Request for quote for the supply of

Ansys electronic design automation tools for teaching, research and enterprise license

to Indian Institute of Science Bangalore.

This is a request for a quote from the domestic manufacturer of the above-mentioned item.

## Contents

This is a Request for Quote (RFQ) from domestic (India-based) vendors for the supply of Ansys electronic design automation tools for teaching, research and enterprise license,

# Section 1 - Bid Schedule

| | | |
|---|---|---|
| 1 | Tender No | CeNSE-SKS/2025/01/1 |
| 2 | Tender Date | 06 Jan 2025 |
| 3 | Item Description | Ansys electronic design automation tools for teaching, research and enterprise license |
| 4 | Tender Type | Two bid system<br>(i) Technical Bid (Part A)<br>(ii) Commercial Bid (Part B) |
| 5 | Place of tender submission | Chairperson Office,<br>First Floor, Centre for Nano Science and Engineering Indian Institute of Science, Bangalore 560012 |
| 6 | Last Date & Time for submission of tender | 27th Jan 2025, 5 PM IST. |
| 7 | For further clarification | Prof. Shankar Kumar Selvaraja<br>CeNSE, Indian Institute of Science<br>Bangalore – 560012, India.<br>shankarks@iisc.ac.in |

# Section 2 – Eligibility Criteria

Prequalification criteria:

1. The Bidder's firm should have existed for at least five years. Bidders should enclose the Company Registration Certificate.

2. The Bidder should belong to Class-1 or Class-2 suppliers distinguished by their "local content" as defined by recent edits to GFR. They should mention clearly which class they belong to in the cover letter.
   a) Class-1 supplier: Goods and services should have local content equal to or more than 50%.
   b) Class-2 supplier: Goods and services should have local content equal to or more than 20 % and less than 50%.

3. The quote should come only from Indian Original Equipment Manufacturer (OEM) or their Indian authorized distributor.

4. The quotations should be on FOR-IISc Bangalore basis in INR only.

5. Bidders offering imported products will fall under the category of non-local suppliers. They cannot claim themselves as Class-1 local suppliers/Class-2 local suppliers by claiming the services such as transportation, insurance, installation, commissioning, training, and other sales service support like AMC/CMC, etc., as local value addition.

6. Purchase preference, as defined by the recent edits to GFR (within the "margin of purchase preference") will be given to the Class-1 supplier.

7. MSMEs can seek an exemption to some qualification criteria. IISc follows GFR2017 for such details.

8. The bidder should sign and submit the declaration for Acceptance of Terms and Conditions as per -Annexure 4.

9. The Bidder must not be blacklisted/banned/suspended or have a record of any service-related dispute with any organization in India or elsewhere. A declaration to this effect has to be given as per Annexure 3.

# Section 3 – Terms and Conditions

## A) Submission of Tender:

1. All documentation in the tender should be in English.
2. Tenders should be submitted in two envelopes (a two-bid system).
    a. Technical Bid (Part-A) – Technical bid consisting of all technical details and checklist for conformance to technical specifications.

       The technical proposal should contain technical compliance for the requirements listed in Section 4. “Yes” or “No” should be mentioned. If there is a deviation, please mention it as well.

    b. Commercial Bid (Part-B) – Indicating item-wise price for the items mentioned in the technical bid, **as per the format of quotation provided in the tender** and other commercial terms and conditions.

3. The technical bid and price bid should be placed in **separate sealed covers**, superscribing the tender description, tender no., and the due date on both envelopes. Both these sealed covers are to be placed in a bigger cover which should also be sealed and duly superscripted with the Tender No, Tender Description & Due Date.

4. The SEALED COVER should reach the Chairperson Office, Department of Electronic Systems Engineering, Indian Institute of Science, Bangalore – 560012, India, on or before the due date mentioned in the tender notice. If the due date is a holiday, the tender will be accepted on the next working day. If the quotation cover is not sealed, it will be rejected.

5. All queries are to be addressed to the person identified in "Section 1 – Bid Schedule" of the tender notice.

6. GST/other taxes, levies, etc., should be indicated separately. The BIDDER should mention GST Registration and PAN in the tender document.
7. If the price is not quoted in the Commercial Bid as per the format provided in the tender document, the bid is liable to be rejected.

8. The purchase committee reserves the right to accept or reject any bid and annul the bidding process and reject all bids at any time prior to the award of the contract without thereby incurring any liability to the

affected bidder or bidders or any obligation to inform the affected
9. bidder or bidders.

10. Incomplete bids will be summarily rejected.

## B) Cancellation of Tender:

Notwithstanding anything specified in this tender document, the IISc purchase committee, in its sole discretion, unconditionally and without having to assign any reason, reserves the rights:

a. To accept OR reject the lowest tender, any other tender, or all the tenders.
b. To accept any tender in whole or in part.
c. To reject the tender, offer not confirming the tender terms.

## C) Validity of the Offer:

The offer shall be valid 30 Days from the commercial bid's opening date.

## D) Evaluation of Offer:

1. The technical bid (Part A) will be opened first and evaluated.

2. Bidders meeting the required eligibility criteria in Section 2 of this document shall only be considered for Commercial Bid (Part B) opening. Further, agencies not furnishing the documentary evidence as required will not be considered.

3. Prequalification of the bidders shall not imply final acceptance of the Commercial Bid. The agency may be rejected at any point during technical evaluation or commercial evaluation. The decision regarding acceptance and/or rejection of any offer in part or full shall be the sole discretion of IISc Bangalore, and the decision in this regard shall be binding on the bidders.

4. The contract award will be subject to acceptance of the terms and conditions stated in this tender.

5. Any offer which deviates from the vital conditions (as illustrated below) of the tender is liable to be rejected:

    a. Non-submission of complete offers.
    b. Receipt of bids after the due date and time or by email/fax (unless specified otherwise).

c. Receipt of bids in open conditions.

6. In case any BIDDER is silent on any clauses mentioned in these tender documents, IISc Bangalore shall construe that the BIDDER has accepted the clauses as of the tender, and no further claim will be entertained.

7. No revision of the terms and conditions quoted in the offer will be entertained after the last date and time fixed for receipt of tenders.

8. The lowest bid will be calculated based on the total price of all items tendered for the basic equipment, accessories selected for installation, operation, preprocessing and post- processing, optional items, recommended spares, warranty, and annual maintenance contract. The purchase committee seeks the most cost-effective solution for obtaining a new tool. Vendors are encouraged to propose all avenues, including but not limited to buy back of the existing tool, turnkey upgrade of existing to, l or purchase of a new tool.

## E) Pre-requisites:

The bidder will provide the pre-requisite installation requirement of the equipment along with the technical bid.

## F) Warranty:

The complete system has to be under warranty for a **minimum period of 3 years** (year-wise breakup value should be shown in the commercial bid). The vendor should include the cost of any spares needed during the warranty period, including electronics, subcomponents, and software. If the instrument is defective, it has to be replaced or rectified at the bidder's cost within 30 days from receipt of written communications from IISc, Bangalore. If there is any delay in replacement or rectification, the warranty period should be extended.

## G) Annual Maintenance Contract:

An annual maintenance contract for at least three years post-warranty should be provided as an essential, optional item upon completion of the warranty period.

The AMC costs will not be considered for classifying the vendor's domestic nature

(class 1 or class 2) (see eligibility criteria in section 2).

## H) SPARES:

Vendors must provide a detailed list of spares and a user manual with a detailed Bill of Materials for all Parts. It should include the Spares Column with the Manufacturer part Number, Qty, and availability of stock after 3 Years.

## I) Purchase Order:

The quantity of the items in the tender is only indicative. IISc, Bangalore reserves the right to increase /decrease the quantity of the items depending on the requirement.

If the product and service quality is unsatisfactory, IISc, Bangalore reserves the right to cancel or amend the contract.

## J) Delivery, Installation, and Training:

The bidder shall provide the lead time to delivery, installation, and made functional at IISc, Bangalore, from the date of receipt of the purchase order. The system should be delivered, installed, and functional within 120 days of receipt of the purchase order. The supply of the items will be considered as effected only on satisfactory installation and inspection of the system and the inspection of all the items and features/capabilities tested by the IISc, Bangalore. **For acceptance, the vendor must demonstrate the technical specifications mentioned in the tender**. After successful installation and inspection, the date of taking over the entire system by the IISc, Bangalore, shall be taken as the start of the warranty period. **No partial shipment is allowed.**

The bidder should also arrange for technical training for the local facility technologists and users.

## K) Payment Terms:

100% payments (except AMC) will be released after completion delivery, satisfactory installation, and qualification, subject to TDS as per rules. AMC cost (if ordered after completion of the warranty period) will be released on a half-yearly basis at the end of each six months, subject to satisfactory services. The price basis must be on FOR-IISc Bangalore basis only. As per GFR, no advance payment can be made to domestic vendors unless an equal amount of bank guarantee is provided.

## L) Statutory Variation:

Any statutory increase in the taxes and duties subsequent to the bidder's offer, if it

takes place within the original contractual delivery date, will be borne by IISc, Bangalore, subject to the claim supported by documentary evidence. However, if any decrease occurs, the advantage will have to be passed on to IISc, Bangalore.

## M) Disputes and Jurisdiction:

Any legal disputes arising from any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction in Bangalore, India.

## N) General:

1. All amendments, time extensions, clarifications, etc., within the tender's submission period, will be communicated electronically. No extension of the bid due date/time shall be considered due to a delay in receipt of any document(s) by mail.

2. The bidder may furnish any additional information necessary to establish capabilities to complete the envisaged work successfully. It is, however, advised not to furnish superfluous information.

3. With prior intimation, the bidder may visit the installation site before tender submission.

4. Any information furnished by the bidder found to be incorrect, immediately or later, would render the bidder liable to be debarred from tendering/taking up work in IISc, Bangalore.

