Outline

I. PEFP
- Goal
- Plan, Schedule
- Status of Accelerator Development
- Project progress

II. 20Mev Control System
- History
- Development Status of Sub Control System
  - Vacuum, RF, Event, Beam Monitor, PS, Utility
Proton Engineering Frontier Project

Collaboration with KAERI, PAL, KAPRA, KIGAM, KAIST.

Under construction for 20MeV Commissioning in KAERI-Deajeon

Final Site will be selected by end of this year.

KAERI – Korea Atomic Energy Research Institute
KAPRA – Korea Accelerator & Plasma Research Association
KIGAM – Korea Institute of Geoscience & Mineral Resources
KAIST – Korea Advanced Institute Science and Technology
Project Name: Proton Engineering Frontier Project

Project Goals:
1st: Developing & constructing a proton linear accelerator (100MeV, 20mA)
2nd: Developing technologies of proton beam utilizations & accelerator applications
3rd: Promoting industrial applications of developed technologies

Project Period: 2002.7 – 2012.7 (10 years)

Project Cost: 128.6 B Won (107M$)

Special Conditions: Land, site & supporting facilities will be provided by a host institution or a local government.

Refer to Slide materials (Page 3~8) presented at ICFA-HB 2004
October 20.2004, Beansheim, Germany
“Status and progress of the PEFP Project”
By Byung-Ho Choi & PEFP Team
Plan of PEFP (100MeV Linac & Utilization)

- PEFP is organized into 3 phases.
- Its accelerator composes of an Injector, RFQ, DTL(I), DTL(II) and a test module of SCL.
- It has 2 beam extraction system: a low energy proton beam extraction of 20MeV, a high energy beam of 100MeV.
- Extracted proton beams will be used in various fields of beam utilisations & applications.
- We open a future extension plan over 100MeV.
## Project Schedule

<table>
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<th>Major Subject</th>
<th>1st Phase ('02~'05)</th>
<th>2nd Phase ('06~'08)</th>
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<td>60 MeV</td>
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</tr>
<tr>
<td>Site Selection</td>
<td>20 MeV</td>
<td>60 MeV</td>
<td>100 MeV</td>
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<tr>
<td>Construction</td>
<td>Basic &amp; Detail Design</td>
<td>Conventional Facilities</td>
<td>Accelerating Tunnel, Gallery</td>
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</table>

- Revised major milestones of the accelerator development & construction.
- In the 1st Phase, 20MeV accelerator will be constructed.
- After completion of the 20MeV accelerator in KAERI site in the 1st phase, it will be moved to new site and commissioned to supply 20MeV proton beam.
- 20MeV beam will be provided by Jun. 2008, 100MeV Beam by Jun. 2011
Basic Accelerator Parameters

- Particle: Proton
- Beam Energy: 100 MeV
- Operational Mode: Pulsed
- Max. Peak Current: 20 mA
- Repetition Rate: 15 Hz for Commissioning to User  
  (120 Hz in Accelerator Design)
- Pulse Width: < 1 ms for Commissioning to User  
  (< 2 ms in Accelerator Design)
- Max. Beam Duty: 1.5% for Commissioning to User  
  (24% in Accelerator Design)
- Accelerator Structures: Linear Acc.
  1st Option: Injector - 3 MeV RFQ - 100 MeV DTL  
  2nd Option: Injector - 3 MeV RFQ - 60 MeV DTL - 100 MeV SCL (under study)
Status of Accelerator Development (Nov. 2002)

- RF System (350MHz, 1MW)
  - Beam Dump
  - RFQ
  - LEBT
  - Injector

- Injector, LEBT, RFQ & RF System have been developed.
- 50keV injector & LEBT were tested and operated.
- RF system of RFQ was tested.
- RFQ is under the beam test.
- DTL is under fabrication.
Project Progress

- Progress (by Aug 2004)
  achieved: 14.8%
  planned: 15.2%
  (0.4% delayed)

- Budget [128,567 M W]

Note: Not include a budget of land, site & supporting facilities by a host.
Control System for 20MeV Commissioning

- Scheduled to 20 MeV commissioning in April 2005 at KAERI, Deajeon
- Development of Control System to satisfy this mission has been executed at PAL in 3 Phases for last 3 years.

- First Phase Development (2002.7~2003.6)
  - Control System Architecture
  - Control ToolKit Chioce (EPICS)
  - Vacuum Control System

- Second Phase Development (2003.7~2004.6)
  - RF Control System
  - Event System for Timing Control

- Third Phase Development (2004.7~2005.6)
  - Beam Monitor Control
  - Power Supply Control
  - Cooling Water Monitoring
  - Integration and Commissioning
EPICS Expert Invitation for Review

Bob Dalesio
LANL, USA
May 27 ~ 31, 2003
Seminar room at PAL

Ralph Langer
BESSY, Berlin, Germany
July 28 ~ August 5, 2004
EPICS Lab. At PAL

EPICS Collaboration Meeting
December 8 ~ 10, 2004 RICOTTI, Tokai JAPAN

Pohang Accelerator Laboratory
POSTECH
Vacuum Control System

- Windows based PC
- RS422 Interface (63 Ports)
- EPICS base 3.14.1
- MEDM
- Installed and Working at KAERI site
RF Control System

EPICS IOC (Developed)
CPU: MVME5100
VME I/O: MFL32A
EPICS Base 3.13.8
Domestic Products

VMEbus MFL32A

- 16 bits ADC, 0~+10V: 8 Ch
- 16 bits DAC, 0~+10V: 2 Ch
- DIO: 32 Ch
- 10/100 Base T Ethernet
- RS232C, 32 bit CPU

Human CC, INC  
http://www.humancc.co.kr

VME Bus Subrack

- 500W (+5V, -12V, +12V)
- 12 slots, VME64x with P0
- Remote Control (RS422, LAN)

VME Tech, INC  
http://www.vmetech.co.kr
Timing Control

- Event system for timing control has been selected.
- TIMO from SLS made contribution.

- Development Progress
  - Detailed Specification
  - System Configuration Layout
  - Hardware Setup and Software module Test
  - Lab Test
Selected the SLS Power Supply Type. H/W Modules are delivered & setting them up.

PS: Power Supply Pack
IP: Industry Pac
TM: Transition Module
DSP: Digital Signal Processing
ADC: Analog Digital Converter
CPU: MVME5100

EPICS VME IOC

Simulation Board With Power Supply (Digital Power Supply)

Control Team PEFP

EPICS Collaboration Meeting
December 8~10, 2004 RICOTTI, Tokai JAPAN

Pohang Accelerator Laboratory
POSTECH
Utility Control (Cooling Water)

Still gathering information for Utility

DTL Cooling System

RFQ Cooling System

Specifications
- 3000 l/min, 3 kgf/cm², 2 MW

Parallel supply into well and vary
Main Control Screen for PEFP
### Summary & Plan

#### PEFP

- Final Site will be selected by end of this year.

#### 20Mev Control System for PEFP

##### IOC Level

- RF (Developed)
- Vacuum (Developed)
- Event System for Timing Control (Developed)
- Beam Monitor (Developing)
- Power Supply (Developing)
- Utility (Still gathering control requirement)

##### OPI

- MEDM Switch to EDM
- Channel Archiver (From Kay)
- More things...
- EPICS Training to PEFP Physicist, Engineer