A.1: Status report on operation of Indus accelerators

Post lockdown, Indus facility was restarted in the month of June, 2020 with two-shift operation. During night hours the subsystems were kept ON in standby mode so that beam filling can be started early in morning shift. Subsequently, after lifting of night curfew by district administration, round-the-clock operation of the facility was resumed with effect from 14th September 2020. Two planned shutdowns of four days each and one for seven days were taken in the months of August, November and December, respectively, for preventive maintenance. Taking all these into account, during the 6-month period from July to December, 2020, the facility was operated in two-shift mode on 71 days and round-the-clock mode on 98 days. It is noteworthy that till August end, the operation of the facility was maintained with reduced manpower in compliance with the guidelines by the department and the district administration for preventing the spread of COVID-19.

The operation of both the machines was largely smooth. All the prescribed safety procedures were followed during operation. Particularly in view of threat due to COVID-19, measures for preventing its spread were followed by the operation staff. In the said period, the beam availability for users was 2830 hours in Indus-1 and 1879 hours in Indus-2. After the start of round-the-clock operation with effect from 14th September, the average beam availability for the beamline users has been more than 21 hours per day in Indus-1 and ~15 hours per day in Indus-2, which is largely in line with the performance of recent years. Figures A.1.1 and A.1.2 show the typical user mode operation of Indus-1 and Indus-2.

In view of travel restrictions due to COVID-19, usage of SR beam at Indus beamlines was mostly limited to samples from external users that were received by courier/post and some in-house users. A few companies from pharmaceutical industry also carried out experiments at the Indus facility. The total number of user experiments carried out at Indus beamlines in this period was 345.

The beam lifetime in both the machines recovered quickly to pre-lockdown values and improved even further. On 25th November, beam lifetime of 93 hours 9 min was recorded in Indus-2 (measured at 100 mA @ 2.5 GeV). Similarly, beam lifetime of more than 9 hours has been achieved in Indus-1. These are the highest numbers of beam lifetime achieved so far in both the machines.

Upgradation/Maintenance activities: Apart from routine preventive maintenance, some of the activities carried out during planned shutdowns are as under:

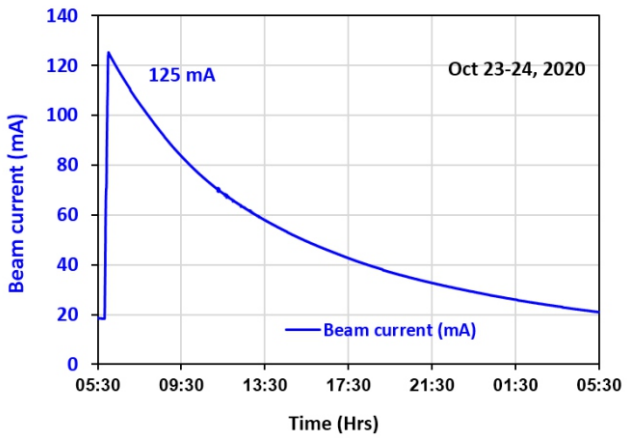

Fig. A.1.1: Typical user mode operation of Indus-1.

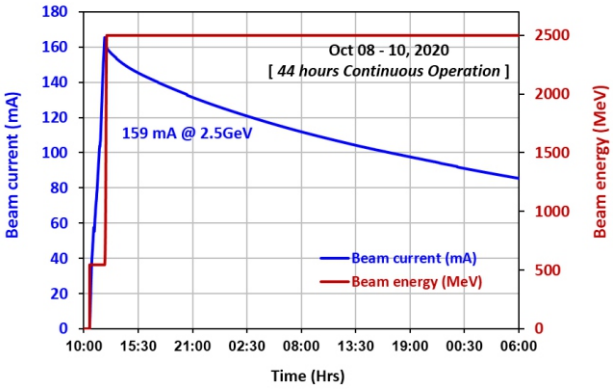

Fig. A.1.2: User mode operation of Indus-2 showing 44 hours of continuous beam operation.

(i) Replacement of all steering power supplies of TL-2 with new ones.

(ii) Automation of 2 out of 4 air handling units (AHUs) of Indus-2 ring by AC cell. The parameters of these AHUs can be set and monitored from a PC in control room. Automation of remaining 2 AHUs shall be taken up in subsequent shutdowns.

(iii) Installation and commissioning of new UPS for Indus-1 UHV system replacing the old one.

(iv) Replacement of PU tubes and fittings in three beamline front ends of Indus-2 with stainless steel tubes and fittings.

All these activities are aimed at improving the availability and performance of the machines.

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A view of Indus Accelerator Complex.