# Section 4 – Technical Specifications

ANSYS ACADEMIC RESEARCH SEMICONDUCTOR

| Feature | Specifications |
|---|---|
| **Geometry Specifications** | - CAD integration for GDSII, OASIS, and DXF formats.<br>- Advanced layout processing for semiconductor geometries.<br>- User-defined primitives for semiconductor devices such as MOSFETs, BJTs, and diodes. |
| **Simulation Types** | - Drift-diffusion simulation for charge transport.<br>- Thermoelectric and electrothermal coupling.<br>- High-frequency signal integrity analysis.<br>- Stress-dependent simulations for piezoelectric and thermal effects. |
| **Meshing Techniques** | - Adaptive meshing for high-density integrated circuits.<br>- Support for boundary-layer and thin-film meshing.<br>- Substrate-aware meshing for complex wafer geometries. |
| **Device Modeling** | - Embedded device models for ICs, MEMS, and nanoelectronics.<br>- Integration of SPICE circuit models.<br>- Multi-physics support for optoelectronic devices. |
| **Material Properties** | - Includes frequency-dependent permittivity and loss tangent.<br>- Semiconductor-specific properties like doping profiles, mobility, and recombination rates.<br>- Anisotropic materials and temperature dependency support. |
| **Post-Processing** | - Carrier concentration, mobility plots, current density, and power dissipation.<br>- Device performance metrics such as leakage current, breakdown voltage, and switching times.<br>- Electrostatic potential and thermal gradient maps. |

ANSYS ACADEMIC TEACHING SEMICONDUCTOR

| Feature | Specifications |
|---|---|
| **Geometry Specifications** | - Predefined templates for semiconductor device geometries (e.g., diodes, MOSFETs).<br>- CAD import for standard formats like GDSII and DXF.<br>- Simple geometry creation tools for students to learn device structure fundamentals. |
| **Simulation Types** | - Basic DC and AC analysis for semiconductors.<br>- Electrothermal simulations for teaching material properties.<br>- Signal integrity and simple noise simulations for basic ICs. |

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| **Meshing Techniques** | - Auto-meshing for ease of use in academic settings.<br>- Simplified boundary condition setup.<br>- Basic substrate-aware meshing for standard devices. |

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| **Device Modeling** | - Simplified device libraries for standard diodes, transistors, and passive components.<br>- Circuit-level modeling integrated with SPICE-like solvers.<br>- Teaching-focused models for key semiconductor phenomena (e.g., drift-diffusion). |
| **Material Properties** | - Standard semiconductor materials (e.g., silicon, gallium arsenide).<br>- Support for temperature-dependent material properties.<br>- Ready-to-use dopant profiles for educational purposes. |
| **Post-Processing** | - Current-voltage (I-V) and capacitance-voltage (C-V) curves.<br>- Simple heatmaps for teaching thermal effects.<br>- Visualization of basic electric field distributions and carrier concentrations. |

ANSYS ELECTRONICS PREMIUM MAXWELL

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| ANSYS Electronics Premium Maxwell:<br>Geometry Specifications –<br>▪ CAD integration with Dxf & Dwf formats<br>▪ User defined primitives available for motors, coils and transformers<br>▪ Inbuild CAD tools to create geometry<br>Rigid Motion –<br>▪ Rotational, translational and non-cylindrical rotation |
| Solution Types/Solvers –<br>▪ Magnetostatic, Eddy current, Transient Magnetic, Transient Electric, Electrostatic and AC or DC conduction |
| Meshing Techniques –<br>▪ Autoadaptive meshing, surface approximation, skin depth mesh, On & Inside mesh, clone mesh, cylindrical and edge cut mesh. |
| Winding/Coil Modeling –<br>▪ Litz wire modeling, current/voltage/external circuit excitations, multi stranded coil design<br>▪ Computation of winding parameters like resistance, self/mutual inductance and flux linkages |
| Expert Solutions –<br>▪ RMxprt: Template based Rotating machine analytical electromagnetic simulation, helps to analyze the motor performance at the concept stage. Directly coupled with ANSYS Maxwell for high fidelity analysis.<br>▪ PExprt: Planar component design for converters |

Simplorer -

- System level analysis of electromagnetic components by coupling with source, load and control circuitry.
- Reduced Order Models (ROM) can be created to reduce the simulation time at the system level.
- Characterization of switching components to extract power loss and temperature.

ACT Tool Kit –

- Effecinecy map plots of the motors
- Static and Dynamic Eccentricity modeling

Post Processing –

- Torque, force, power, current, voltage, flux linkages, induced emf and power losses

Field plots – magnetic flux density, field intensity, current density, voltage stress, loss density

Advanced Material Library which should include;

- A comprehensive materials database containing permittivity, permeability, electric and magnetic loss tangents for common substances.
- Users must be able to include anisotropic materials, ferrites, temperature and frequency-dependent material properties. Frequency-dependent material models

Optimetrics:

- Optimization of the electromagnetic component
- Parametric analysis by defining the range of multiple parameters.

Import ECAD/MCAD

- The tool should support the import of following 3D DATA: ACIS, Acrobat 3D, 2D PDF, AMF, AutoCAD, CATIA, Creo Elements/Direct Modeling, Design Modeler, ECAD IDF, IGES, Image Files, Inventor, JT Open, Keyshot, Acrobat PDF 2D, AMF, AutoCAD, CATIA, Excel, ECAD IDF, IGES, Image files, NX, Parasolid, Point curve text, POV-Ray, Microsoft PowerPoint, Pro/ENGINEER
- The tool should support the export of following 3D DATA: ACIS, Acrobat PDF 3D, Acrobat 2D PDF, AMF, AutoCAD, CATIA, ECAD IDF, IGES, Image Files, Inventor, JT Open, Keyshot, Acrobat PDF 2D, AMF, AutoCAD, CATIA, Excel, ECAD IDF, IGES, Image files, NX, Parasolid, Point curve text, POV-Ray, Microsoft PowerPoint, Pro/ENGINEER, Rhino, SketchUp, SolidWorks, STEP, STL

ANSYS ACADEMIC RESEARCH EM

ANSYS Electronics Premium Maxwell:

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Meshing Techniques –

- Autoadaptive meshing, surface approximation, skin depth mesh, On & Inside mesh, clone mesh, cylindrical and edge cut mesh.

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ANSYS ACADEMIC TEACHING EM

**ANSYS Discovery:**

- Electromagnetic component modelling of available for Initial concept evaluation.

**ANSYS Electronics Premium Icepack:**

- 3D CFD solver for Transient and Static Thermal Analysis.
- Capable to handle types of heat transfer: Conduction, Convention and radiation: Combination of all modes of heat transfer.
- 3D Static Solver for Transient and Static Thermal Analysis.
- 3D FEA solver Mechanical Stress Analysis

**Q3D Extractor:**

- 3D EM Solver for RLGC Extraction of Busbar, PCB, IC Packages.
- Quasi-static 3D electromagnetic field analysis using Method of Moments accelerated by Fast Multipole Method.
- DCRL, ACRL & CG Solver.
- Quasi-static 2D electromagnetic field analysis using Finite Element Method.
- There should be a capability to solve just the 2D cross-section of transmission lines to extract its characteristic impedance.

**ANSYS Electronics Premium Maxwell:**

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Post Processing –

- Torque, force, power, current, voltage, flux linkages, induced emf and power losses
- Field plots – magnetic flux density, field intensity, current density, voltage stress, loss desnity

**ANSYS MotorCAD Enterprise: Multiphysics analysis of radial flux motors**

- Templates available – Brush less PM motor, Switched reluctance motor, Synchronous reluctance motor, Conventional Synchronous Motor, Three Phase Induction Motor, Single Phase Induction Motor, PMDC Motor and Brushless PM Outer runner Motor
- Emag: Electromagnetic performance of the motor at a operating point
- Thermal: Steady state and transient thermal analysis of the motor by employing housing and cooling methods readily available in the MotorCAD
- Lab: Motor performance for a wide range of speed/torque operation.
- Mechanical: NVH analysis of the motor
- User defined Drive cycle data can be considered for EV motor design
- Flexibility to incorporate Vehicle dynamics
- Sensitivity analysis can help to understand the influence of a particular parameter on the motor performance.
- Customization of available motor templates can be done by using Python scripting.

**ANSYS Medini Analyse Enterprise:**

- Ansys medini analyze streamlines functional safety analysis across the entire system architecture — including electronics down to the chip level
- It allows for consistent and efficient application of industry guidelines, specifically tailored to industry standards, such as ISO 26262, IEC 61508, ARP 4761, ISO 21448 or MIL-STD-882E.
- Safety Concept Modeling
- Model-Based Safety Analysis
- Reliability Prediction and Analysis
- Traceability and Validation
- Teamwork and Review Support
- Integration into the Engineering Environment
- Customization and Process Adaptation
- Reporting and Documentation

**ANSYS Granta Materials:** Advanced Material database available for simulations

**ANSYS optiSLang:**

- Helps to optimize the design to meet a specific requirement.
- Can be coupled with any ANSYS physics tools
- Objective of the optimization, limits of variable parameters and constraints can be defined

ANSYS LUMERICAL ENTERPRISE

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| FDTD<br>• Multicoefficient model for accurate material modeling over large wavelength ranges<br>• Powerful post-processing capabilities<br>• Models nonlinear materials and spatially variable anisotropy<br>• Highly interoperable with Lumerical scripting language,<br>• MATLAB API, and Python (via Automation API)<br>• Cloud ready using FDTD Accelerators and FDTD Burst Packs |
| MODE<br>• Bidirectional Eigenmode expansion and varFDTD engines easily handle both large planar structures and long propagation lengths<br>• Bend loss, confinement factor, and modal area analysis<br>• Advanced conformal mesh: high accuracy, even with course meshes, thanks for submesh geometry sensitivity<br>• Interoperable with Lumerical scripting language, MATLAB API, and Python (via Automation API)<br>• Cloud ready using MODE Accelerators |
| CHARGE<br>• 2D/3D steady-state, transient, and linearized frequency domain simulation<br>• Library of comprehensive semiconductor material models: incorporate temperature, doping, and high-field effects<br>• Isothermal, non-isothermal, and self-consistent simulation with HEAT<br>• Support for abrupt and graded heterostructures |
| STACK<br>• Utilizes analytic methods: faster than direct simulation of Maxwell's equations<br>• Well suited for anti-reflective coating, filters, OLEDs, and VCSELs<br>• Functions available for both plane-wave and dipole illumination<br>• Captures interference and microcavity effects |
| FEEM<br>• Accurate results for curved waveguide geometries<br>• Superior performance scaling thanks to higher order mesh polynomials<br>• Spatially varying index perturbations for easy electro-optic and thermo-optic modeling<br>• Ideal for waveguide thermal sensitivity analysis, modulators, photonic crystal fibers, and GRIN fibers |
| MQW<br>• Fully coupled quantum mechanical band structurecalculation using the k.p method<br>• Integrated laser simulation with INTERCONNECT to build sophisticated lasers models, incorporating tuning and external feedback effects<br>• Comprehensive material models includes material library with common III-V semiconductors, and automatically builds models for fractional semiconductor alloys |
| Interconnect<br>• Hierarchical schematic editor with an extensive library of primitive elements and foundry specific PDK elements<br>• Use measured data and component-level simulations to develop and maintain calibrated Compact Model Libraries<br>• Support for publishing foundry PDKs<br>• Interoperable with industry leading EDA and PDA tools<br>• Statistical support including Monte Carlo and corner analyses |
| DGTD |

