

Malaviya National Institute of Technology Jaipur

Jawahar Lal Nehru Marg, JAIPUR-302017 (Rajasthan)

**Ministry of Education
(Government of India)**



Single Tender Enquiry

For

Procurement of Upgrade of Optisuite Design and Simulation tools

NIT Number: F5(2913)ST/MNIT/ECE/2024

Date:12.11.2024

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY

JLN MARG, JAIPUR-302017

To,

M/s Optiwave Systems Inc., Canada

Or (it's authorized dealer/distributor)

M/s HR Universal Systems Inc.
Corporate Suite #59, II Floor, Ansal Plaza,
Sector I, Vaishali, Ghaziabad- 201010

Email id: info@hrunisys.com

Sub: Invitation for Quote for the Purchase “Upgrade of Optisuite Design and Simulation tools (5 Users)”.

Registrar, Malaviya National Institute of Technology Jaipur invites Quote from M/s. Optiwave Systems Inc., Canada, Or it's authorized dealer/distributor. Bidder must submit their bid online on CPP Portal as per details technical Specification given and Price Bid as per BOQ latest by 05.12.2024. The important information related to tender are as follows:

Sr. No.	Name of Item	Specifications	Quantity
01	Upgrade of Optisuite Design and Simulation tools (5 Users)	Upgrade of OptiSuite Design and Simulation Tools (5 Users) 1. Optisystem 2. OptiSPice 3. OptiFDTD 4. OptiBPM 5. Optifiber 6. OptiGrating 7. OptiInstrument 8. OptiMode Perpetual (Permanent) Network Floating License on Windows 10/11 (64 bit) Platform. Consisting of: - New 5 users Network Floating License on your existing USB Key: OCX-2014-004NH Making it 10 User network floating license. - Upgrade of existing Five users Network Floating License to the Latest Version (s) OptiSuite Exclusive Features as per Annexure- F	01

1. The bids should contain the following document:

- i. Detailed technical product catalogue.
- ii. Bidder should be the manufacturer / authorized dealer. In case bidder submitted the bid on behalf of OEM than Letter of Authorization from original equipment manufacturer (OEM) specific to the tender enquiry should be enclosed (as per Annexure A).
- iii. A certificate from OEM to the affect that the said good/software is a proprietary item

- iv. A certificate to the effect that the price quoted by you is the lowest and not more than the price quoted to other Educational Institutes in India.
 - v. A certificate to the effect that your firm has not been Black Listed/De Listed or put to any Holiday by any Institutional Agency/ Govt. Department/ Public Sector Undertaking in the last three years.
 - vi. List of industrial and educational establishments where the items enquired have been supplied is to be provided along with previous Purchase orders.
 - vii. Declaration of Local Content (as per Annexure-B)
2. **Validity:** The validity of the offer shall remain valid for 90 days from the date of submission of the offer.
 3. **Award of Contract** MNIT, Jaipur shall award the contract to the bidder whose bid has been accepted and determined as responsive.
 4. **Installation:** The supplier is required to do the installation and demonstration of the equipment / software within One weeks of the arrival of materials at the MNIT Jaipur, site of installation.
 5. **Delivery Period : 06 Weeks.**
 6. **Warranty:** Warranty period shall be (One -year Standard warranty) from date of installation of Goods and acceptance at MNIT Jaipur. The Supplier shall, in addition, comply with the performance and/or consumption guarantees specified under the contract. If for reasons attributable to the Supplier, these guarantees are not attained in whole or in part, the Supplier shall at its discretion make such changes, modifications, and/or additions to the Goods or any part thereof as may be necessary in order to attain the contractual guarantees specified in the Contract at its own cost and expense and to carry out further performance tests. The warranty should be comprehensive on site.
 7. **Payment Terms:** For Indigenous supplies, 100% payment shall be made by the Purchaser against delivery, inspection, successful installation, commissioning and acceptance of the equipment at MNIT Jaipur in good condition and to the entire satisfaction of the Purchaser.
 - i. GST Deduction at source as per Order/ notification of the Govt.
 - ii. GST No of MNIT Jaipur is **08AAAJM0351L1Z6**
 - iii. HSN/SAC No of the items must be clearly mentioned in the quotation along with GST No.
 - iv. MNIT Jaipur is exempted from paying custom duty under notification No.51/96 (partially or full) and necessary "Custom Duty Exemption Certificate" can be issued after providing following information and Custom Duty Exemption Certificate will be issued to the shipment in the name of the Institute, no certificate will be issued to third party:
 8. **Performance Security:** **05%** of the contract value valid till warranty period plus 60 days. The supplier shall require to submit the performance security for an amount which is stated at the "Schedule" of the tender document within 15 days from the date of receipt of the purchase order and should be kept valid for a period of 60 days beyond the date of completion of warranty period. Performance security may be in the form of irrevocable bank guarantee issued by any commercial bank in the prescribed format (**Annexure - C**) or Demand Draft/ Banker's Cheque in favour of 'MALVIYA NATIONAL INSTITUTE OF TECHNOLOGY' payable at JAIPUR or through NEFT/RTGS in Beneficiary name:
MALVIYA NATIONAL INSTITUTE OF TECHNOLOGY
Account No. 676805000011
IFSC Code ICIC0006768
Bank Name ICICI BANK LTD
Branch address MNIT BRANCH

