



## "We Know Your Machine's Language"

- Vibration Analysis
- In-situ Dynamic Balancing
- Laser Alignment
- Infrared Thermography
- Lube Oil Analysis
- Ferrography
- Ultrasonic services
- Non Destructive Testing
- Acoustic Analysis
- Motor Current Signature Analysis
- Turbo Machinery Trouble Shooting
- Turbo Machinery Overhauling
- Spares Management services
- Root Cause Failure Analysis
- Finite Element Analysis
- Modal Analysis & ODS
- Web based Monitoring
- Energy Auditing
- Training's
- Remote Monitoring
- Asset Management



# About ACME

Aswartha Condition Monitoring Engineers (**ACME**), is the largest Integrated **Condition Monitoring Service** Provider in India; involved in implementing various aspects of Predictive Maintenance techniques that prevent Machine Breakdowns and optimizes the Plant availability.

Mr. G. N. Raju is the founder of ACME with over 24 years of rich experience in the field of Vibration Analysis, In-situ Dynamic Balancing services. Departing from the conventional **"Call Basis"** Emergency Condition Monitoring Services, Mr. Raju pioneered the **"24x7 Concept"** of Condition Monitoring services through Annual Maintenance Contracts to various corporate entities in India for the last 15 years. ACME is in the forefront for resolving many complex vibration issues in Turbo Machinery with capacities ranging from **3 to 700 MW** of different OEM's.

Our Integrated Reliability Maintenance Global Services Model uses different Condition Monitoring techniques striving for and continuously targeting **Zero Breakdowns** with better **Plant Availability** resulting in higher profitability. With our innovative **Web Based Condition Monitoring System** the entire vibration data of all our customer sites spread across India, is analyzed by the top most senior experts stationed at Hyderabad and no problem is left unattended, until it is resolved. Additionally through this web based condition monitoring, the customer is aware of the status of his critical machines on a day to day basis, at any point of time with a single click.

ACME, with its skilled manpower resource comprising **180 Diagnostic Engineers** caters to a broad client base of Power, Petrochemicals, Paper, Cement, Sugar, Steel etc. ACME holds over **50 Annual Maintenance Contracts (AMC)** and attends more than **800 "Call basis"** (Emergency Services). ACME is the preferred vendor for some of the great names in the Industry like:

**GAIL, IOCL, TATA STEEL, TATA POWER, SIEMENS, ITC, ALSTOM, RELIANCE, NTPC, ISRL, BORL, NRL, BHEL-GE, JINDAL GROUP, HZL (VEDANTA GROUP), WARTSILA, CLP INDIA, L & T, KEPCO, ESSAR, TS GENCO, AP GENCO, RATTAN INDIA, ORIENT CEMENT, LARAGE, NABHA POWER, HINDALCO, GSCGL, BILT, ACB INDIA etc.**



Expanding from its current position as a Market Leader in India for specialized Condition Monitoring Services, we are now spreading our activities to the Middle East & South East Asia, Africa and European Countries.

**We are industrious to make ACME a Global Brand in providing Quality Services which is our hallmark in the field of our specialization and is widely appreciated by many of our valued clients.**

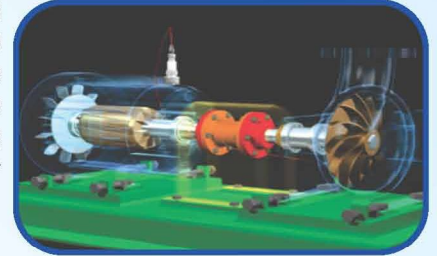


## OUR SERVICES

### Vibration Analysis



Vibration analysis is used to detect early symptoms to machine failures, allowing machinery to be repaired or replaced before an expensive failure occurs. All rotating equipment vibrates to some degree, but as bearings get old and components reach the end of their life or when they develop defects, they begin to vibrate more dramatically, and in distinct ways. Here we drive condition monitoring to valuable diagnosis and prognosis. The vibration analysis involves periodic measurement of machine vibration from either machine bearings, supervisory panels or other permanently installed sensors.



