भारतीय प्रौद्योगिकी संस्थान (भारतीय खनि विद्यापीठ), धनबाद
धनबाद, झारखण्ड, भारत, पिन – 826004

INDIAN INSTITUTE OF TECHNOLOGY (INDIAN SCHOOL OF MINES), DHANBAD
DHANBAD, JHARKHAND, INDIA, PIN - 826004

(An Institute of National Importance under Ministry of Education, Govt. of India)

No. EC-INS-287-24-25 **Date: 07.03.2025**

Request for Quotation

To,
M/s Silvaco Singapore Pte Ltd. 3 International
Business Park, 04-32 Nordic European Centre,
Singapore 609927
Email: qingda.zhao@silvaco.com, sgsales@silvaco.com

Subject: Supply and Installation of Silvaco Tcad Omni Bundle

Sirs
Indian Institute of technology (Indian School of Mines), Dhanbad is interested for the purchase of the materials/ equipment listed below:

Sl. No.	Tender No.	Particulars	Required Quantity
1.	EC-INS-287-24-25	Silvaco Tcad Omni Bundle	01(10 users)

INSTRUCTIONS:

1) Please attach relevant technical literature of the item.
2) Warranty: **5 Years**
3) Price Basis: FOR IIT (ISM) Dhanbad
4) Please attached OEM Certificate.
5) Mode of Delivery and Installation: Through online mode.
6) ***Please attach a certificate that the quoted price is not more than that of any other Govt. organization/ institution in India. This has to be mentioned in the offer letter clearly.***
7) The rates should be quoted for each item separately as per price schedule attached as annexure V.
8) Your tender must be **valid for a minimum of 180 days** from the date of opening of tender.
9) The items/materials are required to be delivered within 30 days, late delivery may not be accepted.
10) Full details of items/materials offered should be given in the tender along with supporting & relevant literatures/ Technical Literature.
11) Tender may please be submitted ***in sealed cover only superscribed with Enquiry No. EC-INS-287-24-25 latest by 28.03.2025.***
12) The offer must be submitted in the office of Deputy Registrar (Purchase & Stores), IIT (ISM), Dhanbad– 826004 (Jharkhand, India) only. Please send your offer by Registered Post/ Speed Post/ Courier along with Courier receipt. Tender/ quotation will be received during IIT (ISM) Dhanbad working hours only (i.e. Monday to Friday). At any circumstances by hand delivery is not acceptable. Late or delayed tenders shall be summarily rejected. Bids sent through Email/Fax or submitted in unsealed cover(s) will not be accepted and such bids will be treated as non-responsive bids.

13) **EMD:** You are required to submit an EMD of **Rs.90,000/-** in form of Demand Draft in favour of Registrar, IIT (ISM) Dhanbad payable at Dhanbad. EMD can also be deposited in the form of a Term Deposit Receipt/Fixed Deposit Receipt/Bank Guarantee drawn in favour of Registrar, IIT (ISM) Dhanbad.

14) **Performance Security:** To ensure due performance of the item, you are required to submit a performance security. The performance security should be furnished within 21 days of the award of supply order. Performance security should be for an amount of five percent (5%) of the value of the supply order. Performance security may be furnished in the form of a Demand Draft/ Fixed Deposit Receipt / Bank Guarantee from a commercial bank in favour of Registrar IIT (ISM) Dhanbad, payable at Dhanbad. Performance security should remain valid for a period of **62 Months** from the date of final acceptance/Installation. The performance security will be refunded without any interest, provided that the performance is satisfactory.

15) Any other information that you may like to obtain, you are free to contact IIT (ISM) Dhanbad before submission of tender.

16) IIT (ISM) Dhanbad reserves the right to accept and/or to reject any/all tenders without assigning any reason.

17) **Payment**: Payment shall normally be made within 3-4 weeks subject to satisfactory supply, inspection, installation/commissioning/ satisfactory services & acceptance and on submission of pre-receipted tax invoice, delivery challan, warranty certificate and installation report in triplicate (as per Purchase Order Terms) of the ordered materials/items. ***Advance payment is not admissible.***

18) **Liquidated damages (LD):** If a bidder fails to deliver the item or any part thereof within the period prescribed for delivery, the Institute shall be entitled to recover as liquidated damages a sum equivalent to 1% (one percent) per week of the purchase order. The total damages shall not exceed 5% (five percent) of the value of the purchase order.