9. **Price:** the price should be quoted in BoQ format only. The offer/bid should be exclusive of taxes and duties, which will be paid by the purchaser as applicable, however, the percentage of taxes & duties shall be clearly indicated.
10. **Force Majeure:** The Supplier shall not be liable for failure of its performance security, liquidated damages or termination for default, if and to the extent that, its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.
- For purposes of this Clause, "Force Majeure" means an event beyond the control of the Supplier and not involving the Supplier's fault or negligence and not foreseeable. Such events may include, but are not limited to, acts of the Purchaser either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.
 - If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such conditions and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.
11. **Defective Equipment:** If any of the equipment supplied by the Supplier is found to be substandard, refurbished, un-merchantable or not in accordance with the description/specification or otherwise faulty, the committee will have the right to reject the equipment or its part. The prices of such equipment shall be refunded by the Supplier with 18% interest if such payments for such equipment have already been made. All damaged or unapproved goods shall be returned at supplier's cost and risk and the incidental expenses incurred thereon shall be recovered from the supplier. Defective part in equipment, if found before installation and/or during warranty period, shall be replaced within 7 days on receipt of the intimation from this office at the cost and risk of supplier including all other charges. In case supplier fails to replace above item as per above terms & conditions, MNIT Jaipur may consider "Banning" the supplier.
12. **Liquidated Damages (L.D):** If a supplier fails to execute the order in time as per the terms and conditions stipulated therein, it will be open to the purchaser to recover liquidated damages for delay in delivery and installation from the supplier at the rate 0.5% of the value of the order per week subject to a maximum of 10% of the total order value. The L.D charges can be increased in case of gross violation of the Purchase Order terms as decided by the Director of the Institute.
13. Only "Class-I and Class-II local supplier will be eligible to bid notified vide (DPIIT) Notification No. P-45021/2/2017-PP (BE-II) dated 4th June, 2020. It is mandatory for bidders to quote items having local content more than 20%. Refer revised Public Procurement (Preference to Make in India), Order 2017 P-45021/2/2017-B.E-II dated 04.06.2020 issued by DPIIT, Ministry of Commerce and Industry, Govt. of India. **(Submit duly filled Annexure B for the same)**
14. **Exemption to Startups:** If the bidder is a Startup, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria". In case any bidder is seeking exemption from Turnover / Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer.
15. **Exemption to MSME:** If the bidder is a Micro or Small Enterprise as per latest definitions under MSME rules, the bidder shall be exempted from the requirement of "Bidder Turnover" criteria and "Experience Criteria". In case any bidder is seeking exemption from Turnover / Experience Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer.
16. **Preference to Make in India Products:** The Institute is following and abide with the revised Public Procurement (Preference to Make in India), Order 2017 P- 45021/2/2017 – B. E. –II dated 04.06.20 issued by DPIIT, Ministry of Commerce and Industry, Govt. of India & subsequent amendments/instructions of Ministry. Accordingly, preference will be given to the make in India products while evaluating the bids.

