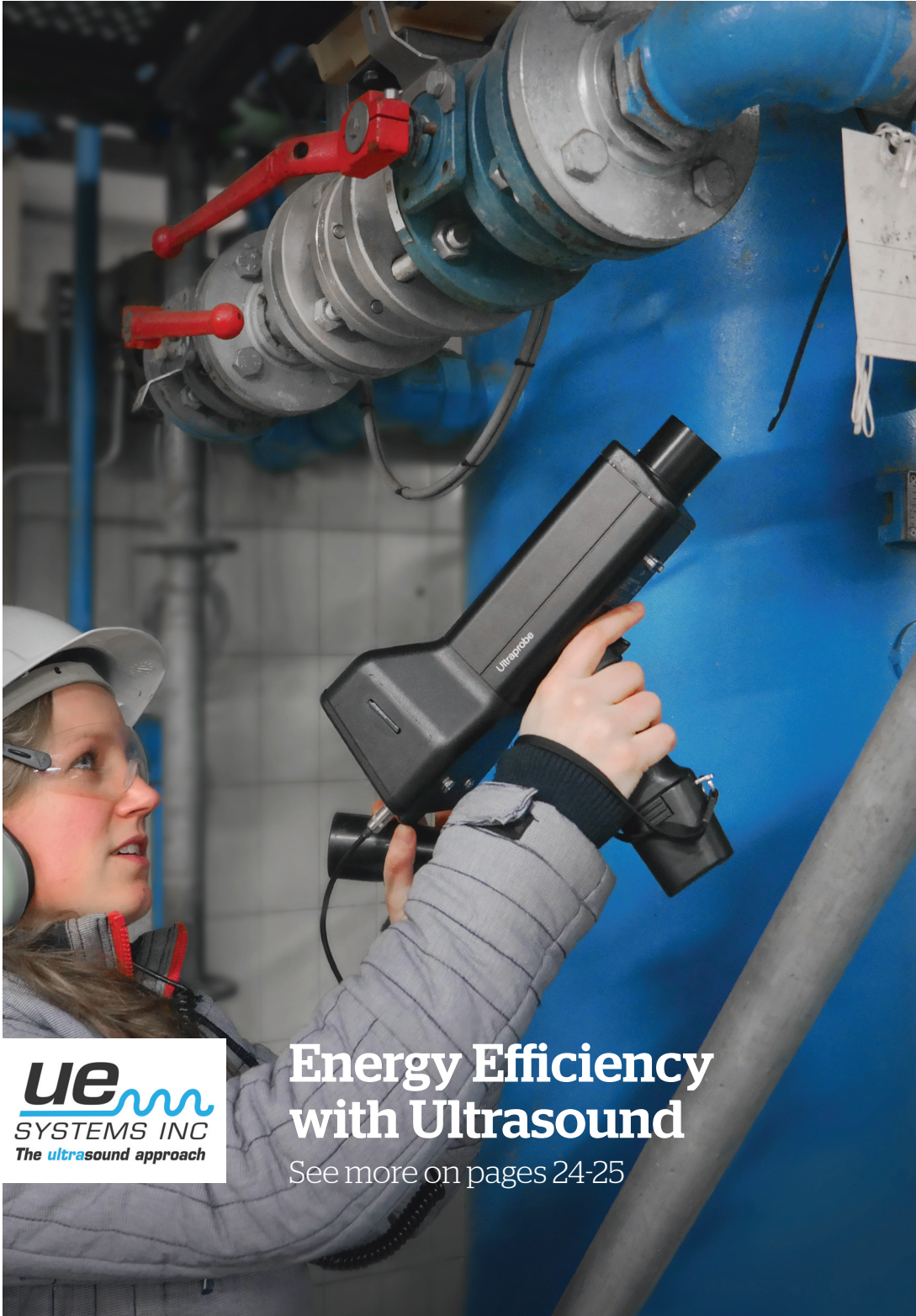


“Implementing a digital twin can help manufacturers to monitor batch manufacturing and ensure that every product is of a high quality”
Advanced Manufacturing, page 10.

