

ANSTO electron microscopy building

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Modern scanning and transmission electron microscopes are capable of extremely high-resolution performance. However, they must be installed in suitable laboratory environments to achieve their design specifications [1, 2]. Existing electron microscopy facilities at ANSTO are housed in a ~60 year old general-purpose building. The laboratory environment in which they are currently located compromises their performance due to external influences such as stray electromagnetic fields, acoustic and mechanical vibrations, high airflow, and excessive cooling water and air temperature variations.

A building specifically designed and constructed to provide the optimum environment is nearing completion and will allow ANSTO's considerable investment in electron microscopes to operate at their full potential thereby maximising their scientific impact. The facility will be suitable for future new generation high-end electron microscopes when current instruments are replaced over coming years.

Consultation with staff at a number of similar facilities identified key design features required to optimise the instrument laboratory environment. These include independent vibration isolated ~1m thick fibre-reinforced concrete slabs for each laboratory, chilled ceiling panels for low air flow precision temperature control, minimal use of metal in the main building and location of air conditioning, electrical, chilled water and compressed gas facilities in a separate plant room. Laminated wooden portal frames support the outer structure of the main building. Instrument labs are constructed from concrete Besser blocks reinforced with fibreglass rod, which are also used to reinforce the corridor slabs.

The building is divided into separate zones (Fig. 1) ranging from lowest environmental specifications in the entrance foyer/office area (orange), through progressively higher specifications

in the service corridors, specimen preparation lab and air locks (yellow) to the most stringent specification in instrument labs (blue).

Electrical wiring distribution is designed to minimise electromagnetic fields at the microscope column positions within each of the labs. Active field compensation is not being installed initially, however it can be retrofitted should the need arise.

Construction is well advanced (Fig. 2) and should be completed by the end of February 2015. Relocation of the instruments is anticipated by the end of June 2015.

References

- [1] M.A. O'Keefe et al, *Microscopy Today* May (2004) 8-14.
- [2] D.A. Muller and J. Grazul, *Journal of Electron Microscopy* **50** (2001) 219-226
- [3] The author gratefully acknowledge Nestor Zaluzec from the Electron Microscope Center Argonne National Laboratory, Peter Miller and others from Monash Centre for Electron Microscopy, and David Mitchell and others from University of Wollongong Electron Microscopy Centre for useful discussions.

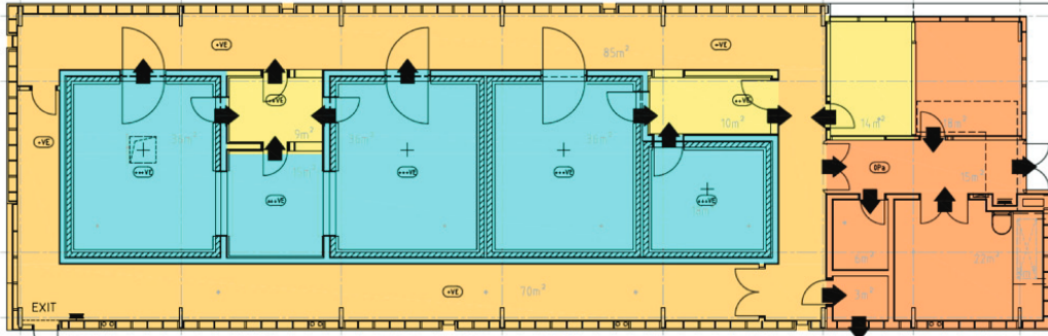


Figure 1. Layout of main building. Instrument laboratories (blue) have very stringent environmental constraints compared with the entry area at right (orange).



Figure 2. Construction status as of December 15th, 2014. Design of the main building minimises use of metal. Air conditioning, chilled water, electrical and compressed gas are supplied via service trenches from the plant building at lower left.