

BEIJING SENDIG TECHNOLOGY CO. LTD.

USER'S MANUAL

For the

Spectrum-based Diagnostic Expert System

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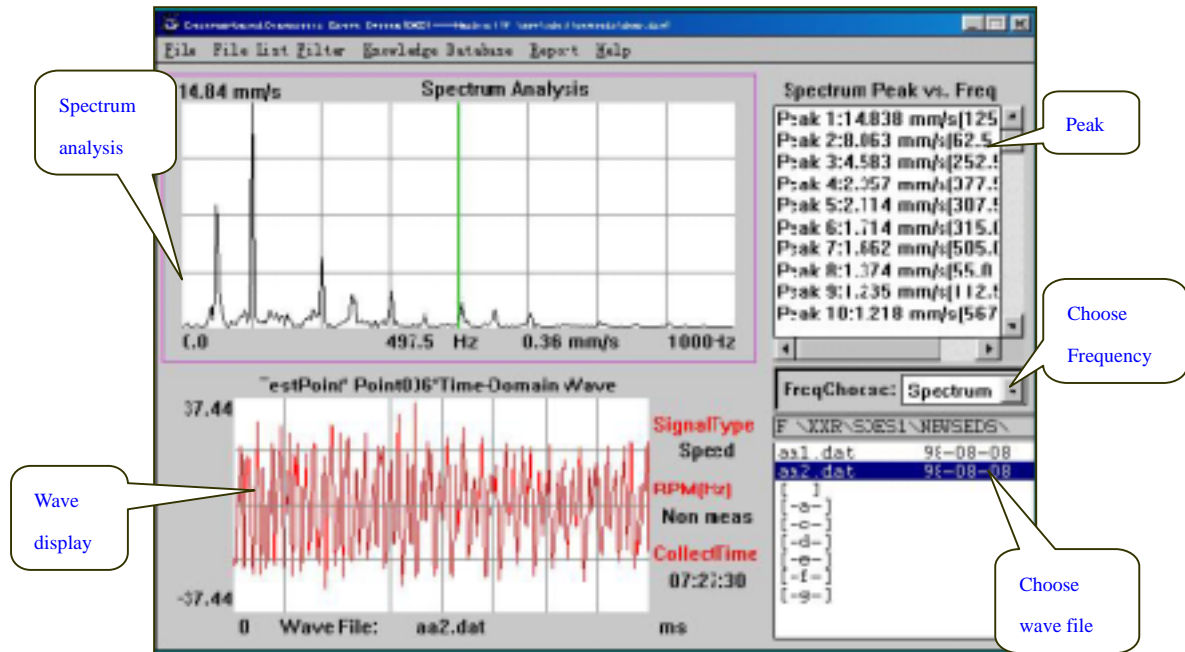
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Spectrum-based Diagnostic Expert System Software

● Interface

The functions of Spectrum-based Diagnostic Expert System Software (SDES) are powerful. SDES is used widely. The interface of SDES is as follows.



Main Function:

1. Fault Diagnosis
2. Calculate Fault Characteristic Frequency
3. Edit diagnosis knowledge library

● Brief Introduction about Functions

Main functions of the software:

1. Diagnose Faults Automatically:

Diagnosed machine components:

- 1). Rotor (including shaft, sliding bearing etc)
- 2). Ball bearing
- 3). Gear
- 4). Induction-motor
- 5). Other equipment——an interface for convenient of enlarging and perfecting its functions

