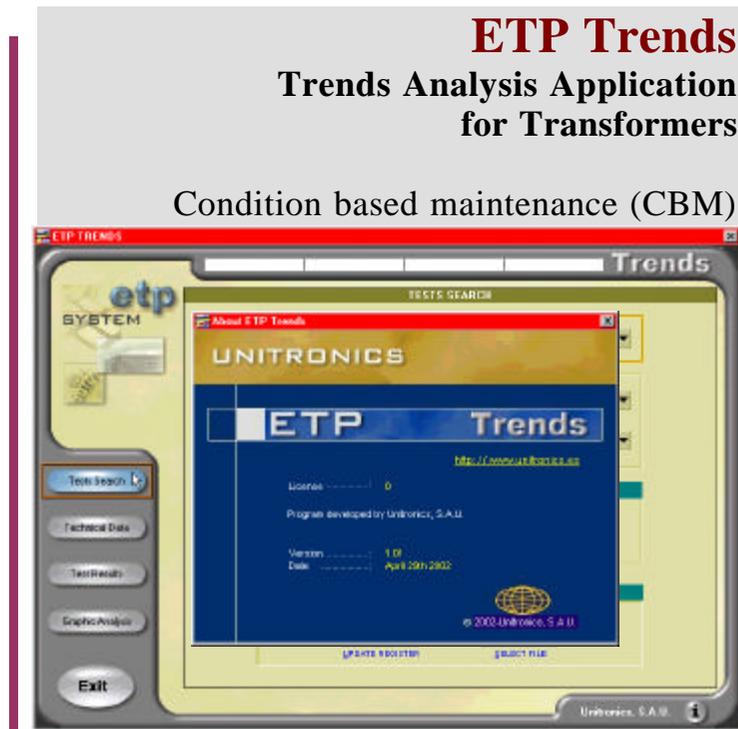


ETP Trends: Basic Features

- Analysis of the Trends Parameters which define the machine's status.
- Allows to detect the risky zone of the machine.
- Combine all requirements for Predictive Maintenance.
- Support Optimization.
- Analysis from ETP System test files.
- Easy to use.



Introduction

ETP TRENDS application has been conceived for the tracking of the evolution with time of transformers tested using the ETP system.

Based Maintenance can be defined like an organised analysis of parameters that describe machine status comparing values with existing standard file or previous test to fix on the system status. In other words, condition based maintenance.

So, a lot of information will be obtained with the control of the parameters evolution and its comparison with similar tests, being very interesting the storage and incorporation of the results to a data base which allow us to correlate them.

This way we will know in which moment the intervention must be carried out and solve the failure when it's in an incipient phase.

Based Maintenance presents a lot of advantages from the point of view of the security, as much in production as in maintenance.

Considering security policy, the predictive maintenance decrease the number of accidents because the operator knows the risk in advance.

From the point of view of the production, it allows us to increase the availability and the production thanks to the improvement in the planning of the time inactive and the reduction of maintenance time.

The result of all is an improvement in the service quality.

Moreover, the maintenance cost is decreased due to the resource optimization, no substitution of unnecessary pieces, improvement in the inactive time planning and reduction of big deficiencies.



Description

There are two ways of evaluation:

- Direct diagnose with the parameters obtained at the concluding of each test.
- Trends analysis to follow the parameters evolution to fix if we are in a risky zone. This is the method used by ETP Trends.

To carry out a first test soon after the machine installation will be suitable, but often it is impossible. Even so, the first test we make of the ETP system will provide us a perfect starting point to carry out a pursuit monitoring the machine ageing from this point.

After the first test, if we carry out a routine test and save the results generated by ETP System, we can keep informed about the machine status and its impairment throughout time.

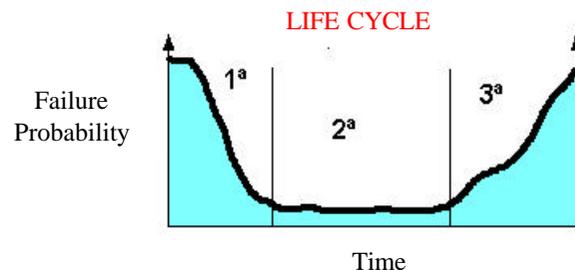
The recommended time between tests depends on the machine status: an old or damaged one must be tested in shorter periods than a new or very good status one. It would be suitable to repeat the test regularly to carry out an annual routine maintenance of the devices that

should be working continuously. Repeat the test in an interval between 1 and 4 years will be enough, depending on the status and the age of the machine. You should also test the machine before and after a repair has been performed on the equipment before it is re-energized.

The Life Cycle of a machine presents three well differentiated stages:

1. Manufacture and installation problems.
2. Machine operates according with its specifications.
3. Near to life end of its components.

