Energy Wastages in the Production System
WHY IT MATTERS?

Application Note

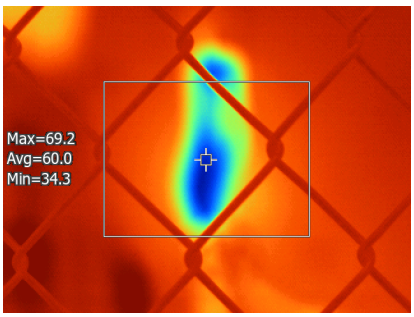
In the production environment, it involves many machineries and processes. There will be a lot of energy waste that you might not have noticed – like the energy that is dissipated as heat into the atmosphere. To pick up such waste, you need to find out the "Hot Spots" in your production line.

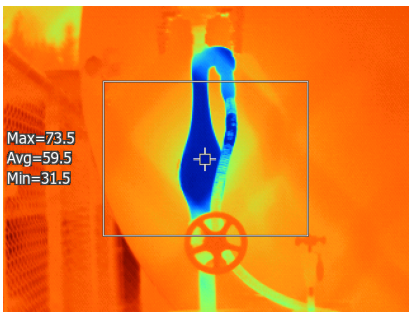
An effective way to pick up such waste quickly is to leverage on the Thermal Imaging Technology.

You can use a Thermal Imager to scan for hot spots in your production line. This will be the fastest way for you to detect the Production System Energy Waste.

Fluke Ti400 Thermal Imager will be one of the recommended tools that is capable to perform this task perfectly. The key lies in the breakthrough technology available in this series of Thermal Imager – the Laser-Sharp Auto Focus.

Most of the thermal imagers have autofocus but they focus on the overall image. The Ti400's Laser-Sharp Auto Focus feature allows camera to focus exactly where it needs to in order to get the RIGHT information, every time.





How it works?

- Use laser distance meter technology to precisely calculate the distance to the intended target with a laser, and focus the camera to that exact spot.
- No mistakes. What you see is what you get. Fluke Thermal Imager's laser illuminates the target to truly give a user a point-and-shoot focusing experience.

Remarks:

- Improper focus can lead to incorrect temperature measurements, lack of detail on critical features and temperature signatures, and misdiagnosis of problem areas.
- Manual focusing takes a lot of practice and experience to familiarize.

Key Area of Production Waste

The motor and drive system is the heart of a product system. When the motor stops, the production line stops. Many people understand this and are working on a good predictive maintenance approach with the right tools to detect the existing and the modern technology noise in these motor and drive systems like shaft voltage issues, voltage reflection and more. However, many did not realize that there are more to gain from here.

"Your production system becomes **More Efficient**. It consumes less energy, there will be less repairs, less part replacements, less breakdowns and the machine lasts longer."

Example

A 350 kW Motor running at 80% of nominal power.

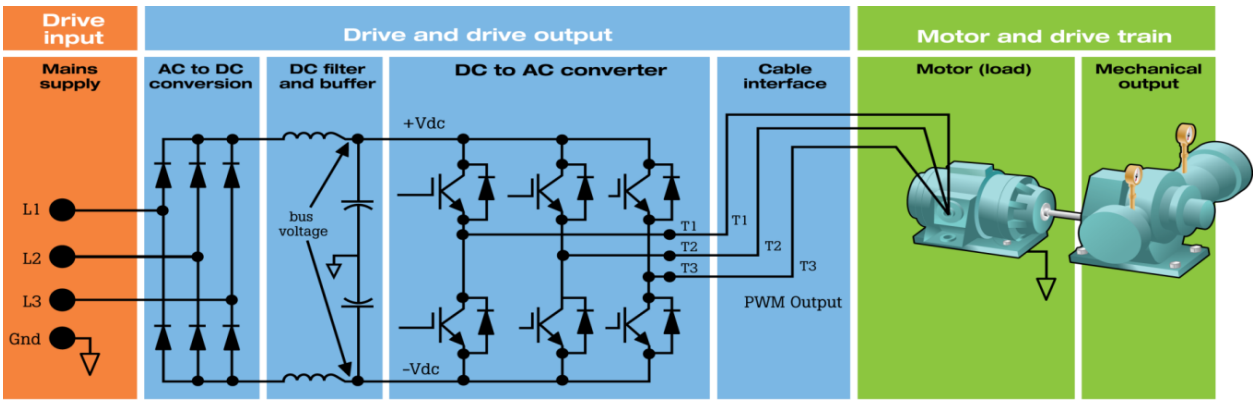
Measured power: ~280 kW

After balancing, reduced power consumption by 2 to 3%

8.4 kW saving x 24hrs x 365days = 73,584 kWh

At 0.20 USD/ kWh, annual savings: 73,584 x 0.20 = **USD 14,714.80**

Recommended Predictive Maintenance Tool Belt Solutions for Motor and Drive System



