ELECTRONIC LOGBOOK

H. -J. Eckoldt, DESY Hamburg, Germany
H. Martirossian, YerPhi, Armenia

Abstract

The DESY MKK shift crew is responsible for magnet power supplies, HV supplies for RF transmitters, water-cooling and air conditioning systems, the HV and LV mains of entire DESY. To keep track of the failures of these systems an electronic logbook was developed. The content of the logbook is available to the maintenance groups giving them the possibility to comment on failures to help in future troubleshooting. Via different filters and search functions it is possible to select failure types, detect multiple tripped components and get a good statistic of trips to see whether systematic failures occur. Hence an early detection is possible and preventive maintenance on these components can be done. The logbook was developed using ORCALE RDBMS (Relational Database Management System), and uses other databases to get information about the built in components as e.g. magnet power supplies. It is in use for more than one year with a large acceptance of the shift members.

1 INTRODUCTION

The technical shift crew is responsible for the first trouble shooting of the technical infrastructure including the water cooling system, the air conditioning system, the low voltage distribution system and magnet power supplies. Additionally the shift crew informs the experts that are on call for the different subsystems.

To keep track of the failures in the past a paper logbook was used. With the HERA machine detailed investigation on failures and a statistical diagnosis became necessary. These investigations were done on the basis of the written information in the books. This was time consuming and inefficient e.g. for finding multiple failures of components. The information was not always precise since it depended on the knowledge and the accuracy of the operator. Therefore the idea for the development of an electronic logbook arose.

2 BASIC DEMANDS FOR THE LOGBOOK

A few basic demands had been defined which are:

1) The system should be easy to handle especially for non computer experts
2) The log book should be available in the offices to spread information and give the workshop leaders a good overview over trips of the systems
3) The communication about the failures between shift crew and the workshop leaders shall be enforced
4) The information shall be precise and free of errors due to misspelling or accidental mistakes etc.
5) The information should be structured to provide a fast overview of the different subsystems
6) A special diagnostic tool should help for investigations on failures and deliver statistical data
7) The system should be a multi-user program instead of a local installation
8) The logbook uses the data from other databases e.g. magnet power supplies database.
9) The long term aim was to transmit the information via Internet

3 SOFTWARE

The first steps have been made on MS-Access. With this basic structures of the database could be developed. However problems including data security, overwrite protection, amount of data and the possibility of using the data with multiple user arose quickly. The use of different operating systems and platforms was not possible. Therefore the electronic logbook was developed on

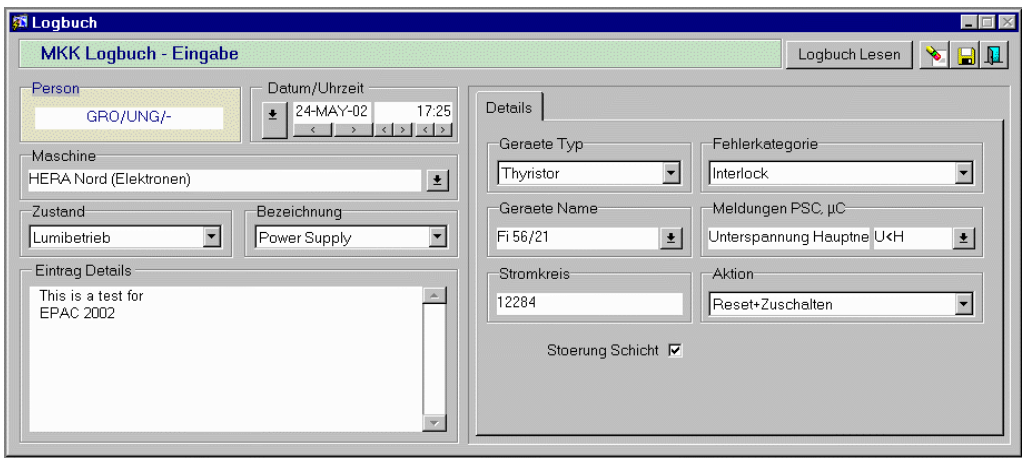

Fig. 1: Input mask for power supply failures

ORACLE RDBMS (Relational Database Management System). The database for the power supplies uses ORACLE as well.

4 DATA INPUT

Since it is very important to have valuable data without errors different input masks have been developed to both help and lead the shift crew to enter data correctly.

Three different sets of data are entered by the shift crew:

1) General data like input power of the three mains stations, reactive power, temperature of outside air, cooling water and accelerator tunnel air; status of the machines has to be inserted by hand. By doing this the shift operators get a fast overview about the entire system.
2) Special information that has to be available for the shift operators. This can be a provisional state in the machines, a general request for the shift crew etc. This data can be introduced at any time and pops up when the new shift operator begin his work
3) Event triggered data. This data is entered whenever an event occurs. This can be an alarm, a trip of a subsystem or in some cases other information that is be of interest.

