THE AUSTRALIAN SYNCHROTRON PROJECT - UPDATE

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Abstract

The Australian Synchrotron – a synchrotron light facility based on a 3-GeV electron storage ring – is under construction at a site adjacent to Monash University in the metropolitan district of Melbourne. Site preparation started in September 2003 and project completion is scheduled for March 2007. In this paper we present an overview of the facility and discuss progress to date in meeting this very aggressive schedule.

FACILITY OVERVIEW

The Australian Synchrotron is being constructed as one of the current generation of medium-energy synchrotron light source facilities. It is based on a 3 GeV double-bend achromat lattice that has a periodicity of 14, a circumference of 216.0 m, and an emittance that can be varied between 7 nm-rad and 16 nm-rad. The storage ring is served by a full-energy injection synchrotron and is housed in a circular building that has a diameter of 112 m. The building can accommodate insertion device (ID) beamlines of up to 40 m from the centre of the ID to the sample. Figure 1 shows the layout of the facility, fig. 2 shows the optical functions of one cell of the storage ring, and fig.3 shows a fish-eye view if the inside of the building taken on 8 June 2004. Table 1 lists the basic parameters of the storage ring; more details regarding the storage ring can be found in references 1 - 3.

PROCUREMENT PROCESS

The Australian Synchrotron facility is being built on a "green-field" site in Clayton, Victoria, on land donated by, and adjacent to Monash University. The funding agency for the project is the Victorian Government (Department of Innovation Industry and Region Development), with the delivery team acting within Major Projects Victoria, a division of the Department of Infrastructure. The total budget, including funding for the initial suite of beamlines is A$ 206.3 M.

The technical facilities are being specified by a relatively small team of engineers and physicists, and being built and installed almost entirely by industry. The commercial procurement process for the project (in line with Victorian Government guidelines) proceeds as follows:

- Requests for Registration of Interest (ROI) for a given procurement package are issued. The ROI package contains sufficient technical detail to enable prospective tenderers to judge whether their capabilities match the requirements – both technically and commercially.
- Tenderers are pre-selected from the ROI list.
- The pre-selected tenderers are issued with a draft Request for Tender (RFT) for comment, then with the final RFT.
- After tender submission preferred tenderers (usually at most two) are selected using a "value for money" approach – the lowest tender price does not necessarily move through to the next phase.
- The project team then enters into clarification meetings with the preferred tenderers to ensure that there are no misunderstandings between the two parties, and that all issues (both technical and commercial) are resolved prior to contract.
- After these discussions the tenderer(s) are asked to submit a Supplementary Price Proposal.
- The final choice of partner is selected, and the contract awarded.

At the time of writing the contracts for many of the major accelerator systems have been awarded, or are moving through the process. Table 2 details this progress.

Table 1: Storage Ring – Basic Parameters

Energy	3.0	GeV
Circumference	216.0	m
Periodicity	14	
Natural emittance ($\eta^* = 0.0$ m) ($\eta^* = 0.24$ m)	16 7	nm-rad
Betatron tunes, ν_x / ν_y	13.3 / 5.2	
Natural chromaticities, x/y	-28 / -27	
Relative energy spread, $\Delta E/E$	0.001	
RF frequency	500	MHz
RF Voltage	3.0	MeV
Energy loss/turn (bends only)	932	keV
Injection energy	3.0	GeV

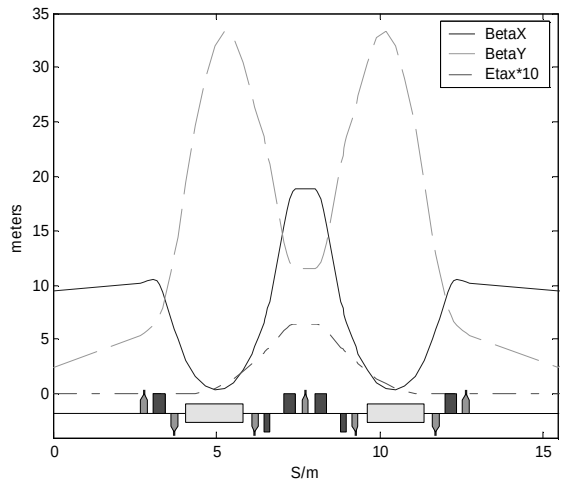

Figure 2: Optical Functions of the Storage Ring Lattice.