Recommended Predictive Maintenance Tool Belt Solutions for Motor and Drive System (con'd)

①	Input Power Quality with Fluke-435
②	Drive & Drive output with Fluke-190 Series-II ScopeMeter®
③	Motor Load and winding resistances with Fluke-289 DMM
④	Motor Insulation and core temperatures with Fluke-1507 Insulation Resistance Testers & Ti400 Thermal Imagers
⑤	
⑥	Mechanical Vibration with Fluke 810, correct alignment with Fluke 830
⑦	
⑧	Process Tools to calibrate & troubleshoot

How to Detect Mechanical Energy Waste?

In the Motor & Drive System, it will be very difficult for you to detect mechanical issues. If the mechanical issues are not detected, your system will not have the optimal operational efficiency. It's not just about energy waste, it will also result into many repairs, system breakdown and loss of production.

Fluke Mechanical Tool Belt Solutions:

Fluke will recommend you to leverage on the vibration technology to have a quick diagnosis of the mechanical problems in your Motor & Drives System.

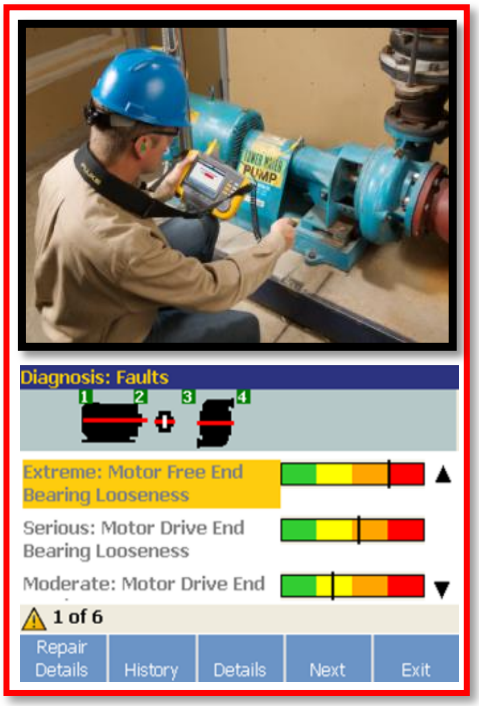
Fluke 805 Vibration Meter

This is a powerful yet simple and easy-to-use vibration hand tool that helps you detect:

- Overall vibration conditions
- Any bearing problems and the bearing conditions
- What is the current temperature of the motor

Fluke 810 Vibration Tester

This is a breakthrough motor and drive diagnostic tools. It's equipped with very easy to learn and operate graphical user interface and also a very comprehensive diagnostics vibration signal analysis capabilities to diagnose the key vibration problems in your rotary systems.



This Vibration Tester simply helps to solve most of the vibration problems :

- Misalignment
- Unbalance
- Bearing
- Looseness

Fluke 810 has very sophisticated diagnostic functions that tell you:

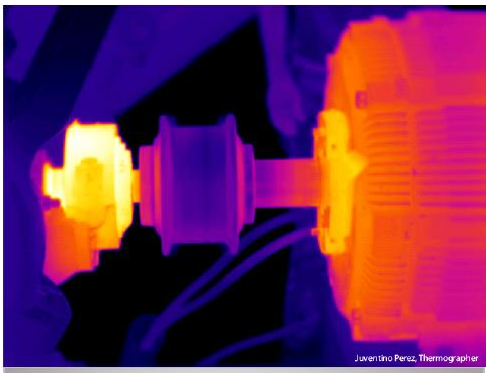
- Where is the problem in your rotary system
- What is the problem of that part of your rotary system
- How serious is the problem
- How long you have before the machine will failed

What are the Most Effective Ways to Resolve Misalignment Issues in Rotary System?

Many companies are experiencing production losses from machine failures, high power consumption from machines, high rate of repairs to mechanical seals and pumps, or high maintenance costs due to short machine life.

Up to 50% of such mechanical problems are related to misalignment in the motor shaft.

We will recommend the Fluke 830 Laser Alignment tool which is an effective alignment tool for motor and drive system. It comes with high precision measurement that can measure as precise as 1µm.