An input mask for entering the magnet power supply trips is shown in Fig. 1. For the power supplies it is important to know which power supply in which machine has tripped; What have been the actions taken to put that device back into operation; and what was the reason for the trip. Since the logbook is connected to the power supply database a lot of information is not typed via keyboard but can be chosen from lists via mouse clicks. This ensures that no failures due to misspelling occur. However it is important to get as much information as possible from the shift operator. Therefore a special text field was introduced to describe the failure in plain words.

Masks are available for:

a) Grounding of the machine
b) Air conditioning system
c) Magnets
d) Mains disturbances
e) Magnet power supplies
f) RF-power supplies
g) Power distribution system
h) Water cooling system
i) Miscellaneous/hints

Once an item of the list is chosen, a new menu appears to take into account the different information needed for that subsystem.

5 READ OUT OF DATA

For the read out of data different options are possible. These are:

- On screen: output window giving all relevant data about trips (Fig.4). The work shop leaders have the possibility to comment on the trips. This helps the operator to get more details about the units which have been worked on and where to put further efforts.
- On screen: the general overview of the machine data like temperatures, status of the machine, powers can be seen.
- On paper : All data can be printed out

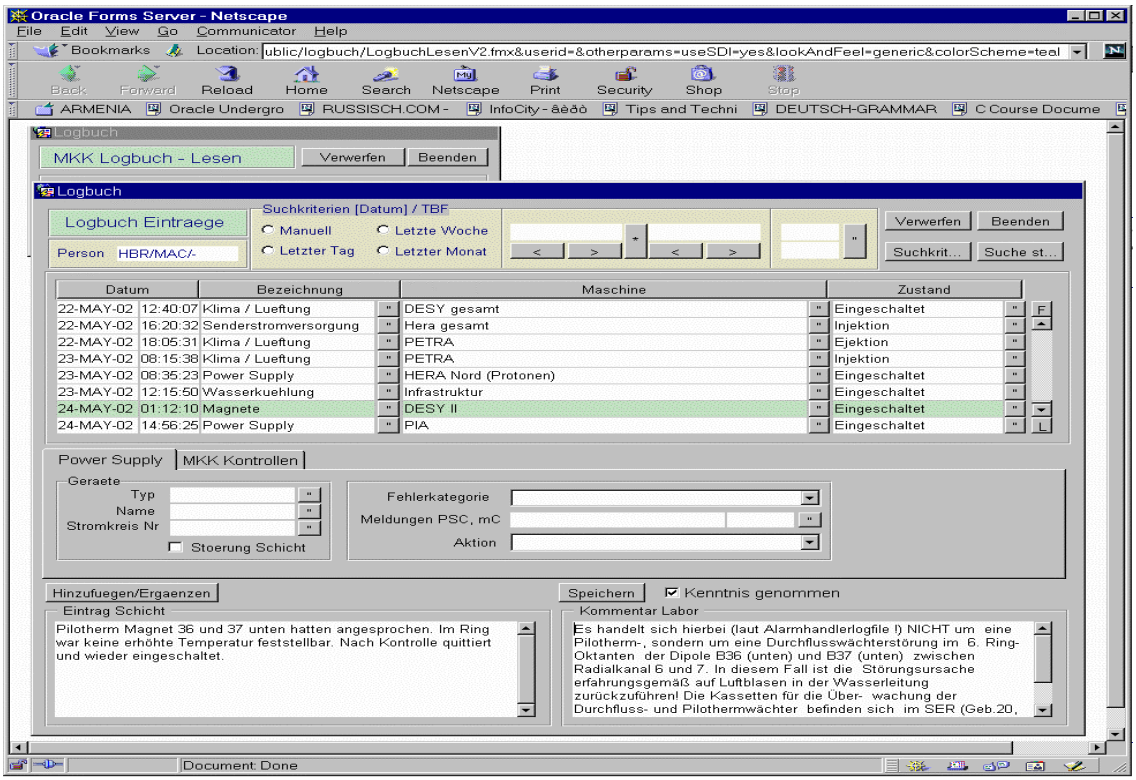

Fig.2: Internet view of the logbook

In all versions the time periods (last 24 Hrs., last week, last month, free time period) and different subsystems can be freely chosen.