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| • Accurately model low-loss metallic structures over broad wavelength ranges with finite element mesh and broadband multi-coefficient material models<br>• Higher order method with variable polynomial order gives maximum control over simulation time and accuracy<br>• Automated partitioning of material domains with sources and monitors definable on arbitrary surfaces<br>• Includes far-field and grating projections, scripting, sweeps and optimizations, and support for concurrent computing |
| Electronic-Photonic Integration<br>• Generate and validate layouts using Tanner L-Edit and Calibre®<br>• Simulate photonic components using Ansys Lumerical's DEVICE Suite for Photonic<br>• Multiphysics Simulation to guide design and update compact models<br>• Support for designers and foundries to develop PDKs complete with layouts and calibrated compact models. |
| CML Compiler<br>• Automated generate version-controlled compact model libraries<br>• Generated from single data source of characterized measurements or 3D simulation results<br>• Generate IP protected INTERCONNECT and Verilog-A models, and co-simulate with third-party EDA simulation tools<br>• Structured input (.json and .mat formats) with template and data validation<br>• Support for generating statistical models for MC and corner analysis |

ANSYS ACADEMIC LUMERICAL RESEARCH

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| Ansys Lumerical FDTD Ansys<br>Lumerical MODE<br>Ansys Lumerical Multiphysics<br>Ansys Lumerical INTERCONNECT<br>Ansys Lumerical CML Compiler |
| Built-in HPC |
| Ansys optiSLang Enterprise<br>Ansys optiSLang AI+ |

ANSYS ACADEMIC LUMERICAL TEACHING

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| Ansys Lumerical FDTD Ansys<br>Lumerical MODE<br>Ansys Lumerical Multiphysics<br>Ansys Lumerical INTERCONNECT<br>Ansys Lumerical CML Compiler |
| Built-in HPC |
| Ansys optiSLang Enterprise<br>Ansys optiSLang AI+ |

ANSYS ZEMAX OPTICS STUDIO ENTERPRISE

| **General Capabilities** |
|---|
| FlexNet Licensing |
| Optimization |
| Tolerancing |
| Ansys Optics Launcher |
| Project directories |
| **Advanced Physics** |
| Phosphors and Fluorescence |
| Phosphors and Fluorescence Spectrum Plot |
| 1D In-House RCWA DLL |
| **Imaging System Design & Analysis** |
| Contrast Optimization |
| Contrast Loss Map |
| Full Field Aberration analysis |
| Diffraction Efficiency |
| Efficiency vs Angle |
| Efficiency vs Wavelength |
| TrueFreeForm Surface |
| Export Point Cloud |
| NSC Single Ray Trace |
| Light Source Analysis |
| IES Source Models |
| Convert to Spectral Source File |
| Concatenate Spectral Source Files |
| Convert Spectral Source File to IES |
| Source Directivity Viewer |
| Source Polar Viewer |
| Source Spectrum Viewer |
| Mechanical Data in Material Catalog |
| **Tool Interoperability** |
| Lumerical 2D RCWA Dynamic Link |
| Export to Speos Lens System |
| Creo 9 Dynamic Link Support |
| Export Optical Design to Speos |
| Diffractive Modelling: DLL for direct modeling of metalenses in OpticStudio and Lumerical |
| **Imaging System Tolerance & Stray Light Analysis** |
| Quick Yield |
| High Yield |
| Yield Analysis |
| Histogram Analysis |
| Composite Surface |
| Critical Ray Tracer |
| Critical Rayset Generator |
| Non-sequential ray tracing |
| ISX Scatter Catalogs |

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| Path Analysis |
| In memory Path Analysis |
| **StructuralThermal Optical Performance Analysis** |
| Alignment Check |
| STAR System Viewer |
| 2D Deformation Plot |
| Performance Analysis |
| Thermal Index Plot |
| FEA Data Viewer |
| Active RBMs |
| STAR Surface Viewer* |
| Direct Index Fitting |
| **Data Libraries** |
| Design Templates |
| Lens Catalog |
| Materials and coatings catalogs |
| **Programming Interface** |
| Zemax Programming Language |
| Programmable interface (ZOS-API) |
| User-defined surfaces, objects, scatter profiles and sources |
| **CAD Interoperability** |
| CAD Assembly: Autodesk Inventor® |
| CAD Assembly: Creo Parametric® |
| CAD Assembly: SolidWorks® |
| CAD Part: Autodesk Inventor® |
| CAD Part: Creo Parametric® |
| CAD Part: SolidWorks® |
| CAD Part: Zemax Part Designer |
| Explode SolidWorks Assembly |
| Explode Autodesk Inventor Assembly |
| Explode Creo Parametric Assembly |
| CAD Part Viewer |
| **Lighting and Illumination** |
| Lightning Trace |
| Source Illumination Map |
| Bitmap Wizard |
| CIE 1931 Color Chart |
| CIE 1976 Color Chart |
| Roadway Lighting Wizard |
| Roadway Lightning Analysis |
| Roadway Lighting |
| Radiant Source Model™ Viewer |
| Radiant Source Models |
| ReverseRadiance™ Detector |
| ReverseRadiance™ Target |
| ReverseRadiance™ Analysis |
| **Lasers & fibers** |
| Physical Optics Propoagation (POP) |

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|---|
| Single mode fiber coupling |
| Multi-mode fiber coupling |

ANSYS ACADEMIC RESEARCH OPTICS

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| Ansys Zemax OpticStudio Enterprise<br>Ansys Speos for Creo Parametric<br>Ansys Speos Enterprise |
| Built-in HPC<br>Ansys Optis HPC |

ANSYS ACADEMIC TEACHING OPTICS

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| Ansys Zemax OpticStudio Enterprise<br>Ansys Speos for Creo Parametric<br>Ansys Speos Enterprise |
| Built-in HPC<br>Ansys Optis HPC |

ANSYS ELECTRONICS PREMIUM ICEPACK

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| Application<br>Icepak is developed extensively for highly accurate thermal management of electronics components and systems completely capable of handling MCAD and ECAD data. |
| Transient and Steady State Analysis<br>Possible (with radiation modeling). |
| Physics models available<br>Turbulence, energy, Forced and free convection, radiation, solar loading, altitude effects, MRF, species transport, multi-fluids system (without fluid - fluid interaction), Krylov Reduced Order Modelling (for very fast transient analysis). |
| Primitive objects and Libraries<br>Icepak provides primitive objects like heat sinks, PCBs, Packages, fans, TECs etc. that can be added to the model by simple drag and drop. Also, a collection of industry standard objects are readily available in the library for quick access. |
| Meshing<br>Highly accurate, powerful and automated conformal/non-conformal meshing, multi-level meshing can be done within the Icepak interface. Icepak uses Hexa mesh to capture features of microelectronic components. Time and effort required for meshing such small components in Icepak is comparatively low. |
| Network Packages<br>Automated procedure in Icepak to create an optimized DELPHI network model from a detailed thermal model of a package is possible. |
| Solver and Accuracy<br>Icepak uses the industry leading, best in class Fluent solver which is renowned in the industry for it's accuracy, robustness and scalability. |
| Multiphysics Capability<br>Integrated in Workbench and Ansys Electronics Desktop. Direct integrations - At the chip level (with Ansys Redhawk), PCB level (with Ansys SIwave), and the System level (with Ansys |

HFSS/Maxwell/Q3D) providing the most powerful Multiphysics solution in the market. Icepak can also be coupled with Ansys Mechanical for highly accurate electro-thermo-mechanical simulation and with Ansys Sherlock for reliability considerations.

ANSYS ELECTRONICS PREMIUM HFSS

- The package have the capability to simulate any arbitrary 2D or 3D model for EM simulation from DC to THz frequency. Moreover Circuit simulation tool allow user to integrate multiple electromagnetically analyzed models to carry out a system-level analysis.

Numerical Solver Technology:

- HFSS (High Frequency 3D Electromagnetic Field simulation)
  - 3D full-wave Frequency Domain-based electromagnetic field solver based on the Finite Element Method (FEM).
  - 3D full-wave Frequency Domain-based electromagnetic field solver based on Integral Equation Method (MoM).
  - 3D full-wave Time Domain-based electromagnetic field solver based on Discontinuous Galerkin (DG) and FEM Time Domain Methods.
  - 3D full-wave Frequency Domain-based Asymptotical electromagnetic field solver based on Shooting and Bouncing Ray + (SBR+) method.
  - 3D full-wave Frequency Domain, Eigen Mode Solver, based on FEM
  - 3D Full-wave Frequency Domain Characteristic Mode Analysis Solver based on MoM
  - 3D Multipaction solver for finding RF breakdown inside High Power RF components
  - 3D simulation tools support Hybridization FEM, IE and SBR+/PO solver in a single design.
  - SBR+ solver should automatically combine following asymptotic methods to arrive at an accurate solution
    - Physical Optic (PO),
    - Geometrical Optic (GO),
    - Physical Theory of Diffraction (PTD),
    - Uniform Theory of Diffraction (UTD),
    - Creeping Wave (CW)
- Circuit simulation (Designer, Simplorer and EMIT)
  - ID circuit simulation capability for following RF simulations
    - Linear analysis
    - DC analysis
    - Oscillator Analysis
    - Harmonic Balance Analysis (1-Tone and N-Tone)
    - Transient Analysis
    - Time Varying noise Analysis
    - Phase noise Analysis
    - Multi-tone harmonic balance analysis
    - Envelope analysis
    - Load pull analysis and model support
    - Periodic transfer function analysis
  - Circuit System solver should have
    - Build power electronic circuits using IGBT, BJT, MOSFET, etc.
    - Capability to characterize semiconductor switches from manufacturer datasheet
    - Capability to do time and frequency domain simulations

- Capability to co-simulate with physics-based models
- Capability to import Reduced-Order Models generated for Physics-based simulations