2. Print Diagnostic Report:

- 1). Detailed precondition (include the names and contents of machine configuration files, the names, the setting method, signal type and other parameters of waveform data files.)
 - 2). Frequency spectrum analysis result (peak value and corresponding frequency list)
 - 3). List of components' faults characteristic frequency
 - 4). Diagnostic reason
 - 5). Final diagnostic result
- Users can edit and print the report.

```

Diagnosis Report

=====
Section one Content of machine configuration file(f:\xxr\sdes1\nwseds\demo.dcg):
=====

(1)Machine Name:Machine1

(2)Rotor Parameter:
RPM of each rotor (Unit:r/m):
Rotor 1: 3000;
Rotor 2: 3000;
Rotor 3: 3000;
Rotor 4: 3000;
Rotor 5: 3000; (sliding bearing)

(3)Parameter of ball bearing:
=====
BearingType|BearingPitch (mm) |BallDia (mm) |NumSingleRow|ContactAngle|RPM(r/m)
=====
16          11.500000          3.6700          7          1.0000 3200.0000
16          11.500000          3.6700          7          1.0000 3200.0000
18          15.000000          4.6700          7          1.0000 3000.0000
=====

(4)The machine has series 3 gear-mesh:
(5)RPM of known shaft 2 : 3000.00 r/m
(6)Teeth number of gears of each series:
    Series 1: 100---- 110
    Series 2: 120---- 130

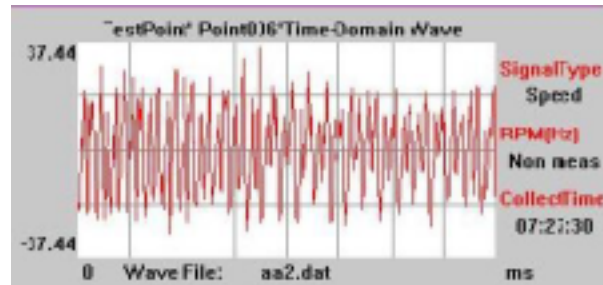
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3. Knowledge Base Maintenance:

Functions include the addition, modification, browse of knowledge rule, back-up and restoring knowledgebase automatically, etc. The knowledge rules for diagnosis are open to users, users can not only view these rules, but also add and modify when needed. To presume the system running normally, users had better save the knowledgebase files before adding and modifying. When there are abnormal phenomena (such as screen displaying "Error", exit abnormally, etc) in course of edition, it can restore the files. The software provides functions of backing up and restoring automatically.

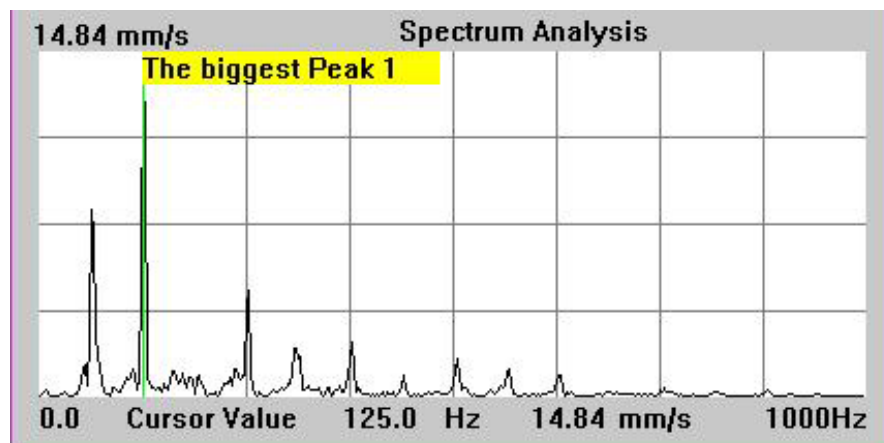
4. Waveform Browse:

Displaying signal collecting date and time, measured rotation speed, signal type, signal peak value etc. Users can monitor the condition of equipment.



5. Data Analysis:

Analyzing collected data. Users can find machine faults quickly and accurately by these curves



6. Ball Bearing Database Maintenance:

- 1). Add
- 2). Edit
- 3). Delete

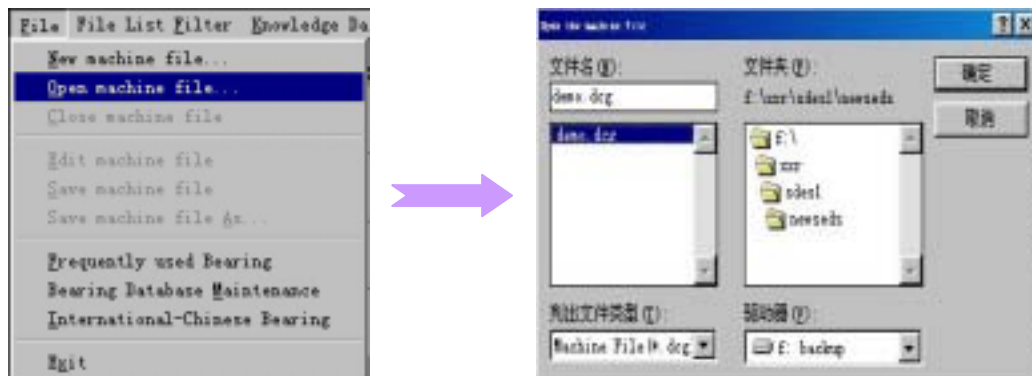
When setting new equipment configuration files, users can transfer data from the common using bearing database when they exist. If they do not exist, users should input them. The system would query users whether store the data in database.

7. Other Functions:

- 1). Filtrate file name
- 2). Query and display amplitude spectrum analysis result
- 3). Provide online help

● Operation Guide

