



Strategies for an Effective Airborne Ultrasound Program

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ABSTRACT

Over the past decade maintenance professionals and reliability specialists have embraced airborne ultrasound inspection technology like never before. An ultrasonic detector is a tool unlike any other when speaking in terms of sheer versatility and return on investment. The technology has matured keeping pace with that of other advanced technologies to provide maintenance practitioners with more solutions while consuming less resources.

Despite the warm reception of this technology, and its wide spread acceptance into the maintenance tool cribs of the world, we continue to meet (post sale) clients who buy into the technology but do not realize the full benefit of an airborne ultrasound program. They purchase the equipment with good intentions but after the initial delivery-day euphoria dissipates the program dies on the vine. If this truth applies at your facility you may take comfort in knowing you are not alone. This is a uniquely human phenomenon that everyone has experienced at least once in a lifetime.

For any program to succeed it needs a sound strategy. Start by identifying the need for the program, and then set goals to satisfy the need. Justify the program by recognizing some key areas for improvement. Establish a basis for how the program's return on investment will be measured. Invest in training at both management and user levels. Choose a leader who can technically carry the program forward. Usually this person reveals him or herself after the first training class. Finally, reward individual successes and make frequent review of progress a part of your regularly scheduled meetings.



Optimize Potential

Wouldn't it be great if every piece of technology ever bought paid immediate dividends? Wouldn't it be nicer still if every tool or instrument purchased lived up to its initial billing and was implemented full scale to perform the jobs it was purchased for? For instance, take that wonderful idea to reduce energy waste; or the plan to implement more frequent quality checks; or the decision to reduce wait times at the tool storeroom. The reality is that each of us at one time or another made a purchase or implemented

a plan with good intentions, but never realized the full benefits for one reason or another. This happens both in our private and professional lives and it happens for a reason: We went forward with NO STRATEGY.

As a sales professional for the past 17 years I've seen a lot of the above, and been guilty of the same too. But what I've learned is real simple: "If it is worth doing, then it is worth doing right... and right means beginning with a strategy."

An Integral Part of Any Maintenance Tool Box

Airborne ultrasound inspection is an important part of any company's predictive maintenance practice. No other inspection technology pays immediate return on investment like a properly executed ultrasound program. Savings in energy costs, downtime reduction, catastrophic failure avoidance, predictive lubrication procedures, improved product quality, improved building safety and efficiency, and increased employee awareness are just some of the benefits of a good program. Despite the obvious benefits, too many companies have invested in this excellent technology with poor results to show.

They had a good idea, but they didn't have a good plan.

During a plant visit it is customary after a brief presentation of our technology to be invited out to the plant floor. Most often the customer wants to see the equipment in action; to prove our sales

claims. After a few minutes the customer handles the equipment and sees how easy it is to find a compressed air leak in his very noisy plant environment. Perhaps we will, together, find a steam trap that is faulty or noisy gearbox. Often we'll allow a lubricator





to connect our Acoustic Lube Adaptor to his grease gun so he can experience first hand the power of acoustic lubrication of motor bearings. I've even witnessed a customer find a serious and dangerous fault in a high voltage switch panel the first time he picked up the equipment.

Finding problems this quickly is impressive for the client and often all the justification they need

to embark upon an ultrasound program. But keep this in mind; finding a faulty steam trap or a compressed air leak doesn't save money or improve the efficiency of the facility. It only identifies a problem. A strategy must be put in place to repair the problem once it is found, or even assess if the problem is worthy of the cost of repair.

Keys to an Effective Ultrasound Strategy

We always want to know why our customer choose to start an ultrasound program, but its equally interesting, and beneficial for us, to understand the reasons when they decide not to start a program. We ask why because, after all, we want to know what we can do better next time. Surprisingly, the number one reason for clients not to invest in ultrasound technology is fear of the program failing! Either they do not want to assign their name to a failed project, or

they've purchased ultrasound equipment in the past and were unsuccessful in starting a program, or they could not convince others (managers, peers, colleagues etc...) to get on board with them. I say "**CONGRATULATIONS**" for making a decision not to invest in something you are clearly not ready for. Now... let's see about getting you ready for an airborne ultrasound inspection program.

Steps to Take

1. Assemble a team and identify need(s) for a program
2. Justify needs by recognizing key areas where improvement can be benchmarked
3. Set written goals for the program
4. Establish how ROI will be measured
5. Purchase quality ultrasonic inspection equipment
6. Invest in certification training at both management and user levels
7. Choose a leader to technically carry the program forward
8. Establish a system to reward the successes
9. Frequently review the progress as part of regular meetings



10. Ensure everyone involved is 100% mentally invested in the program's success

Assembling a team and identifying the needs for an airborne ultrasound program is an important first step as it serves two ends. First, you will immediately discover that the primary reason for initializing a program ends up being only a small portion of your final list. Airborne ultrasound inspection is a vast field with endless possibilities and once the path of discovery is taken you and your colleagues will be amazed.

