

How making sound visible leads to better products

Acoustic cameras are widely regarded as powerful tools for the localization of unwanted noise in products and processes. Engineers from product development, manufacturing and maintenance who are blessed with having access to such technology, appreciate the added value of visual information for implementing highly effective technical solutions. In addition, engineering managers and product marketers value avoiding costly trial and error as well as securing timely product launches due to increased predictability during product development, respectively.

Introducing a novel method of sound imaging

Seven Bel has tasked itself with developing a novel acoustic camera which delivers high image quality for industrial applications and offers superb usability and mobility at a super competitive price. The enabling technology is a compact rotating sound scanner with a few state-of-the-art digital microphones. Fine spatial sampling of the sound field over a disc with a diameter of up to 1.32 meters results in acoustic images with excellent spatial resolution and dynamic range which drives confidence in the implementation of technical solutions, see Figure 1.

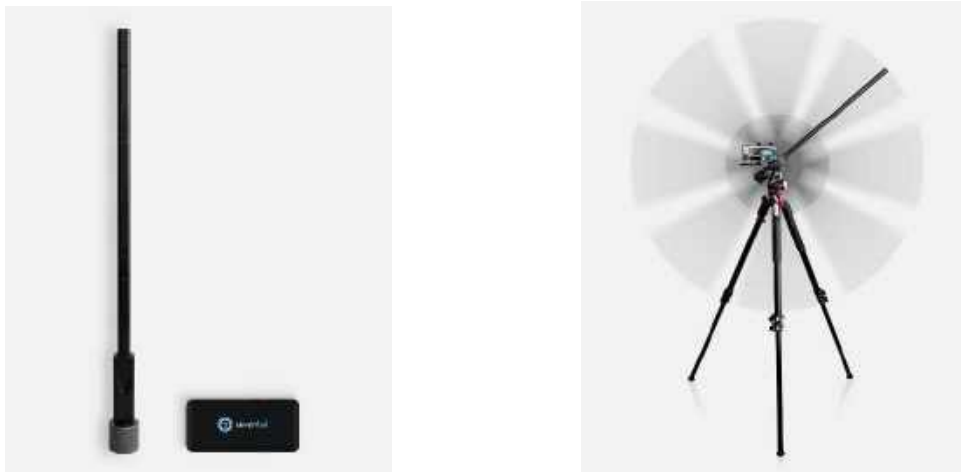


Figure 1 Sound Scanner P132 with a scanning diameter of 1.32m (left) specifically developed for low frequency industrial applications. Measurement system includes rotating scanner mounted on tripod, mobile device and Seven Bel's cloud infrastructure (right).

The sound scanner together with the user's mobile device and Seven Bel's number crunching cloud infrastructure in the background create a compact high-performance measurement system for the fast analysis of acoustic problems. The developers at Seven Bel paid special attention to designing a massively simplified workflow for measuring and analyzing acoustic images. Automatically generated reports can be easily shared with colleagues, partners or clients.

The technology has already been successfully demonstrated with products and processes from various industries ranging from machinery construction to automotive, transportation and home appliances.

Use cases

The design of enclosures for machining centers constitutes a particularly challenging task for mechanical engineers. Manufacturers must not only meet corresponding regulatory limits but also increasingly consider the fact that an optimal work environment for the machine operators is guaranteed. Acoustic images support engineers during the development phase in understanding, for instance, the time averaged local sound radiation during a machining process. These insights allow

them to build machine housings which are optimal with respect to cost and acoustic effectiveness. In certain cases, sound is not coming from where it is initially expected. Grinding the edges of glass plates in glass processing centers leads to critical excitations of eigenfrequencies and eigenmodes of the material being processed. Sound may then not only come from the location where the grinding takes place. Instead, the glass plate being processed acts as a loudspeaker and may dominantly radiate sound from the opposite edge, see Figure 2. It is exactly this sort of insights which gives engineers the confidence to take the right measures when implementing designs for optimal sound reduction.

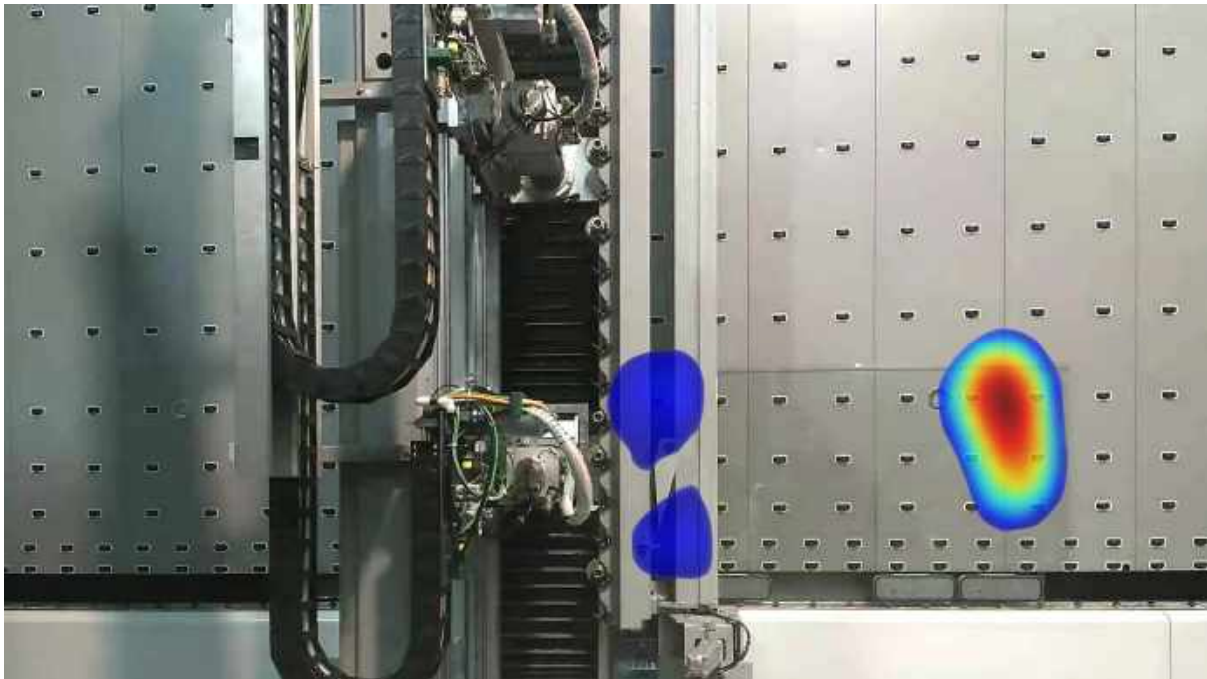


Figure 2 Complex machining processes, in many cases, cause complex sound events. Acoustic images support engineers in understanding the time averaged local sound radiation during a machining process, and thus allow them to build optimal machine housings.

Another interesting application can be found in the field of automotive engineering where engineers from vehicle simulation and testing are involved in reconciling simulation models with actual measurement data. Figure 3 shows a motorcycle operated under full load on a roller dynamometer. Engineers are particularly interested in confirming the exact location of sound radiation from the clutch cover in order to update material and geometry parameters in simulation models and thus, drive design optimizations.



Figure 3 Investigation of surfaces with dominant sound radiation on a roller dynamometer under full load. Acoustic images support engineers during research and development, in adjusting simulation models of engine and transmission components.

Seven Bel is currently gearing up for introducing their P50 and P132 sound scanners on the European market. The team is eager to learn more about new potential applications. So, contact them today at sevenbel.com and request a demo kit.