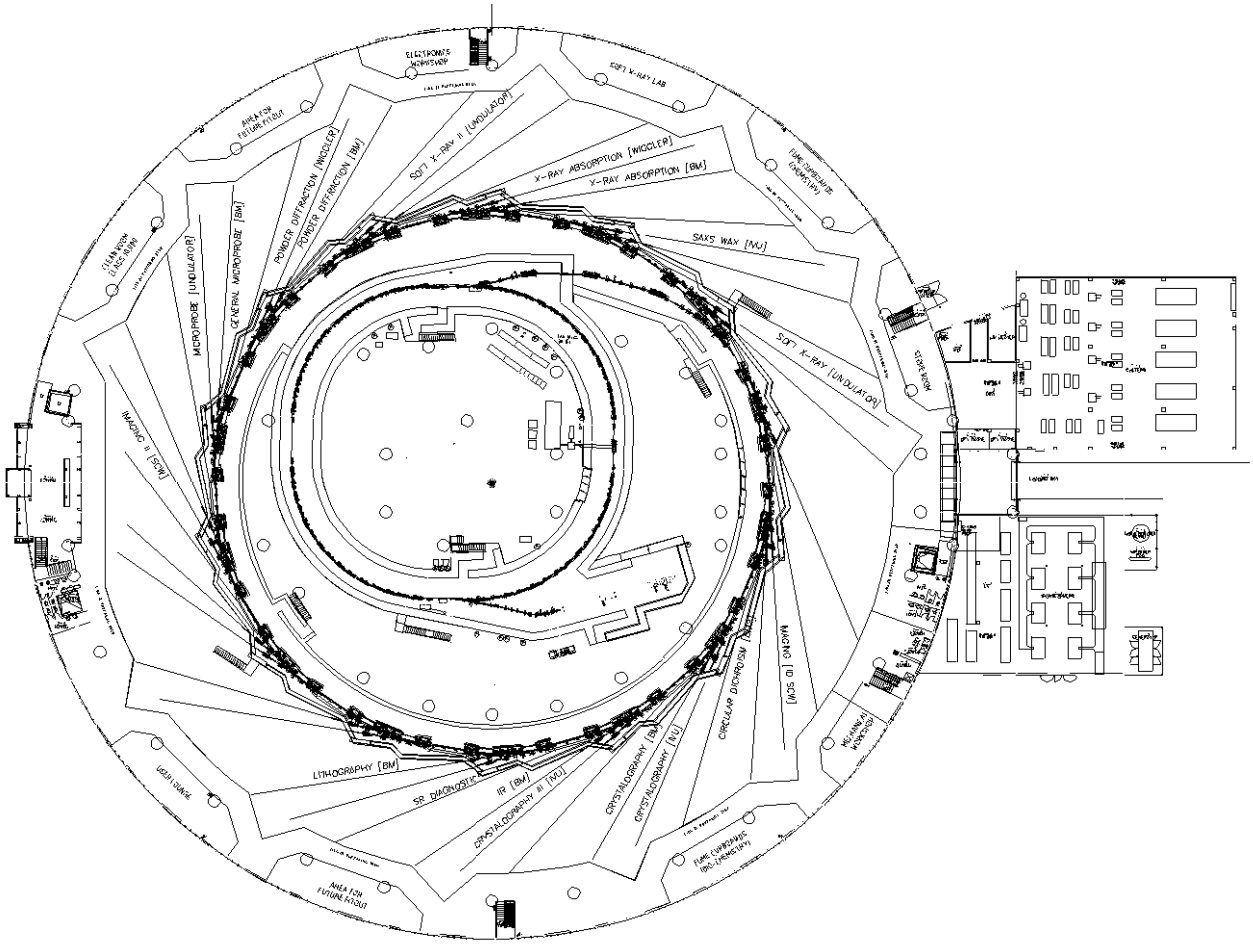

Figure 1: Layout of the Australian Synchrotron Facility.

Table 2: Major Subsystems for the Australian Synchrotron

Sub-system	Contractor	Award Date	Completion Date
Injection System	Danfysik	16 December ‘03	1 April ‘06 *
SR Magnets	CMS Alphatech/ Buckley Systems	25 March ‘04	30 November ’05 *
SR Magnet Power Supplies	TBD	1 October ’04 *	15 December ’05 *
SR Cabling	TBD	27 October ‘04 *	25 February ’06 *
SR Vacuum Vessels	FMB (Berlin)	26 April ‘04	25 January ’06 *
SR RF System	Toshiba	28 June ‘04	31 March ’06 *
SR Girders and Pedestals	TBD	27 August ’04 *	15 February ’06 *
Front-ends	TBD	26 November ’04 *	1 February ’06 *

* predicted dates

BEAMLINES

It is anticipated that there will be nine beamlines supported by initial funding for the Project. They are detailed in the "National Science Case for the Initial Suite of Beamlines", that can be accessed at: http://www.synchrotron.vic.gov.au/content.asp?Document_ID=1265 Of these beamlines it is expected that at least four will be at an advanced stage of commissioning at the hand over to operations in 2007. The four selected beamlines will serve:

- Protein Crystallography from a bend-magnet source
- Powder Diffraction from a bend-magnet source
- EXAFS using a wiggler
- Soft X-ray microscopy using an undulator, most likely an EPU

The design objectives for each of the beamlines are developed by the user community. Their concept designs will be reviewed by subject-expert panels prior to finalisation of design/performance specifications. The contract activities will be responsibility of the MPV delivery team.

Contract activity for the beamlines and insertion devices will start in September 2004, and it is anticipated that beamline commissioning will commence in December 2006.

SUMMARY

The Australian Synchrotron is an ambitious technical project being undertaken with a relatively small staff (currently 30 people total), to be built in a short (four year) time frame from first funding to project completion. In order to achieve this we are making extensive use of specialist subject-area consultants, and design / supply / installation / design performance demonstration contracts for all major subsystems. To date the building contract is on schedule for completion in February 2005. Installation of the accelerators will commence in April 2005, and commissioning of the injection system should start in August 2005. All the major storage ring subsystems are being ordered with the anticipation of first beam in the storage ring in June 2006.

REFERENCES

[1] G. LeBlanc, M. Boland, and E. Tan, "The Australian Synchrotron Project Storage Ring", these proceedings.

[2] E. Huttel, W. Barg, A. Jackson, B. Mountford, "The Vacuum System for the Australian Synchrotron", these proceedings.

[3] E. Huttel, A. Jackson, G. LeBlanc, J. Tanabe, "The Storage Ring Magnets for the Australian Synchrotron", these proceedings.

Figure 3. A view of the interior of the facility taken from the mezzanine floor (June 2004).