

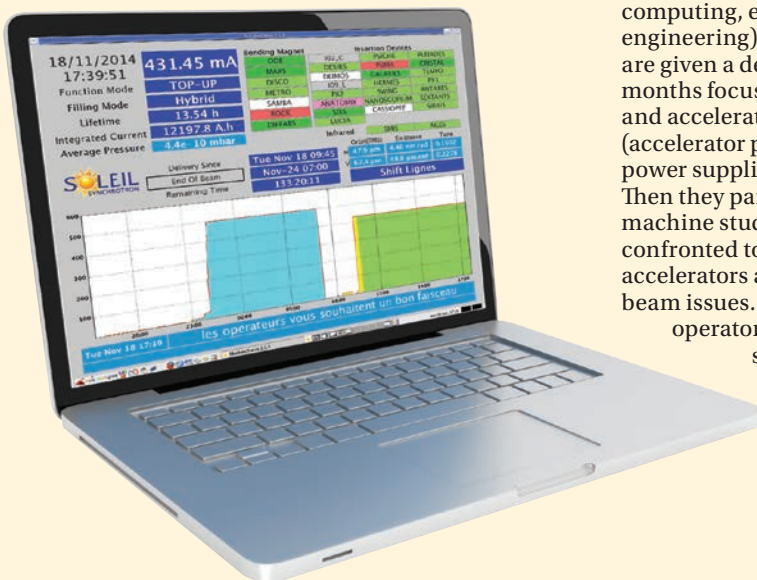
## SPOTLIGHT ON

# The Operation Group, a team at the ve

The operators control the day-to-day operation of the synchrotron. They operate several accelerators and monitor 24/7 all readings to ensure top quality of the beam parameters. They also develop related tools, equipment and software programs. To end they are the first contacts for any safety issue since the control room is a security PC.

**A**t the center of the synchrotron building, in the control room, eight operators are taking turns day and night, seven days a week to ensure the optimum operation of the accelerators. They are managed by two engineers, and are part of the « Sources and Accelerators » Division of SOLEIL. During the machine-dedicated shifts, they give their support to the colleagues who are working with the accelerators. During the users' shifts, they work in pairs with a part-time operator who is a member from any SOLEIL division and participates to the whole operation. The operators ensure the set-up of the beams, and monitor all the parameters from the numerous devices located all around the accelerators: the LINAC, the Booster, the Storage Ring down to the beamline front-ends. They stand ready to respond to the slightest alert. The

The Machine Status provides real-time information of the electron beam and beamline front-ends.



overall task is impressive according to the fact that almost 3 000 parameters are critical, i.e. are likely to cause a beam disturbance or even loss. If necessary, they can call on-duty SOLEIL experts who will come on-site and repair the malfunctioning equipment. Operators also play an important role in the delivered beam quality (position, dimension, intensity stability...), and in particular in the availability of the beam, which are essential parameters to ensure an efficient operation of a synchrotron light source.

This task of driving the accelerators at SOLEIL represents the largest part of their working time.

## An in-house training to acquire a specific know-how

Operators are hired with various backgrounds (physics measurements, industrial computing, electronics or electrical engineering). At their arrival, they are given a dedicated training of 6 months focused on the equipment and accelerator operation (accelerator physics, magnets, power supplies, vacuum system...). Then they participate to some machine studies where they are confronted to real tunings of the accelerators and solving typical beam issues. The newly hired operator will then start

sharing several shifts with a more experienced one before leading a shift by himself.



## Facing an incident, analyzing, solving, anticipating

The beam in the storage ring is stable; no alert on the horizon. Suddenly, a crisis situation occurs. The beam is interrupted. To be solved, the origin of the problem must be first identified. The reaction speed is very crucial. If the incident is minor or its solution is already known, it will take only 20 minutes for the operator to deliver a new beam with the nominal characteristics. If the incident is more complex or of a new type, a precise analysis is performed, in particular on the 15 000 parameters stored today permanently in the

ry heart of the synchrotron performances



databases. Every fault is recorded and analyzed a posteriori. The overall goal is to identify the cause of any incident, and the actions to implement in order to avoid its reappearance in the future.

The operator also relies on procedures prepared and optimized together with all the technical groups, and on several applications available for postmortem diagnostics. In case it is necessary to enter into the accelerator tunnel to solve the problem, the operator is responsible for the control access entrance of the involved colleagues.

While solving the incident, the operator keep informed the experimental hall coordinators and updates the “Machine status” on the progress of the repair and the foreseen return time of the beam. The “Machine status” is a screen available in several places at SOLEIL and accessible from the SOLEIL webpage giving the status of the electron and photon beams in real time. The following-up of any shift is recorded in an electronic logbook filled in by the operators and available online for all SOLEIL staff.

### **Technical developments to improve the operation efficiency**

The operators perform technical work of which first goal is to improve the accelerator operation. This work is performed either during the users’ shifts while they are monitoring the beam parameters in the control room or during the period of normal working hours in their offices. The operation group has developed about half of the applications used in the control room using several software packages (GlobalSCREEN, LabVIEW, Python...). These tools provide answers to operation needs and have various goals: continuous

The entire  
Operation Group.

In the control room, operators are monitoring thousands of parameters on dozens of control screens.



surveillance and control of equipment, automatic control of the Top-Up injection in the storage ring, operation statistics review... Operators are also in charge of the commissioning and maintenance of several technical devices such as: the temperature measurement system using PT100 probes, the water leakage detection system, the cameras and the video-distribution in the tunnels, the signal multiplexing of various screens...

### Always present, with or without beam!

The activity in the control room is remaining dense even during the shutdown of the accelerators. All the technical interventions are coordinated in the control room and follow a precise schedule established by the two engineers of the group. The operators are also daily responsible for the site safety (fire, first aid...), in close relation with the Safety Group of SOLEIL. At night especially, the operator in the control room must be able to face an emergency situation, whether it is a human or a material one. Operators are also the preferred contact point for comments or



During machine shutdown, operators supervise each intervention in the tunnels of the accelerators.

questions about the behavior of the photon beams of the beamlines (characteristics of the beam, stability, undulator control, front-end...). Finally, the operation group handles a broad variety of missions and needs to keep a

constant vigilance to maintain SOLEIL performance at the highest level.

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