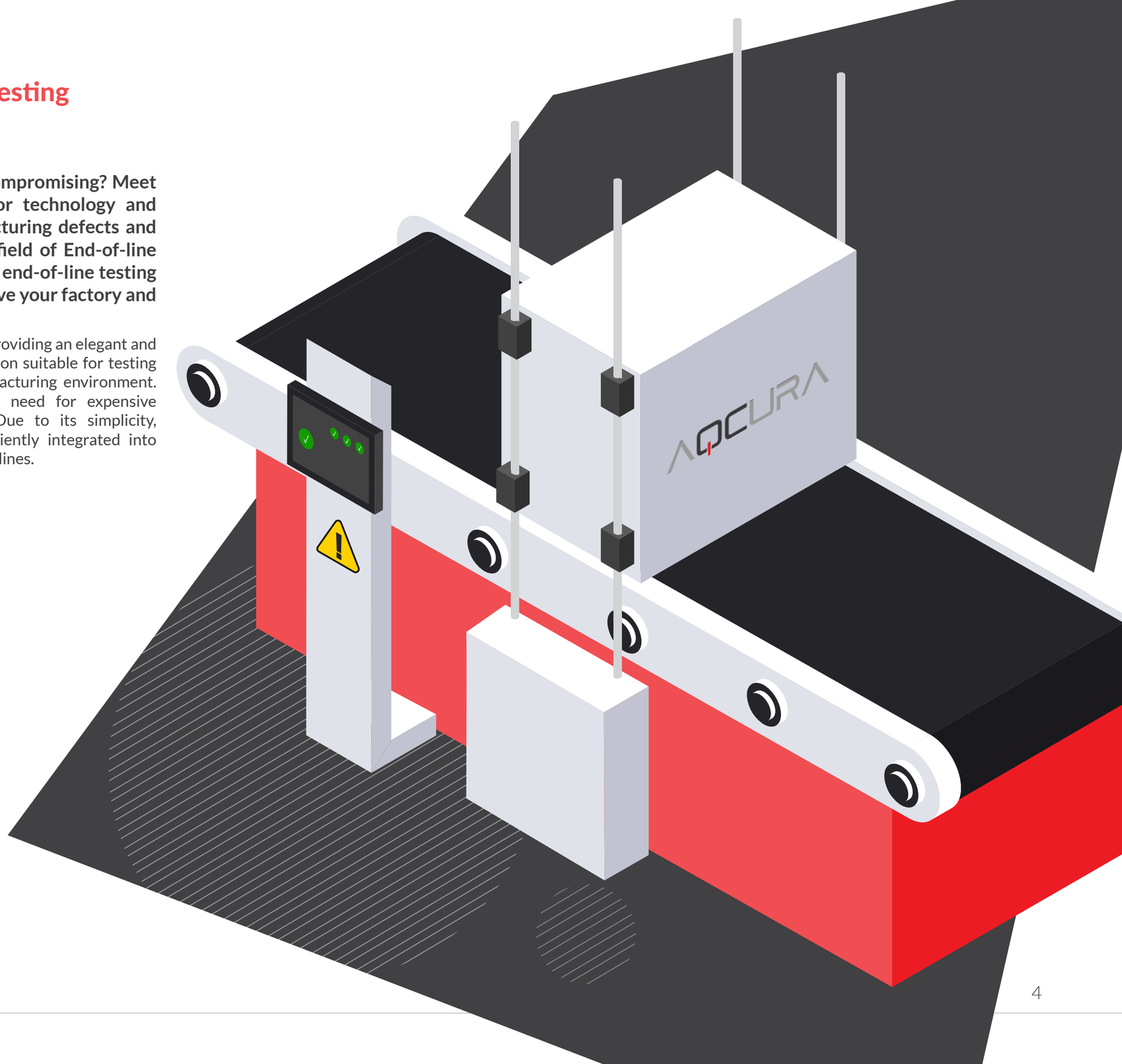
# AQCURA AT A GLANCE

**Looking for an affordable quality control system without compromising? Meet AQCURA: the solution that combines cutting-edge sensor technology and advanced machine learning to objectively identify manufacturing defects and determine product quality. AQCURA is set to change the field of End-of-line quality control testing. Providing a revolutionary innovative end-of-line testing solution! Helping you ensure that only the right products leave your factory and end up with your clients.**