- 1D Power Spectral Based solver for finding RF interference between different Microwave system
- System-level solver for Integrating physics-based model with multi-domain based components, Power Electronic circuits, etc.
- Power Spectral solver should provide following RFI matrics across multiple Transmitter and Receiver platform: EMI Margin, Sensitivity, Availability, Desense, Noise In-Band EMI Margin
- Power Spectral solver should provide RF interference of Mulitple Transmitter to the single receiver.
- Power Spectral solver should support Non-Linear Interference Effects in RF interference analysis

Graphical User Interface for EM analysis

The software package should have the following features:

- Tools should have an option or toolkit to automatically setup simulations for following RCS/Radar simulation: Range Profile, ISAR, Range Doppler Prcoessing and waterfall.
- The tool should have an option to encrypt the 3D component, which a user can share with others without revealing the IP
- The tool should have an option to import/export encrypted/unencrypted 3D component models for simulation.
- The tool should have templates for setting up EMI EMC simulation like Radiated Emission, Conducted Emission, ESD, BCI
- The tool should have the capability to model and parameterize any arbitrary 3D model
- The tool should have the capability to do operations such as unite, subtract, intersect different objects to create a model
- There should be a provision for creating equation-based curves/surfaces for creating more complex models.
- There should be provision for wrapping sheets onto curved surfaces.
- The software should have the ability to import, edit, simplify and parameterize 3D CAD models from third-party tools.
- The capability to clean up 3D CAD and detection tools for Short Edges, Overlap Faces, Corrupt Faces
- The tool should allow users to edit STL files directly and leverage automatic repair tools
- Options for cleaning imported 3D models
  - Options for analyzing individual objects of the complete 3D model to locate any faults in the modelling
  - Possibility to find inter-object misalignments
- There should option for healing the geometry
- There should be provision to model layouts into a stackup based environment and simulate in the same environment
- Layout interface should have options to change the stackup, trace widths, via and padstack.
- PCB Trace modelling options in the Layout interface
  - Surface roughness – Huray and Groisse
  - Options for Etching

Import ECAD/MCAD

- The tool should support the import of following 3D DATA: ACIS, Acrobat 3D, 2D PDF, AMF, AutoCAD, CATIA, Creo Elements/Direct Modeling, Design Modeler, ECAD IDF, IGES, Image

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| Files, Inventor, JT Open, Keyshot, Acrobat PDF 2D, AMF, AutoCAD, CATIA, Excel, ECAD IDF, IGES, Image files, NX, Parasolid, Point curve text, POV-Ray, Microsoft PowerPoint, Pro/ENGINEER<br>• The tool should support the export of following 3D DATA: ACIS, Acrobat PDF 3D, Acrobat 2D PDF, AMF, AutoCAD, CATIA, ECAD IDF, IGES, Image Files, Inventor, JT Open, Keyshot, Acrobat PDF 2D, AMF, AutoCAD, CATIA, Excel, ECAD IDF, IGES, Image files, NX, Parasolid, Point curve text, POV-Ray, Microsoft PowerPoint, Pro/ENGINEER, Rhino, SketchUp, SolidWorks, STEP, STL |
| Mesh Options<br>• Use tetrahedron element for 3D models and triangles for sheet structures (HFSS/Q3D/MAXWELL)<br>• Option to have curvilinear mesh elements for accurately solving curved geometries (HFSS)<br>• Mesh Control (HFSS/Q3D/MAXWELL)<br>• Options to specify surface deviation, normal deviation and aspect ratio to control mesh density(HFSS/Q3D/MAXWELL)<br>• Ability to restrict the number of elements/size of the elements within an object or just on the surface of the object (HFSS/Q3D/MAXWELL)<br>• Skin-depth based seeding capability (HFSS)<br>• Advanced capability like Assembly Meshing: Independent component meshing allows mesh reuse, no re-meshing in parametric variations, independent mesh settings for different components and more robust meshing for models with a significant difference in scale. Especially useful for Antenna Placement and scattering problems where mesh reuse can be done (HFSS)<br>• Phi mesher (Prism elements) for faster meshing of the planar structures (HFSS). |
| Advanced Material Library which should include;<br>• A comprehensive materials database containing permittivity, permeability, electric and magnetic loss tangents for common substances.<br>• Users must be able to include anisotropic materials, ferrites, temperature and frequency-dependent material properties. Frequency-dependent material models like Debye and Djordjevic-Sarkar models to ensure that the material satisfies causality conditions.<br>• Provision for Spatially dependent material properties and boundary conditions.<br>• Data base of interface materials like thermal components (manufactures like 3M, Aavid, etc).<br>• Heat sinks: Standard heat sinks of different manufactures like Aavid, Thermshield etc to be provided. Minimum of 500 No's of heat sink database. |
| Excitation and Boundary Condition<br>• Excitation for Ports SYZ parameter excitation<br>o Arbitrary internal and external ports – Waveport and Lumped Port<br>o Ability to solve all ports in one solution and not port-by-port<br>o Floquet ports for antenna arrays, frequency selective surfaces (FSS) and other periodic structures<br>o The software should have a provision for extracting fields/active S parameter as per user specified excitation magnitude and phase<br>• Option to provide voltage source and current source<br>• Magnetic bias for ferrite models<br>• Incident wave excitations available from following wave types:<br>o Plane Wave, Hertzian dipole wave, Cylindrical wave, Gaussian Beam Wave<br>o Linear Antenna wave, Far Field Wave, Near Field Wave<br>o Far-field wave and near field wave can be from another design or the measurement. |

- Boundary conditions available:
  - Radiating, perfectly matched layers and FEBI
  - Impedance boundary
  - Layered Impedance with shell elements which can account for thickness even when modelled as sheets
  - Lumped RLC boundary
  - Symmetry boundary for reducing the problem size
  - Period boundary condition for solving arrays
  - Finite conductivity boundary with the capability to include metal roughness using Huray or Groisse algorithm
  - Fresnel Boundary

General Solver Options

- Direct or Iterative approach for solving the matrices
- Hybrid solver with Integral equation solver should support matrix solving with ACA (Adaptive Cross Approximation) or MLFMM (multilevel fast multipole method).
- Basis functions are available as zero, first, second and mixed order for simulation of various class of problems.
- Import mesh to design from other similar design
- Frequency sweep options
  - Interpolation sweep
  - Discrete sweep
  - Fast sweep
- Broadband frequency sweeps with the capability to take into account dispersive ports, materials and skin effect.
- Enforce passivity / enforce causality for the broadband sweep
- DC point solver option for PCBs for accurate DC point characterization
- The asymptotic solver should enable all SBR solver like PTD, UTD, and CW in a single simulation
- PO and SBR+ asymptotic solver should support lossy dielectrics
- SBR solver should support multilayer dielectrics
- FEM frequency-domain solver should have the capability to simulate even in THz region for applications such as metamaterials, FSS etc.
- There should be an option of using 2.5D MOM or FEM solver to analyze planar layouts.
- Solution convergence and control:Convergence based on S parameter, field quantities or user-defined expressions
- The software should have the capability for adaptive meshing across different frequencies of broadband structures.
- Eigenmode solver should be able to find the natural resonances and quality factor of the lossy structure.
- The solver (FEM) should have an option to
  - physically divide the simulation model into the different sections
  - Enable parallel meshing and solving for each section individually
- Solver has the capability for solving a single unit cell of an array for Active Element Patterns using Periodic Boundary Conditions
- The solver should have the ability to create and solve Finite Array Simulation by combining different types of unit cells.
- Finite Array simulation should support features like Array Mask creation for arbitrary sparse array configuration.

- Scattered field simulation for solving RCS problems. Provision for both bistatic and monostatic RCS along with incident field excitations.
- RCS calculation should be able to conduct with FEM, IE and SBR+ solvers
- RCS simulation using SBR solver should automatically combine additional solvers like PTD, UTD and CW in a single design
- Broadband frequency sweeps with the capability to take into account dispersive ports, materials and skin effect.
- The IE and SBR should have an option to create an ISAR image, Near Filed Radar ROM (Waterfall plot) of the Radar target
- SBR+ Radar simulation should support Pulsed Radar and FMCW Radar
- Capability to generate raw IQ data from Radar simulation (FMCW)
- Mulitpaction solver should support multiple port simultaneous excitations for RF breakdown analysis
- Basic Solver should enable 4 cores HPC (High Performance Computation) capability.
- Built-in Antenna model for RF interference and SBR+ simulation: Short Dipole, Half-wave dipole, Quarter wave Monopole, Pyramidal Horn, Small Loop, Parametric Beam Antenna, Wire Monopole
- SBR solver should have the ability to simulate Radar Simulation
  - Able to incorporate multiple transmitting and receiving antenna
  - Able to create Radar simulation scenarios
  - Scenario simulation with respect to time
- Calculate Range, Velocity and Angle of Arrival
- Types of flow for thermal analysis:
  - Laminar, transition & turbulent flows
  - Ability to model multiple fluids.
- Transient, steady state and parametric analysis (Thermal)
- Joule heating in objects with temperature dependent properties supported
- In case of transient simulation, ability to model variables as a function of time (Thermal).
- Bi-directional coupling with Q3D, Maxwell, HFSS for node to node EM loss mapping and coupled electro-thermal simulation

Pre-Processing Options

- Ability to perform package merge with PCB.
- Advanced and easy-to-use layout-based GUI allowing users to easily manipulate layouts, with features as follows:
  - trace drawing utilities,
  - layer stackup editor,
  - padstack editors,
  - add bondwire - standard JEDEC bondwire, non-standard bondwire,
  - generate 3D models of selected nets, areas or both.
- Built-in Circuit and system components library including wide range of active, passive, and distributed device models from transistors to transmission lines, including sources and probes.
- Import power maps in form of X, Y, Z, P. X, Y and Z are the coordinates and P is the heat flux

Post-processing options-

The output from the tool should be

- Network parameters like SYZ
- Characteristic port impedances and propagation constants
- Capability to observe near field and far-field radiations
- Far field antenna parameters like

