



Total Valve Management

Cycle Isolation Testing and Evaluation

Superior Cycle Isolation Testing and Evaluation Services



Leaking valves are costing power plants millions in lost energy and maintenance down-time.



ValvTechnologies' Total Valve Management (TVM™) program provides innovative solutions for efficiently maintaining valve populations and solving valve leakage problems.

Features

- Accurate, quantitative results
- Non-intrusive to plant operations
- Low cost, easy to execute
- Fast results

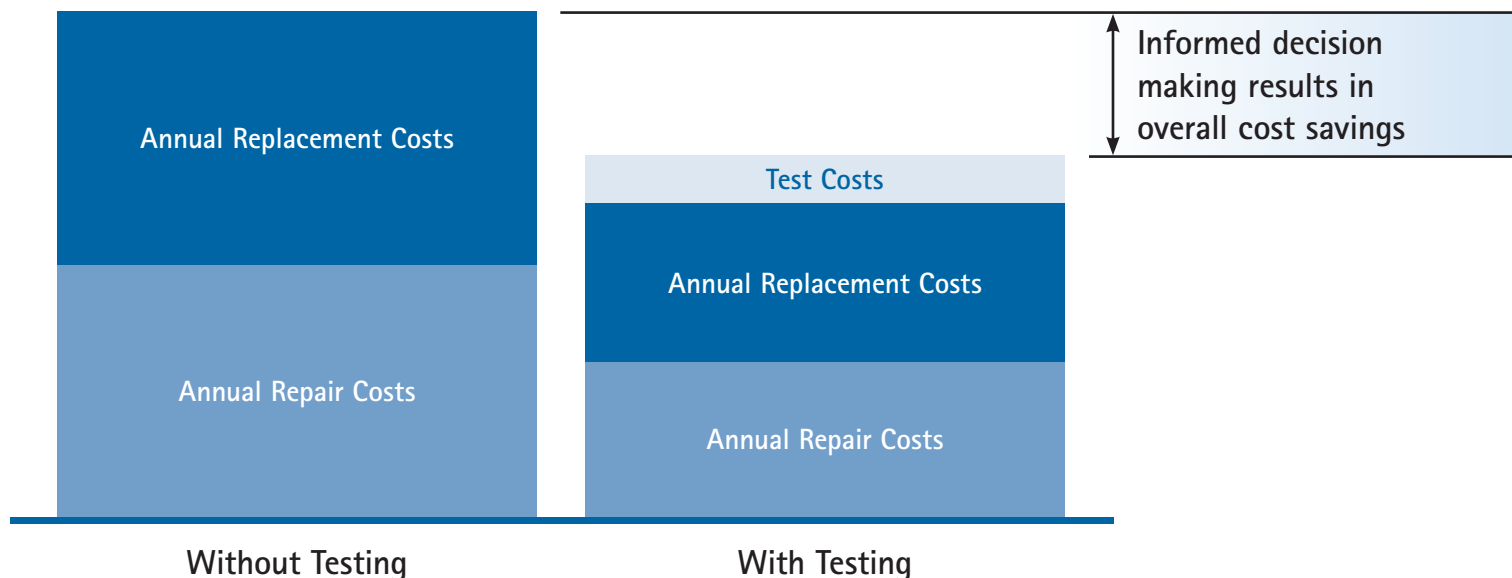
Benefits

- Plant efficiency improvement
- Economic paybacks in just months
- Improved decision-making
- Reductions in overall valve maintenance spend
- Cost avoidance of unnecessary valve repairs or replacements

Overall Reductions in Operations and Maintenance Spend

Our experience shows that without the benefit of accurate, quantified test results, fully functioning valves are often scheduled for repair or replacement. Superior cycle Isolation testing services provides the decision-making tools necessary to avoid unnecessary repairs and prioritize the higher value items.