6 DIAGNOSTICS

One of the important aims of the logbook was the development of an efficient diagnostic tool. The most elaborate diagnostics have been developed for the magnet power supplies. Per default the data is shown in a window as shown in Fig 2. It can be opened via ORACLE and even the Internet. Fig. 2 is a screen shot of the Internet page.
The database can be searched by

1) name and type of the power supply
2) the machine
3) the type of failure (e.g. short to ground,)
4) the date, predefined time periods (last month, week)
5) state of the machine (lumi run, injection)
6) Action that was taken (e.g. repair, exchange, reset)

It is possible to show the information of the categories of the failures in different charts. One can choose between a pie chart (Fig. 3) and a bar chart (Fig.4).

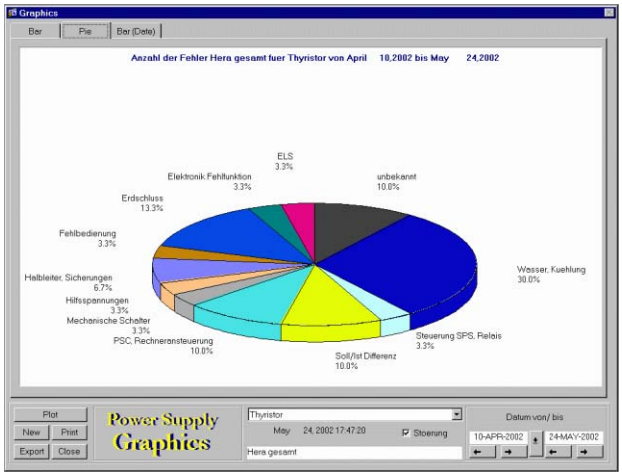

Fig. 3: Pie chart presentation

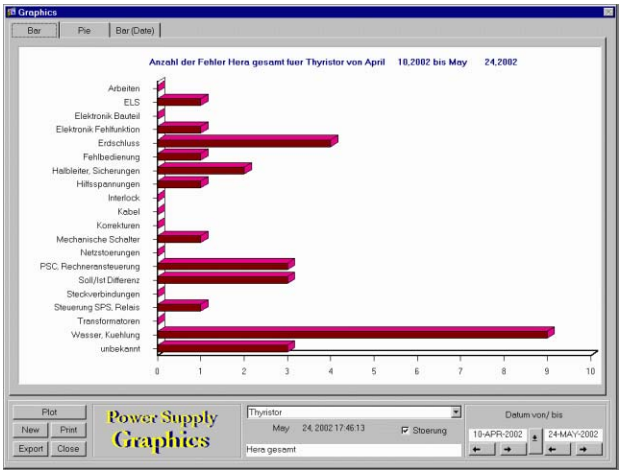

Fig. 4 Bar chart presentation the logbook

The third chart is the failure over time chart (Fig. 5). The aim is the detection of clusters of failures that might be related to e.g. seasonal effects as temperature.

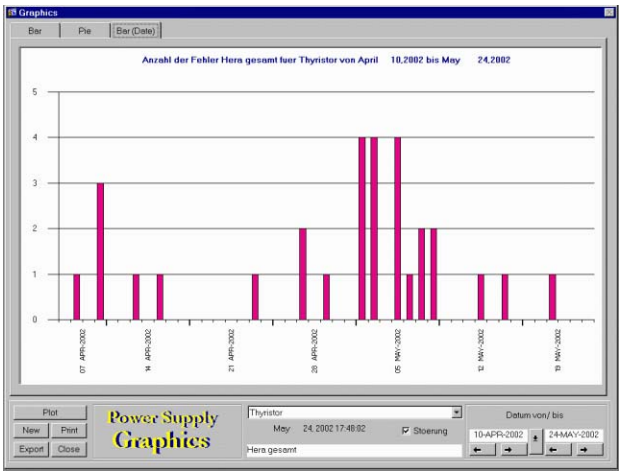

Fig. 5 Failure over time presentation

7 FIRST USE

The input masks were programmed to get the necessary information. The shift people were asked to tell their demands. For testing there was a two month period where the data was taken from the written logbook and typed into the beta version. After having reducing program bugs and inconveniences the logbook was introduced in October 1999 into the main control room and the shift operators were asked to use it. For two weeks the programmer worked very closely with the shift operators to change the program according to the their wishes. By doing so the logbook was accepted very fast. So far 4400 entries have been made.

8 SUMMARY

To keep track of the failures of the systems of the group MKK the electronic logbook was introduced in October 1999. Due to the fact that the demands of the shift operators point of view user friendliness was taken into account the logbook was accepted very fast. With the logbook a powerful diagnostic tool for the failures of the power supplies is available today.

9 REFERENCES

[1] MKK Datenbanken, internal work report, Mario Baetz, 1998