- Gain
- Directivity
- Radiation efficiency
- Axial ratio

- Capability to observe co-pol and x-pol antenna patterns
- Observe antenna array patterns based on array factor and pattern multiplication
- Characterize RCS of structure
  - Monostatic RCS and Bistatic RCS
- SAR plot
- Capability to dynamically link electromagnetic models to circuit simulator for further system analysis. There should be an option to push excitation back from circuit to the electromagnetic solver to observe fields based on actual excitation
- Feature to perform optimization of decoupling capacitor scheme on the PDN of PCB/package design, based on constraints like target impedance, number and types of capacitors, cost etc.
- The electromagnetic solver should have the option to export s parameter data in touchstone format, generate equivalent RLGC models, export W element model, export equivalent spice models
- Field Animation
  - Capability to animate E-field/H-field and Current density
- User Defined Field Calculations using Field Calculator
- RF Link Budget analysis: using simulation or measured data
- Option to add rain and atmospheric attenatuion in RF interference and Link budget calculation.
- Wireless Propagation Models support for RF interference and Link Budget calculation: Hata model, S parameter model, Path loss coupling, two ray path loss coupling, Log distance coupling, Walfisch-Ikegami model, Erceg Coupling, Indoor propagation model, Two-ray ground-reflection model
- The tool should have option or toolkit to automatically post process and display the following RCS/Radar outputs: Range, Range Doppler, ISAR, Waterfall
- The tool should have option or toolkit to automatically calculate Power Density and Cumulate Derivtive Function from phased array or antenna simulations
- Ability to get a quick idea of characteristic impedance by generating an impedance delay plot for each trace path selected and also to rapidly generate transient voltage waveforms of pin-to-pin signal propagation.
- Ability to simulate for TDR and TDT for specified nets in design
- Provide impedance scan feature to quickly examine trace impedance profiles and identify any viola-tions according to user chosen criteria
- Provides two-way coupling with thermal or electronics cooling solver to solve for joule heating
- Perform QuickEye analysis, a pattern-dependent convolution based approach to calculate eye diagram from transient analysis of single transitions.
- Perform VerifEye analysis using a fully statistical approach to calculate the BER directly.
- Perform IBIS-AMI analysis allowing time-domain simulation of a linear channel using customer-supplied models for the transmitter and receiver.
- Direct integration with HSPICE simulation software, allowing transient simulations with HSPICE and also plot results directly from HSPICE output data files.

Advanced analysis features and parallel solve

- Analytical derivatives to find output sensitivity to design parameters without resolving structure.

- Capability for simulation of very large models across a network of machines using all of the available memory using Domain Decomposition.
- Data link for field-to-field 3D electromagnetic linking – Enabling fields from one simulation to be used as source in another simulation.
- Dynamic link for circuit and EM co-simulation with smith tool capability for matching circuit design.
- The capability of tools to integrate with other application such as Thermal, Mechanical for Multiphysics Problems
- Should be capable of doing:
  - Queuing the projects for solving
  - Support for remote analysis with client and server each on any supported platforms
- 64-Bit Support:
  - The software should be able to support 64-bit CPU architecture on Windows and Unix Operating system for both solver and user interface.
  - Should support unbounded 64-bit Solver Memory allocation.

Optimetrics – For optimizing designs

- Integrated optimization capability including:
  - Parametric analysis
  - Optimization analysis
  - Sensitivity analysis
  - Statistical analysis
- Optimizer should have these algorithms:
  - Pattern search algorithm
  - Quasi-Newton search algorithm
  - Sequential Non-Linear Programming (SNLP) Optimizer
  - Genetic optimization algorithm
  - Link to Matlab for custom optimization codes
  - Screening (Shifted Hammersley)
  - MOGA (Multi-Objective Genetic Algorithm)
  - NLPQL (Non-linear Programming by Quadratic Lagrangian)
  - MISQP (Mixed-Integer Sequential Quadratic Programming Method)
  - Adaptive Single-Objective
  - Adaptive Multiple-Objective
- Analytical derivatives to find output sensitivity to design parameters without resolving structure.
- Capability to solve parametric variations of a design in parallel using processor cores in a single machine or spread over networks

Automation and distributed computing

- Scripting options for model creations, plotting, exporting results thus providing automation
- Scripting languages
  - VB script
  - Iron python script
  - Java script
- Able to use multiple cores in simulation for faster simulations.
  - Multiple cores can be a single machine or across the network
- Domain Decomposition Method for solving electrically large model
  - Automatically break the large problem into smaller domains and solve them in parallel

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| • Distribute frequency points and solve in parallel<br>• Should be capable to Queue the projects for solving<br>• Support for remote analysis with client and server each on any supported platforms |

ANSYS ACADEMIC RESEARCH HF

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| Ansys Electronics Premium HFSS |
| Ansys Electronics Premium IcePak<br>Ansys Electronics Premium SIWave<br>Ansys Electronics Premium Q3D Extractor Ansys<br>SynMatrix Filter<br>Ansys EMC Plus<br>Ansys Charge Plus<br>Ansys Motor-CAD Enterprise |
| Ansys Discovery Modeling<br>Ansys Discovery Simulation |
| Ansys GRANTA Materials Data for Simulation |
| Ansys Medini Analyze Enterprise<br>Ansys ModelCenter Premium<br>Ansys MC MBSE Connectors |
| Built-in HPC<br>Ansys HPC<br>Ability to extend built-in HPC |
| Ansys optiSLang Enterprise<br>Ansys optiSLang AI+ |

ANSYS ACADEMIC TEACHING HF

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| Ansys Electronics Premium HFSS |
| Ansys Electronics Premium IcePak<br>Ansys Electronics Premium SIWave<br>Ansys Electronics Premium Q3D Extractor Ansys<br>SynMatrix Filter<br>Ansys EMC Plus<br>Ansys Charge Plus<br>Ansys Motor-CAD Enterprise |
| Ansys Discovery Modeling<br>Ansys Discovery Simulation |
| Ansys GRANTA Materials Data for Simulation |
| Ansys Medini Analyze Enterprise Ansys<br>ModelCenter Premium<br>Ansys MC MBSE Connectors |
| Built-in HPC<br>Ansys HPC<br>Ability to extend built-in HPC |
| Ansys optiSLang Enterprise<br>Ansys optiSLang AI+ |

ANSYS MECHANICAL ENTERPRISE

**Capabilities in Geometric Idealization**

- Spring
- Mass
- Damper
- Spar
- Beam
- Cable
- Pipe/Elbow
- Shell - Thin
- Layered Shell - Thin (Composite)
- Shell - Thick (Solid Shell)
- Layered Shell - Thick (Solid Shell)
- 2D Plane / Axisymmetric
- 3D Solids
- Layered 3D Solids (Composite)
- Reinforced
- Infinite Domain
- 2.5 D Elements
- Coupled Field ROM Element Technology

**Modeling Capabilities**

- Contact - Linear
- Contact - Nonlinear
- Joints
- Seam Welds
- Spot Welds
- Element Birth and Death
- Gasket Elements
- Rezoning and Adaptive Remeshing
- Inverse Analysis

**Types of Materials**

- Basic Linear Materials (Linear, Anisotropic, Temperature Dependent).
- Basic Nonlinear Materials (Hyperelastic, Plasticity, Rate Independent, Isotropic, Concrete, Viscoelasticity).
- Advanced Nonlinear Materials (Rate dependent, Anisotropic, Damage Models, Geomaterials, and Multiphysics).
- Field Dependent
- User Defined Material Model Formulations
- Fracture Mechanics and Crack Growth
- Materials Multiscale Homogenization

**Composite Materials Modelling**

- Material Definitions
- Ply Definitions
- Interface Layers
- Advanced Ply-Modeling Features
- Variable Material data
- Solid Extrusion
- Lay Up Mapping
- Draping
- Lay-Up Exchange Interfaces
- Advanced Failure Criteria Library
- First-ply Failure
- Last-Ply failure
- Delamination
- Sandwich Modeling
- Automation / Run Scripts
- Short Fiber Composites

**Structural Solver Capabilities**

- Linear & Nonlinear Static
- Pre-Stress effects, Linear perturbation
- Nonlinear Geometry
- Buckling - Linear Eigenvalue
- Buckling - Nonlinear Post Buckling Behavior
- Buckling - Nonlinear Post Buckling Behavior – Arc Length
- Steady State Analysis applied to a Transient Condition
- Advanced Wave Loading
- Implicit Time Integration

**Topology Optimization**

- Structural Optimization
- Modal Optimization
- Thermal Loads
- Inertial Loads
- Optimized Design Validation
- Manufacturing Constraints
- Stress constraints
- Symmetry
- Lattice Optimization
- Overhang / Additive Constraints

**Multi Analysis Capabilities**

- Submodeling
- Data Mapping
- Multiphysics Data Mapping
- Initial State

- Advanced Multi-Stage 2-D to 3-D Analysis

**Vibrations analysis capabilities**

- Modal
- Modal - Pre-Stressed
- Modal - Damped/Unsymmetric
- Transient - Mode-Superposition
- Harmonic - Mode-Superposition
- Harmonic – Full
- Nonlinear Harmonic - Full
- Spectrum
- Random Vibration
- Mistuning
- Multi-Stage Cyclic Symmetry
- Rotordynamics

**Acoustics Capabilities**

- Modal Acoustics
- Harmonic Acoustics
- Transient Acoustics
- Boundary Element Method Acoustics
- Statistical Energy Analysis Acoustics
- Piezoelectric Acoustics
- Generation of Acoustic Signature from Contact Regions
- Acoustics Element Library
- Acoustics Material Models

**Nonlinear Multi-Body Dynamics**

- Rigid Body Mechanisms
- Rigid Body Dynamics with CMS components for flexible bodies
- Full Transient
- CMS with Substructuring
- Mixed Rigid - Flexible Systems

**Explicit Dynamics capabilities**

- FE (Lagrange) Solver
- Implicit-Explicit Material States
- Mass Scaling
- Natural Fragmentation
- Erosion Based on Multiple Criteria
- Explicit Time Integration

**Durability analysis**

- Stress-Life (SN)
- Strain-Life (EN)
- Safety Factor

**Wave Hydrodynamics capabilities**

- Diffraction and Radiation
- Frequency & Time Domain Motions Analysis
- Moorings, Joints & Tethers
- Internal Tanks
- Load Transfer to Structural Analysis

**Thermal analysis capabilities**

- Steady State Thermal
- Transient Thermal
- Conduction
- Convection
- Radiation to Space
- Radiation - Surface to Surface
- Phase Change
- Thermal Analysis of Layered Shells and Solids

**Additional Physics**

- 1-D Thermal-Flow
- 1-D Coupled-Field Circuits
- 1-D Electromechanical Transducer
- MEMS ROM
- Piezoelectric
- Piezoresistive
- Electromagnetic
- Electro-Migration
- Diffusion-Pore-Fluid
- Diffusion-Thermal-Electric-Magnetic
- Multi-scale Modeling

