



Terms of Reference (TOR)

Technical Consulting Service for Construction of the Siam Photon Source II (SPS-II), a 3-GeV Synchrotron Light Source Facility

1. Introduction

Synchrotron Light Research Institute (SLRI) plans to construct a new synchrotron light source, Siam Photon Source II (SPS-II), in the coming years. The new light source has been designed with a beam energy of 3.0 GeV, a beam current of 300 mA and a beam emittance below 1 nm-rad. The machine consists of a 270 MeV injector linac, a 3.0 GeV booster synchrotron and a 3.0 GeV storage ring installed in the same tunnel as the booster synchrotron. The SPS-II is planned to open for users in 2034.

SPS-II detailed design report has been prepared by SLRI to include the detailed design of lattice and all components of the linac, storage ring, booster synchrotron, beam transport lines, as well as the details of survey and alignment network, control system, utility system, radiation protection and shielding. External reviews of the design by experts in the field are essential to ensure that SPS-II machine is designed with optimal parameters and relevant technical aspects are considered.

2. Objectives

The objectives of the technical consulting services are to provide SLRI with appropriate technical advice and assistance to achieve the efficient and proper preparation and implementation of the SPS-II project. This consultation encompasses the design, prototype development, production, installation, and commissioning of the SPS-II machine.

3. Duration

Within 360 days after the contract signing date.

4. Scope of works

The technical consulting services under this contract will primarily support activities during the first phase of the SPS-II project construction, which includes the

detailed accelerator design, prototype development and testing. The consultant's responsibilities include reviewing and providing suggestions in the following areas:

1. Review and provide technical recommendations on the Detailed Design Reports based on the revised 270 MeV linac, including evaluation and input on the detailed design of:
 - a) Low-energy Beam Transfer Line (LBT)
 - Lattice design and simulation
 - Magnet system design and simulation
 - Power supply system design
 - Mechanical positioning system design
 - Vacuum system design and simulation
 - Survey and alignment design
 - Utility system design
 - b) Booster Ring (BR)
 - Lattice design and simulation, including errors and close orbit correction, dynamic aperture and imperfection, booster ramping and related issues
 - Magnet system design and simulation
 - Power supply system design
 - Mechanical positioning system design
 - RF system design
 - Vacuum system design and simulation
 - Survey and alignment design
 - Utility system design
 - c) High-energy Beam Transfer Line (HBT)
 - Lattice design and simulation
 - Magnet system design and simulation
 - Power supply system design
 - Mechanical positioning system design
 - Vacuum system design and simulation
 - Survey and alignment design
 - Utility system design
 - d) Storage ring
 - Vacuum system design and simulation

2. Prototype testing
 - a) Vacuum chamber prototype
 - b) Measurement of magnetic fields in partial prototype magnets
3. Review and provide recommendations on engineering design
 - a) 3D design and manufacturing drawings of vacuum chambers
 - b) 3D design and manufacturing drawings of magnets and support
4. Review and provide recommendations on technical specifications of LBT, BR, and HBT

5. The consultant's team and input

The proposed services under this Terms of Reference shall be carried out by a consultant with much experience in the design and construction of synchrotron light sources. Key professionals, estimated input, and qualifications are listed in Table 1.

Table 1 Input and qualifications of key experts

Key expert	Expertise	Preferred qualifications
Team leader/project manager	System integration or Insertion devices	Education: PhD Experience: More than 16 years
Assistant project manager	Integration of Electromagnet System	Education: PhD Experience: More than 15 years
Assistant project manager	Beam dynamics Booster lattice design	Education: PhD Experience: More than 15 years--
Beam dynamics specialist	Beam instability Beam dynamics High Energy Transport Line	Education: PhD Experience: More than 11 years
	Beam dynamics Low Energy Transport Line	Education: Master Degree Experience: More than 11 years
RF system specialist	RF Electronics and feedback LLRF System	Education: Master Degree Experience: more than 11 years
	RF system stability theory RF simulation	Education: PhD Experience: more than 11 years
Power Supply	System integration of AC/DC power supply	Education: Master Degree Experience: more than 11 years
	AC/DC power supply	Education: Master Degree Experience: More than 11 years

	Pulse power supply	Education: Master Degree Experience: More than 11 years
Magnet system specialist	Magnet system Insertion device	Education: PhD Experience: More than 11 years
	Mechanical design	Education: Master Degree Experience: More than 11 years
	Magnet simulation	Education: Master Degree Experience: More than 11 years
Precision Mechanical Engineering specialist	Mechanical positioning system Survey and alignment	Education: Master Degree Experience: More than 11 years
	Precision machinery Mechanical vibrations	Education: Master Degree Experience: More than 11 years
Vacuum system specialist	Vacuum system practice and design	Education: PhD Experience: More than 11 years
	Vacuum chamber construction	Education: Master Degree Experience: More than 11 years
	Interlock for vacuum system	Education: Master Degree Experience: More than 11 years
Utility specialist	Architecture Fire Safety	Education: Master Degree Experience: More than 11 years
	Power or Electricity	Education: Master Degree Experience: More than 11 years
	System control	Education: Master Degree Experience: More than 11 years

6. Deliverables and payments

The payment will be made within 15 days upon acceptance of deliverables as specified in Table 2.

Table 2 Deliverables and payments

Deliverable	Delivery date	Payment
First progress report covering scope of work item 1.	Within 120 days after effective date of contract	30%
Second progress report covering scope of work item 2.	Within 240 days after effective date of contract	30%
Third progress report covering scope of work item 3 and 4.	Within 360 days after effective date of contract	40%

7. Budget

A total budget is 3,500,000 THB (Three million five hundred thousand Thai Baht)

8. Responsible Agency

Synchrotron Light Research Institute

111 SirinthonWitchothai Building, University Avenue, Muang District,
Nakhon Ratchasima 30000, THAILAND

Signature.....  Purchaser
Miss Porntip Sudmuang