| Six Steps to Value | | |
|--------------------|---------------------------------|---|
| 1 | Data Collection | Identify suitable target valves, collect relevant valve data (size, type, class and service) |
| 2 | Walk Down and Safety Assessment | Walk down of valve population, identify areas with heat tracing or asbestos, secure safe access to valves, tag valves for testing |
| 3 | Testing | Drill transducer access holes and record acoustic emissions |
| 4 | Reporting | Correlate data and test results to database of valves with known leakage rates via knowledge-based software and report quantified findings and economic impact |
| 5 | Analysis | Based on the report content, review high value target and determine the appropriate mitigative measures. Schedule repairs, adjustments and replacements against valve maintenance budgets |
| 6 | Execute | Mitigate cycle isolation losses and improve plant performance |

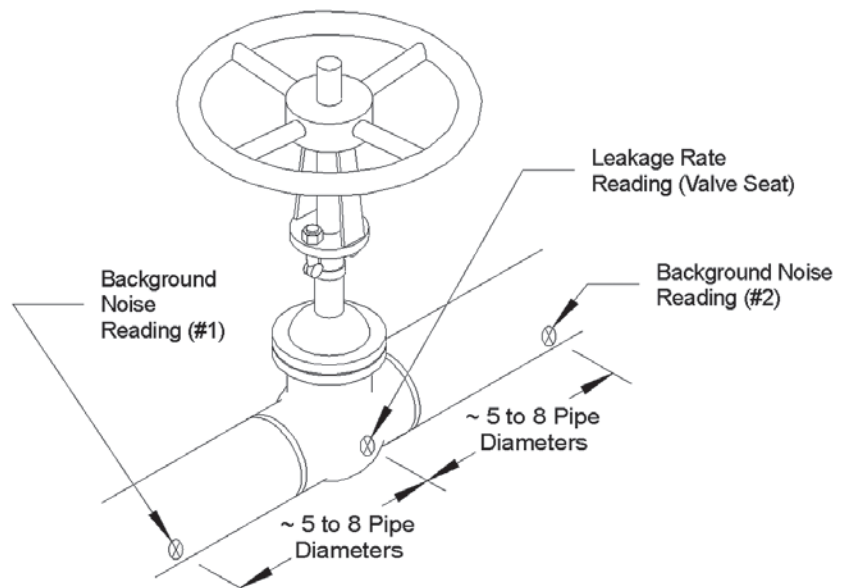


Noise Signature™



Unlike other testing methods that require the removal of large amounts of insulation, ValvTechnologies requires only small drill holes for access with a 3/8 inch diameter transducer.

Energy losses attributable to poor steam/water cycle isolation valves in power generation applications can add up to three or more percent in total unit heat rate (efficiency) losses. ValvTechnologies' Ultrasonic Emission Testing program enables an **inexpensive, rapid** recovery of lost generation with **minimal effort** and without interruptions to plant operation.



The underlying theory is simple: a leaking isolation valve is releasing energy and the ultrasonic emissions or noise levels coming from that valve can proxy the rate of energy release (i.e. the flow rate). ValvTechnologies takes that premise to the next level and beyond. Using knowledge-based software, ValvTechnologies is able to correlate the noise or ultrasonic emissions from a subject valve to a vast database of valves with known, laboratory verified leakage rates.

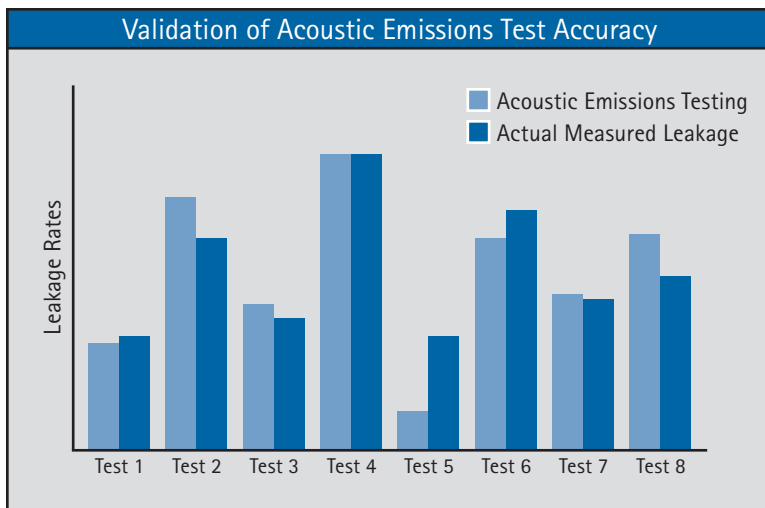
By interpolating among multiple variables including acoustics, valve size, type and class, fluid and the upstream and downstream pressure and temperature conditions, the software returns a mass flow rate of leakage. This is based on the premise that an identical valve, leaking under identical conditions will produce identical acoustic signatures in a laboratory, as it does in a power plant.