AQCURA provides a contactless measurement solution capable of characterizing complex vibro-acoustic problems across a broad frequency, ranging from 20Hz up to 10kHz. The unique properties offered by the Microflown particle velocity sensor in terms of natural background noise reduction, in combination with a simple yet effective soundproof enclosure, enable AQCURA to perform acoustic measurements in noisy factory conditions with ease. Providing an elegant and low-maintenance solution suitable for testing products in any manufacturing environment. While eliminating the need for expensive robotic test stands. Due to its simplicity, AQCURA can be efficiently integrated into existing manufacturing lines.

## Key features

- Cutting edge sensor technology for non-contact measurements
- Automated in-line, objective testing solution
- Operating in-line in factory conditions with background noise
- Detects airborne- and structure-borne defects
- Conventional Metrics, Artificial Intelligence & Machine Learning tests
- Psychoacoustic prediction
- Time, frequency and order features
- Controllable with an external control unit
- Simple, clear and informative interface
- Automatic reporting with storage for traceability
- Database storage
- Scalable platform

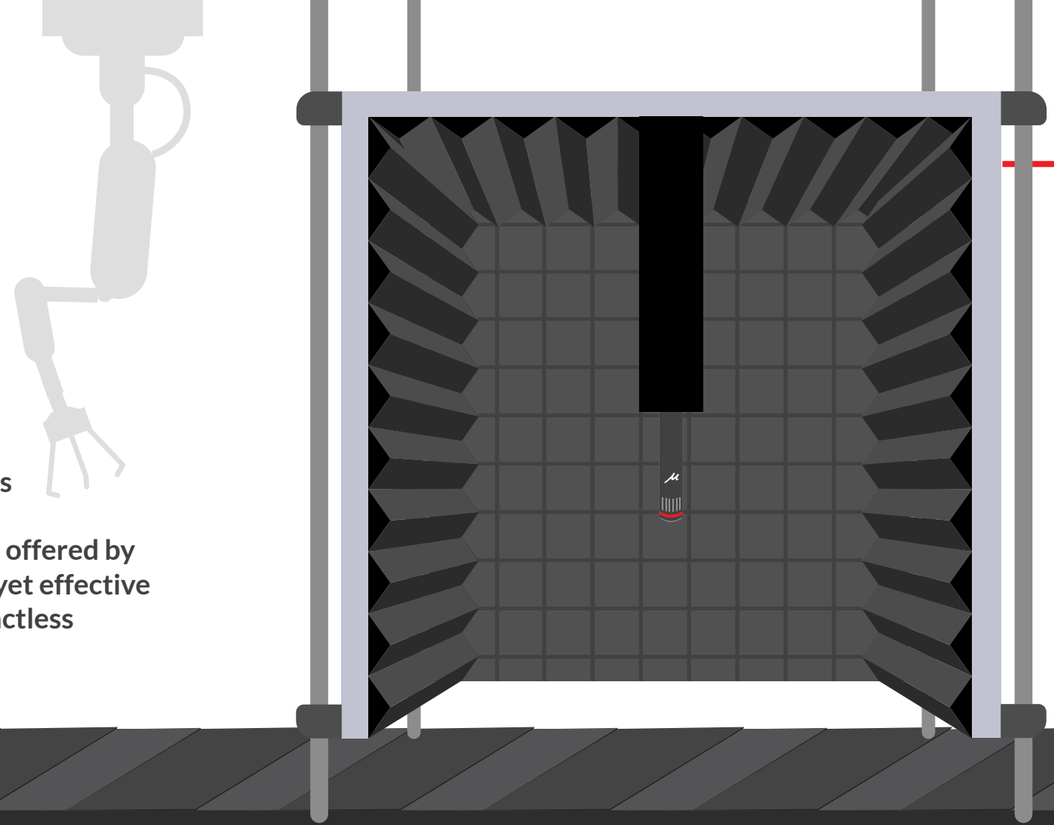


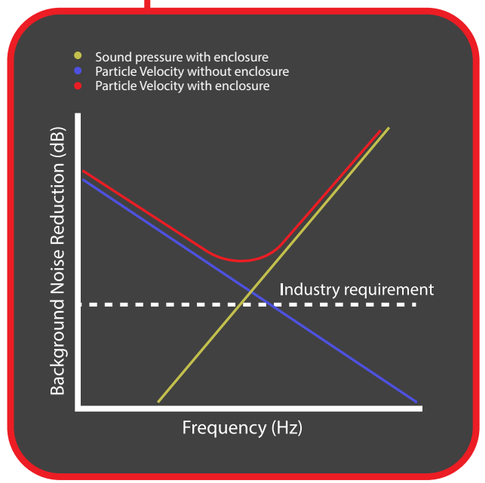

PASS
In-line, in manufacturing environments

## Particle velocity sensing

# CUTTING EDGE SENSOR TECHNOLOGY

**When entering a production factory, you will notice that in most cases it is a noisy environment. The buzzing, banging, and clanking of heavy machinery can make acoustic measurements feel impossible. Sound