ETP Trends watches over the machine during the stable stage of operation (stage 2 at Life Cycle Figure) and it detects a possible entrance in the third stage, which allows us to carry out the opportune maintenance works. The main objective is to maintain the machine always in the second stage.

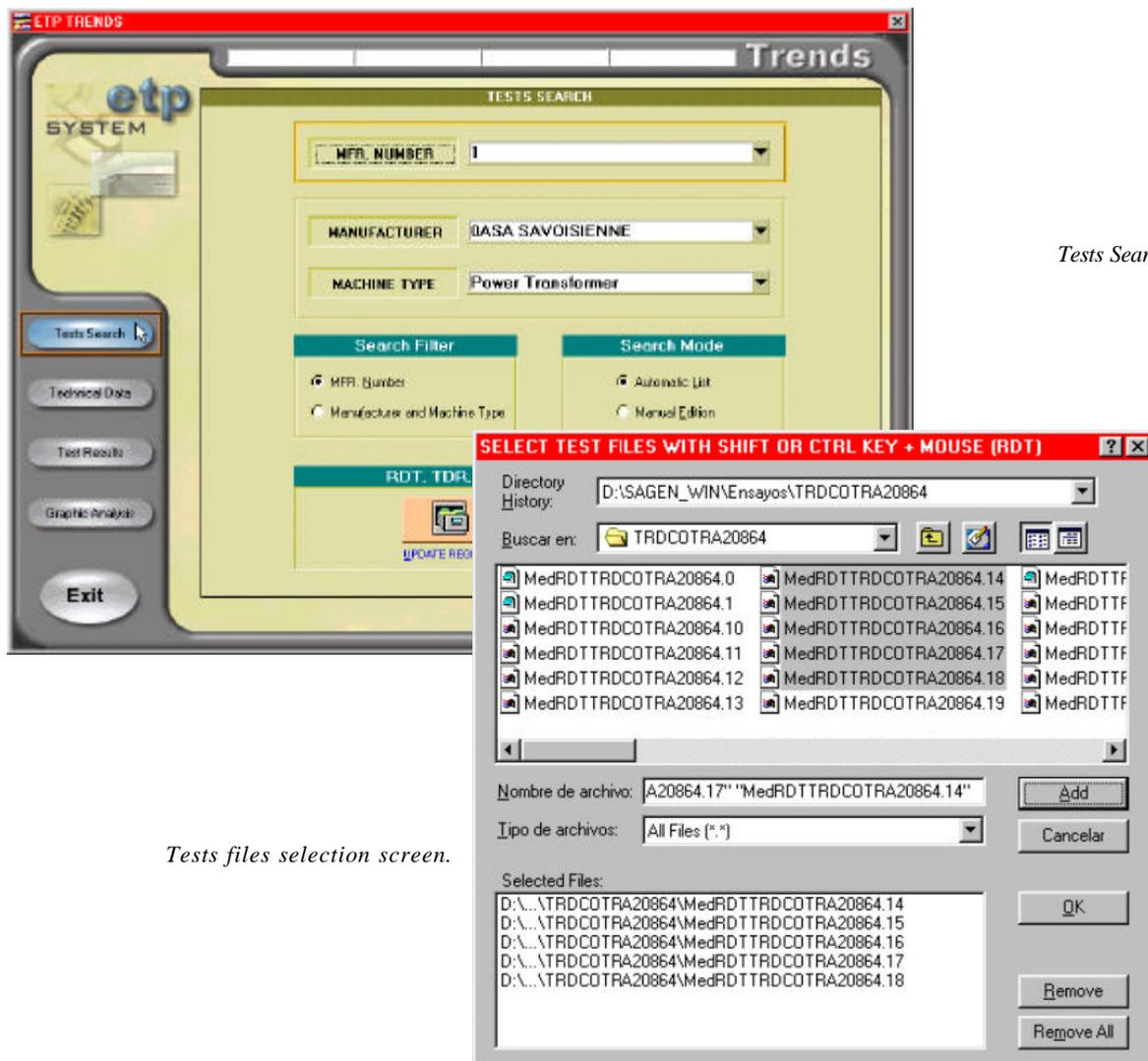


ETP Trends: Operation Procedure

ETP Trends tool allow us to determine anomalies on the lifetime of the machine clearly, observing the evolution of the parameters that characterize it. In this way it can be prevented that a machine enters in a risky zone observing the evolution of the parameters showed in the ETP Trends graphics.

Test Search

This option appears by default at the beginning of the application. To carry out a trends analysis: do only select the serial number of the machine and press the SELECT button, all the tests made on the machine are presented and the user will be able to select the tests which interest for the analysis.



Tests Search Screen.