That leads to the second purpose for identifying your needs; bringing pessimists and doubters onside. If your strategy does not include some way of convincing all those opposed to the project, the project stands little chance of succeeding. Here are just a few reasons why your facility will benefit from an airborne ultrasound program:

- Compressed air system is full of leaks and compressors are at full capacity
- Insurance company wants to see monthly PM on electrical systems
- Over lubrication in rolling element bearings are causing unnecessary outages
- Want to implement a simple, but effective, condition monitoring program
- Can't hold vacuum on key processes
- Faulty steam traps are taxing the boiler room
- Premature pump failures attributed to cavitation
- Leaks in building envelope raise HVAC costs in summer and spring
- Put Predictive Maintenance into hands of many rather than few
- Trouble shoot complex hydraulic systems to reduce overhaul time
- Integration of technology to complement infrared thermography program
- Integration of technology to complement vibration analysis program

Understanding the full scope of ultrasound applications will triple or quadruple the size of this needs list.

Justification Process Begins

Now that you have identified a general need for an airborne ultrasound program and all the key players are onside, the next step is to refine your needs and justify the reasons to proceed. Bring

together all the key players and form a task force or decision team. Carefully examine your needs list point by point evaluating the relative merits of each. You're going to need capital to make



the project work and in most cases that will mean selling your ideas to a higher level of management (it's nice if you can include that level of management in your task force but not always possible). Since your initial list is exhaustive, and quite possibly very long, it may be overwhelming to upper management. Decide whether it makes sense to present the entire list or to key on one or two "hot points" to sell the project. If the latter makes sense then choose one or two, (three max) applications and show how improvements would be justified with an inspection program in place.

One of the easiest methods to justify ultrasound inspection is leak detection in a compressed air system. There is an endless source of charts which calculate savings from repaired leaks. Such charts will show leak rate ratios dependent on orifice size and pressure. Others will calculate waste based on SCFM, compressor horsepower and electricity costs. Bottom line is simple. If you are losing 40% of your compressed air capacity to leaks (industry norm

Goal Setting

It's often said that "a goal is just a wish until its written down." No truer words are spoken when it comes to goal setting. Establishing goals for the program shows that the project is well organized, the participants are serious about making it work, and everyone agrees on the direction and scope of the program. Using the example of compressed air leaks once again, the goal can be as simple as reducing leakage from

if no leak program is in place) and you can cut that to 10% (industry target with leak program in place), you stand to decrease your compressor energy consumption and wear and tear by up to 30%.



You may want to look at bearing failures as a means of justification. Can you identify key machines that will shut down production in the event of failure? It doesn't have to be a million dollar machine. A \$35.00 bearing can stop a production line as quickly as a \$ 35,000.00 bearing. However you choose to validate your intentions to the next level, be sure to make a solid business case and have everyone onside.

40% to 10%. Another objective could be to move one compressor to stand-by service. How about reducing or eliminating all bearing failures related to improper lubrication?

Wherever the targets are set, they must be realistically attainable, easily benchmarked, and not carved in stone. Goals exist to add purpose to a project. Making the goals too rigid or unattainable can have a negative effect or even



kill the program. Therefore it is recommended that plateaus be set for each goal and they be reviewed on a regular basis to ensure a) the program is still on course, and b) the goals still

Return on Investment

In the first part of our strategy I suggested to identify all the reasons why an ultrasound program should be established and then zero in on one or two key reasons and use those for your justification. If you rationalized that an ultrasound inspection program would save the company money by improving the steam

- **Steam Traps**
 - Identified and replaced 25 faulty steam traps
 - Increased quality of steam at process end
 - Reduced energy consumption in the boiler room **by 15%**

Purchase Quality Ultrasound Inspection Equipment

While you've been assembling your task force, getting peers and managers on side, identifying needs, and justifying your ends, you've likely also been shopping for quality ultrasound equipment. Before selecting your detector have an in-house demonstration and take the instrument to task. Be sure to have a clear understanding of the equipments capabilities, and if the sales person is cooperative get out onto the plant floor and try the equipment in real life situations. There are a few quality manufacturers

fit the program. Good and realistic goal setting will aid the next part of the strategy; measuring Return on Investment of the ultrasound inspection program.

delivery system you better have a strategy in place to back up that claim. In other words, how will you measure your success? There may be several correct answers. Brain storm as a team and come up with some suggestions. Here is a couple to get you started:

- **Air Leaks**
 - Found and tagged 75 compressed air leaks in first month
 - Repaired 90% of leaks during planned outage at a cost of????
 - Took electrical readings at the compressor and notice amp reduction of 28% for a savings of \$35,500.00

to choose from so it pays to do your homework. Here are some guidelines to follow and some features to look for:





- **Quality** – You are building a 1st class program so use first class equipment
- **Accuracy** – Your strategy is dependent upon benchmarking so whatever data you are collecting had better be accurate.
- **Repeatability** – Monitoring condition of rotating equipment involves trending and comparing data that is repeatable
- **Digital** – Choose a manufacturer that uses current technology. If the equipment is not true digital it can't be used for accurate data trending
- **True RMS** – How the signal is measured is as important as how it's stored. Detectors with True RMS capability provide a signal that is linear and stable for accuracy and repeatability
- **Easy to Use** – Controls should be logical and accessible
- **Upgradeable Software** – Can the system be enhanced with future upgrades?
- **Route Capable Data Collection** – An absolute must for benchmarking
- **Multi-Functional** – Some manufacturers offer sensors with added functionality such as temperature guns, tachometers, noise sensors, and flow meters (SCFM).
- **Warranty** – Look for manufacturers offering extended warranties. Some are offering deals up to five years if you ask
- **Training** – Look for equipment that offers certification training. A 2 ½ day ASNT approved course is normally sufficient to get users and managers up to speed

Certification Training

Lack of training is the single biggest killer of airborne ultrasound training programs. It is truly a crime that a technology with so much promise is under utilized because the customer did not realize the importance of training. Each and every time we conduct a certification training I am amazed by how many eyes light up when the true power and vastness of applications for airborne ultrasound is taught. “You mean you can scan electrical switchgear with that thing?” or “We bought it to find compressed

air leaks and had no idea we could use it for that” are comments heard frequently.

Following up that statement, it is proven repeatedly that certified airborne ultrasound graduates go back to their respective companies more confident, and more resolved to get results from their program. Knowledge is gold and without it your program is dead.

Certification training should not be restricted to the operators either. Both end-users and managers alike should become certified at least





Level 1. We hear comments all the time that an ultrasound program would be better served if the

managers received some instruction and understanding about the technology.

Choose a Leader

Some would argue that leaders are born, not made. I disagree. Leadership is a quality that resides in all of us. In some it is obvious from day one while in others it may be dormant, waiting for the opportunity to be awakened. Rather than back up this statement first, I want you to do a little exercise. First, think of one, two, or three individuals whom you consider to be a leader. Write down their names at the top of a piece of paper. Then ask yourself what true defining characteristics these individuals possess that qualify them as leaders in your eyes. Write those qualities down below their names. When I did this same exercise I came up with three character traits that defined all three personalities. They are: Honesty, Confidence and Conviction, and willing to be fully accountable. Leadership qualities often emerge from within unlikely candidates. I firmly believe that leaders are born AND made. Each of us possess the characteristics to become a leader, but we are not always thrust into a position that allows our leadership qualities to shine through.

In my experience, companies that have implemented successful and effective airborne ultrasound programs did not have to look for a leader. After the team was assembled, and needs were identified this person emerged by default. He/She may have had more at stake or had the most to gain from a successful program. This person played the biggest role in identifying the right equipment to purchase, and excelled during the Level 1 Training. After the program was implemented results were benchmarked and successes were rewarded. When there were doubts the leader provided or found an honest and useful answer.

I believe that any person can lead when called upon so long as they conduct themselves honestly, have confidence in themselves, can execute with passionate conviction, and while able to work in a team environment, ultimately are willing to be fully accountable for failures within the program. There will be no shortage of people willing to take credit for the successes.

Reward Success

As important as it is to benchmark results to validate the program, it is equally important to validate the efforts of the people making it all work. Rewarding successes can have a motivational effect that will propel the project

forward and ensure its survival during lean times. One agenda for the regular maintenance meeting should be to establish a reward structure that is fair and fun. It doesn't have to cost a lot of money... or any money at all. It could be as



simple as a posted notice on the lunchroom bulletin board or a mention in the monthly company newsletter.

While visiting a customer I had the privilege to witness an award ceremony for an employee who

had saved the company a considerable sum of money on a cost cutting project he initiated. He was awarded a small plaque, a company shirt, and a free round of golf for four at a local golf course. It doesn't have to be that elaborate, but it has to be fun and meaningful to the recipient.

Review to Maintain Commitment

As part of the regular maintenance meeting time should be set aside to review the progress of the project. This process needn't be difficult. In fact it's the easiest part of the strategy. Simply pull out the written strategy and goal sheet, and one by one address each point to ensure everyone is on target. Are goals being reached or do they need to be revised? Are the goals set too easily attainable? Then revise them with more challenge, and therefore more positive impact for the project. Acknowledge participants who have given more effort than required and open the floor to allow a free flow of knowledge exchange. Ultrasonic inspection is a vast and versatile technology with far reaching applications. Many of the applications have been invented, or improved upon, by our customers. Use this forum as an opportunity to share new ideas and new uses for the tool. Document the findings and contact your supplier of ultrasound to write a joint case study. Getting your ideas published in a nationally distributed trade journal can be a very satisfying experience, not to mention extremely motivational.

Frequent review of your results will ensure that everyone involved is 100% mentally invested in the success of the UT program. Publish your review on the company intranet and you will be surprised to see new recruits wanting to join the group.

Airborne and structure borne ultrasonic inspection provides industry with an efficient solution for all kinds of preventative and predictive maintenance functions. It is considered by some to be the most important reliability tool based on its versatility, low cost, and ease of use. It is a tool that can be used right out of the box with immediate success and payback. For those wishing to start a long-term airborne ultrasound inspection program simply purchasing equipment is not enough. A program strategy based on, but not restricted to, the ten points outlined in this paper will ensure the success of ultrasonic inspection in virtually any industry.



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