19) **Refund of EMD:** EMD will be refunded without any interest on receipt of performance security. If supply order is placed and you fail or refuse to supply the item, in such case the EMD will be forfeited.

20) You are requested to fill the enclosed **Annexures.**

21) **Please attach purchase order copies of the same equipment which you have supplied to any other Govt., public sector and autonomous institutions.**

For and on behalf of
IIT(ISM), Dhanabd

Deput Registrar (P&S)
IIT(ISM), Dhanbad

Annexure – I

TECHNICAL SPECIFICATIONS OF *SILVACO TCAD OMNI BUNDLE*

1. Process simulation capability

Sr No.	Item	Description
1.1	Semiconductor Fabrication Technologies	The TCAD should be capable of fast and accurate 1D, 2D and 3D simulations of all critical fabrication processes used in modern semiconductor technologies including: • RF Devices: HEMT, FET, HBT, BJT, JFET, IGBT, SOI, TFT, Fin-FET etc. • Multiple Gate FETs (MuGFETS): FinFET, FlexFET, Gate-All-Around (GAA) FETs, etc. • IR detector and sensor devices. • Solar cells. • Primarily focused on compound semiconductors.
1.2	Processes	It should possess advanced physical models for following processes. • Doping diffusion including rapid thermal annealing (RTA). • Ion implantation • Oxidation with stress effects • Physical etching and deposition, e.g. CVD, PVD, Plasma etching, RIE, etc. • Epitaxy and stress formation and strain/ stress engineering. • Lithography. This process models shall be capable of • Interactive visualization of 2D structures and distributions as well as 1D cross-sections. • Run-time extraction of process parameters • Optimization of process flow and calibration of process models. • Easy creation and modification of process flow input decks including automatic control of layout GDS2 mask sequences.
1.3	Process Materials	It should be capable of providing process simulation for a variety of materials used in the semiconductor industry like Silicon, III-V, III-N, II-VI, IV-IV but not limited to: • Silicon Carbides (SiC), Compound Semiconductors, e.g. GaN, AlGaN, GaAs, AlGaAs, InP etc. • Silicon, Silicon Germanium (SiGe). • 2D Materials • All Schottky and Ohmic contact metals and dielectric/insulating materials used in Semiconductor Nano electronics device technology.

2. Device simulation Capabilities

Sr No.	Item	Description
2.1	Device Simulation Capability	The device simulation software should be capable of: • Analyzing and characterizing the electrical, optical and thermal performance of various devices in 2D and 3D. • Fully integrated with process simulation software, comprehensive visualization package and extensive database of examples. • Material parameters and physical models for a wide range of Silicon, III-V, III-N, II-VI, IV-IV like compound semiconductor materials and polymer/organic based technologies. • Compatible with smartSPICE and other device simulators (SPICE).

Annexure – I

TECHNICAL SPECIFICATIONS OF *SILVACO TCAD OMNI BUNDLE*

3. Modules:

Sr No.	Item	Description
3.1	Physics based Models	• It should be cater physics based models like drift-diffusion, energy balance transport equations, surface/ bulk mobility, recombination, impact ionization and tunneling models. • The capabilities of all the physical models should be extended to deep submicron devices. • The models should be capable to calculate all measurable electrical parameters which include gate and drain characteristics, sub-threshold leakage, substrate current and punch through voltage, breakdown behavior, kink and snapback effects, low temperature and high- temperature operation, RF/AC parameters and intrinsic switching times. • Boltzmann and Fermi Dirac statistics with band gap narrowing. • Interface to Drift-diffusion and energy balance transport models with advanced mobility models. • Trap dynamics for DC, transient and AC. Models for Shockley- read -hall, optical and Auger recombination, impact ionization, band to band tunneling and Ohmic and Schottky contacts. • DC, AC/RF and transient device characteristics can be simulated. • Calculated DC characteristics include threshold voltage, gain, leakage, punch through voltage and breakdown behavior. • Calculated RF characteristics include cut-off frequency, s-, y-, h-and z parameters, maximum available gain, maximum stable gain, maximum frequency of oscillation and stability factor. • Inclusion of the models for graded and abrupt heterojunctions and simulates binary structures such MESFETS, HEMT's etc. DC, AC/RF and time -domain solutions for general nonplanar homojunction and heterojunction semiconductor device structures. • It should have provision for Monte Carlo simulation. • Interface provision that allows user-defined composition dependent, models and material parameters. • This module should be capable for 2D and 3D device simulation. • Simulator should be functional at atomic resolution for 2D and 3D materials.
3.2	Nanoelectronics	• Should be capable of simulating devices below 10 nm. • Device simulator should be functional at atomic resolution for 2D and 3D materials; • Should incorporate Multiple physics solvers, such as, Self-consistent Poisson-Schrödinger; Force-field relaxation, strain-dependent calculator; Quantum Transmission Boundary Method (QTBM); Non-Equilibrium Green's Function (NEGF); Electron-phonon and phonon-phonon self-energies; Mode-space and low-rank approximation compatible with scattering; Büttiker-probes method. • Should be capable of o Electronic structure calculations: band-structure, density of states, transmission probability o Atomic prediction of potentials, charges, mobilities, and band edge shifts that can serve as input to traditional TCAD.
3.3	Material Library	• It should cover materials as per para1.3 • Library of binary, ternary and quaternary semiconductors as well as other important advance materials along with materials parameters. • Built- in materials library that contains parameters for all well- known semiconductor materials.
3.4	Thermal Effect Simulation	• It should be able to model heat generation, heat flow lattice heating, heat sink and effects of local temperature on physical constant. • It should provide an ideal environment for design and optimization of power devices.

