XFEL DATABASE STRUCTURE & LOADING SYSTEM

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Abstract

The XFEL database was designed to store cavity production, preparation, and test data for the whole LINAC on a very detailed level: from half cells up to module tests. To load this amount of data (more than 140 file types per cavity) in automatic regime a special Data Loading System was developed.

DATABASE STRUCTURE

The XFEL database for cavities and modules was developed at DESY using the ORACLE Relational Database Management System (RDBMS) [1].

According to the ORACLE RDMS strategy the structure is based on a set of tables. These tables are linked via 1to1 and 1toN relations.

The database is created to store data for more than 840 cavities from the serial production. These 9-cell cavities are produced by different European companies for the XFEL project.

In addition the database has to store data about 100 modules assembled at CEA and tested at DESY.

The content of the database is logically divided into 2 parts: cavity and module. The first one contains information about cavity production, measurements, and test results. In the module part the information about module structure, assembling information, and module test results are collected.

The XFEL database table structure repeats the structure of the real cavity production, preparation, testing, module assembling and module testing chain. Therefore the database is very flexible, and there is no problem to add new kinds of process steps.

With the help of the database the history of all steps of production are stored and can be traced very easily.

DATA SOURCES

The XFEL project is a European project, and therefore the database has to collect data from different sources in different countries:

- data about cavity production and preparation steps done at different european firms are transfered via the Engineering Data Management System (EDMS) used at DESY side;
- data about cavity measurements and tests in vertical cryostat done at the Accelerator Module Test Facility (AMTF) at DESY are collected by local database on AMTF side;
- data about module assembling process done at CEA SACLAY are transfered via EDMS and files;
- data about cavity retreatments and additional investigations done on DESY side are transfered via EDMS and files;
- data about module test results done at AMTF DESY are collected by a local database on AMTF side.

The access to EDMS is realized via JAVA API. All files of the format types XLS, XLSX, PDF, JPEG and ASCII are accepted.

The connection to AMTF is realized over a DB – DB connection via a set of views (virtual tables) to access different types of data and to trace the update status.

DATA LOADING SYSTEM

For the serial production and the big amount of data the data loading system must fulfil the following requirements:

- full automatic functionality
- checking data on consistency
- cataloging the data loading process
- include manual accessibility
- dynamically extendibility for new data types

The XFEL Data loading system fulfils all the requirements listed above. It works in this way:

- checking for new data every 30 minutes

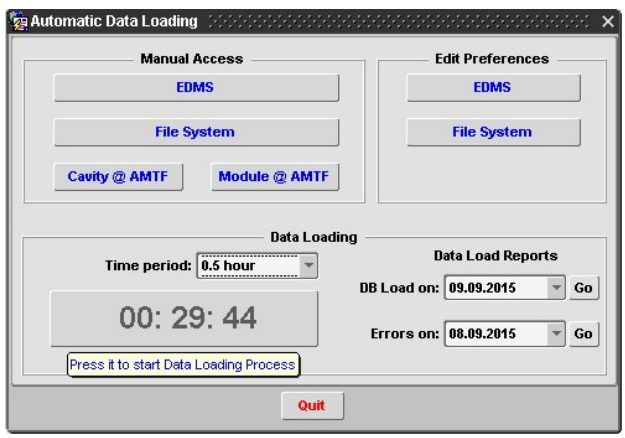

Figure 1: Data loading user interface

- daily catalogue for data loading and error reports

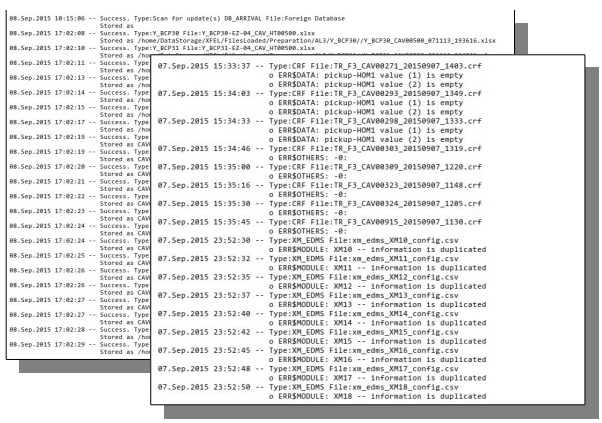

Figure 2: Data loading reports

- manually data access

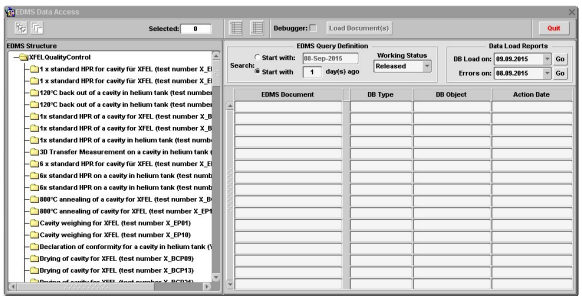

Figure 3: EDMS manual access

- online editor for data loading preferences

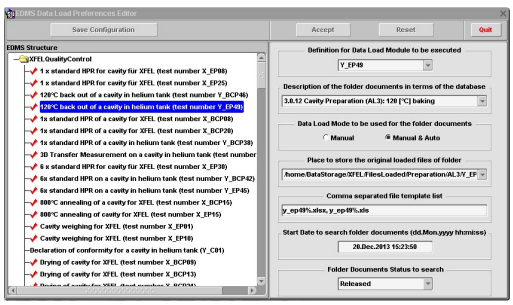

Figure 4: Preferences editors

The XFEL data loading system includes some additional functionalities:

- to meet the requirements of colleagues (from CEA SACLAY, cavity retreatment process, and so on) we add the possibility to upload data files directly from client computers

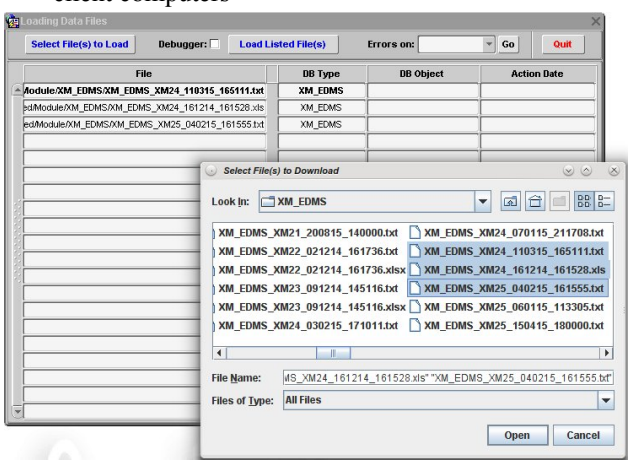

Figure 5: Data uploading interface

- Accessibility from any point in the world

CONCLUSION / SUMMARY

Since the beginning of the data loading in July 2012 up to now the system is working in automatic regime 24 hours / 7 days per week with 30 minutes interval. During this period more than 350000 data sets were loaded (~ 320 data sets per day).

According to the 30 minutes interval of activation we can consider the XFEL database as an “ON-LINE” storage system.

ACKNOWLEDGEMENT

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REFERENCES

[1] P.D. Gall, V. Gubarev, S. Yasar, A. Sulimov, J.Iversen., “A Database for the European XFEL” SRF 2013

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