Get your Noise Signature™, just as everyone has a unique written signature, so every leaking valve has a unique Noise Signature™; no two are the same, especially since there are so many different valve shapes and sizes. The acoustic emissions measured with our ultrasonic equipment are specific to each individual valve, just as your signature is unique to you. The acoustic readings, taken together, are the specific Noise Signature™ for that individual valve.

Accurate, Quantitative Results

After determining the rate of leakage, ValvTechnologies then calculates the corresponding energy losses and the overall effect of those losses on plant operating economics for each individual valve. Typical results are shown below:

| Typical Test Results | | | | | | | | | |
|----------------------|-----------------------|------------------------|---|-------------------|--------------|-----------|------------------------|--------|--------------------------------------|
| Test # | Leakage Rate (lbs/hr) | Energy Loss (MMBTU/hr) | Annual Cost of Energy Loss @ \$2.10 per MMBTU | Replacement Costs | | | Payback on Replacement | | 4 Year Internal Rate of Return (IRR) |
| | | | | Valve Cost | Install Cost | Total | Years | Months | |
| 3 | 3,897.02 | 5.504 | \$ 92,467 | \$ 11,220 | \$ 2,500 | \$ 13,720 | 0.1 | 1.8 | 674 % |
| 7 | 287.87 | 0.407 | \$ 6,831 | \$ 1,809 | \$ 2,500 | \$ 3,309 | 0.5 | 5.8 | 204 % |
| 15 | 584.18 | 0.739 | \$ 12,418 | \$ 6,879 | \$ 2,500 | \$ 9,379 | 0.8 | 9.1 | 127 % |
| 16 | 23,060.33 | 32.045 | \$ 538,350 | \$ 22,000 | \$ 4,000 | \$ 26,000 | 0.0 | 0.6 | 2,071 % |
| 17 | 35,479.31 | 40.816 | \$ 685,711 | \$ 22,000 | \$ 2,500 | \$ 24,500 | 0.0 | 0.4 | 2,799 % |
| 19 | 10,010.73 | 13.911 | \$ 233,703 | \$ 22,000 | \$ 4,000 | \$ 26,000 | 0.1 | 1.3 | 899 % |
| 48 | 366.61 | 0.503 | \$ 8,449 | \$ 1,482 | \$ 1,500 | \$ 2,982 | 0.4 | 4.2 | 282 % |
| 49 | 2,660.16 | 3.649 | \$ 61,308 | \$ 1,482 | \$ 1,500 | \$ 2,982 | 0.0 | 0.6 | 2,056 % |
| 51 | 4,499.96 | 5.137 | \$ 86,310 | \$ 11,220 | \$ 2,500 | \$ 13,720 | 0.2 | 1.9 | 629 % |
| 53 | 1,154.80 | 1.584 | \$ 26,614 | \$ 1,482 | \$ 1,500 | \$ 2,982 | 0.1 | 1.3 | 892 % |
| 55 | 1,945.39 | 2.669 | \$ 44,835 | \$ 1,482 | \$ 1,500 | \$ 2,982 | 0.1 | 0.8 | 1,503 % |
| 66 | 526.20 | 0.669 | \$ 11,238 | \$ 3,903 | \$ 1,500 | \$ 5,403 | 0.5 | 5.8 | 206 % |



Referring to the table, the process has been third-party verified for accuracy. On populations of valves, the process has demonstrated to be within 4% of the laboratory verified leakage rate and within 10% over two standard deviations.