#### The following range of machine faults and reliability problems can be identified.

- Unbalance (static, couple, quasi-static)
- Misalignment (angular, parallel, skew)
- Mechanical looseness, structural weakness, soft foot.
- Gear problems (tooth wear, tooth load, Gear eccentricity, backlash, gear misalignment, and cracked or broken tooth.
- Bend shaft, Rotor eccentricity.
- Resonance & Beat vibration.
- Mechanical rubbing
- Problems of belt driven machines
- Journal bearing defects.
- Anti friction bearing defects (inner race, outer race, cage, rolling elements).
- Hydrodynamic & Aerodynamic forces (flow turbulence & cavitations)

### In-Situ-Dynamic Balancing

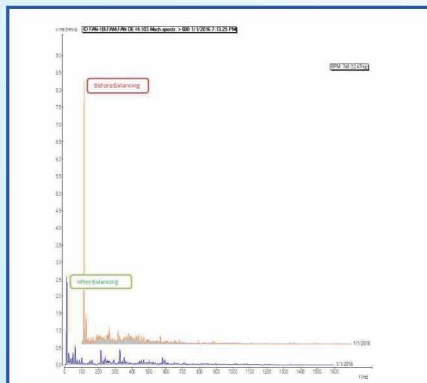
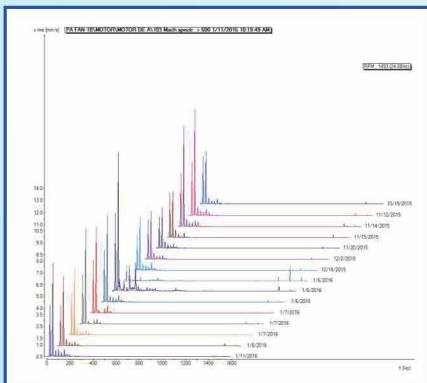
One of the most common causes of abnormal vibrations in rotating equipment is Unbalance. Even a new machine assembled at its permanent location may need balancing or a machine already in operation need re-balancing.

We perform In-Situ Dynamic Balancing by using the latest techniques in the most economical way to correct imbalance in a completely assembled machine, ensuring an increased bearing life and a reduced operational noise and vibrations.



#### This will save:

- Costly and tedious disassembly of machine components.
- Overcome the limitations to dismount the machinery from the structure.
- Rigorous efforts of Loading & Unloading.
- Improves product quality.
- Reduces down time, labor and material cost.
- Reduces machine transportation cost for shop floor balancing and thereby minimizes machine's down time.
- Extends bearing and machine life.
- Reduces the possibility of catastrophic failures.

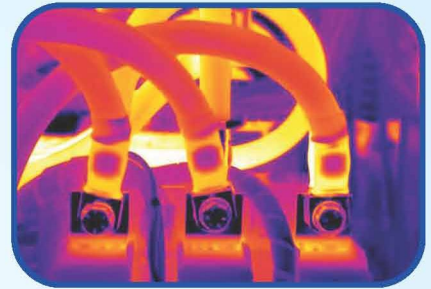


Equipments like gas/steam turbines, compressors, blowers, centrifuges, irrespective of their weight or RPM can be rectified on their regular setup.



## Infrared Thermal Imaging

Thermal imaging technology has become one of the most valuable diagnostic tools for industrial applications. Many failure processes generate excessive heat. By measuring the intensity of the infrared radiation emitted by the machinery, our experienced engineers can uncover valuable information about your plant operating condition. By detecting anomalies that are usually invisible to the naked eye, thermal imaging allows corrective action to be taken before costly system failures occur. With infrared thermography study, thermal inaccuracies can be identified and categorized as minor, intermediate, serious and critical areas for corrective action.