**Optimization Analysis**

- DesignXplorer Included
- Parameters
- Design Point Studies
- Correlation Analysis
- Design of Experiments
- Sensitivity Analysis
- Goal Driven Optimization
- Six Sigma Analysis

**Includes following modules**

- ANSYS SpaceClaim
- ANSYS Customization Suite (ACS)
- Support ACT Extensions
- Journaling and Scripting
- Command Snippet Support

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| • Batch run capability<br>• Read/Write 3rd Party Matrix CAE Data<br>• CDB and 3rd party FE Model Import<br>• Nastran Bulk File Export<br>• Global/Selective Mass Scaling<br>• Keyword Input<br>• Splitting o fInput File into Subfiles<br>• User Subroutines<br>• Re-mapping<br>• Transmitting boundaries<br>• Dynamic Storage Allocation<br>• Extensive Output Data Controls(ascii/binary)<br>• Interactive Real-Time Graphics<br>• Double Precision |
| **HPC**<br>• Parallel solving upto 4 cores on local PC Option<br>• Parallel solving upto 4 cores over Network option<br>• Can be extended with Add-on HPC packs |

ANSYS ACADEMIC RESEARCH MECHANICAL

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| Ansys Mechanical Enterprise |
| Ansys LS-DYNA Ansys<br>Forming Ansys<br>Additive Suite Ansys<br>Additive Print<br>Ansys Discovery Modeling<br>Ansys Discovery Simulation<br>Ansys Motion Enterprise<br>Ansys Sound Pro |
| Ansys GRANTA Materials Data For Simulation |
| Ansys Geometry Interfaces for Parasolid & SAT<br>Ansys Geometry Interfaces for Solidwork, SolidEdge, Autodesk, NX Ansys<br>Geometry Interfaces for CATIA V5 & V6 Reader<br>Ansys Geometry Interfaces for Creo Parametric & Elements Direct Modeling<br>Geometry Interface for JT |
| Built-in HPC<br>Ansys HPC<br>Ansys LS-DYNA HPC<br>Ability to Extend built-in HPC |
| Ansys optiSLang Enterprise<br>Ansys optiSLang AI+ |

ANSYS DISCOVERY SIMULATION

Real-time Simulation

- Instant Feedback: Provides real-time simulation results for structural, thermal, and fluid analyses, allowing for faster design iteration.
- Design Exploration: Instantaneous updates of performance metrics as users modify geometry, enabling quick evaluation of design alternatives.

Simulation Types

- Structural Simulation: Includes linear static, modal, and harmonic analysis for investigating stress, deformation, and vibration.
- Thermal Simulation: Heat transfer analysis to understand temperature distribution and thermal gradients across designs.
- Fluid Flow Simulation: Computational Fluid Dynamics (CFD) tools for simulating fluid flow, pressure drops, heat transfer, and fluid-structure interaction.
- Multiphysics Simulation: Coupled thermal and structural simulations for scenarios where both temperature and mechanical effects are critical.

Geometry and Meshing

- Automatic Meshing: Advanced meshing algorithms that automatically generate high-quality meshes based on geometry and simulation requirements.
- Geometry Handling: Import and edit complex CAD geometry from various sources. Supports parametric and non-parametric CAD models.
- Mesh Refinement: Tools to refine mesh density in critical areas to enhance simulation accuracy.

Design Optimization

- Topology Optimization: Automates the process of finding the best material distribution for weight reduction and performance enhancement.
- Parametric Studies: Set design parameters and run sensitivity analyses to optimize key parameters in a design.
- Goal-Driven Design: Allows setting design objectives and constraints, guiding the design process for optimal results.

Supported Analyses

Structural Analysis

- Linear static and dynamic analysis for deformation, stress, strain, and vibration analysis.
- Modal and harmonic analysis for assessing natural frequencies and response to oscillatory forces.

Thermal Analysis

- Steady-state and transient thermal analysis to simulate temperature effects and thermal stress.
- Heat transfer analysis for both conduction and convection scenarios.

Fluid Dynamics

- Steady-state and transient flow analysis for both incompressible and compressible fluids.
- Heat exchange modeling and pressure drop calculations.
- CFD simulations for both internal and external flow conditions.

Electromagnetic Analysis (if applicable)

- Analysis of electromagnetic fields and thermal effects from electric currents or magnetic fields.

Coupled Multiphysics

- Simultaneous thermal-structural analysis for evaluating temperature-dependent stress and deformation.

- Fluid-structure interaction simulations for applications involving coupled fluid and solid behavior.

ANSYS CFD ENTERPRISE

- FLUENT Solver Capabilities
    - Steady-State Flow
    - Transient Flow
    - 2D and 3D Flow
    - Compressible and Incompressible Flow
    - Customizable Material Properties
    - Non-Newtonian Viscosity
    - Real fluids models (steam, refrigerants, cryogenics, NIST data)
    - Pressure-Based Solver
    - Density-Based Solver
    - Native Multi-GPU Solver
    - Coupled and Segregated Solvers
    - Subsonic Flow
    - Supersonic and Hypersonic Flow
    - Turbulence – RANS models
    - Turbulence - LES/SAS/DES
    - Heat Transfer - Natural Convection, Conduction and CHT
    - Heat Transfer - Shell Conduction
    - Thermal Radiation - Participating & Transparent Media
    - ECAD Import for PCB Thermal Modeling
    - Expressions, Inc. Functions of Solution Values
    - Flow-Drive Solid Motion (6-DOF)
    - Porous Media
    - Reduced Order Model (ROM) creation
    - Dynamic/Moving-Deforming Mesh
    - Overset Mesh
    - Dynamic Solution-Adaptive Mesh Refinement
    - Fan Model
    - Virtual Blade Model
    - Inert and Massless Particle Tracking
    - Coupled Particle Tracking (with Mass)
    - Wall Film Modeling
    - Macroscopic Particle Model
    - Reacting/Combusting Particles
    - Particle Break-Up and Coalescence
    - Dense Particle Coupling (DDPM) and Granular Particle modeling
    - Wall Erosion Modeling
    - Discrete Element Model (DEM)
    - Free Surface VOF model
    - Regime change between particle and free surface (VOF <-> DPM)
    - Multiphase flow modeling
    - Complex Multiphase Regime Transitions
    - Surface Tension
    - Gas – Liquid – Solid Phase Change models, including Cavitation,
- Boiling, Evaporation, Condensation, Solidification and Melting
    - Reactions Between Fluid Phases

- Non-reacting Multicomponent Flow/Species Transport
- Reacting Multicomponent Flow/Species Transport
- Extensive Combustion modeling including FGM
- Finite Rate Chemistry modeling
- Pollutants and Soot Modeling
- Ability to use Model Fuel Library Reaction Mechanisms
- Comprehensive Surface-Kinetics
- Flamelet Table Generation
- Virtual cooling hole models (effusion and blade film cooling)
- Electrochemistry modeling for Li-ion Batteries
- Battery swelling modeling
- Battery life modeling
- Fuel Cell modeling
- Multiple Stationary & Rotating Reference Frames
- Periodic Interfaces
- Mixing Plane/Stage Frame Change Interface
- Sliding-Mesh/Transient Rotor-Stator Frame Change Interface
- Pitch Change across Frame Change Interfaces
- Aerodynamic damping (Blade Flutter)
- Dedicated Aerodynamics workspace (Fluent Aero)
- In-flight Aircraft Icing modeling
- Adjoint Solver for Shape Optimization
- Parameter-driven mesh morphing and optimization
- Parameters
- Design Point Studies
- Design of Experiments
- Local Parallel Solving
- Distributed Parallel Solving
- Batch solving
- Parallel Solving on Cloud launched from Desktop
- Workbench Integration
- Simulation Reports
- Built-in FEA solver for Fluid-Structural and Fluid-Thermal Stress Coupling
- Functional Mockup Unit (FMU) Coupling
- Fluid Structure Interaction (FSI) with Ansys Mechanical
- Fluid Thermal Deformation with Ansys Mechanical
- Fluid Electro -Thermal Interaction
- Electromechanical Thermal Management
- Aero -optics
- Aero Acoustics and Vibro Acoustics
- Acoustic-Structural
- Fluid Magnetohydrodynamics (MHD)

- FLUENT Meshing Capabilities
  - Polyhedral, Poly-Hexcore, Hexcore, Tet and Prism meshing
  - Mosaic-Enabled Meshing Technology
  - Task-Based Workflow - Watertight Geometries
  - Task-Based Workflow - Fault Tolerant Geometries
  - Parallel Mesh Generation
  - Wrap meshing
  - Rapid Octree meshing

- CFX Solver Capabilities

- Steady-State Flow
- Transient Flow
- Customizable Material Properties
- Non-Newtonian Viscosity
- Real fluids models (steam, refrigerants, cryogenics, NIST data)
- Flow-Drive Solid Motion (6-DOF)
- Pressure-Based Coupled Solver
- Expressions, inc. functions of solution values
- Dynamic/Moving-Deforming Mesh
- Compressible and Incompressible Flow
- Porous Media
- Subsonic & Supersonic Flow
- Turbulence – RANS models
- Turbulence - LES/SAS/DES
- Heat Transfer - Natural Convection, Conduction and CHT
- Thermal Radiation - Participating & Transparent Media
- Particle Tracking (Discrete Phase Modeling)
- Liquid Droplets (including Evaporation)
- Reacting/Combusting Particles
- Wall Erosion Modeling
- Free Surface VOF model
- Surface Tension
- Multiphase flow modeling (Eulerian)
- Gas – Liquid – Solid Phase Change models, including Cavitation,

- Boiling, Evaporation and Condensation
  - Reactions Between Fluid Phases
  - Multicomponent Flow/Species Transport
  - Combustion Modeling
  - Acoustics / Aerodynamic noise
  - Blade film cooling model
  - Multiple Stationary & Rotating Reference Frames
  - Periodic Interfaces
  - Mixing Plane / Stage Frame Change Interface
  - Transient Rotor-Stator Frame Change Interface
  - Pitch Change Across Frame Change Interfaces
  - Aerodynamic Damping (Blade Flutter Analysis)
  - Transient Blade Row
  - Time Transformation
  - Fourier Transformation
  - Harmonic Analysis
  - Automated Speedline / Performance Map creation
  - Local and Distributed Parallel Solving
  - Parallel Solving on Cloud launched from Desktop
  - Workbench Integration
  - Functional Mockup Unit (FMU) Coupling
  - Fluid Structure Interaction (FSI) with Ansys Mechanical
  - Fluid Thermal Deformation with Ansys Mechanical
  - Fluid Electro -Thermal Interaction
  - Electromechanical Thermal Management
  - Fluid Magnetohydrodynamics (MHD)

