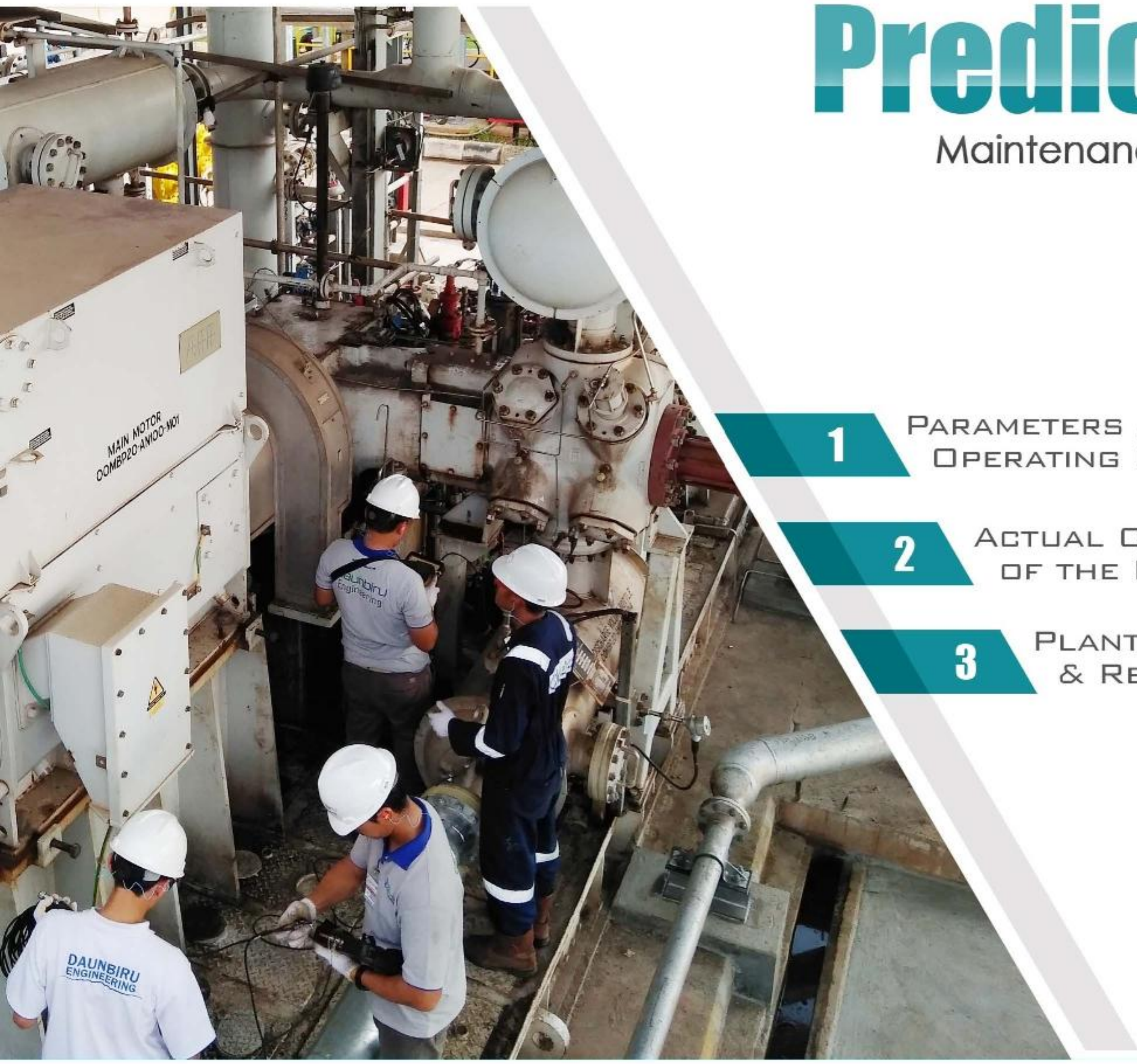
Maintenance Technology Specialist

Measure • Analyze • Improve



Predictive

Maintenance Services

1. Parameters and Operating Condition
2. Actual Condition of the Machine
3. Plant Efficiency & Reliability

Vibration Analysis | Thermodynamic Analysis | Motor Current Signature Analysis | Thermography Analysis | Lube Oil Analysis

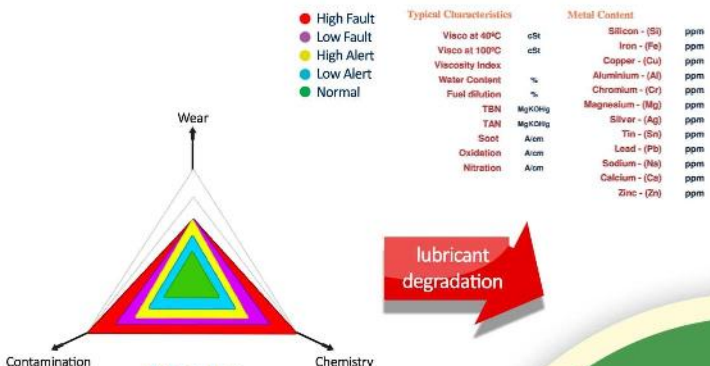
daunbiru Engineering

Maintenance Technology Specialist

ISO 9001 TÜV SÜD ISO 14001 ISO 45001

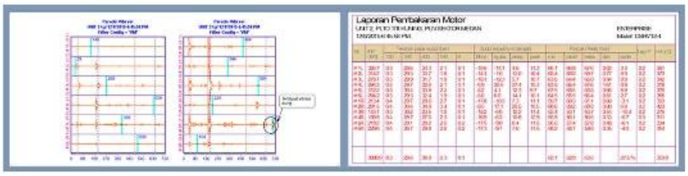
Lube oil analysis (ISO CD-14830)

- Oil sampling for further analysis
- Lubrication condition analysis to check the chemical structure of the lubrication, contamination, and component wearout
- Further action recommendation



Trivector

lubricant degradation

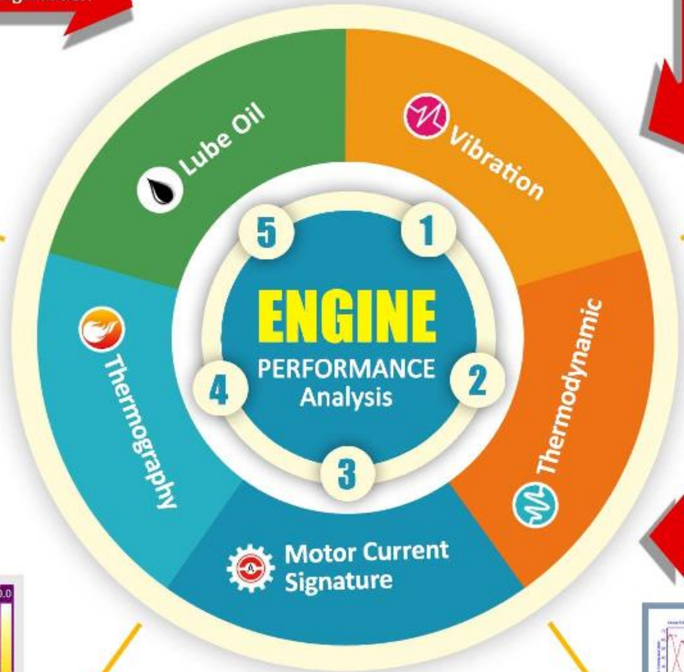


Engine Vibration Analysis

Internal Combustion Engine Report

Misalignment
Engine overload
Mechanical parts wear out
Rubbing
Bearing faults
Mechanical looseness
Oil whirl & Oil whip

Hot spots
Electricity Problems



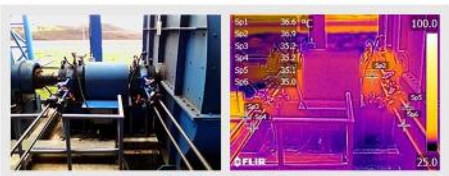
Thermodynamic analysis

- Machine operation condition observation
- Pressure measurement of each cylinder
- Decide whether the pressure is still in acceptable limit
- Analysis of pattern and data of the pressure profile
- Analysis of pressure balance of each cylinder
- Analysis of leakage
- Further action recommendation

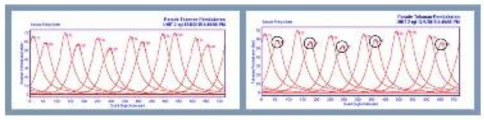
Thermography analysis (ISO-18436-7)

- Machine operation condition observation
- Measure the surface temperature of the machine in operation
- Identify hotspot that shows abnormality
- Further action recommendation

Combustion pressure leaks
Unbalanced pressure



Data Thermography

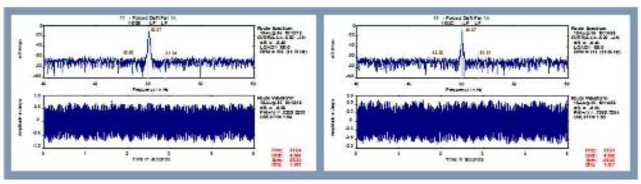

Combustion Pressure Parade

Combustion Pressure Parade Analysis

Air gap eccentricity
Rotor bar breakage
Bearing cracks
Stator winding faults

Motor Current Signature Analysis (MCSA) (ISO-20958)

- Conducted on electric motors to figure out problem on rotors, stators, and other electrical components
- Measure the electric motor current
- Analyse electrical current spectrum
- Further action recommendation



CONDITION MONITORING ACTIVITIES

MEASURE

- Critical position of machine vibration
- Combustion compression of reciprocating machines
- Machine surface temperature
- Machine's operation parameter
- Lubrication condition

ANALYZE

- Actual machine condition (normal/abnormal)
- Baseline to actual comparison of machine performance
- Root cause identification
- Lubrication quality degradation identification
- Prediction of component wear out through lubrication analysis

IMPROVE

- Reduce the maintenance decision making
- Take appropriate and right maintenance action according to the data
- Increase operational and maintenance cost efficiency
- Increase industry's effectiveness and reliability

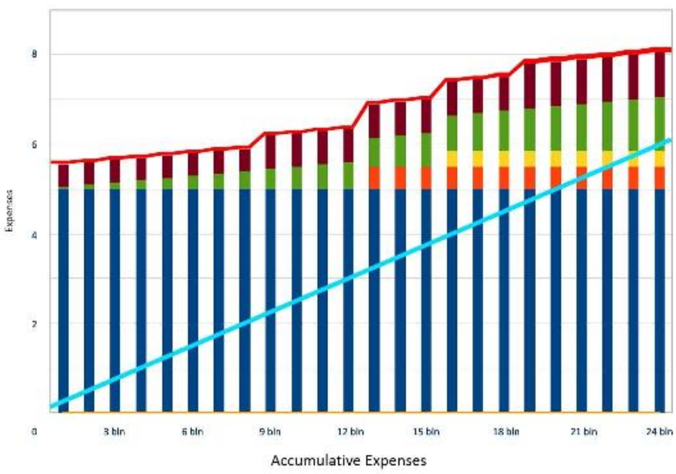
WHEN IS THE NEED TO BE DONE CONDITION MONITORING ?

- Testing machines which just installed
- Before and after component replacement
- Before and after overhoul
- Before and after system replacement

WHY US SERVICES PREDICTIVE MAINTENANCE DAUN BIRU ?

- Has high dedication and commitment in his field
- Knowledgeable in making instruments predictive maintenance supports
- Certified and experienced human resources in various industries
- HR experts in troubleshooting
- Using state of the art equipment
- Fast response support

Accumulative Operational Cost Comparison



Operational Cost Comparison

NO	Item	Internal Team PdM	Daun Biru PdM
1	Tools Investment	$$$$$	-
2	Personnel Cost	$$$$	-
3	Tools Calibration	$$$	-
4	Tools Maintenance	$$	-
5	Training	$	-
6	Service Cost	-	$

Benefit

- Prevents equipment unplanned downtime/breakdown so increase the effectiveness of production machines
- Reducing the number of major repairs
- Extend the life of company assets
- Improve operational cost and maintenance HR cost efficiency due to reduced breakdown
- Improve safety in the work environment

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