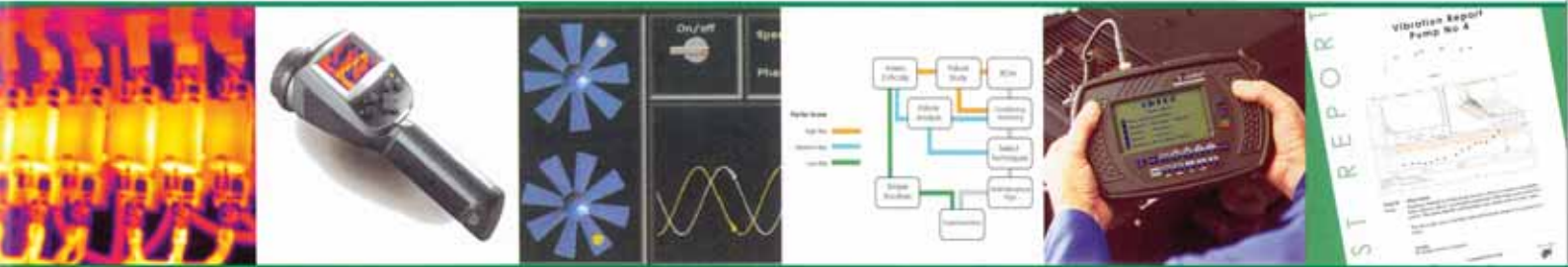


# WHERE FAILURE IS NOT AN OPTION





## INTEGRATED MAINTENANCE SOLUTIONS

### IMPROVING THE BOTTOM LINE

Proviso Systems was established some 10 years ago to help industry change the way it performs maintenance by introducing innovative approaches to condition monitoring.

The company has grown rapidly and the advanced techniques within the 'Proviso Healthcheck' are now widely recognised as the way forward, ensuring as they do, a range of on-site diagnostic procedures, leading to early detection of wear and tear.

Our specialist engineers have a wealth of industrial experience which, when combined with the very latest monitoring technology, provides a solution to most maintenance problems. These include Critically Audits, Risk Based and Reliability Centred Maintenance Assessments, Condition Monitoring and Predictive Maintenance.

It is no coincidence that Proviso is now one of the premier service organisations in the UK, with a customer list that boasts many leading names in the food, manufacturing, brewing, mining and quarrying, aerospace, automotive, processing and general engineering markets.

From oil sampling, vibration measurement and analysis, through thermal scanning to hydraulic testing, Proviso Systems offers innovative management programmes guaranteed to improve plant and equipment efficiency, reduce maintenance costs and prevent breakdowns.

### SERVICES

- Reliability Engineering
- Condition Monitoring Programmes
- Equipment Criticality Analysis
- Oil Sampling and Analysis
- Thermal Imaging Surveys
- Vibration Analysis
- Alignment
- Balancing
- Training
- RCM

### PRODUCTS

- Vibration Data Collectors and Software
- Interactive Training Software
- Thermal Imaging Cameras
- Sensors and Systems
- On-Line Monitoring
- Accelerometers



## RELIABILITY ENGINEERING

### ASSET CONDITION ASSESSMENT AND RESTORATION

The principle objective of an Asset Assessment and Restoration programme is to bring equipment economically back to condition, with minimum disruption. During implementation, equipment is assessed and critical differences analysed. A structured process for restoring it to its optimum operating condition is then designed and implemented.

### RELIABILITY CENTRED MAINTENANCE

The fundamental principle of Reliability Centred Maintenance (RCM) is to avoid or mitigate the consequences of failure. RCM is based on determining the balance between corrective and preventative maintenance to ensure that the equipment fulfils its intended function in its operating context. This methodology allows the consequences of each failure mode to be evaluated and provides decision logic to aid selection of the most appropriate maintenance technique.

### TOTAL PRODUCTIVE MANUFACTURING

The main objective of Total Productive Manufacturing (TPM) is to maximise the effectiveness of the facilities that are used within the business by adopting a continuous improvement regime. TPM is an all embracing, results orientated/objectives driven approach for delivering business wide improvements through the optimisation of complete equipment

lifecycle management. Its focus creates flexible teamworking through the involvement of representatives from all departments associated with equipment purchase, installation, maintenance and operation.