### Infrared thermal imaging can be effectively used to identify:

- Hot joints caused by faulty connections in electrical circuits.
- Inspection of electrical distribution lines. (High & Low voltage Installations)
- Insulation degradation heat losses.
- Electrical phase imbalance heat losses
- Incorrect installation or poor lubrication of bearings.
- Misalignment of couplings, lubrication issues, over loaded pumps, over heated motors, hot bearings.
- Corrosion and contamination.
- Moisture infiltration in roofs.
- Air handling in clean rooms.
- Blockages and dead shots in circulation system such as the cooling tubes of heat exchangers

## Non Destructive Testing

NDT examines materials for flaws without harming the equipment being tested. NDT refers to several methods of inspection that can detect internal or external material faults originated from material processing, manufacturing or operation. NDT is not only a safety requirement; it is also a key component of your loss prevention program. Inspections and proper diagnoses are best protection against unexpected and costly shutdowns. Non-destructive testing can help solve chronic process problems, as well as help avoid catastrophic failures and unsafe operating conditions.



### BENEFITS OF NDT

- Can help detection of faults in early phases.
- Provides sufficient time for action plan development and implementation.
- Enhances machine operation.
- Reduces chance of machine failure and downtime.
- Detects operational as well as manufacturing faults viz. cracks, inclusions or other disturbance.



### ACME provides below NDT services for industries:

- Infrared Thermal Imaging
- Hardness Testing
- Ultrasonic Flaw detection
- Magnetic Particle Test
- UT Thickness Gauging
- Ultrasonic Leak Detection (Steam/Air/Vacuum)
- Radiography
- Dye Penetrant Testing
- Flow Measurement
- Boroscopy



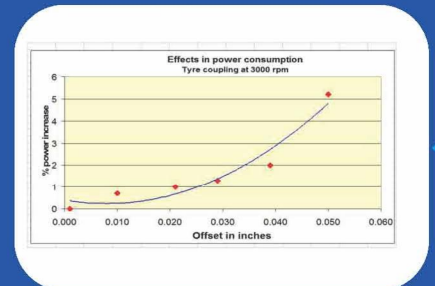
**Laser Alignment:** Rotating machines are prone to misalignment. Precisely aligned machines significantly reduce operating and maintenance costs. We provide a range of high-end alignment services which include roll alignment, shaft alignment, bore and turbine alignment, geometric alignment, monitoring foundation settlement and machine positional changes. The customer is provided with a detailed measurement report that provides a glance of the alignment condition of the machines. This information is useful in the installation and maintenance of plant machinery.

Poorly aligned shafts create many machine problems: Tests have shown that incorrect alignment is the cause of around 50% of machine breakdowns. When misaligned, the loading of shafts dramatically increases due to the reaction forces created within the coupling.



#### Benefits achieved by Laser Shaft Alignment would be:

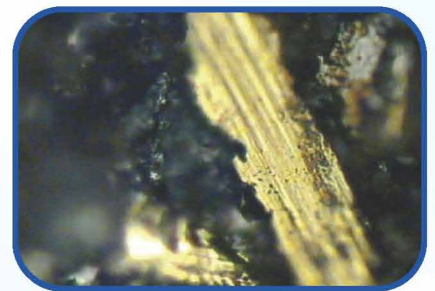
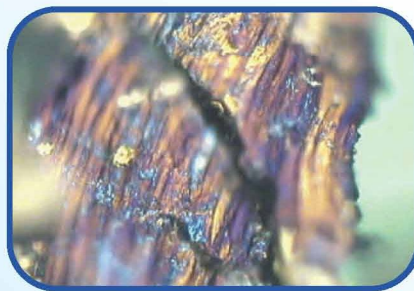
- Significant Power savings through accurate alignment.
- Decrease wear on bearings, seals, shafts and couplings.
- Protects the assets and increases product quality as the vibrations are reduced to very low levels.
- Extends the machine availability as the mean time between failure increases. Increases maintenance savings on spare parts
- Increase in time savings and decrease in consumption of manpower for carrying out alignment.



## Lube Oil Analysis & Ferrography

### Why Lube oil analysis?

“Oil analysis of machinery is like blood analysis for human body”. Oil analysis is performed during predictive maintenance to provide meaningful and accurate information on lubricant and machine condition. By analyzing the condition of wear debris, the cause of wear within the machine can be identified and preventive steps can be taken.



### Advantages of lube oil analysis:

- Oil analysis results to establish the condition of the oil and condition of the equipment and help to optimize service intervals.
- Enables a predictive strategy to be adopted.
- Drives a proactive strategy.
- Oil analysis suggests methods to reduce accelerated wear and contamination.
- Reduces machine downtime and extend equipment life, and thus helps in saving both money and resources. Increases production/machine availability/reliability.



## Turbo Machinery and Compressor Services

ACME is specialized in Turbo-Machinery Vibration Analysis using Powerful 16 Channel Vibration Analyzer, capable of simultaneous Data collection in both Steady & Transient (Run up & Coast down) conditions.

ACME specializes in providing and supervising mechanical service crews, implementing maintenance programs, providing turnkey Overhauls, Installations, Maintenance of various high speed Turbines and Compressors.



### Field services include:

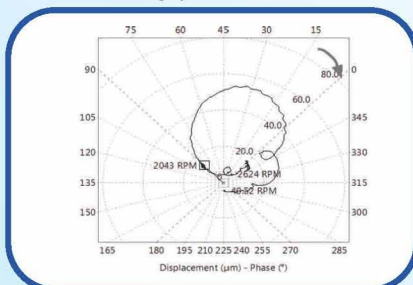
- In-situ multi plane balancing of flexible turbo generator rotors.
- Consulting services to analyze and diagnose problems and take corrective action.
- Technical assistance to carry routine maintenance to keep turbo machinery more efficiently with longer MTBF.
- Providing Technical support & assistance for new installations and start-ups.
- Major overhauls, Inspections, Outages, Maintenance support, Relocation and installation services.
- ACME has the ability to deploy emergency service teams, enabling customers to remain focused on their core business activities while their turbo machinery issues are being resolved.

Some of the advanced analysis techniques to pinpoint the problems are: (with graphs)

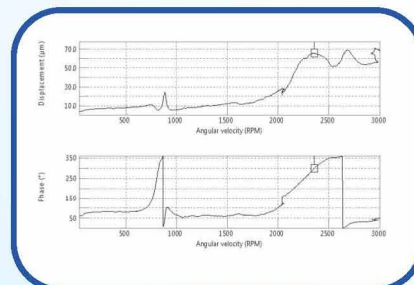
- Shaft centerline plots (Run-up and Coast-down)
- Bode and Nyquist plot
- Orbit Analysis
- Waterfall Spectrums



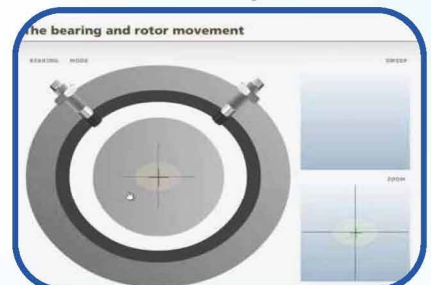
Nyquist Plots



Bode Plots

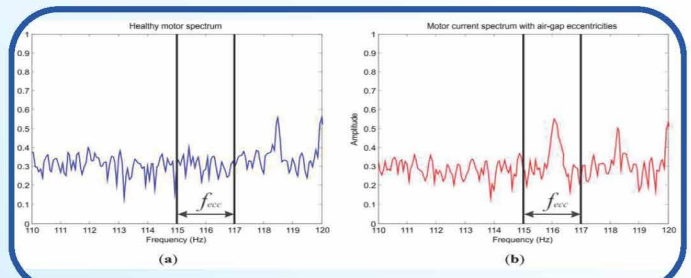
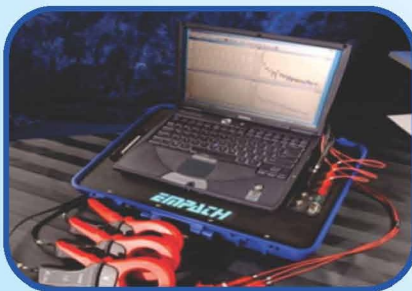


Orbit Analysis



## Motor Current Signature Analysis

Motor current signature analysis (MCSA) has proven to be a highly valuable predictive maintenance tool though relatively young, rarely utilized technology, it is rapidly gaining acceptance in the industry today. MCSA is simply the process by which motor current readings are recorded and analyzed in the frequency domain. It has been effective in locating rotor and stator faults and air gap problems in motors. Mechanical faults related to belts, couplings, alignment and more are easily found through the use of a demodulated current spectrum.





## Training

The problem industry faces now is the high level attrition forcing them to seek fresher's or inexperienced technical crew, but the machineries are becoming more and more complex and the technologies more and more complicated. Technical training is vital and immediate requirement for Reliability Centered industry. ACME provides certified and equivalent training programmes on Condition Monitoring Technologies, e.g. ISO 18436 Level-I & Level-II and technical training on a wide range of process plant machinery at various levels from technicians, engineers to managers.



### **We have developed several modules and programs for training in basics of industrial maintenance like:**

- ◆ Rotating equipments (pumps, compressors, fans and gear boxes) etc.,
- ◆ Stationary equipments (boilers, heat exchangers, cooling towers) etc.,
- ◆ Engineering support like bearings, condition monitoring, fits & tolerances, piping, hand tools, precision tools, and metallurgy, etc.

## Asset Management

Steering into Reliability Centered Management, ACME provides asset and maintenance consultancy services to improve the Plant performance, which includes:

- ◆ Plant Criticality Assessments
- ◆ CBM program design implementation, development and support.
- ◆ Root Cause Failure Analysis.
- ◆ Training Courses.

These services compliment the integrated reliability maintenance solutions provided by us & help to improve the equipment and plant productivity, availability and reliability.

The program runs from assessment to implementation and takes few weeks to few months to realize the objectives set for the program and enjoy the fruits.



### **Our Strengths:**

- The first company in India to promote 24X7 AMC- Annual Maintenance Contracts concept for improving the plant reliability.
- A total of 180 engineers spread across India in executing 40 AMC sites.
- A team of 50 exclusive ISO-18436 Certified Vibration Analysts who are experienced in resolving complex vibration issues.
- We have also started our operations overseas viz., Kingdom of Saudi Arabia, Abudhabi, Libya, Vietnam etc.
- A team 20 Engineers are currently executing 4 AMC's in Kingdom of Saudi Arabia.
- Widespread geographic customer reach and manpower presence across the country is the main advantage for attending emergency calls anytime anywhere.
- The only service provider known for their promptness to respond for attending any service/trouble shooting call anywhere in India within 24 HRS.
- We provide most economical quality services compared with other players in the market.



We are providing the 24X7 AMC- Annual Maintenance Contracts for serving the needs of the industry, where our team of experts shall be deputed at your site for implementing the CBM and in turn assuring you the best possible benefits on your assets.

## Aswartha Group of Companies

- Aswartha Condition Monitoring Engineers
- ACE Turbo Specialist Pvt. Ltd.
- Aswartha Arabia
- Lube Expert Pvt. Ltd.

## Associate Partners:

- Osborne Engineering LLC-Dubai
- EM Services India Pvt. Ltd.
- Najla Ibrahim Al-thunayan Est
- Aimil Ltd.

## OUR TECHNOLOGY PARTNERS:



# ACME

Integrated Reliability Maintenance Global Services

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