

§2. A PC Database on Early Design, Construction and Initial operation of LHD

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1 Introduction

Last year (2009), both the LHD (Large Helical Device) operation and the plasma experiment completed their 13th campaign with many brilliant results and discoveries. Since the first plasma discharge on March 31 1998, no erroneous stoppage nor interruption of LHD experiments was experienced. In the meantime, the construction for a database of archives on early design, construction and trial operation of LHD was required intensively mainly due to the following two reasons. One is that LHD is the first and largest fully superconducting magnets equipped fusion device. The second is that the worldwide demands for energy and the conservation for the earth environment accelerate R&D for magnetic confined controlled nuclear fusion reactor.

2 Database on LHD

There has been a previous work already made in 2003 on successful superconducting magnets of LHD, ITER-CS model coil and TRIAM-1M by the collaboration among NIFS, JAERI and Kyushu Univ., and the database covering ca. 1000 titles became available at each institute's homepage by internetⁱ (in Japanese), which is called "A database of large-scale superconducting magnets for fusion device".

The purpose of current work is to construct a PC database on the early trade-off phase design considerations as well as their final details of the main body of LHD machine, that is, the minutes on weekly technical evaluation meetings dating back 1990 until 1998 of the first plasma, application documents for building a high pressure gas generating plant satisfying governmental code for Refrigerator, operator's manual and reports of initial trouble caused during the early period from 1998 to 2000, and finally the list of manufacturing drawings of LHD. Lists of final drawings and of operation manuals give fine information to construct a new LHD machine if necessary.

3 Work for compiling the database

All aspects of the work can be divided into four steps, namely, Step 1; select suitable candidate original documents, Step 2; convert paper information into PDF files, Step 3; write title list of individual documents in a form of EXCEL table, Step 4; write a PC query system and combine the table to facilitate PC inquiry. The work was started in June 2007

with a three year schedule. Before the end of FY 2008 Steps 1 and 2 were completed, and the other two Steps were finished in 2009.

The volume of papers are nearly 100 King-pipe files, each composes of ca. 300 pages and roughly 30-50 titles. A total number of carton boxes for them is 19, and they are being kept at places where they were originally stored (Prof. Takeiri, Y.). The extent of the PC memory is roughly 70 GB assuming each 700 MB / King-pipe file. Other than the highest level categories, middle level titling for manufacture drawings and machine operation manuals is excluded at Step 3 because they are self-evident in it's product name, thus only 17 King-pipe files become the subject of classification.

The last half of Step 3 was finished during 2009; the titles of minutes and processed documents on 550LOB (LHD On Board) meetings were compiled in EXCEL table. The total number of the titles included is ca. 2000.

These titles must be queried by keywords using a suitable database searching engine. Several candidate commercial or free-wares were compared, such as JAVA-SQL, MY-SQL, RUBY, PEARL, and FileMaker PRO. Among those soft-wares, FileMaker PRO was chosen due to its convenience from the authors and perhaps the user's past experience. Furthermore, it was also beneficial that it can be easily combined with the EXCEL table written at Step 3.

At Step 4, a conversion of EXCEL table into FileMaker PRO table was made and those two tables were downloaded onto a CD-ROM as well as a user's operation manual for the database. The PDF files of 70 GB are not included in the CD and they must separately be referred to the original according to the Box (carton) No. and the File (King-Pipe) No. which are listed in the tables. Both of the commercially obtainable soft-wares are also excluded from the CD. Versions are Microsoft Office 2004 and FileMaker PRO 8.5 respectively. The CD-ROM can be read by Windows and Mac OS-X.

In order to query the title, a list of the abbreviations was also written for several proper words/terms to LHD. The abbreviations list is also included in a user's manual.

Acknowledgments

Special thanks are made to the previous Director-General Dr. O. Motojima for his support and encouragement in photo copy work at Step 2.

ⁱ For example: <http://scmdb.nifs.ac.jp>