Conservative Economics

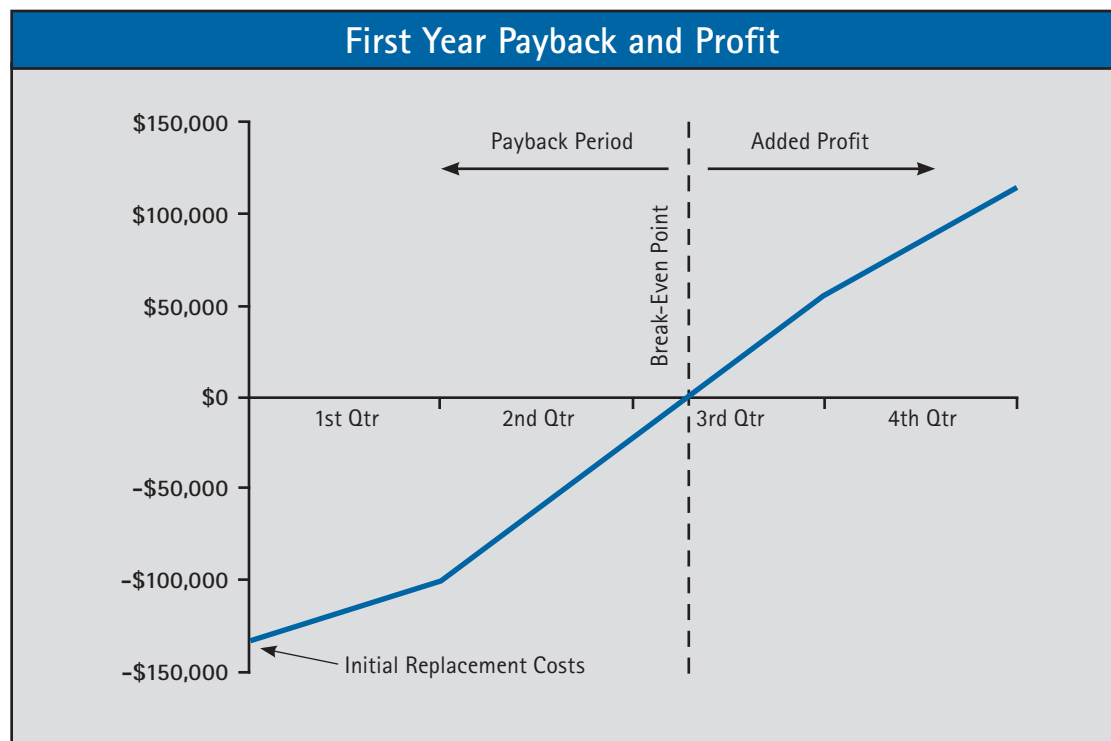
A minimal investment in effective steam cycle isolation can yield dramatic improvements in plant operating profit.

ValvTechnologies reports efficiency losses based on fuel consumption and fuel costs. This is qualified as the **minimum expected benefit**.

In the vast majority of cases, more heat or energy cannot be added to the power cycle to account for valve leakage related losses; consequently valve leakage will also have an effect on plant generating output (MWHs).

The total extent or impact of a leaking valve depends on the location of the valve in the cycle and the thermal or equipment capacity constraints of the individual unit.

Actual Client-Reported Results



The solution has been tested accurate and ValvTechnologies clients have seen the results in the control room. A minimal investment in effective steam cycle isolation can yield dramatic improvements in plant operating profit.

Additional Benefits

The value of cycle isolation testing is not limited to recovery of energy. Additional benefits Include:

- Reductions in cycle make-up requirements
- Protection of other plant equipment from unnecessary heat loads or water induction problems
- Verification of warranties and guarantees of valves in place
- Confirmation that plant equipment can be isolated for repairs
- The general transparency necessary to make more informed decisions

Environmental Impact

Improvements in plant efficiencies correspond to a reduction in environmental toxins and pollutants



Every pound of coal saved with an assumed Carbon content of 75% by weight results in 2.75 pounds less CO₂ emitted to the atmosphere.

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ValvTechnologies products are certified to:

