

ENERGY
ENVIRONMENT
ECONOMY

WÄRTSILÄ ELECTRICAL AUDITS



THE COMPLETE ELECTRICAL HEALTH CHECK TAILORED TO YOUR INSTALLATION

THE RISK TO YOUR OPERATIONS

Breakdowns and unplanned downtime present the highest of all maintenance costs. Replacement parts, if available at all, have to be shipped in urgently, often at a significant additional cost. Your maintenance personnel may need to work long hours at premium

rates and your company is suffering both operational losses and a loss of confidence from your customer. Clearly breakdowns and unplanned downtime place a significant burden on your business and this risk should be reduced as much as possible.



THE ADDED VALUE APPROACH TO TACKLING THE PROBLEM

We have studied the requirements not only to reduce the risk of potential breakdowns and unplanned maintenance but also to bring further added value benefits in reducing repair costs, extending equipment life and improving operational efficiencies.

By focussing on a wider spectrum of inspection, testing methods and operational reviews coupled with our unrivalled field experience and our technical expertise we target benefits in the following area:

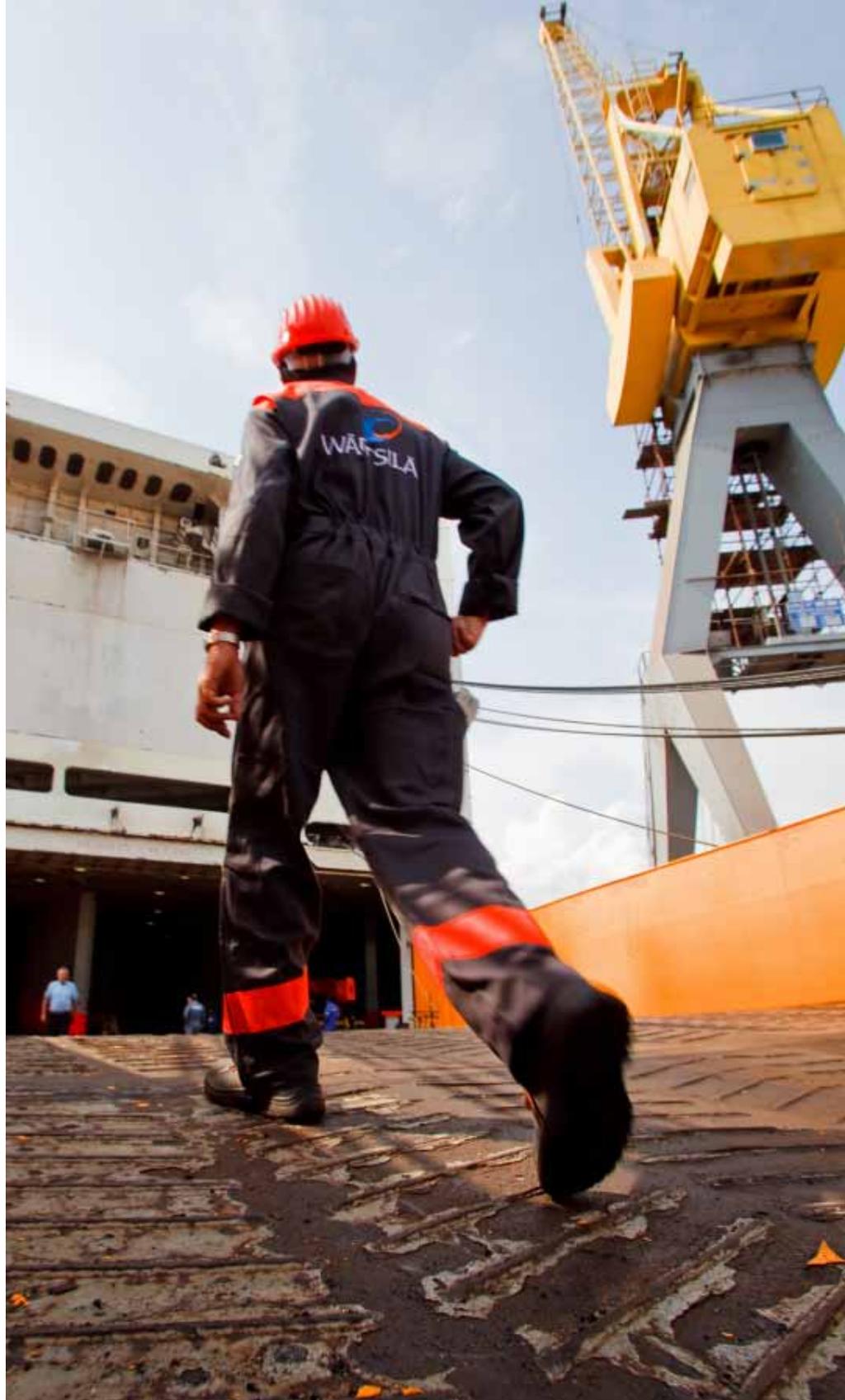
- Minimise unplanned downtime
- Reduce repair and equipment damage cost
- Increase overall efficiency of your electrical plant
- Extend the life of your mechanical plant
- Reduce insurance premium costs