### PREDICTIVE MAINTENANCE COST BENEFITS

The true measure of effectiveness of an integrated predictive maintenance programme can be determined in several ways. Examples of this include increased machine availability, increased product quality, reductions in down time and avoidance of costly maintenance overtime. Proviso Systems are happy to assist their clients in designing and operating a cost benefit analysis programme, which will truly reflect the impact on their business.







# EQUIPMENT CRITICALITY ANALYSIS

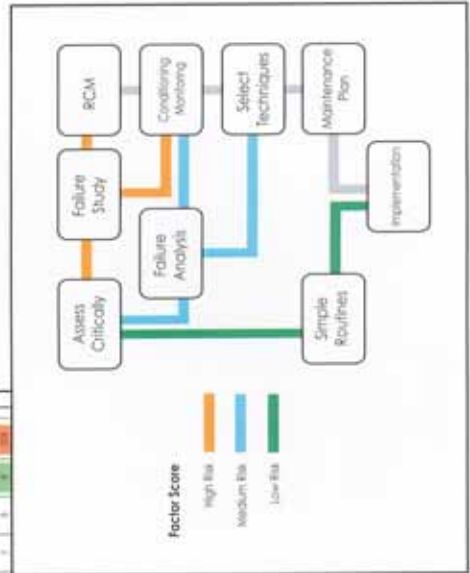
A Proviso Criticality Audit is the optimum method of highlighting potential failures within a production system, identifying the potential hazards associated with these failures and classifying them according to priority.

The process involves: selecting the assets requiring analysis; selecting the categories to be used i.e. output, safety, repair time etc.; putting each asset through the analysis process and reaching an appropriate score.

By using the RCM approach, the appropriate maintenance requirements for individual assets can be defined.

Requirements for individual assets

Requirement Provision	A	B	C	D	E	F	G	H	I	J
Food Industry	1	1	1	1	1	1	1	1	1	1
Egg units	1	1	1	1	1	1	1	1	1	1
New milk plants	1	1	1	1	1	1	1	1	1	1
High pressure	1	1	1	1	1	1	1	1	1	1
Batching	1	1	1	1	1	1	1	1	1	1
Transfer U.S.	2	2	2	2	2	2	2	2	2	2
Milk plants that cost > £100,000	2	2	2	2	2	2	2	2	2	2
Complexity	1	1	1	1	1	1	1	1	1	1
Complexity Factor 1	1	1	1	1	1	1	1	1	1	1
Complexity Factor 2	1	1	1	1	1	1	1	1	1	1
Complexity Factor 3	1	1	1	1	1	1	1	1	1	1
Complexity Factor 4	1	1	1	1	1	1	1	1	1	1
Complexity Factor 5	1	1	1	1	1	1	1	1	1	1
Complexity Factor 6	1	1	1	1	1	1	1	1	1	1
Complexity Factor 7	1	1	1	1	1	1	1	1	1	1
Complexity Factor 8	1	1	1	1	1	1	1	1	1	1
Complexity Factor 9	1	1	1	1	1	1	1	1	1	1
Complexity Factor 10	1	1	1	1	1	1	1	1	1	1
Complexity Factor 11	1	1	1	1	1	1	1	1	1	1
Complexity Factor 12	1	1	1	1	1	1	1	1	1	1
Complexity Factor 13	1	1	1	1	1	1	1	1	1	1
Complexity Factor 14	1	1	1	1	1	1	1	1	1	1
Complexity Factor 15	1	1	1	1	1	1	1	1	1	1
Complexity Factor 16	1	1	1	1	1	1	1	1	1	1
Complexity Factor 17	1	1	1	1	1	1	1	1	1	1
Complexity Factor 18	1	1	1	1	1	1	1	1	1	1
Complexity Factor 19	1	1	1	1	1	1	1	1	1	1
Complexity Factor 20	1	1	1	1	1	1	1	1	1	1
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Complexity Factor 22	1	1	1	1	1	1	1	1	1	1
Complexity Factor 23	1	1	1	1	1	1	1	1	1	1
Complexity Factor 24	1	1	1	1	1	1	1	1	1	1
Complexity Factor 25	1	1	1	1	1	1	1	1	1	1
Complexity Factor 26	1	1	1	1	1	1	1	1	1	1
Complexity Factor 27	1	1	1	1	1	1	1	1	1	1
Complexity Factor 28	1	1	1	1	1	1	1	1	1	1
Complexity Factor 29	1	1	1	1	1	1	1	1	1	1
Complexity Factor 30	1	1	1	1	1	1	1	1	1	1