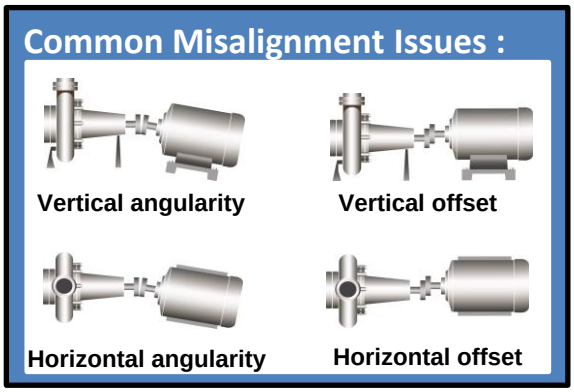
1. When machines are misaligned the flexible couplings begin to heat up and the machine operates at higher temperature, especially around the bearings.
2. High reaction forces and faults that lead to asset failure and production losses are drastically reduced after performing a precision alignment.

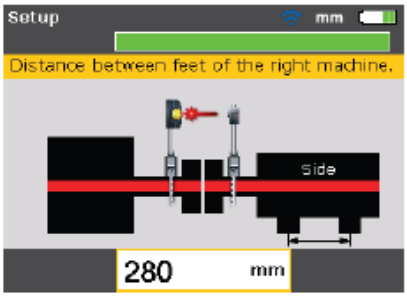
Fluke 830 redefines shaft alignment Solution:

Simple and effective:
There are a few ways to align motor shaft, from the traditional way of using ruler or dial indicator to the most efficient way of using the Fluke 830 Laser alignment tool. The key differences are the precision alignment and the time needed to align the shaft. The traditional methods are very tedious and can take as long as 5 to7 hours to align the shaft of the motor, compared to using the Fluke 830 Laser alignment tool that only needs less than an hour to complete the alignment task.

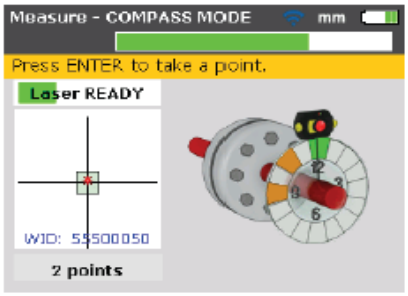
Many tools are simple to use, but it can take a lot of time to relearn how to use them and to remember what the numbers mean— especially if it has been a long time since the last alignment was performed.

You need a tool that walks you through the steps so that you can get back to running the plant. With the Fluke 830 Laser Shaft Alignment tool, evaluating alignment can be done in three simple steps:

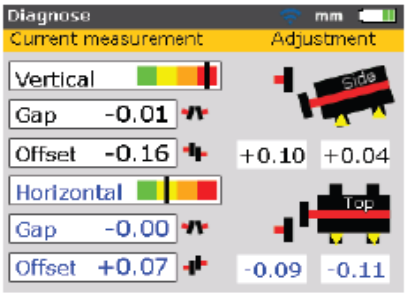




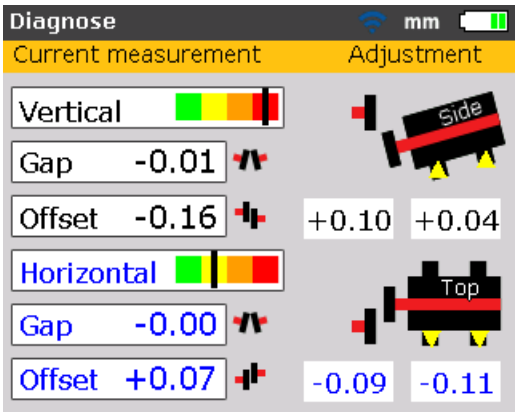
Step 1: Setup



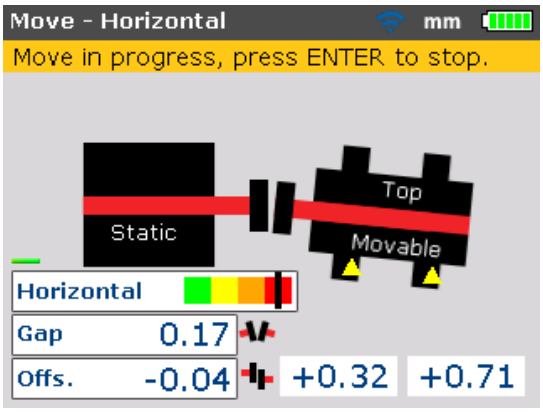
Step 2: Measure



Step 3: Diagnose



All-in-One Screen that shows all the gaps and offset and the required adjustments.



Real-Time Live mode that helps to update the changes you have made, help to make shaft alignment much easier and more efficient.