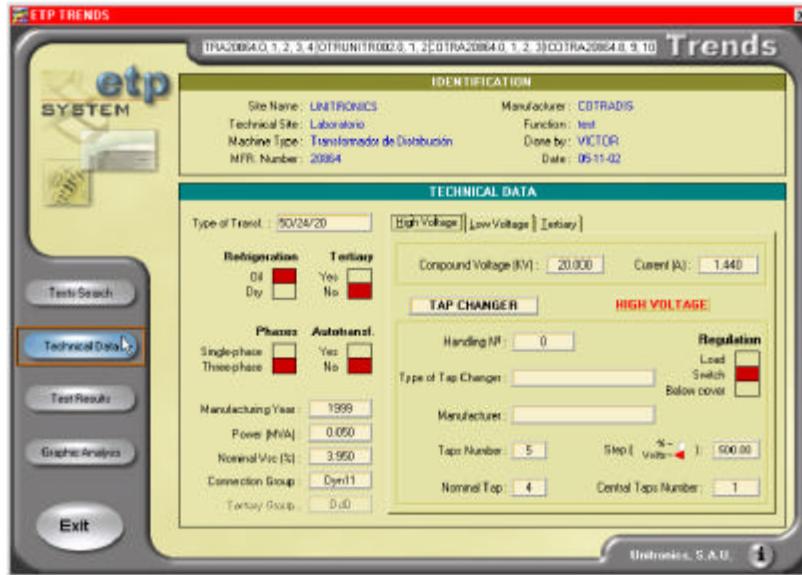
Tests files selection screen.



Technical Data

identification and technical data of the machine.

This screen is the first one that appears when a test is selected. It shows the

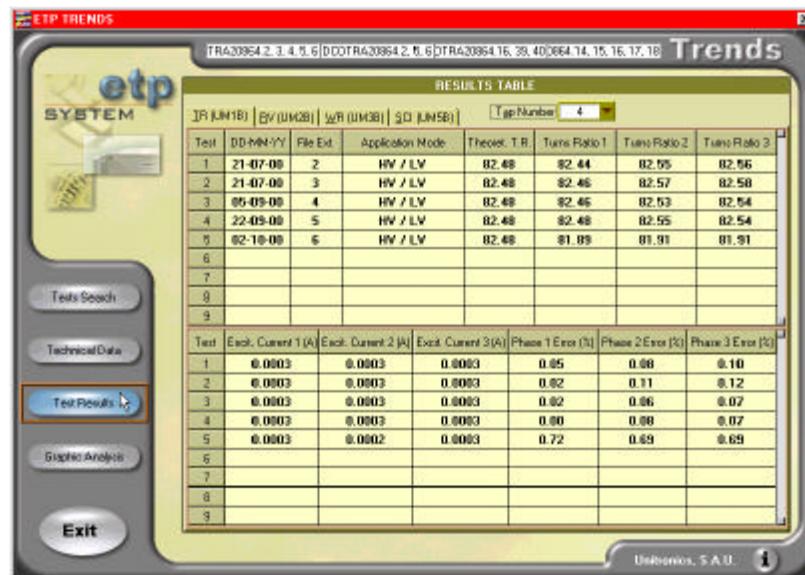


Technical data screen.

Test Results

There are two ways of visualizing the trends of the most significant parameters of the machine. The first one is by means of the results tables.

In these tables the parameters of each one of the tests selected for the analysis are ordered by chronological order. The second is graphical analysis.



Test results screen.



Graphic Analysis

Graphic Analysis is very important because it allows us to select the parameters and see it in a plot and to observe their evolution along the time.

It can also perform interpolations that serve as help to estimate the future evolution of the machine.

In the example of the Graphic Analysis Screen, we can observe the initial evolution of the parameter *Short-Circuit Impedance*, it is showing us that the state of the machine is worsening, and it goes in risky zone. This is the philosophy of the Trends Analysis, **detect the entering in the risky zone** and study in depth in other type of analysis when we reach this kind of situations.



Graphic Analysis screen.

Conclusions

ETP Trends analyse the evolution of the parameters along the time. The trend of a parameter to change, give us information that something is wrong in the machine and that it will be necessary to watch it over, and to carry out more frequently

tests to compare them with ETP DIAGHELP. The use of this system allows us:

- Breakdown prevention.
- To avoid catastrophic shortcomings.
- To avoid high cost repairs.



Specifications

▪ EDA Trends: Trending Analysis Software (Ref.: Edatrendsw00)

- PC Requirements
 - IBM compatible 486 or above.
 - Running Windows95,98 or NT 4.
 - 16MB RAM (32MB recommended).
 - Floppy disk (3 1/2 inch) and CD-ROM drive.
 - VGA colour monitor
- Annual Software Maintenance Contract. This contract includes:
 - Updates to latest generation of all licensed software
 - Installation support and operation troubleshooting