absorbing materials can attenuate sound but because of its inability to attenuate lower frequencies for most sensors it remains very challenging. Microflown has the solution thanks to its cutting-edge sensor technology. The unique properties offered by the particle velocity sensor, in combination with a simple yet effective soundproof enclosure, enables AQURA to provide a contactless measurement solution in a manufacturing environment.**






### How does it work?

Until the invention of the Microflown sensor, acousticians were limited to the use of microphones to quantify sound. Being a scalar value, sound pressure provides information about the magnitude and phase of the sound field at the measurement location. Unlike sound pressure, particle velocity is a vector quantity and is thus described by magnitude and phase, as well as direction. Measuring three-dimensional particle velocity at one single spot in the sound field would provide a better description of a sound wave's physical behavior. Moreover, the physical behavior of particle velocity coupled with the unique features of the Microflown sensor, allow for accurate measurements under non-anechoic conditions, such as manufacturing environments. The two most important benefits are explained in the near field effect and directivity.

### Near Field Effect

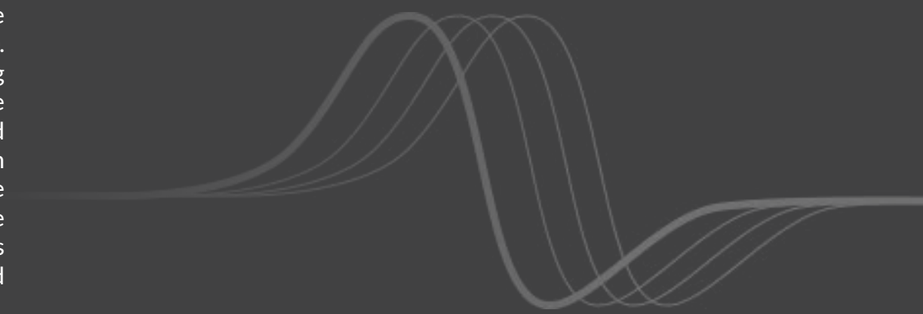
Measurement of normal particle velocity close to a surface of a sound source is less affected by background noise than a sound pressure measurement. This effect is caused by the near-field properties of a sound source. Such phenomena are referred to as the near-field effect.