However, it is sole responsibility of the bidder(s) to specify the product quoted by them is of Make in India along with respective documentary evidence in the technical bid itself.

17. **Genuine Pricing:** Vendor is to ensure that quoted price is not more than the price offered to any other customer in India to whom this particular item has been sold. (Annexure-D)
18. **Cancellation:** MNIT Jaipur reserves the right to accept or reject or cancel any or all enquiries or quotations at any stage without assigning any reason thereof.
19. The bid submission of last Date & Time- **05th Dec.,2024 by 02.00 PM**
20. All disputes are subject to Jaipur jurisdiction.
21. Must ensure to submit duly signed checklist (as per Annexure- E)

Deputy Registrar (S&P)

MANUFACTURERS' AUTHORIZATION FORM

[The Tenderer shall require the Manufacturer to fill in this Form in accordance with the Instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer].

Date: [insert date (as day, month and year) of Bid Submission]

Tender No.: [insert number from Invitation for Bids]

To: [insert complete name and address of Purchaser] WHEREAS

We [insert complete name of Manufacturer], who are official manufacturers of [insert type of goods manufactured], having factories at [insert full address of Manufacturer's factories], do hereby authorize [insert complete name of Tenderer] to submit a bid the purpose of which is to provide the following Goods, manufactured by us [insert name and or brief description of the Goods], and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with the Terms and Conditions, with respect to the Goods offered by the above firm.

Signed: [insert signature(s) of authorized representative(s) of the Manufacturer]

Name: [insert complete name(s) of authorized representative(s) of the Manufacturer] Title: [insert title]

Duly authorized to sign this Authorization on behalf of: [insert complete name of Tenderer] Dated on day of,

[insert date of signing]

DECLARATION OF LOCAL CONTENT

[For Local Content of Products, Services or Works]
(To be given on Company Letter Head – For tender value below Rs.10 Crores)

(To be given by Statutory Auditor/Cost Auditor/Cost Accountant/CA for tender value above Rs.10 Crores)

To,
The Registrar MNIT Jaipur

Subject: Declaration of Local Content

Tender reference No. _____

1. Country of Origin of Goods being offered: _____
2. With reference to Order No. P- 45021/2/2017-PP(BE-II)-Part (4) Vol.II dated 19-07-2024 read with O. M. No. P- 45021/102/2019-BE-II-Part (1) (E-50310) dt. 04/03/2021 of DPIIT, Ministry of Commerce and Industry, Govt. of India, we fall under the following category of supplier (please tick the correct category) for the items for which this tender has been floated and being bided.
 - Class I local supplier – has local content \geq 50%. Local contents added at _____ (name of location).
 - Class II local supplier – has local content \geq 20% but $<$ 50%. Local contents added at _____ (name of location).
 - Non-local supplier – has local content $<$ 20%. Local contents added at _____ (name of location).
3. Details of value addition in India:

Sr. No.	Particulars	Content (In percentage)
1	Addition of indigenous items (manufactured in India) inclusive of taxes	
2	Addition of Locally sourced imported items inclusive of taxes	
3	License/Royalty paid/Technical expertise etc.	

4. Certificate from OEM for Country of Origin has been attached (mandatory if bidder is reseller) (Strike down if not applicable).
5. We are solely responsible for the above mentioned declaration in respect of category of supplier. False declarations will be in breach of the Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which we may be debarred for up to 2 years as per Rule 151(iii) of the General Financial Rules along with such other actions as may be permissible under law.

Signature of BidderName:

Designation: Organization Name:Contact No.:

PERFORMANCE BANK GUARANTEE

(To be executed on Stamp Paper of Rs. 100/- or such higher value as per the Stamp Act of the State in which the Guarantee is issued. Stamp Paper should be in the name of the Bank Issuing the Guarantee.)