- TURBOGRID Meshing Capabilities

- Automatic block-structured Hex meshing
- Predefined block topologies for blades
- Axial, Radial and Mixed machines
- Splitter blades
- Compressors, Fans, Turbines, Pumps
- Rounded and sharp leading/trailing edges
- Partial tip clearances
- Automated hybrid meshing for secondary flow paths, complex tips,
- partial tip and hub gaps (buttons), and blends
- Automatic addition of approximate blends/fillets
- Support for multiple input formats (CAD, NDF, profiles/curves)
- Automatic creation of high-fidelity CAD from profile/curve input
- Mesh refinement maintaining consistent mesh topology

- POLYFLOW Solver Capabilities
  - Viscoelasticity and Yield Stress models
  - Extrusion & Co-extrusion modeling
  - Blow Molding modeling
  - Fiber Spinning modeling
  - Thermoforming modeling
  - Screw extruder modeling
  - 2D and 3D forming
  - Mixers and Filling modeling

- FORTE Solver Capabilities
  - Automatic On -the -fly Mesh Generation with Dynamic Refinement
  - Species Transport
  - Finite Rate Chemistry
  - Pollutants and Soot Modelling
  - Sparse Chemistry Solver Dynamic Cell Clustering Dynamic Adaptive Chemistry
  - Ability to Use Model Fuel Library Mechanisms
  - Flame -speed from Fuel -Component Library
  - DPIK Spark-Ignition Model
  - Internal Combustion Engine Specific Solution
  - Ge-rotor, screw compressor and scroll compressor modeling

- CHEMKIN-PRO Solver Capabilities
  - Species Transport
  - Finite Rate Chemistry
  - Multiphase Reactions
  - Pollutants and Soot Modeling
  - Sparse Chemistry Solver Dynamic Cell Clustering Dynamic Adaptive Chemistry
  - Ability to Use Model Fuel Library Mechanisms
  - Flame-speed from Fuel-Component Library
  - Internal Combustion Engine Specific Solution
  - 0-D/1-D/2-D Reactor Models and Reactor Networks
  - Plasma Reactions
  - Comprehensive Surface-Kinetics
  - Chemical and Phase Equilibrium
  - Flamelet Table Generation
  - Flame speed and Ignition Table Generation
  - Reaction Sensitivity, Uncertainty and Path Analysis
  - Surrogate Blend Formulation and Optimization
  - Mechanism Reduction

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|---|
| • Reaction Workbench<br>• Model Fuel Library |
| • FENSAP-ICE Solver Capabilities<br>• Simulation of Standard Droplets, SLD and Ice Crystals<br>• Inclusion of Vapor/Humidity Effects on Icing<br>• Icing Environments of Appendices C, O (SLD) and D (Ice Crystals)<br>• Pre-Defined Droplet Size Distributions<br>• Simulation of Rime, Glaze and Mixed Icing<br>• Single and Multi-Shot Icing Simulations with Mesh Deformation for Prediction of Ice Accretion and Aerodynamic Performance Degradation<br>• Single and Multi-Shot Icing Simulations with Automatic Re-Meshing for Prediction of Ice Accretion and Aerodynamic Performance Degradation<br>• Ice Cracking<br>• Ice Shedding |
| • POST-PROCESSING Capabilities<br>• Simulation Reports<br>• Turbo-specific Surface and Line locators<br>• Turbo coordinate systems<br>• Turbo macros and calculations<br>• Multiple case file comparison<br>• Point, Line, Surface and Volume locators<br>• GPU accelerated animations<br>• Keyframe animations<br>• Charts<br>• Contours, Vectors, Streamlines, Particle Tracks<br>• Expressions and quantitative calculations<br>• Operating Map post-processing<br>• Mesh quality metrics and calculations<br>• Polyflow Results Post-processing |
| • HPC<br>• Parallel solving upto 4 cores on local PC Option<br>• Parallel solving upto 4 cores over Network option<br>• Can be extended with Add-on HPC packs |
| • Additional Capabilities<br>• Discovery Modeling<br>• Discovery Modeling /SpaceClaim modeling<br>• Ansys Meshing (Workbench Meshing)<br>• ICEM CFD meshing.<br>• Ensight<br>• DesignXplorer |

ANSYS ACADEMIC RESEARCH CFD

| ANSYS CFD ENTERPRISE |
|---|
| Ansys CFD AI+ |
| Ansys Ensight Enterprise |
| Ansys Blademodeler |
| Ansys Discovery Modeling |
| Ansys Discovery Simulation |
| Ansys Electronics Premium IcePak |

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|---|
| Ansys GRANTA Materials Data For Simulation |
| MCAD Geometry & EDA Interfaces<br>Ansys Geometry Interfaces for Parasolid & SAT<br>Ansys Geometry Interfaces for Solidwork, SolidEdge, Autodesk, NX Ansys<br>Geometry Interfaces for CATIA V5 & V6 Reader<br>Ansys Geometry Interfaces for Creo Parametric & Elements Direct Modeling Geometry<br>Interface for JT |
| Built-in HPC<br>Ansys HPC<br>Ability to Extend built-in HPC |
| Process Integration & Design Optimization<br>Ansys optiSLang Enterprise<br>Ansys optiSLang AI+ |

ANSYS ACADEMIC TEACHING MECHANICAL AND CFD

| |
|---|
| Ansys Mechanical Enterprise<br>Ansys CFD Enterprise<br>Ansys CFD AI+<br>Ansys Ensight Enterprise<br>Ansys Blademodeler<br>Ansys Rocky<br>Ansys LS-DYNA Ansys<br>Forming Ansys<br>Additive Suite Ansys<br>Additive Print<br>Ansys Discovery Modeling<br>Ansys Discovery Simulation<br>Ansys Motion Enterprise<br>Ansys Sound Pro<br>Ansys Sherlock |
| Ansys Electronics Premium IcePak |
| Ansys GRANTA Materials Data For Simulation |
| Ansys Geometry Interfaces for Parasolid & SAT<br>Ansys Geometry Interfaces for Solidwork, SolidEdge, Autodesk, NX Ansys<br>Geometry Interfaces for CATIA V5 & V6 Reader<br>Ansys Geometry Interfaces for Creo Parametric & Elements Direct Modeling Geometry<br>Interface for JT |
| Built-in HPC<br>Ansys LS-DYNA HPC |
| Ansys optiSLang Enterprise<br>Ansys optiSLang AI+ |

ANSYS ACADEMIC RESEARCH HPC WORKGROUP 128

| **Feature** | **Specifications** |
|---|---|
| **Purpose** | - High-Performance Computing (HPC) license designed for academic research institutions. |

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|---|---|
| | - Enables advanced, large-scale simulations by leveraging up to 128 CPU cores. |
| **HPC Capability** | - Supports simulations requiring extensive computational power, such as:<br>- Large-scale CFD simulations.<br>- Structural analysis of complex geometries.<br>- Multiphysics coupling simulations.<br>- High-resolution transient simulations. |
| **Licensing** | - Academic research license for non-commercial use.<br>- Access for multiple users (workgroup configuration) within an academic department or research team.<br>- Flexible network license for concurrent usage. |
| **Parallel Processing** | - Scalable to utilize up to 128 CPU cores for distributed or shared memory systems.<br>- Compatible with multi-node clusters for enhanced computational capacity.<br>- Optimal for reducing time-to-solution for intensive simulations. |
| **Simulation Domains** | - **Structural Analysis**: Large assemblies, nonlinear analysis, and modal frequency extraction.<br>- **CFD**: High-resolution turbulence models, heat transfer simulations, and multiphase flows.<br>- **Electromagnetics**: Full-wave solutions for large models. |
| **Solver Efficiency** | - Accelerates solvers for linear and nonlinear systems.<br>- Optimized for ANSYS Mechanical, Fluent, HFSS, and Maxwell.<br>- Ensures faster convergence and efficient memory utilization. |
| **Hardware Compatibility** | - Compatible with both on-premise HPC clusters and cloud-based HPC resources.<br>- Leverages GPU acceleration where supported (e.g., NVIDIA CUDA cores for Fluent or Mechanical solvers). |
| **Job Management** | - Seamless integration with job schedulers like PBS, SLURM, and others for efficient queue management.<br>- Supports hybrid parallelization (MPI + OpenMP). |
| **Supported Software** | - Compatible with all ANSYS Academic Research products, including:<br>- ANSYS Mechanical<br>- ANSYS Fluent<br>- ANSYS HFSS<br>- ANSYS Maxwell<br>- ANSYS LS-DYNA<br>- ANSYS CFX.<br>- Multiphysics integration support. |
| **Meshing Capability** | - Enables fine-resolution meshing for large-scale simulations.<br>- Supports automated meshing workflows and parallel mesh generation for |

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| | complex geometries.<br>- Scalable meshing for adaptive refinement in key simulation areas. |
| **Data Handling** | - Handles large datasets efficiently with distributed memory architecture.<br>- Supports post-processing of massive datasets generated from high-fidelity simulations.<br>- Compatible with ANSYS Cloud for storage and computation. |
| **Collaboration Features** | - Facilitates collaborative research by allowing multiple users to access simulations simultaneously.<br>- Centralized license management for departmental usage. |
| **Use Cases** | - **Aerospace**: High-fidelity aerodynamic and structural simulations.<br>- **Automotive**: Crash analysis, aerodynamics, and NVH studies.<br>- **Electronics**: Thermal management and electromagnetic interference (EMI) studies. |
| **Training and Support** | - Access to ANSYS Learning Hub for training on HPC configurations.<br>- Documentation for optimal cluster setup and solver configuration.<br>- Academic support for troubleshooting and optimization. |
| **Material Libraries** | - Supports extensive material models for mechanical, fluid, and electromagnetic analyses.<br>- Ability to incorporate user-defined materials and temperature-dependent properties. |
| **Scalability** | - Ideal for research teams scaling up simulation capacity.<br>- Expandable to higher core counts with additional licensing tiers.<br>- Support for future-ready hardware upgrades and evolving simulation demands. |