Annexure – I

TECHNICAL SPECIFICATIONS OF *SILVACO TCAD OMNI BUNDLE*

Sr No.	Item	Description
		• Applications include characterization of device design, thermal failure analysis and heat sink designs. • This module should be capable for 2D and 3D device simulation.
3.5	Optoelectronics Device Simulation	• It should be able to model light absorption and photo generation in non-planer semiconductor devices. • It should be account for arbitrary topologies, internal and external reflections and refractions, polarization dependencies and dispersion. • Optical transfer matrix method and EM wave method for coherence effects in layered devices. • It should be applicable to a wide array of device technologies including CCDs, solar cells, photodiodes, photoconductors, avalanche photodiodes, Metal-Semiconductor-Metal photodetectors, phototransistors, microlens coupled detector. • This module should be capable for both 2D and 3D device simulation.
3.6	Circuit Simulation	• It should contain physical based devices in addition to compact analytical models. • It should be compatible to small and large signal analysis of RF devices. • It should contain compact analytical models for high power circuits including variety of devices such as diode, HEMT, bipolar, thyristor, GTO, MOS and IGBT devices. • This module should be capable for both 2D and 3D device simulation.
3.7	Noise Simulation	• It should be capable of analyzing small-signal noise generated within semiconductor devices. • It should be capable of characterizing small-signal noise sources and extract figure of merit for circuit design. • This module shall preferably be capable for noise device simulations.
3.8	Quantum Mechanical effect simulation	• It should provide a set of models for simulation of various effects of quantum confinement and quantum transport of carriers in semiconductor devices. • It should allow quantum mechanical calculation of bound state energies and associated carrier wave functions self consistently with electrostatic potential. • It should associate with Schrodinger solvers with Non-Equilibrium Green Function(NEGF) approach in order to model ballistic quantum transport in 2D or cylindrical devices with strong transverse confinement. • This module should be capable for both 2D and 3D device simulation
3.9	User defined Models & Library elements	• It should have capabilities of user defined physical models & material parameters via standard language interface (e.g. C, C++, etc.). • It should have capability of user defined functions such as doping, composition fraction, defect, density of state temperature and composition dependent band parameters, mobility recombination and generation models at run-time.

4. Other interactive tools

Sr No.	Item	Description
4.1	Run time interactive tools	• It should have numerous simulator specific and general debugger style tools, such as powerful extract statements GUI based process input, line by line runtime execution and intuitive input syntactical error messages. • Should support .str file format model generation.
4.2	Graphical display and analytical tool	This tool should have following capabilities: • Should be powerful enough to visualize 1D and 2D/3D structures produced by TCAD simulators.

Annexure – I

TECHNICAL SPECIFICATIONS OF *SILVACO TCAD OMNI BUNDLE*

Sr No.	Item	Description
		• It should provide visualization and graphical features such as pan, zoom views labels and multiple plot support. • Plotting engine should support all common 1D and 2D/3D data views including 2D/3D contour data, 2D/3D meshed data, smith charts and polar charts, Exports data in many common formats (jpg, png, bmp, SPICE raw file and CSV) for use in reports or third-party tools.