In order to understand the implications of the near field effect we will study two scenarios:

1. First, consider a non-vibrating surface in an environment where background noise is present. Measuring sound pressure under such conditions, while gradually decreasing the distance between the measurement point and the rigid surface would result in continuous increase of the amplitude of sound pressure – sound will reflect off the rigid surface and cause an increase of sound pressure at the boundary. In contrast, normal particle velocity would behave in an exactly opposite fashion. Its amplitude would decrease in the proximity of a rigid surface.
2. Second, consider a vibrating surface (a sound source). Measuring sound pressure in such conditions, while gradually decreasing the distance between the measurement point and the surface of the sound source, would result in a linear increase of the sound pressure level. In the case of the same experiment carried out with particle velocity, we would notice an exponential increase of the velocity near the source surface. This increase of amplitude is so significant, that it becomes the dominant source of excitation, largely suppressing external sound sources.

### Directivity

Whereas most sound pressure microphones have a omni-directional sensitivity pattern, the Microflown particle velocity sensor has a broad-banded figure-of-eight sensitivity pattern. Thanks to its directivity pattern, the Microflown sensor disregards 1/3 of the total sound field.



## Scalable on all levels

# AQCURA EOL QC

**AQCURA can be applied to many products and cover a strong differentiation in goals for objective testing, from high volumes of low-cost products to low volumes of high-cost products. AQCURA excels in flexibility; control one or multiple lines from one manager.**

## High volumes of low cost products

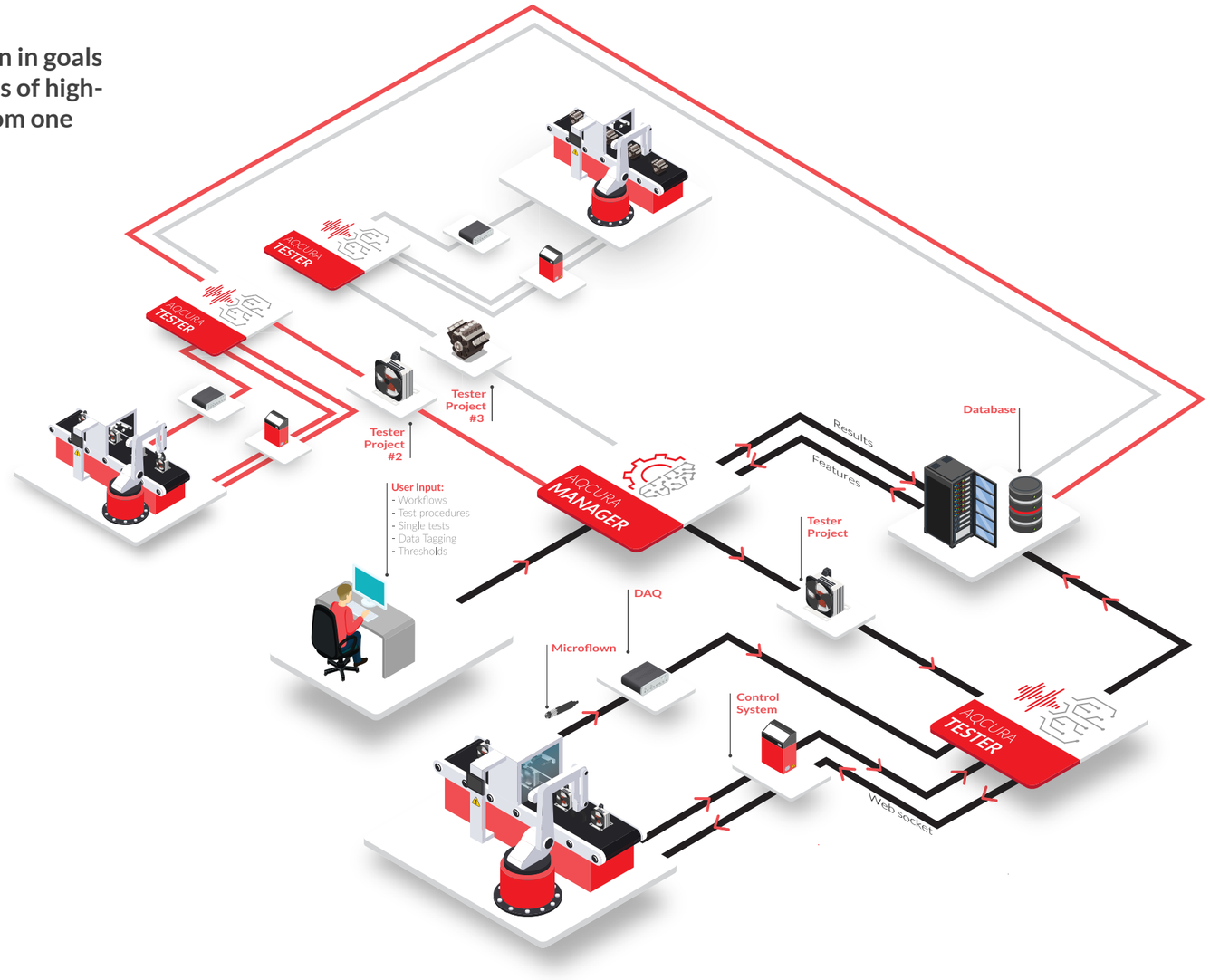
AQURA can help to increase the amount of samples tested and reduce the change of a failing products to be delivered to customers. Particle velocity sensor enable to perform EOL QC directly in the production line. This saves time and money but moreover due to short test cycles it could increase the ratio of tested versus total produced products. For example, instead of testing just 1 out 5 products, test all of them. Reducing the change of a faulty product leaving your factory to the minimal.