1. Choose Machine Configuration File:



2. Select Data File:



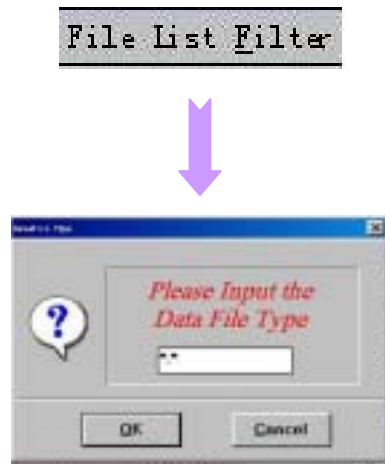
3. Automatic Fault Diagnosis:

After opening a device configuration file, users select data file system (that is: automatic fault diagnosis), and display the result after the diagnosis is finished (before this, several simple questions would be asked). During the diagnostic process, no need for user's interference.

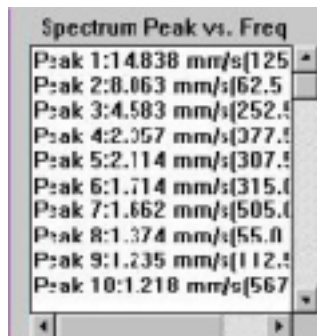
4. Output Diagnostic Report:

After selecting the menu "Diagnostic Report" (only after establishing or opening device file, this function can be realized), the system will call the "NOTEPAD" of Windows to display the concrete diagnostic report (if the file is too large, call the "TABLET". The file is text file, so user can typeset or print it by using word processing software.

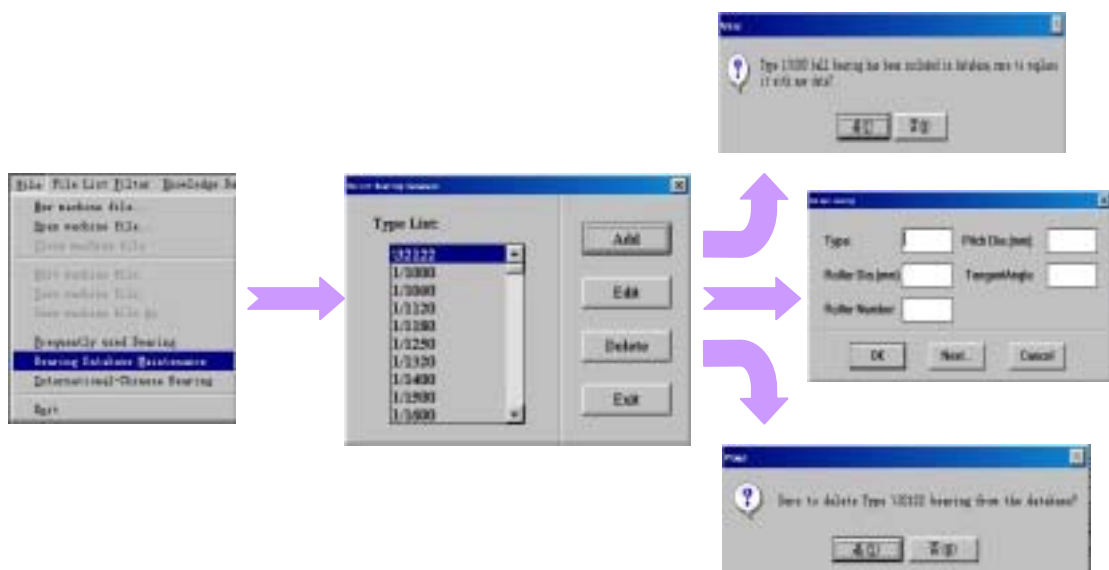
5. Data File Name Filter:



6. Query for Spectral Analysis:



7. Ball bearing database maintenance: User can select the menu “Device file/bearing database maintenance ” to add new data, modify or delete original data. Do as the following picture:

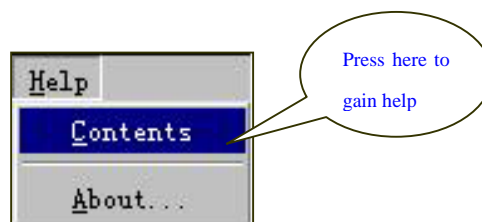


8. Frequently Used Bearing Data Pick-up:



9. Moving of Window Focus: Using the key “Tab” can move the focus to the next window, using”Shift+Tab” to move conversely. In the same window, move the focus by “↑”, ”↓”.(The operation only is the same with keyboard control, this problem not existing when using the mouse.)

10. Online Help:



11. Screen Print:

By dint of the function of screen-print provided by Windows. Operation method:

- 1) Display the plot which will be printed on the screen;
- 2) Press”Print Screen” or “Alt” + ”PrtScr” to copy current screen to the clipboard of Windows;
- 3) After starting such software as “NOTEPAD”, “TABLET” or “WORD”, select the menu “Edit/Paste” or press “Ctrl”+”v”to call out the plot;
- 4) Select the menu “File/Print”, and set up the “Property/Plot/resolution” as the highest, then print.

● Notes:

- 1). **BPFO**: Ball Pass Outer Race Frequency
- 2). **BPFI**: Ball Pass Inner Race Frequency
- 3). **BSFS**: Ball Spin Frequency relative to Separator
- 4). **CosineCA**: Cosine of Contact Angle
- 5). **RPFR**: Roll Pass Raceway Frequency of step bearing
- 6). **DH**: Double Harmonic
- 7). **TH**: Triple Harmonic
- 8). **DRH**: Double Harmonic of Rotational Frequency
- 9). **TRH**: Triple Harmonic of Rotational Frequency
- 10). **FF**: Fundamental Frequency
- 11). **SRPF**: Step Race Pass Frequency
- 12). **SFO**: Separator & Outer Race collision Frequency
- 13). **SFI**: Separator & Inner Race Frequency
- 14). **SBF**: Stator Barbroken Frequency
- 15). **REVF**: Rotator Electromagnetic Vibration Frequency
- 16). **NGT**: Gear Teeth Number
- 17). **LB**: Left bracket
- 18). **RB**: Right bracket