

## §4. Construction for a PC-based Database of Archives on Early Design and Operation of LHD

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### Preface

Last year (2008), both the LHD (Large Helical Device) operation and the plasma experiment completed their 12th campaign with many brilliant results and discoveries. Since the first plasma discharge on March 31 1998, no erroneous stoppage nor interruption of experiments was experienced and LHD is still in active service instead of becoming an historical monument. In the meantime, demands for an accessible archive on the construction of LHD seems to be much more intensive mainly due to the following two reasons. One reason is that LHD is the first and the largest fully superconducting magnet equipped fusion device, which has contributed to exploring advanced superconducting and cryogenic technology. The second reason is that the worldwide demands for energy and conservation for the earth environment accelerate R&D for magnetic confined controlled fusion reactor electrical generation plants as well as for related scientific and technical research activities.

### 1 Databases on LHD

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

The purpose of current work is to construct a PC database for archives on the early tradeoff 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 from 1990 to 1998, application documents for a high pressure gas generating plant satisfying governmental code for Refrigerator, operator's manual and reports of initial trouble caused during the period from 1998 to 2000 and finally the list of manufacturing drawings of LHD. It is the author's opinion that any technical development always necessitates various investigations among various tradeoff experiences before a final selection is made, hence, learning not only from a successful result but also by studying previous experiences is also inevitable for any ongoing project. Lists of final drawings and of operation manuals give fine information to construct a new LHD machine if necessary. Mainly due to the reason of industry proprietary information, access to such PDF database by public may be limited for the moment.

### 2 Progress

All aspects of the work can be divided into four steps, namely, Step 1: select suitable candidate documents, Step 2: conversion of paper information into PDF files, Step 3: write index of titles of individual documents in a form of EXCEL® table, Step 4: write a PC query system and combine the table. The work was started at June 2007 with a three-year schedule. Before the end of FY2008 Step 1 and 2 were completed, Step 3 is half finished. The volume of papers are nearly 100 King-pipe® files, each composed of 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 required PC memory is roughly 70 GB assuming each 700 MB/King-pipe file. Other than the highest level categories detailed titling work for drawings and operation manuals in Step 3 is excluded because they are self-evident in it's product name, e.g. "poloidal coil IV", thus only 17 King-pipe files become the target of classification for mid level categories.

### 3 Future Work

As stated, the last half of Step 3 will be continued to complete the table, then they will be combined with the PC query software (Step 4). The prescription for a suitable PC software has been made preliminarily. The system must satisfy following requirements.

- ◆ data field can be inquired by multiple key.
- ◆ look up of details may not be required but the index number in separate PDF files. This is due to reasons of private industry proprietary and of limited extent of user's PC ROM.
- ◆ Internet /Web query system is not essential both due to reasons of economy and of limited number of users.
- ◆ The database can be approached from a user's PC with a user-friendly and obtainable software.
- ◆ database can be upgraded by any user.

These are determined under the provision that it must be used by the one with the access permission to NIFS, that is a matter of proprietary right again. Several candidate commercial/free softwares may be nominated, such as JAVA-SQL, MY-SQL, RUBY, PEARL and FileMaker Pro®. Among these softwares, FileMaker Pro is selected due to the convenience of the authors and perhaps the user's past experience. Furthermore, it was also beneficial that it can be combined with the database written at Step 3 as the EXCEL table (Japanese language).

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<sup>1</sup> for instance; <http://scmdb.nifs.ac.jp>