- Maintenance Assessment**
- The Benefits
- Reduce the risk of serious failures on high criticality assets
  - Reduced costs by
    - Reduced labour requirement as 'low criticality' assets require less attention
    - Reduced usage of parts through unnecessary maintenance
    - Reduced planned maintenance stoppages attributed to unnecessary maintenance
- High productivity due to 'critical assets' improved reliability



# CONDITION MONITORING SERVICES

Our multi-technology condition monitoring programme may include some or all of the following methods, which then enables a comprehensive Maintenance Strategy and Schedule of Planned Preventative Maintenance (PPM) to be implemented:



### VIBRATION ANALYSIS

As a recognised leader in the field of condition monitoring techniques, we utilise vibration analysis for a variety of applications. Problems such as looseness and instability of mountings, gear and bearing deterioration, misalignment of couplings, and lubrication deficiency can all be detected. Early identification reduces the chances of secondary component damage, improves reliability and therefore maintains efficiency.



### OIL ANALYSIS

Our on-site fluid sampling and advanced lab analysis enable us to monitor oil condition and

contamination in addition to identifying abnormal machine wear and debris levels. Lubrication programmes can then be introduced, which will improve machine life and help save you money.



### INFRARED THERMOGRAPHY

Thermal imaging has proved to be a critical element of the condition monitoring process. We utilise the latest in thermal imaging technology to provide a highly accurate indicator of emerging problems.

**Electrical surveys**, are used to identify high resistance joints, overloading and localised heating.

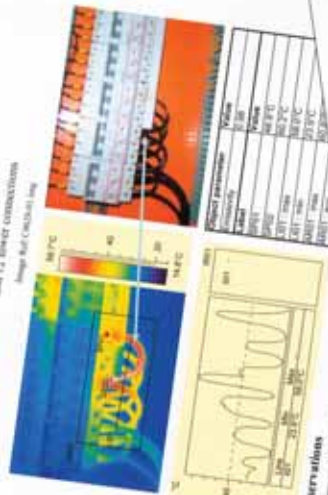
**Mechanical surveys** help to uncover component deterioration, friction, misalignment and temperature dependant process disorders.

**Building surveys** show heat loss through inadequate insulation across the building envelope and assist in the location of leaks.

T E S T R E P O R T

### Thermographic Survey Report

Date of Survey: [Blank]  
Area ID: [Blank]  
Plant ID: [Blank]  
Fault Description: Breakers 11 and 12 lower connections  
Image Ref: 06/03/15



**Observations**  
The image shows electrical cables/breaker connections to be approximately 20°C above ambient temperature. This was noted when these lower connections were in this breaker. The temperature was noted on the left side for reference and comparison.

**Recommendations**  
The circuit breakers were recommended for a repair as the breakers had been replaced at the job. To provide the confidence and evidence to the customer, the photograph on the right shows

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Doncaster, South  
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T E S T R E P O R T

### TYPICAL TEST REPORTS

### Vibration Monitoring

Example Gearbox  
SKS STL 87210



**Diagnosis**  
Gearbox  
The gearbox should be removed from service and refurbished as soon as possible.

**Issue Date:** [Blank]  
**Signature:** [Blank]  
**Work Order:** [Blank]

**Comments:**  
Vibration levels from this gearbox continue to display a progressive increase in g's (acceleration activity at the position governed accuracy and increase in g's). This 2nd harmonic is identified by the high speed 10's 2s harmonizing damage assessment with the maintenance checklist frequency of the plant in performance with the customer safety and the reference PPMANSTL highlighted the unit was commonly noisy and the vibration could be hard felt.

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**proviso**

## Oil Analysis Report

Oil Grade: Castrol Alpha SP4

Machine No: 34  
Growth: [Blank]  
Make: [Blank]  
Year: [Blank]  
Model: [Blank]  
Serial: [Blank]

Parameter	Units	Comments	Wear	OK
Oil Level	mm	Oil level OK	0.0	
Oil Viscosity	mm²/s	Oil Viscosity OK	150	
Total Solids	mg/L	Total Solids OK	0.5	
Water	ppm	Water OK	10	
Total Acid	mg/L	Total Acid OK	0.1	
Total Alkali	mg/L	Total Alkali OK	100	

Notes: [Blank]  
Remarks: [Blank]

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## TEST REPORT

Building 1: Press Shop

Compressor: [Blank]  
Pressure: [Blank]  
Temp: [Blank]

Job to run after pipe work being finished when pressure present

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## TEST REPORT

### Can You Afford to Waste Compressed Air

You will all be aware that it takes 28kW of electricity to produce 100L of compressed air, at 7.5 bar. The cost per minute to produce that compressed air, for a site working 40 hours a week, 48 weeks year, at £0.02 per kWh is **£3,379.20**.