Excellence in Industrial Efficiency

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SYSTEMS INC
The *ultrasound* approach

Energy Efficiency with Ultrasound

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Using Ultrasound to Enhance Energy Efficiency

One of today's greatest challenges for maintenance & reliability teams is to improve energy efficiency - high energy prices and global competition dictate a need to reduce energy waste and improve system efficiencies whenever possible. A major contributor to energy waste is leaks: both in compressed air systems and steam traps. Ultrasound inspection instruments can detect these leaks, leading to potential energy savings.

Detecting Compressed Air Leaks with Ultrasound

Contrary to what some might think, compressed air is not free. In fact, it is estimated that more than 50 percent of all compressed air systems have energy efficiency problems that should be corrected. These losses can be quite costly. Around 30% of all industrial compressed air is usually lost to leaks, resulting in huge losses. A leak that is just 1 mm. can cost a plant upwards of £1,500 per year if it goes undetected.

Ultrasound instruments detect the turbulent flow produced as the compressed air moves from the high-pressure side to the low-pressure side of a leak. Using the characteristics of Ultrasound, locating leaks is fast and easy because of:

- Directionality of sound waves makes locating the source easy
- Intensity of signal: the closer you get, the more sound you detect
- Fixed frequency, making it effective to locate even in a loud factory environment

The "Gross to Fine" Method

One thing to keep in mind while scanning for compressed air leaks out in the facility, is the fact that high frequency sound is very low energy. Because it is low energy, the sound will not travel through solid surfaces, but rather bounce and reflect off of solid surfaces. That's why it is important to scan in all directions with the ultrasound instrument, while adjusting the sensitivity. Adjusting the sensitivity and scanning in all directions will help to pinpoint the location of the compressed air leak. Once the general area of the leak has been located, most ultrasound instruments will come with a focusing probe that can be slipped over the end of the airborne scanning module on the instrument to more finely narrow the field of view to more



precisely identify the location of the leak. This method of compressed air leak detection using ultrasound is commonly referred to as the "Gross to Fine" method.

Considerations must also be made to determine the type of leaks that are to be detected with ultrasound such as pressure leaks in compressed air or compressed gas systems, vacuum leaks, or refrigerant leaks. After the initial walk through, select one area or zone to test at a time. For consistency, it is recommended to begin at the compressor, or supply side, and then move to the distribution lines, and then areas where the compressed air is being used. As the compressed air leaks or being found with the ultrasound instrument, a tagging system should be in place to tag the leak at the leak site. The tag should have places to record the leak number, the pressure, type of compressed gas, a brief description of the leak location, and decibel level of the leak that was indicated on the ultrasound instrument once the leak location was confirmed. An estimated cost of the leak may also be helpful in creating awareness of the



A leak that is just 1 mm. can cost a plant upwards of £1,500 per year if it goes undetected

expense of compressed air or compressed gas leaks.

Reporting & Documenting Compressed Air Leak Surveys

Besides repairing the leaks, the success of the survey largely relies on proper reporting and documentation. Reports can be created easily using software like Ultratrend, or a mobile app as the LeakSurvey app. The cost of the compressed air leaks is based on the decibel level once the leak has been located; the cost per kilowatt hour of electricity; and the pressure at the leak site. Several independent studies compared an ultrasound leak survey report with the actual energy savings,

March 2019					
	Air Leaks Repaired		Cost Avoidance		% Complete
	LPM	Cost	Identified	Repaired	
	0,0	€ 0,00	£ 4.927,90	£ 0,00	0%
Record Number	Group Name	Location Name	Type of Gas	Pressure at Leak	dB Reading
1	UP9000	compressor	Air	7	45
2	UP9000	compressor	Air	7	75
3	UP9000	compressor	Air	7	83
4	UP9000	compressor	Air	7	85
5	UP9000	compressor	Air	7	52
6	UP9000	compressor	Air	7	38