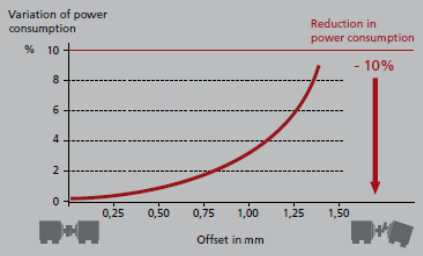
Benefits of Precision Alignment

Reduced energy consumption

Effects on power consumption

Significant power savings can be made through accurate alignment. Precise alignment eliminates reaction forces and reduces energy consumption by up to 10 %.

Courtesy of © ICI PLC

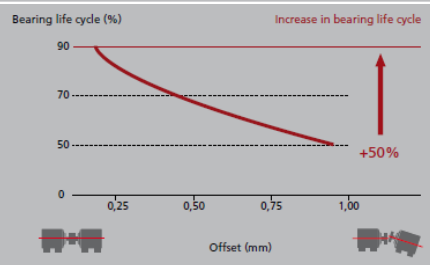


Longer machine life

Relation between offset and bearing life cycle

The smaller the offset misalignment, the higher the expected bearing life cycle.

Courtesy of © The University of Tennessee

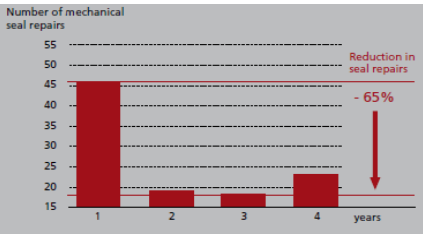


Reduced repair incidences

Mechanical seal repairs

Mechanical seal repairs decline by up to 65 % when precision alignment is carried out on a regular basis.

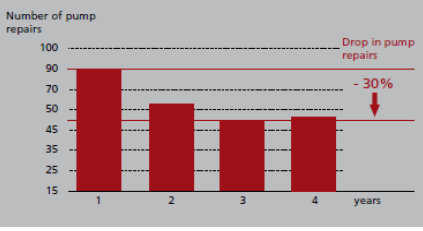
Courtesy of © HOECHST AG Gendorf / Germany



Pump repairs

The rate of repairs declines by up to 30% when precision laser alignment becomes an integral part of the pump repair schedule. Maintenance costs are also reduced through lower parts expense and inventory levels.

Courtesy of © HOECHST AG Gendorf / Germany



So why does Energy Wastages matter in the Production System?

In a Production System, many automation systems and modern technology are involved that could lead to inefficiencies in the production processes. To detect the energy wastages arising from such inefficiencies, you can leverage on the Thermal Imaging Technology and the breakthrough Laser-sharp Auto-Focus feature in Fluke TI400 Thermal Imager to pin-point and diagnose "Hot Spot" at a component level in the production system. These "Hot Spots" are where you can find significant amount of energy wastages.

Motor and drive systems are the heart of the production systems and are responsible for more than 65% of the energy consumption in the factory. Hence, it is crucial to adopt a good predictive maintenance approach for such critical systems and this will require the technicians to be equipped with the right tools in order to identify potential risks and energy wastages. Adopting a good predictive maintenance program on this variable speed drives system not only help to reduce energy consumption, but it will also prolong the lifespan of the machines and enable a significant reduction in repair and maintenance costs. In this scenario, the Fluke 810 Vibration Tester, leveraging on the vibration technology with advanced diagnostic capabilities, that is specially designed for Maintenance Engineer will be the right tool to troubleshoot the motor & drives system for problems – where and what are the problems in the system; how serious are the problems and also how long you have before the system will fail.

Beside maintaining the variable speed drives and motors, enabling total energy transfer from the motor to the load is also an important approach to minimize energy wastages. More than 50% of such mechanical issues of motors are related to misalignment. Traditional alignment tools are either not able to provide the high precision alignment or they are too tedious with too many calculations. With the latest Fluke 830 Laser Alignment Tool, you can now achieve precision alignment that will help to increase the motor efficiency. This will help to reduce energy consumption as well as the repair and maintenance costs. More to gain from Fluke 830, it allows user to reduce more than 60% of the time to carry out the alignment tasks.

The size and type of production processes occurring in your facility have a big impact on what kind of energy waste you will find. Identify and quantify at each point of your production system with Fluke Tools for easy energy savings now.

Fluke. *Keeping Your World Up and Running.*

For more information:
Fluke South East Asia Pte Ltd
1 Clementi Loop #06-02/03/04 Singapore 129808
Tel: +65-6799-5566 Fax: +65-6799-5577
Web: http://www.fluke.com.sg