**The Problem**  
Assuming that your pneumatic systems are not so tight and the summation of your leaks add up to the following indicators:

**The cost of wasted energy is as follows:**

Summative Diameter OF Leaks (mm)	Air Leakage @ 7 Bar L/s	Compressor Power Required (Kw)	Cost of Leaks per Annum
6.5	0.4	0.32	£ 28.40
1.5	0.1	0.08	£ 7.04
2.0	1.8	0.34	£ 29.60
6.0	5.1	0.54	£ 46.50
10.0	26.2	0.93	£ 79.76
	38.1	1.5	£ 127.00
		23.4	£ 1972.00
		25.4	£ 2167.00

Based on 7.00 bar system @ 8.00mp3/Kwh. Source BCS Insulations Guide.

**Your Numbers may vary slightly but the Theory is Accurate.**

**The Solution**  
To minimise air leaks contact Proviso Systems for an Ultra Sensitive Air Leak Survey, offering a written report and leak tags fitted adjacent to each air leak. The service is conducted when the site is in full production, therefore detecting leaks not always using traditional methods.

For further information on any of the above please do not hesitate to contact Peter Gaskley marketing department on 01777 817324 or Email [info@proviso-systems.co.uk](mailto:info@proviso-systems.co.uk)





## PRODUCT PORTFOLIO HARDWARE, SOFTWARE, TRAINING & SUPPORT

The VB Series of vibration analysis equipment. Affordability without compromise

The VB Series along with Ascent software combines up to the minute technology with affordability. Comprising six models, each instrument is designed to be up and running in minutes and is supplied complete with:

- 5 years warranty
- Lifetime helpdesk support
- Comprehensive Ascent Software
- 12 hours free interactive training
- Balancing capability (4 models)

After comparing its cost and capability, the VB Series is rapidly becoming the first choice for maintenance professionals throughout the world.



Seamless integration of portable and on-line data collection

### Balancing

**VB1000-b** A compact stand alone instrument which will solve any single or dual plane balance problem with ease.

### Portable Instruments

**VB1000** A single channel instrument that will solve both balance and vibration problems.

**VB2000** A dual channel instrument offers extra power and convenience to solve both 2 plane balance and vibration problems.

**VB3000** A comprehensive dual channel instrument enhanced by the Inclusive Level 2 - Ascent Software Surveillance Systems

**VB-Online** A multiple channel, ethernet based surveillance system for those more critical assets - Includes Ascent Software Level 3

Setting the standard for affordable on-line surveillance systems.

The VB-Online monitoring system provides 24/7 round the clock surveillance for your critical assets. It is a flexible modular systems that is constantly and automatically evaluating your data, notifying when potential problems arise, thus avoiding costly downtime.



The system utilises 16 or 32 channel modules which may be interconnected to your existing network via a standard (wired or wireless) Ethernet connection. Each module is flexible enough to accept a range of field inputs giving a true indication of the condition of your equipment.

The VB-Online works hand in hand with the proven Ascent Software and can be used in conjunction with any of the VB range of portable instruments.

Some of the key features include

- OPC data acquisition compliance
- Web browser technology
- Email and text message alert
- SQL/HTML reporting

## INTERACTIVE TRAINING

### VIBRATION ANALYSIS AND ALIGNMENT

#### Mastering Vibration Monitoring.

With our iLearn interactive training products you are embarking on a lifelong training and resource programme that will become invaluable to you and your organisation's development.

#### iLearnVibration – Practice Makes Perfect

This interactive training resource is not limited to one single user and includes a range of modules to advance your knowledge and understanding of condition monitoring and vibration analysis.

The course includes over 7.5 hours of narration, 400 quit questions and over 1800 slides, together with a series of modules to aid your development, including :-

50 case histories, a Virtual Test Rig, a Machine Fault calculator, with bearing database and the new Reference Center.

Thousands of people are already using iLearn Interactive software in over 60 countries.

#### iLearnAlignment

Misalignment is one of the leading causes of premature machine failure.

iLearnAlignment will teach you how perform shaft alignment with dial indicators and laser systems in a self-paced, interactive format that guarantees that new concepts and difficult procedures are fully understood.

When shafts are correctly aligned, bearing life is extended, energy consumption reduced and product quality improved.



## THERMAL IMAGING CAMERAS

Whether viewing electrical systems, carrying out maintenance inspections or checking process installations, thermal imaging is without doubt the most effective predictive maintenance instrument available – quickly and accurately locating problems prior to system failure.

We are dedicated UK agents for the Fir range of infrared thermography cameras. With over 30,000 units currently being used on predictive maintenance applications world-wide and a range of innovative software packages for reporting, analysing and organising captured images, it's no wonder Fir is a world leader.

We offer the full Fir range of instruments including -

### ThermaCAM B Series

An extremely affordable range of infrared cameras, specially developed for building diagnostic applications including: the detection of air leaks, heat losses, areas of moisture, leaking pipes and for pinpointing locations where overheating is occurring. They are also ideal for Building Inspectors to detect construction failures and building/insulation abnormalities

These cameras have been specially calibrated for the building industry (-20°C to +55°C) and include a range of powerful features including a built in 17mm lens, interchangeable optics, an in-camera automatic dew point identification alarm.



### ThermaCAM E series

Fitting in the palm of your hand, these affordable, high performance cameras include everything you need from an infrared camera.

Ideal for electrical inspections, general predictive maintenance applications and for when there is a need for instant infrared troubleshooting.

They deliver unmatched temperature measurement accuracy, thermal sensitivity of 0.10°C and clear noise-free images.



### ThermaCAM E320

In co-operation with its customers, FIR systems has further developed its successful ThermoCAM E-series range.

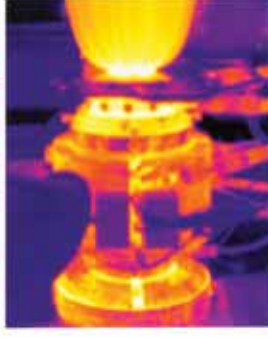
The result is the E320. Now, you will see even sharper infrared images (320 x 240 pixels) on the high-resolution LCD display. Fitting in the palm of your hand, the E320 offers non-contact temperature measurement, crisp thermal imaging, in-field image analysis and storage, and both qualitative and quantitative post-analysis and reporting.

The ThermoCAM E320 is the only camera that offers you practically all the possibilities of a high range infrared camera at an affordable price.

**Easier and quicker inspections thanks to powerful features:**

- **Sound and colour alarms:** the operator can set a maximum temperature in the camera. If the E320 is pointed at an object and this temperature is exceeded, the camera will produce an audible and/or a visible alarm.
- **Movable crosshair:** a joystick allows moving the crosshair for temperature measurement on any pixel in the IR image. A considerable advantage over having just one fixed spot in the middle.
- **Automatic cold or hot spot:** the E320 automatically detects the coldest or the hottest spot in the infrared image.

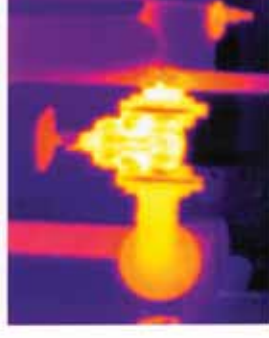
See what infrared can do for you



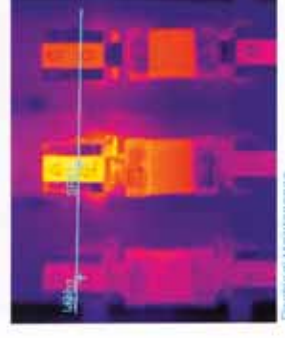
Process Control  
Expanded Polystyrene Extrusion



Building Services  
Find hot spots due to poor insulation



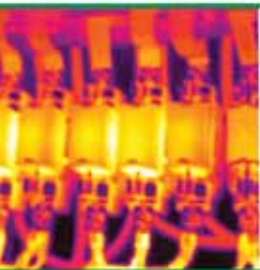
Machinery Maintenance  
Safety Valve Inspection



Electrical Maintenance  
High Resistance Connection







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INVESTOR IN PEOPLE