BANK GUARANTEE NO. :

DATED :

Dear Sirs,

1. THIS DEED OF GUARANTEE made on this.....day of between **MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY, JAIPUR** (hereinafter called the "**MNIT**" which expression shall unless excluded by or repugnant to the context includes its successors and assignees) of the one part and the (hereinafter called the "**Bank**" which expression shall unless excluded by or repugnant to the context include its successors and assignees) of the other part.
2. AND WHEREAS as per clause..... Of the purchase order in question the supplier shall furnish a Performance Bank Guarantee of 05% of P.O. Value i.e. Rs. (in words) only) valid for the period of two months beyond warranty period as and by way of security for satisfactory working of the AND WHEREAS at the request of the supplier, the Bank executes these presents.
- 3.0 THIS DEED WITNESSETH AND IT IS HEREBY AGREED AND DECLARED BY AND BETWEEN PARTIES HERETO AS FOLLOWS:
 - 3.1 The Bank hereby guarantees to the MNIT, Jaipur that the equipment / service contracted are capable of performing the work as demanded by the MNIT, Jaipur. In the event of equipment / service failing to perform to the satisfaction of the MNIT, Jaipur, which shall be final and conclusive of the factum of non-performance, the Bank shall indemnify and keep the indemnified to the extent of of P.O. Value i.e. Rs. (Rupees) valid for the period of two months beyond the warranty period against any loss or damage that may be caused to or suffered by the MNIT, Jaipur consequent to non-performance of the contracted equipment / services to be supplied by the supplier.
 - 3.2 In consideration of the aforesaid premise and at the request of the supplier, we the Bank hereby irrevocably and unconditionally guarantee that the supplier shall perform in an orderly manner their contractual obligations in accordance with the terms and conditions set forth in the Purchase order dated and in the event of the supplier's failure to do so, the Bank unconditionally pay to the MNIT, Jaipur on demand, any amount up to the value mentioned in Clause 3.1 above without any reference to the supplier and without questioning the claim.
 - 3.3 The guarantee herein shall remain in full force for a period of two months beyond the warranty period from the date of certification by the MNIT, Jaipur of successful installation and commissioning of the equipment/ service contracted. Date of start of warranty period will be notified by MNIT, Jaipur to the Bank.

- 3.4 The decision of the MNIT, Jaipur regarding the liability of the Bank under the guarantee and the amount payable there under shall be final and conclusive and binding on us without question. The Bank shall pay forthwith the amount demanded by the MNIT, Jaipur notwithstanding any dispute, if any, between the MNIT, Jaipur and the supplier.
- 3.5 The Bank further agrees that the guarantee herein shall remain in full force during the pendency of aforesaid period mentioned in Clause 3.3 above and also any extension of the guarantee which has been provided by the Bank for this purpose beyond the aforesaid period provided, further, that if any claim accrues or against the Bank by virtue of this guarantee, should be lodged with us within a period of 60 days from the date of expiry of the guarantee period.
- 3.6 This Guarantee shall not be affected by any change in constitution of the supplier, MNIT, Jaipur or us nor shall it be affected by any change in constitution or by any amalgamation or absorption or reconstruction thereof otherwise, but will ensure for and be available to and endorsable by the absorbing amalgamated company or concern.
- 3.7 The MNIT, Jaipur has the fullest liberty without affecting the guarantee to postpone at any time or from time any of the powers exercisable by it against the supplier, either to enforce or forbear the clause governing guarantee in the terms and conditions of the said contract and Bank shall not be released from its liabilities under the guarantee by any matter referred to or by reason of time being given to the supplier or any other forbearance, act or omission on the part of the MNIT, Jaipur or any material or things whatsoever which under the law relating to sureties shall but for the provisions hereof have the effect of so releasing the Bank from its liabilities.
- 3.8 We further agree that the MNIT, Jaipur shall have the fullest liberty without affecting in any way our obligations hereunder with or without our consent or knowledge to vary any of the terms and conditions of the said contract or to extend the time of delivery from time to time.
- 3.9 The Bank undertakes not to revoke this guarantee during its currency except with the previous consent in writing of the MNIT, Jaipur.
- 3.10 We further agree that in order to give full effect to the guarantee herein contained MNIT, Jaipur shall be entitled to act as if we were its principal debtors in respect of its claim against the Supplier hereby guaranteed by us as aforesaid and we hereby expressly waive all our rights of suretyship and other rights in any which are in any way inconsistent with the above provision of this Guarantee.