## Low volumes of high cost products

Typically, here products under test are more complex comprising more (sub) components. The cost price per module is too high to simply discard bad classified products. Hence, besides objectively define good or bad a deeper level of inside is required. State of the AI and ML algorithm will identify multiple complex vibro-acoustic problems that could lead to different reasons of failure. Using multiple advanced features helps to lead to the root cause a fail.  This information will help to fix the majority of the bad tested products and get them to pass in the second round.

## Scalable and flexible platform

AQCURA excels in flexibility; it can be used in combination with any sensor or testing routine and is easily scalable. This allowing to control multiple production lines from a single manager module; either of the same product type and test routines as well as for a complete different product line with its own testing routines.



# AQCURA

**AQCURA is a flexible & scalable software platform for end of line testing. Driven by artificial intelligence and machine learning algorithm, applicable form a single to multiple production lines.**

AQCURA MANAGER

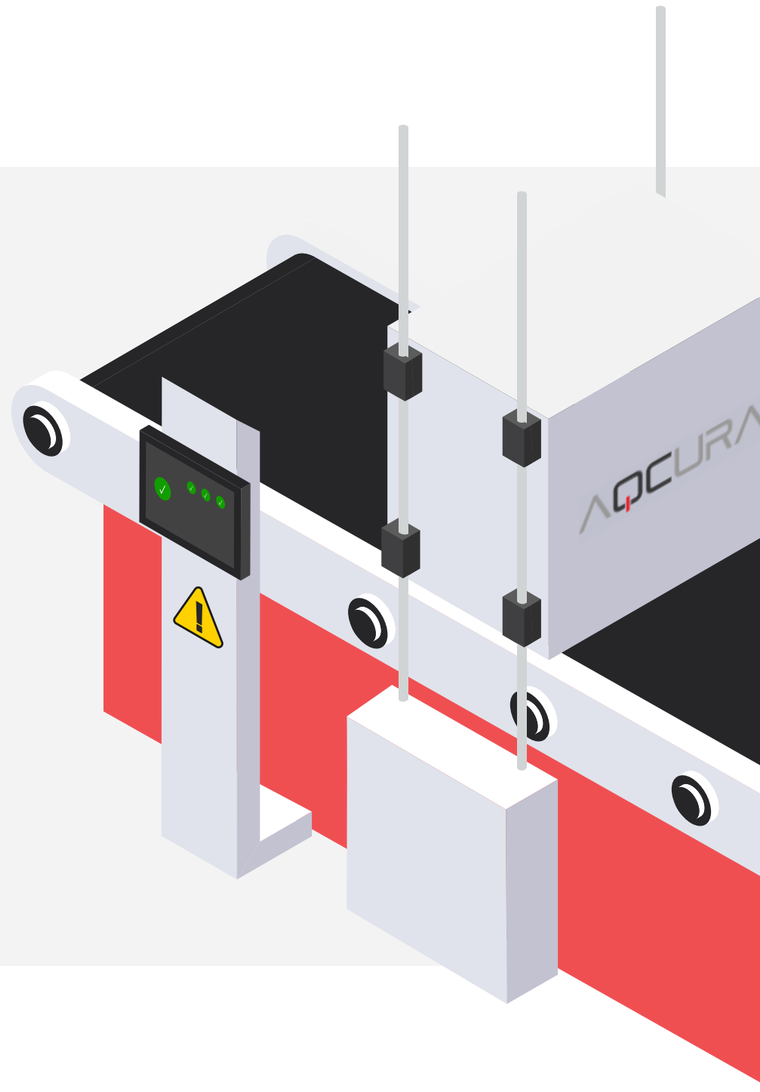
## Module: Manager

Define workflows, testing routines and thresholds. Monitor and analyze all the production data.

AQCURA TESTER

## Module: Tester

Running on the production line, executes the routines created in the Manager, communicates with other control units (e.g. PLC) and stores information into an external database.



## Artificial Intelligence & Machine Learning

# AQCURA, STATE-OF-THE-ART EOL SOFTWARE

**AQCURA software is driven by state-of-the-art Artificial intelligence and Machine learning algorithms. Redefining targets, enabling much more than simple level thresholds, and providing capabilities to recognize very specific features. The capability of self-learning allows AQCURA the ability to detect unknown problems automatically and at an early stage, even with small data sets. This ensures the highest degree of accuracy when running at full production.