ANSYS LEARNING HUB

| **Feature** | **Specifications** |
|---|---|
| **Purpose** | - Platform designed to address the availability of training material concerns on the complete Ansys Product portfolio.<br>- Designed for engineers, students, and professionals to build simulation expertise.<br>- It is designed to improve the productivity of the organization by offering the cross learning with curated learning paths. |
| **Content Library** | - Over 350+ courses, including tutorials, lectures, and practical exercises.<br>- Covers foundational to advanced topics across all ANSYS products and simulation domains.<br>- New content regularly added to align with software updates.<br>- Content is classified into batches based on the domain. |

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|---|---|
| **Learning Paths** | - Structured learning paths tailored to specific industries (e.g., Aerospace, Automotive, Electronics).<br>- Skill-based paths for roles such as CAE Engineer, Structural Analyst, or CFD Specialist. |
| **Interactive Features** | - Virtual learning labs with hands-on exercises.<br>- Real-time simulation examples with problem statements to challenge the users to get hands on experience.<br>- Instructor-led sessions and physical sessions are conducted on timely basis at different offices for in-depth guidance. |
| **Certifications** | - Official ANSYS certifications available upon course completion.<br>- Industry-recognized credentials for professional development.<br>- Badging system for showcasing achievements. |
| **Collaboration Tools** | - Discussion forums for peer and instructor interactions.<br>- Live Q&A sessions and webinars hosted by ANSYS experts.<br>- Group learning options for corporate teams or university classes. |
| **Integration** | - Seamless access to ANSYS simulation software for practice.<br>- Integration with institutional or corporate learning management systems (LMS). |
| **Accessibility** | - 24/7 access to the Learning Hub platform from desktop or mobile devices.<br>- Multilingual support for global audiences.<br>- Offline access to selected resources. |

ANSYS INNOVATION COURSES

| **Feature** | **Specifications** |
|---|---|
| **Purpose** | - Free, interactive courses designed to teach simulation from core concepts to the application level.<br>- Targeted at students, educators, and young professionals for self-paced learning. |
| **Content Coverage** | - Fundamental principles of physics and engineering simulations.<br>- Application-specific topics like thermal analysis, fluid dynamics, structural mechanics, and electronics.<br>- Case studies for real-world design challenges. |
| **Learning Format** | - **Video Lectures**: Engaging, bite-sized modules covering key simulation concepts.<br>- **Hands-On Tutorials**: Practical exercises using ANSYS simulation software.<br>- **Knowledge Checks**: Quizzes and assessments to validate learning. |

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| **Interactive Features** | - Built-in simulation tools for interactive problem-solving.<br>- Guided exercises with step-by-step instructions.<br>- Visualization tools for understanding simulation results. |
| **Target Audience** | - Primarily aimed at high school and university students.<br>- Also useful for early-career engineers seeking foundational knowledge. |
| **Certification** | - Completion certificates for each course.<br>- Can be added to resumes or LinkedIn profiles to showcase skills. |
| **Accessibility** | - Free access to all courses via the ANSYS Innovation website.<br>- Available on desktop and mobile devices.<br>- No prior software installation required for basic course content. |
| **Integration with ANSYS Software** | - Some courses include access to ANSYS software for practice (cloud-based or trial license).<br>- Direct alignment with ANSYS Academic teaching solutions. |
| **Collaboration Tools** | - Educators can integrate courses into their teaching curriculum.<br>- Team-based learning encouraged with group activities and discussions. |
| **Course Examples** | - **Introduction to FEA**: Basics of finite element analysis.<br>- **CFD Essentials**: Fundamentals of computational fluid dynamics.<br>- **Electronics Cooling**: Simulation for thermal management in electronics.<br>- **Topology Optimization**: Advanced design methods for lightweight structures. |
| **Support** | - 24/7 access to courses.<br>- Support through forums and FAQs.<br>- Periodic updates to reflect the latest trends in simulation technology. |

**Nature and number of licenses:**

Research licenses:

- 25 numbers for all the modules except semiconductors.
- 10 numbers for semiconductors.
- 1 number for Ansys research HPC workgroup 128
- We would like to have perpetual licenses for all the modules with 3 year upgrade contract.
- Wherever perpetual licenses are not available, mention the cost for 3 year period.

Teaching licenses:

- 50 number of all the modules.
- License period 3 year lease.

Enterprise licenses:

- 1 number all the listed modules.

# Section 5- Technical Bid

The technical bid should furnish all requirements of the tender along with all annexures in this section and be submitted to:

The Chairperson,
Attn: Prof. Shankar Kumar Selvaraja
First floor, Centre for Nano Science and Engineering,
Indian Institute of Science,
CV Raman Ave. Bangalore – 560012, India.

# Annexures

## Annexure 1:

Details of the Bidder

The bidder must provide the following mandatory information & attach supporting documents wherever mentioned:

**Details of the Bidder**

| Sl. No | Items | Details |
|---|---|---|
| 1. | Name of the Bidder | |
| 2. | Nature of Bidder (Attach an attested copy of the Certificate of Incorporation/ Partnership Deed) | |
| 3. | Registration No/Trade License (attach attested copy) | |
| 4. | Registered Office Address | |
| 5. | Address for communication | |
| 6. | Contact Person: Name and Designation | |
| 7. | Telephone No | |
| 8. | Email ID | |
| 9. | Website | |
| 10. | PAN No. (attach copy) | |
| 11. | GST No. (attach copy) | |

Signature of the Bidder

Name
Designation, Seal Date:

# Annexure 2:

Declaration regarding experience

To,
The Chairperson,
Attn: Prof. Shankar Kumar Selvaraja
Centre for Nano Science and Engineering,
Indian Institute of Science,
CV Raman Ave. Bangalore – 560012, India.

Ref: Tender No: XXXXXXXXX Dated: XXXXX

Dear Sir/Madam

I have carefully reviewed the Terms & Conditions in the above-referred tender. I hereby declare that my company/firm has years of experience in supplying and installing the proposed equipment.

(Signature of the Bidder)
Printed Name
Designation,
Seal
Date:

# Annexure 3:

Declaration regarding track record To,

The Chairperson,
Attn: Prof. Shankar Kumar Selvaraja
Centre for Nano Science and Engineering,
Indian Institute of Science,
CV Raman Ave. Bangalore – 560012, India.

Ref: Tender No: XXXXXXX
Dated: XXXXX

Dear Sir/Madam,

I have carefully reviewed the Terms & Conditions in the above-referred tender. I hereby declare that my company/ firm is not currently debarred/blacklisted by any Government / Semi-Government organizations/institutions in India or abroad. I further certify that I am a competent officer in my company/firm to make this declaration.

Or

I declare the following

| Sl.No | Country in which the company is Debarred /blacklisted / case is Pending | Blacklisted/debarred by Government / Semi-Government/Organizations /Institutions | Reason | Since when and for how long |
|---|---|---|---|---|
| | | | | |

(NOTE: In case the company/firm was blacklisted previously, please provide the details regarding the period for which the company/firm was blacklisted and the reason/s for the same).

Yours faithfully (Signature of the Bidder)

Name
Designation,
Seal

Date:

# Annexure 4:

Declaration for acceptance of terms and conditions

To,
The Chairperson,
Attn: Prof. Shankar Kumar Selvaraja
Centre for Nano Science and Engineering,
Indian Institute of Science,
CV Raman Ave. Bangalore – 560012, India.

Ref: Tender No: XXXXXX

Dated: XXXX

Dear Sir/Madam,

I have carefully reviewed the Terms & Conditions mentioned in the above-referred tender document. I declare that all the provisions of this tender document are acceptable to my company. I further certify that I am an authorized signatory of my company and am, therefore, competent to make this declaration.

Yours faithfully,

(Signature of the
Bidder) Name
Designation, Seal Date:

# Annexure 5:

Details of items quoted:

a. Company Name
b. Product Name
c. Part/Catalogue number
d. Product description/main features
e. Detailed technical specifications
f. Remarks

Instructions to bidders:

1. Bidder should provide technical specifications of the quoted product/s in detail.
2. Bidder should attach product brochures along with the technical bid.
3. Bidders should clearly indicate compliance or non-compliance with the technical specifications provided in the tender document.

# Section 6 – Commercial Bid

**The commercial bid should be furnished with all requirements of the tender with supporting documents as mentioned:**

Addressed to

The Chairperson,
Attn: Prof. Shankar Kumar Selvaraja
Centre for Nano Science and Engineering,
Indian Institute of Science,
CV Raman Ave. Bangalore – 560012, India.

An example.

| S.No | Description | Cat. Number | Quantity | Unit Price | Sub Total |
|---|---|---|---|---|---|
| 1. | Essential items noted in the technical specification | | | | |
| 1.a | … (details of essential items) | | | | |
| 1.b | … | | | | |
| | | | | | |
| 2. | Optional items noted in the technical specification | | | | |
| 2.a | … (details of essential items) | | | | |
| 2.b | … | | | | |
| | | | | | |
| 3. | Accessories for operation and installation | | | | |
| 4. | All consumables, spares and software to be supplied locally | | | | |
| 5. | Warranty (3 years) | | | | |
| 6. | AMC 3 years beyond warranty | | | | |
| 7. | FOR IISc, Bengaluru | | | | |
| 8. | | | | | |

Any additional items, such as Spares and Hardware/PCBs Likely to go obsolete after the next 3 Years

| S.No | Description | Cat. Number | Quantity | Unit Price | Sub total |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
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| | | | | | |

# Section 7 – Checklist

**(This should be enclosed with a technical bid- Part A)**
**The following items must be checked before the Bid is submitted:**

## 1. Sealed Envelope "A": Technical Bid

1. **Section 5- Technical Bid (each page signed by the authorized signatory and sealed) with the below annexures:**
    a. **Annexure 1: Bidders details**
    b. **Annexure 2: Declaration regarding experience**
    c. **Annexure 3: Declaration regarding clean track record**
    d. **Annexure 4: Declaration for acceptance of terms and conditions**
    e. **Annexure 5: Details of items quoted**
2. **Copy of this tender document duly signed by the authorized signatory on every page and sealed.**

## 2. Sealed Envelope "B": Commercial Bid

**Section 6: Commercial Bid**

Your quotation must be submitted in two envelopes: **Technical Bid (Envelope A) and Commercial Bid (Envelope B),** superscribing on both the envelopes with, Tender description, Tender No. and due date and both of these in sealed covers and put in a bigger cover which should also be sealed and duly super scribed with Tender No., Tender description & Due Date.