Notwithstanding anything herein before, liability of the Bank under this guarantee is restricted to Rs. (Rupees only) and it will remain in force up to the period specified in Clause 3.3 unless a suit to enforce any claim under the Guarantee is filed against the Bank before the period specified in Clause 3.4. All your rights under this Guarantee shall be forfeited and we shall be relieved and discharged from all liabilities thereunder.

COUNTERSIGNED

Signature	:	Signature	:
Name	:	Name	:
Designation	:	Designation	:
Organization	:	Organization	:

PRICE REASONABILITY CERTIFICATE

(to be submitted on firm's letterhead)

This is to certify that we have offered the maximum possible discount to you in our Quotation No. Dated for (Currency)

We would like to certify that the quoted price are the minimum and we have not quoted the same item on lesser rates, than those being offered to MNIT Jaipur, to any other customer nor will do so till the validity of offer or execution of purchase order, whichever is later.

Signature of Tenderer

Name: _____

Designation: _____

Organization

Name: Contact

No.: _____

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

The bidders submitting quotations for the supply of items must ensure to fill the checklist as mentioned below:

S.No.	Document/Details sought for	Page No.	Yes	No
1	Detailed technical product catalogue.			
2	Bidder must be manufacturer/authorized distributor/dealers and they have to enclose a certificate of authorization of manufacturer in format at Annexure –A, (Authorization certificate in any other format will not be valid) OEM itself or any one authorized dealer on behalf of OEM a may participate in bid. OEM and its dealers both may not participate at the same time.			
3	A certificate from OEM to the effect that the said good /software is a proprietary item			
4	A certificate to the affect that the price quoted by you is the lowest and not more than the price quoted to other Educational Institutes in India.			
5	A certificate to the affect that your firm has not been Black Listed/De Listed or put to any Holiday by any Institutional Agency / Govt. Department / Public Sector Undertaking in the last three years.			
6	List of industrial and educational establishments where the items enquired have been supplied is to be provided along with previous Purchase orders.			
7	Declaration of Local Content			
8	Performance Bank Guarantee: 05% of the contract value valid till warranty period plus 60 days.			
9	Warranty: Standard OEM warranty not less than 01 year Standard warranty (Maintenance) includes: <ol style="list-style-type: none"> 1. New version upgrades (as and when announced by M/s optiwave) 2. Patches and minor releases 3. Unlimited technical support via email, telephone and online 4. Assistance with application set up, design, and scripting 5. Access to promotional offers USB security key replacement if damaged (no replacement against lost) 			

Any other important point requested in the bid invitation letter

OptiSuite Exclusive Features

OptiSuite from Optiwave Systems is an integrated solution which allows the user to export both transmission and reflection into one single file containing wavelength, transmittivity real part, transmittivity imaginary part, reflectivity real part, and relectivity imaginary part. The design / layout can be used as an input file for Optical Communication Network Design Grating component.

