

**INDIAN INSTITUTE OF TECHNOLOGY KANPUR**  
Department of Electrical Engineering

Enquiry No.: - EE/SA/INQ/2017-18/12

Opening Date: - 24 Oct 2017

Closing Date: - ~~13 Nov 2017~~ ~~20 Nov 2017~~ 24 Nov 2017

**Sub: Inquiry for Microgrid HIL Test Bed**

We are interested in purchase of hardware-in-loop (HIL) microgrid test bed. Our organization is an educational institute of repute and liable to get **educational discount** from the manufacturer / supplier. Please specify the discount separately.

There will be **two steps in the tender process**:

1. Technical specifications should be put in one sealed envelope. SPECIFY company name and model number, and attach detailed technical specification for each part/component. Must also include detailed technical brochure.
2. Financial details i.e. budget quotation should be in a separate sealed envelope. This quotation will not be opened if technical details of the product do not match with our specifications.

Please send your **Sealed Quotation** to the undersigned for the same. The envelope should be marked as **“Quotation for HIL Microgrid Test Bed”**

Item required	Specifications	Quantity
<b>Main Microgrid HIL Test Bed</b>	<ol style="list-style-type: none"> <li>1. Main processor(s): 3 x FPGA processors</li> <li>2. Co-processor(s): 3 + 3 CPUs</li> <li>3. Capability:               <ol style="list-style-type: none"> <li>a. Controller HIL capacity of up to 24 multilevel converters, with simulation time-step of 500ns.</li> <li>b. Power system simulation capacity of up to 450 buses (3ph), with simulation time-step of 10us.</li> </ol> </li> <li>4. Analog I/O: 288 channels - 192 Analog outputs, 96 Analog inputs +/- 10V, 1 MSPS update rate, 16-bit resolution, 1% accuracy</li> <li>5. Digital I/O: 384 channels - 192 Digital outputs, 192 Digital inputs DI oversampling resolution 20ns, PWM modulator resolution 7ns, +/-24V ESD protection</li> <li>6. Connectivity: Ethernet/IP, Modbus, IEC61850, CAN RS232, Time Synchronization</li> <li>7. Permanent (lifelong) software / tool-chain license, with:               <ol style="list-style-type: none"> <li>a. Signal Processing toolbox license</li> <li>b. Power Systems toolbox license</li> <li>c. Microgrid library toolbox license</li> <li>d. Communication toolbox license</li> </ol> </li> <li>8. Library should have most of the power electronics, power systems and microgrid components. Should provide support in case of new components are desired, which are not available in the library.</li> <li>9. Should allow for automation / scripting using python</li> <li>10. The Test Bed should be housed in a Cabinet. The cabinet should have sufficient empty space for future expansion.</li> <li>11. Power Supply: Single-phase 230V, 50Hz nominal.</li> <li>12. Connectivity: Ethernet / IP, USB, CAN, RS232</li> <li>13. Supported communication protocol: Modbus, IEC61850</li> <li>14. Should include commissioning and at-least 2-day on-site training</li> </ol>	1

	<p>15. Should support accessories for allowing hardware-in-loop realization and testing of microgrid. This is important for realizing microgrid test bed. Clearly provide quotations of the accessories, which could be integrated with the product, such as relays, DSP cards, DG controllers, inverter controllers etc (useful for microgrid applications)</p> <p>16. Must include the interface cards / PCBs etc to directly interface the TI Make TMS320F2808 controlCARD and TI Make TMS320F28335 controlCARD with the Main Microgrid testbed to achieve controller-in-loop capability using these controlCARD/s. The interface card should have built-in XDS100 Emulator or equivalent for programming the aforementioned controlCARD/s.</p> <p>17. Should have at least 5 years of warranty, annual maintenance contract (AMC) and technical support. Warranty must include/cover parts, labour and transportation cost. (in case of extended warranty, appropriate price should be clearly mention in the quotation)</p> <p>18. Any update in the software and firmware released by the manufacturer within the technical support / AMC period (next 5 years) should be provided to IITK without any additional charge / fee.</p>	
<p><b>Additional HIL Capability Box</b></p>	<ol style="list-style-type: none"> <li>1. Processor: Up to 4 cores</li> <li>2. Capability: Simulation step time of 1<math>\mu</math>s, Switching frequency of 200kHz for power electronic circuit</li> <li>3. Analog I/O: 16 inputs and 16 outputs, 16 bit resolution, <math>\pm 10V</math>, 1MSPS, <math>\pm 24V</math> ESD protection</li> <li>4. Digital I/O: 32 inputs and 32 outputs, 20ns IO update/sampling rate, <math>\pm 24V</math> ESD protection</li> <li>5. Connectivity to computer: Both, USB and Ethernet</li> <li>6. Should be compatible with the “main HIL microgrid test bed”, mentioned above</li> <li>7. Power Supply: Single Phase 230V, 50Hz nominal</li> <li>8. Permanent (lifelong) software / tool-chain license</li> <li>9. Should have at least 5 years of warranty, annual maintenance contract (AMC) and technical support. Warranty must include/cover parts, labour and transportation cost. (in case of extended warranty, appropriate price should be clearly mention in the quotation)</li> </ol>	<p>2</p>

**Note:**

1. In case you are not manufacturer of the product, your quotation shall contain Authorization Letter from manufacturer.
2. Quotation must be valid for minimum of 90 days.
3. Delivery period should not be more than 12 weeks. And delivery should be FOR IIT Kanpur.
4. IIT Kanpur is exempted under 51/96 from payment of IGST. Suitable CDEC certificate can be provided by IIT Kanpur if required.
5. Send complete detail / brochure of the product(s).
6. Payments terms: Letter of credit (LC)
7. The Institute reserves the right of accepting and rejecting any quotations without assigning any reason.

Sandeep Anand  
Department of Electrical Engineering, IIT Kanpur  
Kanpur, UP – 208016, India