A.1: Status report on operation of Indus accelerators

The Indus synchrotron radiation (SR) sources, constituting a national facility, provided SR beam to the users on round-the-clock (RTC) basis. Both Indus-1 and Indus-2 maintained excellent operational performance during the first half of year 2023 (January - June).

In the said period, both the machines were operated smoothly following the prescribed safety procedures. One planned shutdown of four days was taken in the month of May for preventive maintenance. A relatively longer shutdown of 11 days was taken in February for upgradation of vacuum system of Transport Line-2 (TL-2) and other major activities possible in parallel. Taking this into account, the machine was operated in round-the-clock mode for 165 days during these six months. The beam availability in Indus-1 was 3442 hours (~20.8 hours/day) whereas in Indus-2 it was 2711 hours (~16.4 hours/day). This performance is largely in line with performance in recent years. Indus-2 clocked its best yearly performance ever in terms of beam availability of 5601 hours in the calendar year 2022. Figures A.1.1 and A.1.2 show the typical user mode operation of Indus-1 and Indus-2, respectively.

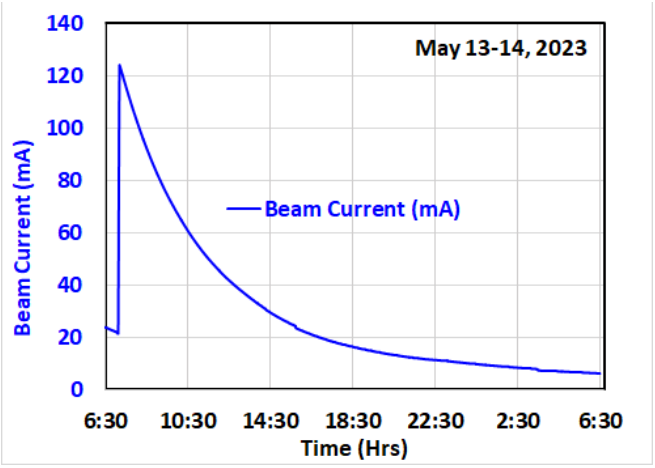

Fig. A.1.1: Typical user mode operation of Indus-1.

Utilization: A total of seven beamlines in Indus-1 and eighteen beamlines in Indus-2 are operational. Users from large number of universities and research institutes carried out experiments at these beamlines. The number of users from pharmaceutical industries is also increasing steadily. Total number of user experiments carried out at Indus beamlines in the reported period was 524.

Machine studies: Experiments for machine studies and improvements were carried out on days specifically reserved for this purpose (total 17 days). Some of the important experiments carried out in Indus-2 are: (a) Broadband impedance measurement experiment, (b) Calculation of alignment offsets of beam position indicators (BPIs) using beam based alignment (BBA) technique, (c) Exercises to address the temperature rise issue of dipole vacuum chambers, and (d) Operation of machine in the orbit having minimized closed orbit distortion (COD).

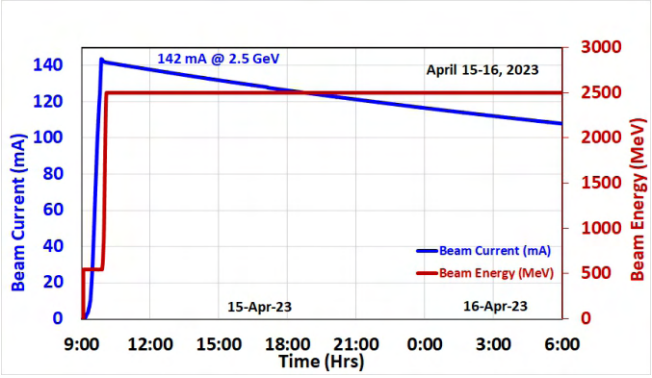

Fig. A.1.2: Typical user mode operation of Indus-2.

Upgradation of vacuum system of TL-2 and other maintenance activities: Upgradation of 25.5 m long vacuum system of TL-2, connecting booster synchrotron to Indus-1 storage ring, was carried out during shutdown taken from 18th to 28th February 2023. The aging effect on the 25 year old vacuum system of TL-2 had started affecting its reliable performance. New vacuum chambers and sputter ion pumps having ConFlat (CF) demountable joints, were installed replacing old ones aimed at reliable operation in years ahead and standardization. More details about this major upgradation work is given separately in report A.8 at page no. 8. Beam injection and filling into Indus-1 was successful on very first day of restart after shutdown due to proper installation and maintaining the working position and orientation of TL-2.

Other major activities carried out during this shutdown were: (a) Upgradation of Motor Control Centre and replacement of electrical panels, both at Indus-2 low conductivity water (LCW) plant, and (b) Upgradation of CAP sub-station.

The above activities were accomplished by the respective teams by working for extended hours due to tight shutdown schedule.

Training qualification and licensing (TQL) programme: The training of 5th batch of operators under TQL programme was completed successfully in the month of April. Under this programme, a total of 39 personnel have been trained and qualified for operation of Indus facility at qualifying levels 3, 4 and 5. The newly trained personnel along with 24 personnel from previous batch have taken over round the clock operation of Indus accelerators with effect from 1st July 2023.

Reported by:
T. A. Puntambekar (tushar@rrcat.gov.in)