5. Other terms and conditions:

Sr No.	Item	Description
5.1	Software license	• All modules and sub modules software should have time-based license, as mentioned in the Indent. • Supplier shall provide software up gradation support as and when applicable within the warranty period.
5.2	Software version	• The software offered should be the latest version. • The same should clearly be mentioned in detail.

29/01/2025

Indenter's Signature
Name: Subindu Kumar

Annexure - II

Declaration by bidder

(Please specify Class of Supplier and Local Content percentage)

In accordance and manner as specified in Order No. P45021/2/2017-PP (BE-II) dated : 04th June 2020 issued by DIPP, Ministry of Commerce and Industries, GoI.

To,
The Registrar,
Indian Institute of Technology (Indian School of Mines)
Dhanbad -826004
Respected Sir,

In accordance with the order No. P-45021/2/2017-PP (BE-II) dated 04th June, 2020, I hereby declare that

i) I am aware about all provision mentioned in GeM Bid No. .....as well as order No. P-45021/2/2017-PP (BE-II) dated 04th June, 2020 and abides by the same.

ii) I declare that for this tender, I am a **Class-I local supplier / Class-II local supplier / Non-local supplier** (Strike out whichever is not applicable) and classification is based on local content of goods/services/work offered by bidder in this tender.

iii) **Local content (in percentage) in offered** good/services/work is: _____%

***Whereas* 'Local Content'** means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

iv) The local content for all inputs which constitute the said goods/services/works has been verified and bidder is responsible for the correctness of the claims made therein.

v) Details of items, amount and location(s) at which the local value addition is made:

Sl. No.	ITEM (S)	AMOUNT	LOCATION(S)
1.			
2.			
3.			
4.			
5.			
6.			
7.			

Date:

Signature:
Name of Authorized Signatory:
Name of Bidder:
Seal of Bidder:

ANNEXURE–III

SELF-CERTIFIED DECLARATIONS FOR TAKING PART IN TENDER

a. Regarding blacklisting / debarring

b. Insolvency

1. I / We _____ (Tenderer) hereby declare that the firm / agency / Company, namely M/s _____ has not been declared as **insolvent**.

AND

2. I / We _____ (Tenderer) hereby declare that the firm / agency / Company, namely M/s _____ has not been **blacklisted or debarred** in the past by Union / State Government or Organization from taking part in Government tenders in India.

OR

2. I / We _____ (Tenderer) hereby declare that the Firm/Agency/Company, namely M/s_____ was **blacklisted or debarred** by Union/ State Government or any Organization from taking part in Government tenders for a period of _____ years w.e.f. _____ to _____. The period is expired and now the Firm/Agency/Company is entitled to take part in Government tenders.

In case the above information is found to be false I / We are fully aware that the tender/contract will be rejected / cancelled by Director, IIT(ISM) Dhanbad, and EMD shall be forfeited.

In addition to the above the Director, IIT(ISM) Dhanbad will not be responsible to pay the bills for any completed/partially completed work.

Date:

Place:

Self Certification:_____

Name:_____

Address:_____

Stamp:

Annexure- IV

UNDERTAKING

(To be signed and submitted/uploaded along with Technical bid documents on Company's Letter Head)

(As per Office Memorandum No. F.7/10/2021-PPD(1) dated: 23.02.2023 issued by Department of Expenditure (Ministry of Finance), Govt. of India)

Model certificate for Tenders

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Where applicable, evidence of valid registration by the Competent Authority shall be attached]"

Place:
Date:

Signature:_____
Name:_____
Stamp:_____

OR

Model certificate for tenders for work involving possibility of sub-contracting

"I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contracting from such countries I certify that this bidder is not from such a country or, if from such a country, has been registered with the Competent Authority and will not sub contract any work to a contract form such countries unless such contractor is registered with the Competent Authority. I hereby certify that this bidder fulfills all requirements in this regard and is eligible to be considered. [Provide Compliance for the above in Vendor Specified Commercial Terms.]"

Place:
Date:

Signature:_____
Name:_____
Stamp:_____

Annexure –V

PRICE BID

Name of the Bidder_____
RFQ Reference No. _____

Sl. No.	Full Description of items	Quantity	Unit Price (In USD)	Total Amount (In USD)
1				

Price Basis: FOR IIT (ISM) Dhanbad

Signature of Bidder
Name _____

Business

Address_____