

Upgrade of Scan Applications for KOMAC Linac Beam Properties

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1. Introduction

In the Korea Multi-purpose Accelerator Complex, a 100 MeV proton linac that consists of an ion source, low energy beam transport (LEBT), a radio frequency quadrupole (RFQ), eleven drift tube linac (DTL) tanks for 100 MeV, is in operation and provides proton beam. Two solenoid LEBTs that have X-Y steering magnet each, are installed at the KOMAC linac for high current proton beam and minimization of beam losses, as LEBTs transport and match the ion beam from ion source into the RFQ. For these reasons, it is important to figure out characteristics of LEBTs. Therefore, we implemented auto-scanning tools for LEBT using Java language and Experimental Physics and Industrial Control System (EPICS) framework. The scan application reduces time to characterize the LEBTs. However there are some issues in that it is not user friendly. Therefore we have revised and upgraded using python script and Control System Studio (CSS). In this paper, the upgraded applications will be discussed in detail.

2. LEBT Control System

LEBT consists of two solenoids magnets, two steering magnets, four power supplies for magnets and power supply control system. The LEBT system is shown in Fig. 1.

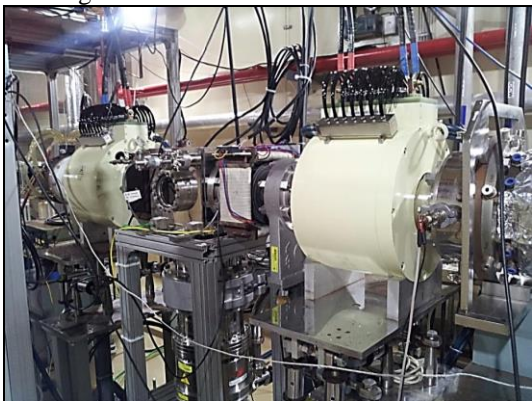


Fig. 1. LEBT system for KOMAC

The main goal of LEBT system is for transporting and matching ion beam to RFQ by controlling solenoids magnets and steering magnets. To control and monitor LEBT, we have implemented LEBT control system based on EPICS framework and CSS tool that communicate with EPICS Input Output Controllers (IOCs) using Channel Access (CA) protocol that are adopted for KOMAC control system. Following Fig. 2 shows the block diagram of KOMAC control system.

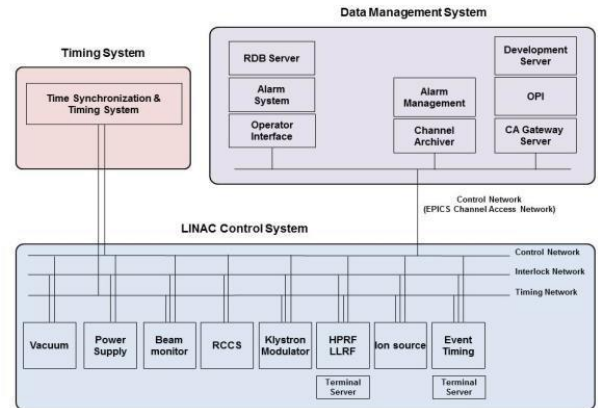


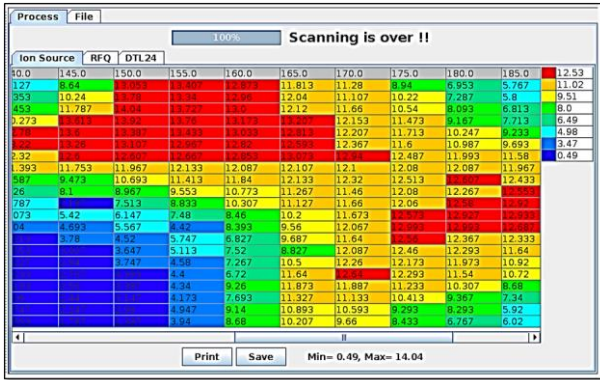
Fig. 2. the block diagram of KOMAC control system.

3. LEBT scan application

LEBT scan was performed by changing the set-values on by one to find suitable LEBT magnet current. So it takes a long time and effort to performing LEBT scan. Therefore LEBT scan application was implemented for operator's convenience. We had chosen java language using eclipse-mar for JAVA integrated Development Environment (IDE). Following fig. 3 shows LEBT scan application.

Fig. 3. LEBT scan application.

As the parameters for performing LEBT scan are set to the value operators desired, operator can run the LEBT scan program. The result of LEBT scan shown in progress table and archived all the value while running LEBT scanning in text format. When scanning is over, the result of scan is shown using color map. Following Fig. 4 shows the result of LEBT scan.



[2] CSS, <http://controlsystemstudio.org/>

Fig. 4. The result of LEPT scan.

Using LEPT scan application operators can easily analysis LEPT feature. However the existing LEPT scan application has fixed scan repetition rate and monitors solenoids. So it takes a long time to scan a lot of samples. Since the application runs on Linux Operating System (OS), it has to go through several steps operators to process the data

Therefore we have been upgraded LEPT scan application using python script and CSS tool that is familiar to operators. The LEPT scan tool using CSS can select the desired parameters between solenoids and steering magnets. The application is synchronized with KOMAC timing system and is performed the same sampling rate that equals the beam repetition rate. After scanning is over, the scan data are archived in file format on windows OS.

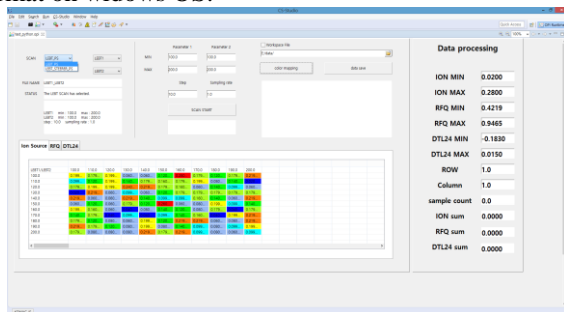


Fig. 5. The LEPT application using CSS and Python

3. Conclusions

For user convenience, high level applications have been being developed for KOMAC control system. The LEPT scan application using CSS tool and python has been implemented. The application displays the result in real time using color map that can find suitable values easily and archive data in text format on window OS that is more familiar to operators. In the future, phase scan application and data analysis and management application will be implemented.

REFERENCES

[1] EPICS, <http://www.aps.anl.gov/epics/>