

2022 operational report of the Nishina RIBF water-cooling system

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In 2022, the Nishina and RIBF cooling systems were operated for a slightly longer duration than the accelerator. The RIBF cooling system was operated for approximately 70 days, excluding the time of installation which was carried out continuously. Other cooling systems by Nishina (AVF standalone, AVF + RRC, AVF + RRC + IRC, and RILACII + RRC) were operated for approximately less than six months. Except for some minor problems, the cooling systems operated stably, and there were no long-term shutdowns of the accelerator. Complications regarding the SRC vacuum were experienced during the second half of the RIBF operating time, resulting in a cooling system operating time that was less than a year.

The minor problems that occurred are listed below.

- (1) Cooling tower fan failure
- (2) Water leakage from the joint of the cooling pipe
- (3) Decline in purity of cooling water due to water leakage
- (4) Cooling water pump motor bearing failure
- (5) Equipment shutdown caused by momentary voltage drop due to lightning (3–4 times a year)

The afore-mentioned problems occur at approximately the same frequency every year. We experienced only minor complications because of proper periodic maintenance. Figure 1 shows a photograph of the periodic maintenance of the RIBF cooling pump. Figure 2 shows a photograph of the disassembly process of the cooling pump bearing. Periodic maintenance is planned as usual for the long-term suspension of accelerator operation in summer and winter. See the previous for details on the maintenance.

The annual cooling-equipment maintenance budget is extremely low. Maintenance is performed annually within the budget; however, the deterioration of the facilities is inevitable. The commodities and spare parts of the water-cooling pumps that have been used for the past 15 years are not produced anymore and are difficult to obtain. Aging cooling equipment is not only a causes of failure, but also one of the causes of beam instability in accelerators. Managing the costs of maintenance is an important concern for the future.



Fig. 1. RIBF water-cooling pump maintenance (Periodic maintenance).

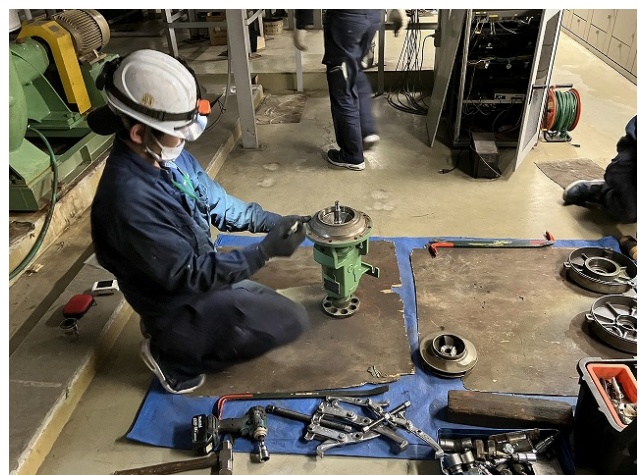


Fig. 2. Pump bearing section disassembly (Periodic maintenance).

Reference

- 1) T. Maie *et al.*, RIKEN Accel. Prog. Rep. **55**, 65 (2022).

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