Construction Status of the Beamline for Radio-Isotope Production in the Korea Multi-purpose Accelerator Complex

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1. Introduction

The KOMAC (Korea Multi-Purpose Accelerator Complex) is operating beamline at a 20-MeV and a 100-MeV for proton beam user [1]. The 100-MeV beamline consist of 5 target room, a TR 103 as one of these is operating beamline, and a TR 101 as the other beamline is under construction as shown in Fig. 1.

The TR 101 as beamline target room will be used for the high value-added medical isotope production and increased utilization of the proton accelerator. The optical system of the beamline consisted of dipole and quadrupole, and it included beam position monitor (BPM) and current transformer (CT) for beam diagnostics. The beamline was inserted into the carbon block and the aluminum collimator, the end of pipe as beam window was used for the aluminum to reduce the radioactive of materials.

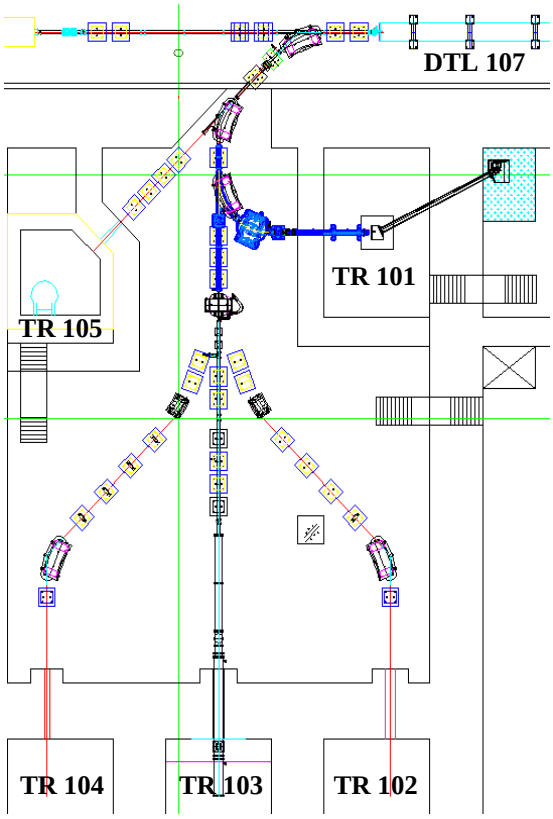

Fig. 1. The CAD drawing of 100-MeV beamline.

2. Design and Construction

2.1 Vacuum System

The vacuum system was isolated from the existing beamline using the gate valve as shown in Fig. 2. The vacuum pump was installed to a scroll pump, a turbo molecular pump and a ion pump on the 6-way tee as shown in Fig. 3. The fast closing valve (FCV) sensor was attached for prevent accidents vacuum destruction at end of the pipe.

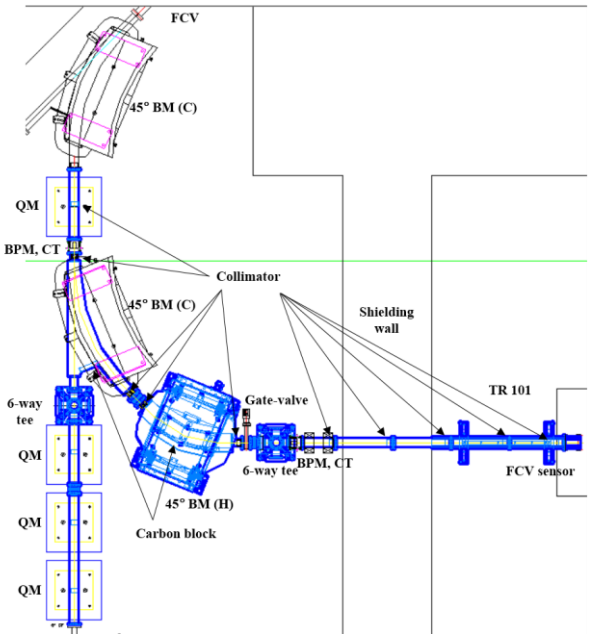

Fig. 2. Schematic of the RI Beamline.

2.2 Beam Transport System

The beam optical system consisted of quadrupole and dipole magnets [2]. The existing beamline are used of 45° bending magnet 2 ea of C-type and RI beamline are used of of 45° bending magnet each one of C and H-type. The parameters of H-type bending magnet is described in Table 1. The beam optics have been designed by the TRACE3D, PARMILA and TRACEWIN code. Results of the beam optics is shown in Fig. 4.

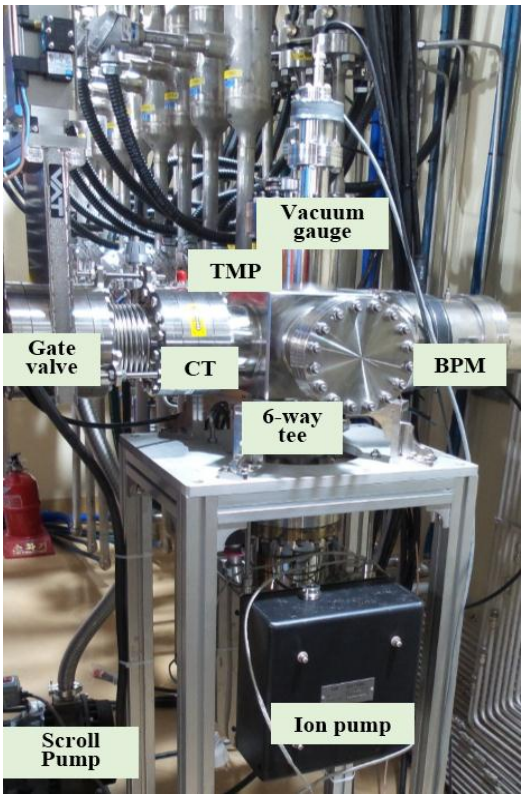

Fig. 3. Photo of the Vacuum and Beam Diagnostic System

Table 1. The Parameters of a Bending Magnet

Magnetic rigidity	TM	1.5
Bending radius	m	1
Bending angle	degree	45
Pole gap	m	90
GFR width	m	100
Field uniformity with GFR	%	0.1
Shape		Rectangular
Type		H magent

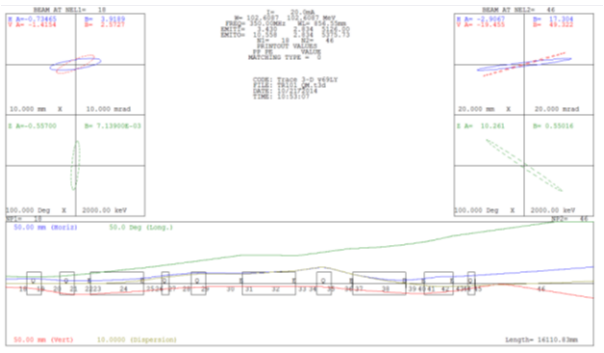
Fig. 4. Result of the Beam Optics.

2.3 Beam Diagnostics System [3]

The beam position monitor (BPM) and the current transformer (CT) was installed to beam diagnostics as form of flange or pipe. Also the blank flange was installed to beam diagnostics of various method at 6-way tee as shown in Fig. 3.

3. Summary

The facility of RI beamline was constructed as shown in Fig. 5. The target transfer equipment is being installed for RI production. The RI Beamline was aligned using the laser tracker, and vacuum leak was not detected by the helium leak detector. This facility is expected to the high value-added medical isotope production and increased utilization of the proton accelerator.


Fig. 5. Before (up) and After (down) Installation of the RI Beamline.

ACKNOWLEDGEMENT

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