HOW CAN YOUR COMPANY ACHIEVE THESE BENEFITS?

We have developed a programme of electrical and operational audits that can be readily tailored to suit the installed equipment, the vessel operational requirements and our customer's needs. Our audits are structured so that the depth of the survey and the detail of reporting reflect the level of potential benefits that can be obtained. This structured approach, coupled with reporting at each stage, means that we can share our suggestions and conclusions with our customer at each stage in the process helping you make an informed decision on proceeding to a more detailed level.

Typically our audits will be targeted to

- Identify hidden failure modes and electrical



safety risks - Loose connections, insulation breakdown, excessive heat can all cause or be an indication of unexpected failures.

- Trace insulation resistance deterioration
- Identify actions required to meet new performance targets or regulations.
- Provide documented evidence of inspection and maintenance for client confidence and proof to your insurers.
- Resolve component obsolescence - Do you know what specialist support and spare parts exists for your electrical and automation hardware?
- Identify equipment operating inefficiently (fuel, electrical losses, nuisance tripping, excessive wear) and how can this be controlled to provide optimal efficiency during different load scenarios.

WHAT DOES THE AUDIT ENTAIL?

All our audits are conducted by a Wärtsilä authorized senior technical representative, familiar with the type of equipment involved and the technical audit procedure. Each stage of the process is tailored to our client's installation, operational requirements and status of operation and would typically comprise three parts should the complete audit and benefit improvement reports be required.

First Stage

The audit includes a detailed visual inspection of the installed electrical and automation equipment:

- Review of the 'high level' drawings and documentation for the equipment
- Visual check of generators, motors, transformers, switchboards, drives and cables
- Verification of all major electrical connections
- Inspection of insulation, evidence of overheating, stress and potential safety hazards
- General review of the operational process and likely benefits and enhancements
- Recording of the equipment nameplate data, breaker and protection settings
- Audit of obsolete components or equipment

To complete this first stage audit our professional report will be presented complete with audit scope, findings, defects report, analysis and recommendations. Our report will also outline the potential benefits and cost saving opportunities that may be possible from further measurements and surveys.



Second Stage

The second stage audit includes a more detailed inspection of the installed electrical and automation equipment and may include test, measurement and maintenance of critical equipment identified during the first audit:

- Detailed review of the drawings and documentation for the equipment
- Measurement of the insulation resistance for the generators, motors, transformers, switchboards, drives and cables
- Measurement of the major operating parameters
- Secondary injection of the main circuit breakers and protective devices
- Inspection of condition of the main switching devices

- Functional testing of auxiliary systems
- Component safety tests

Our professional report from this second stage will be presented complete with audit scope, findings, measurements, test results, analysis and recommendations. This report will also detail the benefits and cost savings from planned modernisation, equipment overhaul, training, or operational changes.

Third Stage

The third level can include planned modernisation, training operating programmes, maintenance programmes or managed spares inventory.



OVERALL BENEFITS

The main benefits of the Wärtsilä electrical audit are:

- Making business critical risks visible and measurable
- Identifying critical items that can cause unplanned shutdowns
- Adapting maintenance schedules as a result of the audit findings
- Developing technical support to suit the lifecycle of the plant

- Offering planned refurbishment programmes to reduce the risk of failure
- Identify ways to improve plant efficiency
- Propose solutions to reduce losses
- Identify solutions for improved availability and uptime

With an understanding of your business needs, we can offer quality and timely support for the complete lifecycle of your vessel.

