

A New Control Room for the KOMAC Linac and Multi-beam Lines

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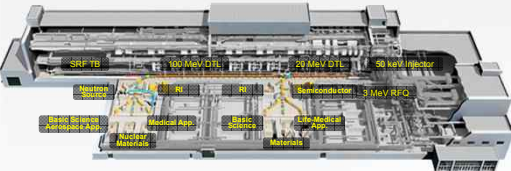
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100MeV Linac of KOMAC and Operation

Features of KOMAC 100MeV linac	Output Energy (MeV)	20	100
- 50 keV Injector (Ion source + LEBT)	Max. Peak Beam Current (mA)	1 ~ 20	1 ~ 20
- 3 MeV RFQ (4-vane type)	Max. Beam Duty (%)	24	8
- 20 & 100 MeV DTL	Avg. Beam Current (mA)	0.1 ~ 4.8	0.1 ~ 1.6
- RF Frequency : 350 MHz	Pulse Length (ms)	0.1 ~ 2	0.1 ~ 1.33
- Beam Extractions at 20 or 100 MeV	Max. Repetition Rate (Hz)	120	60
- 5 Beamlines for 20 MeV & 100 MeV	Max. Avg. Beam Power (kW)	96	160

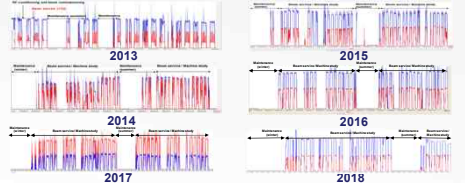


- Started user beam services from July 22, 2013.
- Proton beams delivered to TR23, TR101, TR102, and TR103.
- Operated in weekly-based schedule through a yearly plan : Beam service: Monday 13:00 ~ Friday 12:00
- Accelerator team : 15 people : Nuclear (5), Physics (4), Electrical (3) : Control (2), Mechanic (1)
- Operators/shift : 2 for accelerator, 2 for beam service in target room : 6 days a month as operator
- Beam Service : 2 for beam service in target room

- Operation statistics

	2013	2014	2015	2016	2017	2018	Sum
Operation hours	2,290	2,863	2,948	2,961	3,231	2,142	16,436
Beam service	432	700	704	824	1,061	568	4,290
Availability	82.0%	86.3%	90.5%	94.9%	94.9%	94.9%	94.8%

- Operation time (RF operation time)



Main Control Room for KOMAC Linac

❖ Control Room for 20MeV linac (2006 ~ 2008)



- For 20 MeV Linac & beam line
- Not enough space
- Two operators
- Local panel display
- No tables to hold keyboards and mice
- No ventilation system
- Control tools : High-level language programming in C, C++ language for control & monitoring : Oscilloscope for beam and RF monitor : Independently and manually controlled

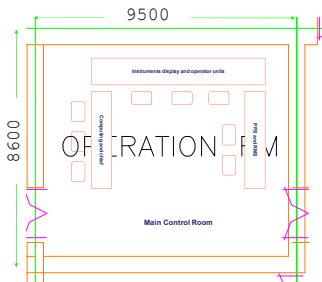
❖ Control Room for 20MeV linac and beam line (2009 ~ 2012)



- Need a large room for operators, scientific and engineering staffs
- Console and seating, Increase display monitors
- Ergonomic design, Air ventilation system, Dust trap
- Installed CCTV camera
- Uninterruptible Power Supply (UPS)
- Control tools : EPICS-based control system for vacuum and LLRF : NI LabVIEW for beam and RF : Partially manually controlled

❖ New Control Room Plan in WAO'10

- MCR located on the ground floor
- MCR of a restricted area
- Unauthorized entry prohibited
- Entry only by showing of access card
- Main factors : Lighting effects : Temperature and humidity : Console layout, reliability
- Console table : U-shaped array : house console and seating : operation, RMS & PPS, computing
- Console layout : decision of a console target : accessibility among console targets : classify the order of priority



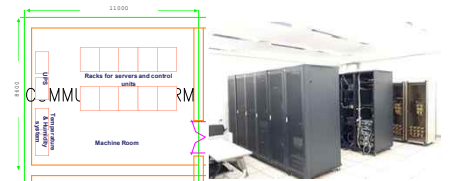
- Room : Restricted area : Air conditioning: 21 ~ 24°C : Access floor (double floor) : Display : OPI - 42", 27" LCD 12 ea. : CCTV - 32" LCD 5 ea. : Display wall - 64" LCD 3 ea.

❖ Control Room for 100MeV linac and beam lines (2013 ~)



- Size: about 20 m x 8.6 m main control room : 9.5 m x 8.6 m, machine room : 11 m x 8.6 m
- Access floor, computer equipment, air conditioning
- Major considerations : EPICS-based integrated control system : Constant temperature and humidity : Power cable, signal cable : Network cable using duct of access-floor

Separate dedicated server room for less noise in control room

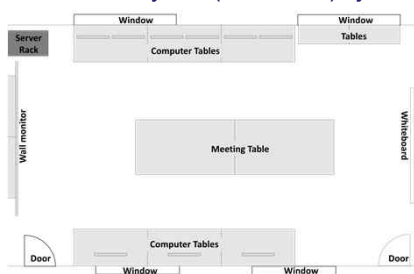


Machine Study Room for KOMAC 100MeV Linac

Over the past five years, KOMAC has made various upgrades to its control room for the 100 MeV proton linac and beam lines. Regrettably, the upgrades have resulted in accelerator operators and data analysts having to share a confined workspace. Therefore, in this project, we sought to redesign the control room to provide those who use it with distinct, more spacious workspaces. We have named the new control room "Machine Study Room (MSR)," and its improved design has resulted in the accommodation of additional personnel without congestion.

- Install sound equipment.
- Provide various graphic user interfaces for data analysis.
- Have the lights adjustable.
- Provide natural light throughout sufficient windows.
- Provide analysts and computer engineers a personal space.
- Provide meeting spaces for long time data analysis and discussion .
- Provide to do focused work

Machine study room (Control room) layout



Right view



Left view



- Air conditioning: 21 ~ 24°C
- Display : OPI - 27" LCD 12 ea. : Display wall - 64" LCD 3 ea.

- Original plan was in September.
- Delayed due to purchase problem.
- Will be built in October.