MISTRAS
A World of NDT Solutions
Products & Systems Division

PHYSICAL ACOUSTICS CORPORATION

**PRODUCT BULLETIN**


*In 2007 a major mid-west utility with a 690-MW unit, found and repaired leaking cycle valves with **P3™** (SteamPAC). This improved the condenser's back-pressure allowing them to realize a reduction in overall heat rate resulting in a **savings of $1.6 Million** in 2008.*

# P3™ Power Plant Predictive Maintenance Analyzer

Today's aging fossil fuel plants need a comprehensive predictive maintenance (PdM) instrument to combat high repair costs, long lead time replacements & limited down time. MISTRAS has just the instrument - the Power Plant Predictive Maintenance Analyzer (P3™), combining multiple diagnostic tools into one system including individual software suites to make testing valves, bearings, SF6, steam traps and more as easy as touching a software icon.

The P3 detects partial discharge and/or bouncing particles on gas insulated substations & components. Ideal for detection, characterization and area location of Electrical & Partial Discharge, Mechanical & Thermal problems.

| Trap I.D. | Signal Level (dB) | Pressure Difference (psig) | Pressure Difference (barg) | Inlet Size (ins NB) | Gate Valve (y/n) | Ball Valve (y/n) | Leak Rate (gal/hour) | Percentage of Total Detected Leakage |
|---|---|---|---|---|---|---|---|---|
| ROV123 | 44 | 2532.3 | 174.64 | 2.00 | n | n | 160.77 | 33.6 |
| SIP345 | 34 | 14.9 | 1.03 | 6.00 | n | n | 88.08 | 51.9 |
| | 27 | 2519.9 | 173.79 | 2.00 | n | n | 46.10 | 61.6 |
| | 21 | 180.5 | 12.45 | 0.75 | n | n | 29.62 | 67.8 |
| | 18 | 359.7 | 24.81 | 2.00 | n | n | 25.03 | 73.0 |
| | 17 | 175.5 | 12.10 | 1.50 | n | n | 23.39 | 77.9 |
| | 18 | 160.9 | 11.10 | 0.50 | n | n | 22.32 | 82.5 |
| | 16 | 232.4 | 16.03 | 0.75 | n | n | 19.38 | 86.6 |
| | 14 | 2797.1 | 192.90 | 1.50 | n | n | 14.77 | 89.6 |
| | 6 | 99.3 | 6.85 | 1.50 | n | n | 10.49 | 91.8 |
| | 9 | 232.4 | 16.03 | 0.75 | n | n | 10.18 | 94.0 |
| | 9 | 2532.3 | 174.64 | 1.50 | n | n | 8.80 | 95.8 |
| | 7 | 2532.0 | 174.62 | 2.00 | n | n | 7.68 | 97.4 |
| | 4 | 160.9 | 11.10 | 0.50 | n | n | 5.25 | 98.5 |
| | 4 | 610.8 | 42.12 | 0.75 | n | n | 4.53 | 99.4 |
| | 3 | 2532.3 | 174.64 | 1.00 | n | n | 2.67 | 100.0 |

*Loss Calculation Software Data*

## APPLICATION SOLUTIONS

### STEAMPAC THROUGH VALVE LOSS MEASUREMENT

SteamPAC, a technology package with a powerful formula for estimating leak rates, is typically used in fossil fuel plants to survey the entire inventory of steam valves and traps while in service. This results in positive impacts on Heat Rate and $CO_2$ stack emissions.

Thermal efficiency in a plant is the amount of steam produced versus the amount of steam that ultimately reaches the turbine. Each leaking valve along the steam path contributes to a reduction in efficiency. These losses require more fuel to provide the same energy at the generator, increasing costs and emissions.

### DRY FLOW TESTING

P3 can quickly check for flow in a pipe or other equipment. Coal feeder tubes and Trona injection systems are examples of where Acoustic Emission (AE) is used to identify if a system is working properly. This is a noninvasive method for identifying problems (i.e.: clogging and improper particle size) in a specific pipe to help eliminate emission problems.

**EXAMPLE: STEAMPAC LOSS**
**TYPICAL 400 MW PULVERIZED COAL BOILER**

***Thermally Efficient PCB (with P3)***
- *1 ton of coal = 26,000,000 BTU*
- *1 MW requires 9,000,000 BTU per hour*
- *400 MW requires 138 tons of coal per hour*

***Less Efficient PCB (with P3)***
- *1 ton of coal = 26,000,000 BTU*
- *1 MW requires 14,500,000 BTU per hour*
- *400 MW requires 223 tons of coal per hour*

***Savings in fuel cost with increased thermal efficiency...*** At $14/ton of coal, fuel cost savings is $1100/hour ($26,400/day) by reducing loss of steam through normally closed valves - reduction of 84 tons of $CO_2$/day.

### BEARING LUBRICATION

Over lubrication at a pipe can cause bearing failures. By using AE to listen as the bearings are being lubricated, proper lubrication can be detected and bearing failure can be prevented.

### DATA TRANSFER AND MANAGEMENT

Transferring data from your P3 to a PC is made easy by simply connecting to any USB or compact flash memory. Trending and graphing of data can be displayed using Excel or AEWin™, our powerful or graphing program.


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