



The Beginner's Guide to Condition Monitoring

A practical guide to understanding vibration monitoring, identifying machine faults early and taking the first steps towards predictive maintenance.

- ➔ What Can Vibration Tell You
- ➔ Where Should You Start
- ➔ Understanding Your Readings
- ➔ Choosing the Right Solution

Created by TPI Europe

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Traditional maintenance generally falls into two categories:

Reactive Maintenance-

- >Wait until something breaks.
- >Simple but often the most expensive option.

Preventive Maintenance-

- >Replace components on a schedule.
- >Better, but many parts are replaced long before they're worn.

What is Condition Monitoring?

>A Smarter Way to Maintain Equipment

Predictive (Condition-Based) Maintenance

Monitor the health of equipment while it's operating.

Maintenance is carried out when the condition of the machine indicates it's required.

This approach helps reduce unnecessary maintenance while identifying problems before they lead to unplanned downtime.



What Can Vibration Tell You?

Every rotating machine vibrates.

The important question isn't whether vibration exists...
It's whether that vibration is changing.

Changes in vibration can indicate developing faults such as:

- **Bearing wear**
- **Misalignment**
- **Mechanical looseness**
- **Rotor unbalance**
- **Gear wear**
- **Poor installation**
- **Mechanical deterioration**

Most of these faults develop gradually, meaning they can often be identified long before complete failure occurs.

Where Should You Start?

> Start with Your Critical Assets

A common misconception is that every machine needs to be monitored.

In reality, the best place to begin is with your most important equipment.

Ask yourself:

- Which machine would cause the biggest production loss if it failed?
- Which assets are expensive or difficult to replace?
- Which machines fail most frequently?
- Which equipment runs continuously?

These machines will deliver the greatest return from condition monitoring.





Understanding Your Readings

You Don't Need to Be a Vibration Expert!

One of the biggest concerns for engineers starting vibration monitoring is:

"How do I know what the numbers actually mean?"

The good news is that modern handheld instruments such as the TPI range of Smart Vibration Meter Analysers are designed to make interpretation straightforward.

ISO Vibration Velocity

The instrument measures the overall vibration level of the machine in mm/s (RMS).

Rather than expecting the user to interpret raw vibration values, the instrument compares the reading against the appropriate ISO vibration standard for the selected machine type.

The result is displayed using a simple traffic light system.

Green

The machine is operating within the recommended vibration limits for its selected machine class.

Continue routine monitoring and record the reading as part of your maintenance programme.

Amber

Vibration levels are increasing.

This doesn't necessarily indicate an imminent failure, but it suggests a developing issue that should be investigated during planned maintenance.

Increasing the monitoring frequency can help determine whether the condition is changing.

Red

Vibration has exceeded the recommended limit.

The machine should be inspected and corrective action planned to reduce the risk of unplanned failure.

Bearing Damage (BDU)

Every TPI handheld instrument also monitors high-frequency vibration associated with bearing condition.

By default:

- Below 50 BDU – Bearing condition appears normal.
 - 50–100 BDU – Early signs of bearing deterioration may be developing.
 - Above 100 BDU – Significant bearing noise has been detected and further investigation is recommended.
- (These alarm levels can be adjusted to suit your maintenance strategy.)

Fault Identification

The full TPI range also displays vibration energy at:

- 1× Running Speed – often associated with rotor unbalance
- 2× Running Speed – often associated with shaft misalignment
- 3× Running Speed – often associated with mechanical looseness

These indicators don't replace a detailed vibration analysis, but they provide valuable clues to help engineers identify likely causes more quickly.

Remember...

One reading tells you the condition of a machine today. A series of readings tells you whether that condition is changing.

That's where the real value of Condition Monitoring lies.

Building a Trend

Why Trends Matter>>

Condition Monitoring isn't about collecting one reading. It's about identifying change over time.

Example:

Inspection Status:

Week 1

 Normal

Week 4

 Normal

Week 8

 Increasing

Week 12

 Investigation Required

By regularly recording vibration readings, maintenance teams can identify gradual deterioration and plan maintenance before a breakdown occurs.

Software integration such as VibTrend supplied with the TPI 9080, help visualise these trends, making it easier to monitor asset health over time.

Choosing the Right Solution

Every Maintenance Journey Starts Somewhere

There isn't a one-size-fits-all approach to Condition Monitoring.

Your solution should reflect your maintenance objectives.

Getting Started

Portable instruments such as the 9070 and 9071 provide an accessible introduction to vibration monitoring and are ideal for routine inspection routes.

Expanding Your Programme

As your programme grows, many organisations choose to introduce advanced handheld analysers, software and wireless monitoring to improve reporting and trend analysis.

Monitoring Critical Assets

For machinery where failure would have a significant operational impact, permanently installed monitoring systems can provide continuous condition information without the need for manual inspections.

The right solution depends on your assets, your maintenance strategy and your long-term goals.

Why TPI?

Supporting Every Stage of Your Condition Monitoring Journey.

Whether you're taking your first vibration reading or expanding an established predictive maintenance programme, TPI offers scalable solutions designed to grow with your maintenance strategy.

Our range includes:

- Smart vibration monitors
- Advanced vibration analysers
- Intrinsically Safe instruments
- Wireless monitoring solutions
- Software for trending and reporting
- Technical advice and product support

Our goal isn't simply to supply equipment.

It's to help maintenance teams make better-informed decisions, reduce downtime and build confidence in Condition Monitoring.

Condition Monitoring doesn't have to be complicated. It just has to start.





Ready to Get Started?

Every successful Condition Monitoring programme begins with a single step.

If you're exploring vibration monitoring for the first time or looking to expand an existing maintenance strategy, our technical team is here to help.

Talk to TPI Europe

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