**

AQCURA software exist out of two main software modules, the manager and the tester. The manager module is used by an operator where he can define custom or pre-programmed testing routines. Once the routines are defined the manager hands a list of instructions that will be executed automatically by the tester module. The tester than execute the testing routines. AQCURA excels in flexibility; it can be used in combination with any sensor or testing routine and is easily scalable. This allows control of multiple production lines from a single manager module.

## Microflown's software platform

# PARTNER UP WITH AQCURA

**For AQCURA predefined packages have been created to serve different needs and requirements. Scale up at any moment by upgrading your package. Furthermore, we offer you two licensing models, either go for a one-time investment to get a perpetual license or a SAAS model where you pay an annual fee to run the software.**

### PERPETUAL LICENSE

- One time (bigger) investment
- Unlimited access to the software
- Optional: SMC | Support & Maintenance Contract

### ANNUAL FEE LICENSE

- Balanced cash outflow, (lower) annual fee
- SMC | Support & Maintenance Contract included
- Lower risk of unforeseen cost


## LITE

### TESTER

- Tester base-module
- ~~Database & Reporting~~
- ~~External Control~~
- ~~Machine Learning (ML) testing~~

### MANAGER

- Manager base-module
- ~~Population analysis~~
- ~~Machine Learning training~~


## STANDARD

### TESTER

- Tester base-module
- Database & Reporting
- External Control
- ~~Machine Learning (ML) testing~~

### MANAGER

- Manager base-module
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## STANDARD +

### TESTER

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- Database & Reporting
- External Control
- Machine Learning (ML) testing

### MANAGER

- Manager base-module
- Population analysis
- Machine Learning training

REDUCE THE PRESSURE IN YOUR WORK

# GO FOR PARTICLE VELOCITY

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