S/N	Modules	Exclusive Features
1	OptiSystem Optical Communication System Design Software	<ol style="list-style-type: none"> 1. LiFi Channel design LiFi system and investigate the power distribution of different transmitters located at different positions in a room. 2. The Multicore Fiber to calculate core-to-core crosstalk and the total crosstalk for each core of a multicore fiber (MCF) cable. 3. MCF XT-Bending Radius to calculate the effect of bending radius on the crosstalk between two cores in a multi-core fiber cable. 4. MCF XT-Core Pitch to calculate core-to-core crosstalk due to changes in the core pitch. 5. Design and investigate OTDR performance of a multi-section fibers with different kinds of connection such as APC/APC, PC/PC, APC/PC and splice. 6. Capable of carrying out design & simulation of amplifiers and lasers using different rare-earth doped glass fibers. 7. Contains extensive visualization & reporting capabilities in both 2D & 3D. 8. Simulates dynamic fiber modeling of double-cladding pumping, Rayleigh scattering, Raman and Brillouin inelastic scattering, dispersion and self-phase modulation for all rare-earth doped fibers. 9. Simulates linear and non-linear fiber simulation and assessment of countermeasures including self-phase modulation, cross-phase modulation, Raman effect, SBS, self-steepening. 10. Ability to run single & multi-parameter optimizations. 11. Employs tools for integration of fiber optics at the component level such as amplifiers, waveguides, WDM, gratings-based components. 12. Interfaces optical domain simulations with Matlab, C++, python software tools. 13. Allows fiber sensing applications for temperature, stress, strain and vibration. 14. Capable of modeling free space optic channels and LiFi applications. 15. Includes Gaussian Noise (GN) model for simplified fiber propagation. 16. Supports advance modulation techniques such as QAM up to 256QAM, multilevel PAM, OFDM, and digital signal processing.

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		<ol style="list-style-type: none"> 17. Imports & post processes results from Fiber designs, Grating/sensor designs, Opto-electronic designs and beam propagation design applications. 18. Allows creation of custom optical, electrical, and binary components using C++ or Matlab. 19. Compliance Test Patterns such as CJTPAT, CRPAT, and CSPAT 20. FBG Sensor: physical parameters of the grating to perform temperature, stress and strain sensing. 21. Phi-OTDR to sense vibration in the optical fiber 22. Phi-OTDR Interrogator: allow the user to analyze experimental measurements. 23. GN-Model component for simulating long-haul single span and multi-span DWDM transmission systems. 24. FSO Weather Condition 25. User Defined M-ary Sequence Generator 26. TDECQ Analyzer 27. Optical to Electrical Signal Converter 28. Electrical Clipper 29. Electrical Transfer Function Visualizer 30. Digital Comparator, Serial to Parallel Converter Bits Grouping 1XN, LOS underwater channel, NLOS Underwater Channel, Nonlinear FBG, Tilted Fiber Grating, Pulses Polarization Meter, Single Photon Detector (SPD).
2	OptiSpice Opto-Electronic Circuit Design Software	<ol style="list-style-type: none"> 1. PIC circuit optimization using compact models with physical parameters. 2. Electrical Spectrum analysis, Electrical Eye Diagram analysis and Optical Spectrum analysis. 3. Electrical Spectrum Analyzer performs Fourier Transform on time domain simulation results for a given node voltage. 4. Optical Spectrum Analyzer performs Fourier Transform on time domain simulation results for a given optical signal. 5. All the simulation results from probes placed in the schematic are exported as a single HDF5 files in addition to XML and text. HDF5 file import is supported by languages like Matlab and Python. With this feature users can easily create scripts for processing simulation results. 6. Bit generator to allow the import of user defined bit sequence from a text file, generate a random bit sequence based on a user defined seed. 7. Filter parameter extractor tool to provide a better fit. 8. Electrical filter component to accept the PRF file generated by the filter parameter extractor. 9. Multi channel bidirectional optical time and frequency domain simulation with SPICE 10. Opto electronic feedback and control loop simulation

