

New control system using COACK for KEK slow-positron accelerator

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Slow-Positron Facility

Application project of electron linac
 Experiment / Outline / Schedule

Outline of New Control System

🗷 Hardware

Software Architecture

- Process of software construction



COACK

Component Oriented Advanced Control Kernel

General-purpose KERNEL for controlling accelerator and other large devices

Ref.WE-I1M. MutohTU-O3H. Ogawa,WE-O3T. KosugeMO-P14H. Katagiri,MO-P20Y. ShibasakiTU-P8K. Nigorikawa

and ..

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Slow-Positron Facility

« **Low Energy Positron**

Useful Probe in Material Science

Positron Source

 \swarrow Isotope (e.g. Na²²) \Rightarrow 10⁴ ? 10⁶ / sec.

 \approx e⁻ Linac + Target \Rightarrow ? 10¹⁰ / sec.

High Intensity Beam



Location











Schedule





Devices in the control system

Series	Devices	I/O lines
Safety interlock	Interlock switches & Beam operation	60
Electron gun	4 power supplies etc.	40
Beam transport magnets	15 power supplies	180
Vacuum	10 vacuum pumps,2 gauges, 2 gate valves	110



Hardware components





Why COACK ?

Requirements:

- ✓ In a short period
- ✓ With low cost & little manpower

Backgrounds:

- *Experience in PC control*
- Set used with Visual Basic

Advantages:

- Many useful components
- *∠ Concept of virtual device etc.*



Software Structure





Construction of the System (1)

COACK provides many functions:

✓ What we did were:

- Built up object class structure
- ✓ Drew GUIs for operator
- Wrote IOC-handling programs
- Made PLC sequence programs



Construction of the System (2)

? Building up class structure ?

R. Class Builder Tool	
IOC (0) Load Device Data Cancel Node (N) Group (G) Property (P) agnet	
Inder WagnetUT → Mag [®] Q → Section [®] 2 → BF → Trigger → Vaccume B····· Ring	Class Structure
Device ID : Node ID : Linac.Mag _ LM-01	BowP BowP
Property : ID Name Current Current Power Power Voltage Voltage	IP_SP_KB
	$(\Rightarrow XML file in Server)$



Construction of the System (3)

? Creating GUIs ?



Construction of the System (3)

? Creating GUIs ?

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		SpVac (SpVacClient.vbp)
	TransportControl1	
▼ • • Pa ■ ■ 1E-5 ■ ■ ■ ● ■ ■ ● ● ■ ● ● ■ ● ● ●	Private Sub TransportControl1_DataArrived(pCommand 'if no command, error If pCommand Is Nothing Then MsgBox "Unknown Event Received" Exit Sub End If With pCommand	As CommandPackageComp.Command)
wom	End With End Sub	



GUI for only showing information
 Working STABLY



GUI for Safety Interlock





Test for Virtual Device





Test for Virtual Device





Summary

We have made new control system for KEK slow-positron Linac using COACK.

The virtual machine concept helped us to complete the control system, even if the whole set of interface are not installed yet.

