Design of HMI(Human Machine Interface) Integration for PEFP Control System

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1. Introduction

KAERI (Korea Atomic Energy Research Institute) has been performing the project named PEFP (proton engineering frontier project). PEFP has been performing the project of a high power proton accelerator. Control system for 20 MeV proton accelerating structure is under development. EPICS (Experimental Physics and Industrial Control System)[1] is adopted for control systems which have OPI(Operator Interface) and IOC(Input output controller). In this paper, we present design and construction of HMI integration for the control system we have been performed.

2. Control System using EPICS Extensions

The Alarm Handler[2] is an interactive graphical application used primarily by accelerator operators and physicists to display and monitor EPICS database alarm states. It serves as an interface between an operator and the EPICS database and it communicates with the database using channel access function calls. The user interface for the Alarm Handler contains a hierarchical display of an alarm configuration structure allowing both high level and detailed views of the alarm configuration structure in one window.

The Channel Archiver is an archiving toolset for the EPICS [2]. It can archive any value that is available via ChannelAccess (CA), the EPICS network protocol [3]. It use the term "archiver" whenever user refer to the collection of programs which allow user to take samples, place them into some storage and retrieve them again.

EDM[2], one example of an EPICS display manager, is an attempt to fulfill interactive graphical display tools. A display manager is a tool that manages a collection of active displays. It provides the ability to create and edit display content (like graphics, text, meters, sliders, buttons, plots, etc.) and uses some facility (e.g. EPICS channel access) to execute the same content resulting in the dynamic presentation of live data.

MEDM[2] stands for Motif Editor and Display Manager. It is a graphical user interface (GUI) for designing and implementing control screens, called displays, that consist of a collection of graphical objects that display and/or change the values of EPICS process variables. The supported objects include buttons, meters, sliders, text displays/entries, and graphs. It has two modes of operation, EDIT and EXECUTE. Displays are created and edited in EDIT mode, and they are run in EXECUTE mode. Besides these, the EPICS extensions have ADT, AR, BURT, HistTool, and so on.

MEDM is adopted as the OPI(Operator Interface) software of our control system. These tools can be uniformly used under the Solaris, Window, and Linux environments.

3. Integration for PEFP Control System

PEFP has been performing the project of a high power proton accelerator. Control system for 20 MeV proton accelerating structure is under development. Figure 1 shows the accelerator structure of PEFP.

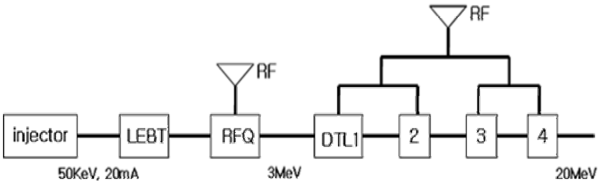

Fig. 1 Accelerator structure of PEFP

We use SUN W/S host computer in the PEPF control system. The host computer also serves a development environment for VxWorks, which is the operating system of IOCs. We currently use the version R3.14 of EPICS on this host machine. A test of the latest release of EPICS software, R.3.14 .4, is under way.

The main objective of this integration is to allow accelerator operators to view and control all accelerator subsystems (vacuum, RF control, timing system, cooling device, etc) in a unified way.

In designing a control system for a large facility like Proton Accelerator, what is the most important and difficult to be achieved is to make all the component systems work consistently by sharing their own data. In addition to operating the machine, the control system should supply extra functions such as storing the operation data. For a large facility, it is usual that the components are a collection of various - sometimes even inconsistent - kinds of hardware or software. In this situation, we should find a way to design a consistent control system which applies to all components and which is also secure, accurate and easily expandable.

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We concluded that EPICS (Experimental Physics and Industrial Control System) is a suitable tool which can be used to develop a control system that satisfies the above requirements and decided to use it for the PEFP linac control system development. Figure 2 shows a main control picture using MEDM tool.

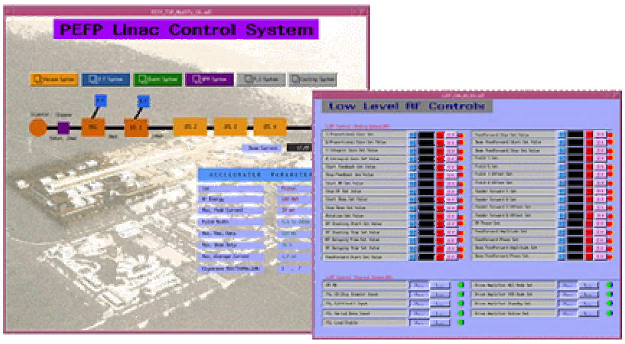

Fig. 2 Main of PEFP control system

4. Conclusion

The integration of PEFP control system frame is in progress. It should be fully available before mid-2005. We are upgrading and modifying the control system to accommodate new control system requirement and to apply long-term operational experiences.

REFERENCES

[1] Experimental Physics and Industrial Control System, http://www.aps.anl.gov/epics
[2] http://www.aps.anl.gov/epics/extensions
[3] J. O. Hill: Channel Access: A Software Bus for the LAACS, ICALEPCS 1989, Vancouver.