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		<ol style="list-style-type: none"> 11. Noise, channel cross talk and interference effects 12. Support for Tanner GPIC PDK 13. Direct opto-electronic interfacing with SPICE components via laser/photodiode/modulators etc.. 14. Optical S-Parameter device for passive components. Compatible with FDTD and BPM 15. User defined or experimental data input for compact model creation, i.e. waveguide effective index and responsivity 16. Standard bandpass, bandstop optical filter components (Butterworth, Chebyshev, Bessel) for quick prototyping 17. Optical signal visualization (magnitude, phase, real, imaginary, power etc..) with Tanner Waveform Viewer 18. Laser/LaserFC to define the channel values either in wavelength or frequency 19. The S-Parameter input file support to include the files generated by Grating Design platform. 20. S-Parameter and Waveguides - Time delay interpolation capabilities of optical signals can be done using either polar (better accuracy) or cartesian coordinates (better stability). 21. Waveguide capability to define the waveguide length as a function of voltage. The length affects the time delay and the phase shift between the input and the output ports of the waveguide. 22. Optical Mode Analysis can be driven by SPICE Tanner Plugin to numerically determine the modal effective index at a set frequency. The results from Mode Analysis platform is directly integrated into the waveguide simulation to determine the time delay and the phase shift of an optical signal. 23. Sparse matrix solver libraries.
3	OptiBPM Waveguide Optics Design	<ol style="list-style-type: none"> 1. Design optical splitters, combiners, couplers, multiplexers, and modulators. 2. Large scale optical circuit design capabilities 3. Mature AWG design environment 4. Model non-symmetrical waveguide structures 5. Channel, rib or ridge waveguide design 6. Buried waveguides 7. Waveguides from a diffused process 8. Sensor structures. 9. Combine channel, fiber, and diffused waveguides into a single layout. 10. A vast number of waveguide shapes are available, including: Linear, Arc, Tapered (Linear, Parabolic, and Exponential), and S-Bend (Arc, Sine, and Cosine). 11. Waveguides can be created with a mouseclick or VB Script commands. 12. Import from AutoCAD DXF and GDSII File Formats.

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		<ul style="list-style-type: none"> 13. Fiber Vector and LP Mode Solver 14. Advanced Optimization Algorithms 15. Analysis of Large Scale Optical Circuits 16. Electro-Optic Simulation to simulate the linear electro-optic effect (Pockels Effect). 17. 64 bit Anisotropic BPM simulation. 18. Polarization rotation in anisotropic BPM. 19. 64 bit Anisotropic Mode Solver. 20. Display of Optical and Refractive Index Data. 21. Mixed Material and Circular Profile 22. Movie of the BPM Simulator Results. 23. Simplified Waveguide Profile and Material management.
4	OptiFDTD Finite-Difference Time-Domain Simulation	<ul style="list-style-type: none"> 1. Surface Plasmon Resonance 2. Nanoparticles simulations 3. Diffractive micro-optics elements 4. Tissue scattering simulations. 5. Photonic band gap materials and devices. 6. Nonlinear materials, dispersive materials, surface plasma and anisotropic materials 7. Photonic surface plasmon and surface plasma wave 8. Electromagnetic phenomena 9. Lossless and lossy materials 10. Isotropic and anisotropic materials 11. Lorentz-Drude materials - Noble metals and surface plasma materials 12. 2nd-Order and 3rd-Order nonlinear materials 13. Kerr effect materials 14. Raman effect materials 15. Perfect conductor materials 16. Waveguide mode excitation 17. Gaussian beam excitation 18. Plane wave excitation 19. Point source and Dipole Source 20. Single wavelength excitation 21. Spectral excitation

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5	OptiFiber Design and analysis of single & multi-mode fibers	<ol style="list-style-type: none"> 1. Software is capable to design fiber profiles, calculate fiber modes (fundamental & higher order). 2. Calculate cut-off wavelengths, birefringence, polarization mode dispersion, fiber propagation loss, Rayleigh scattering, infrared absorption, macro & micro bending loss, effective mode area, coupling efficiencies, polarization mode dispersion, and principal states of polarization. 3. Contains simulation and visualization tools. 4. Exports attenuation and dispersion profiles for import into Optical Communication System & Amplifier Design software. 5. Assess parameters, sensitivities, and tolerances 6. Fiber mode solving of LP or Vector modes by Finite Difference or by Transfer Matrix Methods. 7. Analysis of measured fiber profiles from instruments such as the EXFO NR-9200. 8. Single mode fiber designs such as Corning SMF-28, dispersion flattened or shifted fibers. 9. Multimode fiber design, such as 50/125 m and 62.5/125 m silica fibers. 10. Visualization of multimode interference patterns with propagation. 11. Automatic parameter scanning 12. Fiber Sensor design. 13. Calculation of birefringence and PMD from intrinsic or extrinsic perturbations.
6	OptiGrating Design and analysis of fiber optical gratings	<ol style="list-style-type: none"> 1. Ability to design a Fiber Bragg Grating. 2. Ability to design sensors using gratings. 3. Ability to design manipulate material dispersion parameters. 4. Enables parameter scans. 5. Capable of synthesizing a band pass filter. 6. Allows reconstruction of unknown grating from reflection coefficient. 7. Capable of synthesizing a grating for dispersion compensation. 8. Capable of synthesizing a filter with user-defined spectrum. 9. Contains strain optic option of fiber sensors. 10. Allows export of transmission & reflection data for import into Optical Communication System & Amplifier Design software. 11. Uses coupled mode theory to model light and enable analysis and synthesis of gratings. 12. Capable of analyzing fiber bragg reflectors. 13. Ability to analyze Fiber and waveguide sensors. 14. Ability to analyze Long Period Gratings with coupling to cladding modes.

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		<ul style="list-style-type: none"> 22. Power and amplitude 23. Linear or circular polarization 24. Multiple beam excitations 25. Source supporting tilting modes, Gaussian beam, plane waves with full degrees of freedom in 2D and 3D 26. Straight and tilted waveguides with taper functions 27. Ring, arc, circle and ellipse waveguides with taper 28. Parabolic and exponential waveguides with taper 29. 3D shapes with clipping functions 30. Uniaxial Perfectly Matched Layers (UPML) 31. Perfect Electric Conductor (PEC) 32. Perfect Magnetic Conductor (PMC) 33. Periodic Boundary Conditions (PBC) 34. Time varying field distribution 35. Spectral analysis 36. Poynting Vector in Domain 37. Polarized Power calculation 38. Farfield calculation

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7	OptiInstrument Instruments Communication and Control Tool	<ol style="list-style-type: none"> 1. Capable of remote communication with instruments 2. Capable of setting equipment parameters 3. Capable of characterization and automated testing 4. Allows passive optical component testing and characterization 5. Allows environmental testing 6. Allows extraction and saving generated signals for post processing 7. Allows integration of instruments from a variety of fields, including photonics and electronics with software simulation tools 8. Allows user-Friendly GUI that operates in a single window 9. Ability to execute one or a sequence of SCPI commands 10. Ability to import script files and sequences 11. Ability to rearrange commands, add loops, and pause from a preconfigured list 12. Create python script from a sequence of commands 13. Ability to edit and run Python code using the built-in editor 14. Display graph or table view of data signals 15. Ability to remotely operate and control of instruments 16. Save results of executed SCPI commands in a CSV or JSON file 17. Ability to run preformatted scripts to automate optical measurements using <u>EXFO equipment</u> 18. Run configured scripts to talk to CTP10, OTDR, OSA, or VOA 19. Allows multiple traces in graph at the same time 20. Allows seamless import of Python functions for test sequences
8	OptiMode Design and Modal Analysis of Waveguide Structures	<ol style="list-style-type: none"> 1. Supports a wide range of applications, including single mode (SMF), multimode (MMF) fibers, planar waveguide design, and complex profiles like Multicore fibers (MCF) and hollow core fibers (HCF). 2. Enhances design workflows through modal injection as source components. 3. Have advanced solvers for accurate waveguide analysis, including Alternating Direction Implicit (ADI), Anisotropic waveguides (AnIso), Finite Difference (FD Complex), Finite Element (FEM), and Fiber Solvers (LP or Vector). 4. Have precise analysis, allowing users to identify supported modes and determine critical characteristics such as mode profiles and effective indices. 5. Supports constant dielectric, doped materials, diffuse materials, and electrodes/electro-optics. It ensures compatibility with diverse design requirements while guaranteeing precise analysis and waveguide design.

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